



**RAMSEY COUNTY, MN
HAZARD MITIGATION PLAN
2025**

Ramsey County, MN
Hazard Mitigation Plan Update
2025



Developed by the communities of Ramsey County

In consultation with Tidal Basin Government Consulting



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1. Introduction and Planning Process

1.1 Introduction

Hazard mitigation is defined as any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property. Hazard mitigation is crucial to a comprehensive emergency management program, working alongside preparedness, response and recovery efforts. This plan will help participating jurisdictions lower their risk to natural hazards and enhance their resilience by identifying local policies and actions to reduce losses.

The 2025 Ramsey County Hazard Mitigation Plan (HMP) update provides a framework to enhance the general well-being, safety and resilience of residents and communities across Ramsey County. This plan considers the impact of natural hazards across the planning area, reviews current levels of capability relevant to hazard mitigation, and identifies a comprehensive hazard mitigation strategy to buy down levels of risk.

1.2 Plan Goals and Objectives

The planning process included a review and update of the prior mitigation goals and objectives as a basis for the planning process and selection of appropriate mitigation actions addressing all hazards of concern. Upon consideration, participating jurisdictions identified the follow goals for the plan update:

Goal 1. Mitigate impacts to life, property, the economy and the environment from natural, technological and human-caused hazards.

Goal 2. Build and support local capacity to create resiliency from natural, technological and human-caused hazards.

Goal 3. Build resilience for critical infrastructure and systems against impacts of natural, technological and human-caused hazards.

Goal 4. Increase education, outreach and awareness to the whole community to build resiliency.

1.3 Plan Organization

The Ramsey County HMP update is organized as follows:

Section 1. Introduction and Planning Process. Overview of participants, planning process and information regarding adoption of the HMP by Ramsey County and each participating jurisdiction. Description of the HMP methodology and development process; Local Planning Team (LPT) and stakeholder involvement efforts; and a description of how this HMP will be incorporated into existing programs.

Section 2. Profile and Capability Assessment. Overview of Ramsey County, including: (1) physical setting, (2) land use, (3) land use trends, (4) population and demographics, (5) general building stock and (6) critical facilities and lifelines. A summary and description of the existing plans, programs and regulatory mechanisms at all levels of government (federal, state, county, local) that support hazard mitigation within the County.

Section 3. Hazard Identification and Risk Assessment (HIRA). Documentation of the hazard identification and hazard risk ranking process, hazard profiles, vulnerability assessment (estimates of the impact of hazard events on life, safety, health, general building stock, critical facilities, the economy); consequence assessment (consequences Ramsey County and its communities could reasonably expect from an instance of the hazard including impacts on the public; responders; continuity of operations; property, facilities, and infrastructure; environment; economy of the jurisdiction; and public confidence in the jurisdiction’s governance); description of the status of local data; and planned steps to improve local data to support mitigation planning.

Section 4. Mitigation Strategy. Information regarding the mitigation goals and objectives in response to priority hazards of concern and the process by which Ramsey County and local mitigation strategies have been developed or updated.

Section 5. Plan Maintenance Procedures. System established to continue to monitor, evaluate, maintain, and update the HMP.

1.4 Planning Process

1.4.1 PARTICIPATING JURISDICTIONS

Table 1 shows all jurisdictions that were participants in the plan update.

Table 1. Participating Jurisdictions in the 2025 Update

Participating Jurisdictions		
Arden Hills	Falcon Heights	Gem Lake
Lauderdale	Little Canada	Maplewood
Mounds View	New Brighton	North Oaks
North Saint Paul	Roseville	Saint Anthony
Saint Paul	Shoreview	Vadnais Heights
White Bear Lake	White Bear Township	Ramsey County

Each participating jurisdiction was asked to do the following:

- Actively participate in the planning process.
- Provide an update on the status of mitigation actions identified for that community in the 2019 plan.
- Provide an update on community capabilities.
- Identify at least one new or continuing hazard mitigation action in the updated 2025 hazard mitigation strategy.
- Provide input throughout the process on plan elements.
- Support public participation in the process.

1.4.2 LOCAL PLANNING TEAM

To assist in the development of the plan update and provide guidance and community input on the process, an LPT was convened to serve as community representatives in the process.

Table 2. Local Planning Team

Last Name	First Name	Title	Jurisdiction
Artig-Swomley	Gretchen	Mayor	Gem Lake
Bownik	Jim	Assistant to the City Administrator	Lauderdale
Brosnahan	David	Fire Chief	Roseville
Butkowski	Heather	City Administrator	Lauderdale
Christopherson	Pat	Town Administrator	White Bear Township
Diaz	Izzy	Fire Chief	St. Anthony
Freed	Judd	Director of Emergency Management and Homeland Security	Ramsey County
Hamdorf	Trevor	Deputy Director of Public Safety	New Brighton
Hearden	Chris	Fire Chief	Vadnais Heights
Lawrence	Melissa	Acting City Clerk	Gem Lake
Linder	Jim	City Council	Gem Lake
Linehan	Jack	City Administrator	Falcon Heights
Lovas	Mike	EM Planning Coordinator	St. Paul
Mayer	Bryan	Emergency Management Coordinator	Ramsey County
Mallinger	Jason	Fire Chief	North St. Paul
Minwegen	Jen	Office Assistant – Fire Division	New Brighton
Montain	Matt	Assistant Fire Chief	Mounds View
Peltier	Paul	Public Works Lead	White Bear Township
Peterson	Greg	Fire Chief	White Bear Lake
Richter	Mike	Assistant Fire Chief	Vadnais Heights
Sather	Matt	Assistant Fire Chief – Lake Johanna Fire	Arden Hills, North Oaks & Shoreview
Schroeder	Ryan	Assistant Fire Chief	Maplewood
Sieben	Terry	Emergency Management Coordinator	St. Paul
Smiley	Don	Fire Chief	Little Canada
Zender	Ben	Chief of Police	Mounds View

1.4.3 PUBLIC AND STAKEHOLDER OUTREACH

Public engagement is a key component to the HMP’s success. Public outreach was accomplished both at the beginning and the end of the process. An electronic survey regarding hazard mitigation was released on June 24, 2024, utilizing the web-based Microsoft Forms survey tool. The survey was advertised by the County and jurisdictions within. A full accounting of advertising for the public survey is included in the Planning Process Appendix to this plan.

Efforts were made by Ramsey County and participating jurisdictions to focus on including traditionally underserved populations (TUP) into the planning effort. Partnerships between the County, the

communities, and TUPs were explored. Ramsey County is currently building in-roads with TUPs to ensure that they can be a part of future planning processes. The plan was reviewed by a subject matter expert in TUPs to identify ways in which the plan could be developed in a more inclusive manner, resulting in substantive changes to the plan.

After completing the draft plan, it was opened for public review from December 9th, 2024, through December 20th, 2024. The plan was posted for online access, and a comment tool was developed to collect comments. Comments received were reviewed and integrated as appropriate.

Stakeholders are the individuals, agencies, and jurisdictions that have a vested interest in the recommendations of the HMP, including all planning partners. The planning process prioritized extensive representation from regional, county and local areas. Stakeholders were given a chance to review the plan during the plan review process. Jurisdictional representatives for each participating jurisdiction were also asked to serve as brokers to stakeholders within their own communities when providing plan inputs.

Table 3. Stakeholders

Stakeholder	Method
Anoka County Emergency Management	Plan review via direct email
Washington County Emergency Management	Plan review via direct email
Dakota County Emergency Management	Plan review via direct email
Hennepin County Emergency Management	Plan review via direct email

1.4.4 PLANNING MEETINGS

Three large-group LPT planning meetings were held to support the planning process. All meetings were held virtually, via Microsoft Teams.

Meeting #1 focused on introducing the planning process to the LPT and discussing reporting for community capabilities and progress on 2019 HMP mitigation actions.

Meeting #2 focused on the initial results of the HIRA process.

Meeting #3 focused on community hazard mitigation strategy development.

Additionally, a series of informal mitigation strategy update support meetings were held virtually with communities upon request to discuss potential ideas for hazard mitigation actions. The following jurisdictions held additional community-specific meetings:

- North St. Paul September 10, 2024
- Vadnais Heights September 10, 2024
- Falcon Heights September 12, 2024
- Ramsey County September 12, 2024

1.4.5 COMMUNITY CAPABILITIES

Participating jurisdictions were provided the opportunity to identify community capabilities identified in the previous plan; these capabilities were used as a baseline to identify areas upon which to build for the hazard mitigation strategy. Communities reported on capabilities in the following target areas:

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach

The outcome of the capability assessment surveys is summarized in Section 2.

1.4.6 HAZARD IDENTIFICATION AND RISK ASSESSMENT

A risk assessment is a calculation of the threat, vulnerability, and consequence of hazards that impact the participating jurisdictions in the planning area. While hazard mitigation lends itself to natural hazards, Ramsey County included human-caused and technological hazards to develop a more holistic understanding of risk. The following hazards were identified and assessed during the plan update process:

- Dam/Levee Failure
- Drought
- Floods
- Geological Hazards (landslide, subsidence, and sinkholes)
- Hazardous Materials (Fixed Sites and In Transit)
- Summer Weather Hazards
- Tornado and Windstorm
- Winter Weather Hazards
- Human-Caused Hazards
- Infrastructure Failure

Following an initial evaluation of hazard risk, the LPT discussed the results during the second planning meeting and added comment and context to the final assessment. Further information on the risk assessment process can be found in Section 3.

1.4.7 HAZARD MITIGATION STRATEGY

The hazard mitigation strategy was structured in two phases. Initially, communities were provided a list of the hazard mitigation actions from the 2019 HMP. Communities were asked to assess their progress, employing a four-option status indicator to report updates:

- Not started
- In progress

- Completed
- Cancelled

Communities were also asked to provide background information on each action where applicable, identifying:

- If an action was completed, when was it completed? Has the community seen any benefits from the project?
- If an action has not been started, why not?
- If an action is in progress, how much progress has been made? When is the project slated for completion?
- If an action is deleted, why?

This evaluation process enabled communities to establish a foundation of ongoing initiatives for the revised hazard mitigation strategy. After completing the HIRA, the LPT focus shifted to developing new hazard mitigation actions to enhance the 2025 strategy. Communities received instructions on creating these new actions, and what supporting information would be necessary for each action included in the plan. Customized planning support meetings were available for communities that requested additional engagement in developing mitigation strategies. These efforts are reflected in Section 4.

1.4.8 PLAN IMPLEMENTATION AND MAINTENANCE

The LPT developed a plan for HMP implementation and maintenance, including annual review and evaluation, integration with other planning mechanisms and continued public involvement. This information can be found in Section 5.

2. Community Profile and Capabilities

2.1 Introduction

Established in 1849, Ramsey County is the second-most populous county in the state and the smallest by land area in Minnesota, covering approximately 170 square miles. Its dense urban core gives it a vibrant economy and diverse population, estimated at 536,075 in 2023.

The county encompasses several cities, including Arden Hills, Blaine, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Maplewood, Mounds View, New Brighton, North Oaks, North Saint Paul, Roseville, St. Anthony, Saint Paul, Shoreview, Spring Lake Park, Vadnais Heights, and White Bear Lake. White Bear Township is the only township in Ramsey County. Ramsey County's economy is diverse, with a mix of public sector, healthcare, education, and service industries forming the backbone. Major employers include state government, major healthcare systems, and higher education institutions. Unemployment rates in the county have remained relatively low in recent years, though like many urban areas, some neighborhoods experience higher rates due to economic disparities.

2.2 Geography and Topography

Ramsey County is anchored by its largest city and the state capital, Saint Paul, which forms part of the Twin Cities along with neighboring Minneapolis. The Mississippi River runs along the western boundary of the county, significantly shaping its topography and land use. Despite its urban nature, Ramsey County boasts an extensive park system, with over 6,500 acres of parkland, including lakes, trails, and natural reserves. It is bordered by four counties: Hennepin to the west, Dakota to the south, Washington to the east, and Anoka to the north.

Ramsey County, Minnesota, has a relatively flat to gently rolling topography, typical of much of the Upper Midwest. Key features of the county's landscape include:

- **Low Elevation:** The county sits at an average elevation of around 700-1,000 feet above sea level. The terrain is generally flat to gently undulating, with no significant mountain ranges or dramatic elevation changes.
- **Lakes and Waterways:** Ramsey County is home to several lakes, wetlands, and rivers. The Mississippi River forms part of the county's western boundary and is a major geographical feature. Other notable bodies of water include Lake Phalen, Lake Como, and White Bear Lake (partly located in Ramsey County). These water features are integrated into the local landscape, providing natural beauty and recreation.
- **Glacial Influence:** The topography of Ramsey County, like much of Minnesota, was shaped by glacial activity during the last ice age. The landscape includes remnants of glacial drift and moraine, resulting in the formation of lakes, wetlands, and gently rolling hills.
- **Urban Development:** As the county is heavily urbanized, particularly in Saint Paul and surrounding areas, much of the natural topography has been altered by development. Parks, green spaces, and lakes offer glimpses of the region's natural terrain.

2.2.1 GEOGRAPHY

Ramsey County is largely characterized by gently rolling terrain typical of the central lowland region, with areas of flat plains and gradual elevation changes.

- **Elevation:** The elevation in Ramsey County ranges from around 690 feet above sea level near the Mississippi River to approximately 1,100 feet in some of the county's highest points.
- **Highest Point:** The highest natural point in Ramsey County is located near Indian Mounds Park in Saint Paul, offering scenic views of the Mississippi River Valley.
- **River Valleys:** The Mississippi River Valley provides some of the most dramatic changes in elevation in the county. Bluffs and steep slopes are found along the riverbanks, particularly in the western portion of the county.

2.2.2 HYDROLOGY

Despite being an urban county, Ramsey County has numerous water features that play an important role in its geography and landscape, with approximately 10% of the county's total area being surface water.

- **Groundwater:** Groundwater is the water found beneath the earth's surface, stored in and moving through small spaces within soil, rocks, and geologic formations. In Ramsey County, a section of a large geologic basin, made up of several aquifer units, lies underground and supplies much of the water used for daily needs. Wells are used to extract groundwater from these aquifers, which is then utilized for drinking, heating and cooling, irrigation, manufacturing, and other purposes. Groundwater quality is influenced by its natural properties and any contaminants introduced into the aquifers, either naturally or through human activity. Approximately 15-20% of Ramsey County residents rely exclusively on groundwater for their drinking water.
- **Rivers:**
 - The **Mississippi River** forms part of the western boundary and is the most significant water feature. Historically, it has been a key transportation route and continues to play a major role in commerce and recreation.
 - The **Minnesota River** joins the Mississippi just south of Ramsey County.
- **Lakes:** There are over 80 lakes in Ramsey County. Prominent lakes include:
 - **Lake Phalen:** One of the largest lakes in the county and a popular recreational destination.
 - **Como Lake:** Located in Saint Paul's Como Park, this is an urban lake with surrounding parkland.
 - **White Bear Lake:** Part of this large lake lies within Ramsey County, although most of it is in neighboring Washington County. It is a recreational hub and supports suburban communities.

- **Wetlands:** The county has numerous wetlands that contribute to its diverse ecology, including areas near Battle Creek Regional Park and Rice Creek. Wetland areas are critical for stormwater management, wildlife habitats, and maintaining biodiversity in this urban landscape.
- **Watershed Districts:** There are five watershed districts and three water management organizations within the county. The five districts are Capitol Region Watershed District, Lower Minnesota River Watershed District, Ramsey-Washington Metro Watershed District, Rice Creek Watershed District, and Valley Branch Watershed District. The water management organizations are Lower Mississippi River Water Management Organization, Mississippi Water Management Organization, and Vadnais Lake Area Water Management Organization.

2.2.3 GEOLOGY

Ramsey County has a diverse geological history shaped by both glacial and ancient marine processes. The landscape was heavily influenced by the Wisconsin Glaciation, which left behind glacial deposits, moraines, and outwash plains, forming the county's rolling terrain and contributing to the development of the Mississippi River. Beneath the glacial sediments, the bedrock consists primarily of sedimentary rocks like limestone, dolostone, and sandstone, deposited when the area was covered by shallow seas around 500 million years ago. The Mississippi River has carved valleys into these rock layers, exposing bluffs, while fertile soils from glacial deposits historically supported agriculture. Additionally, karst features are present in some areas due to the soluble limestone bedrock, although these are less common than in southeastern Minnesota.

2.3 Population and Demographics

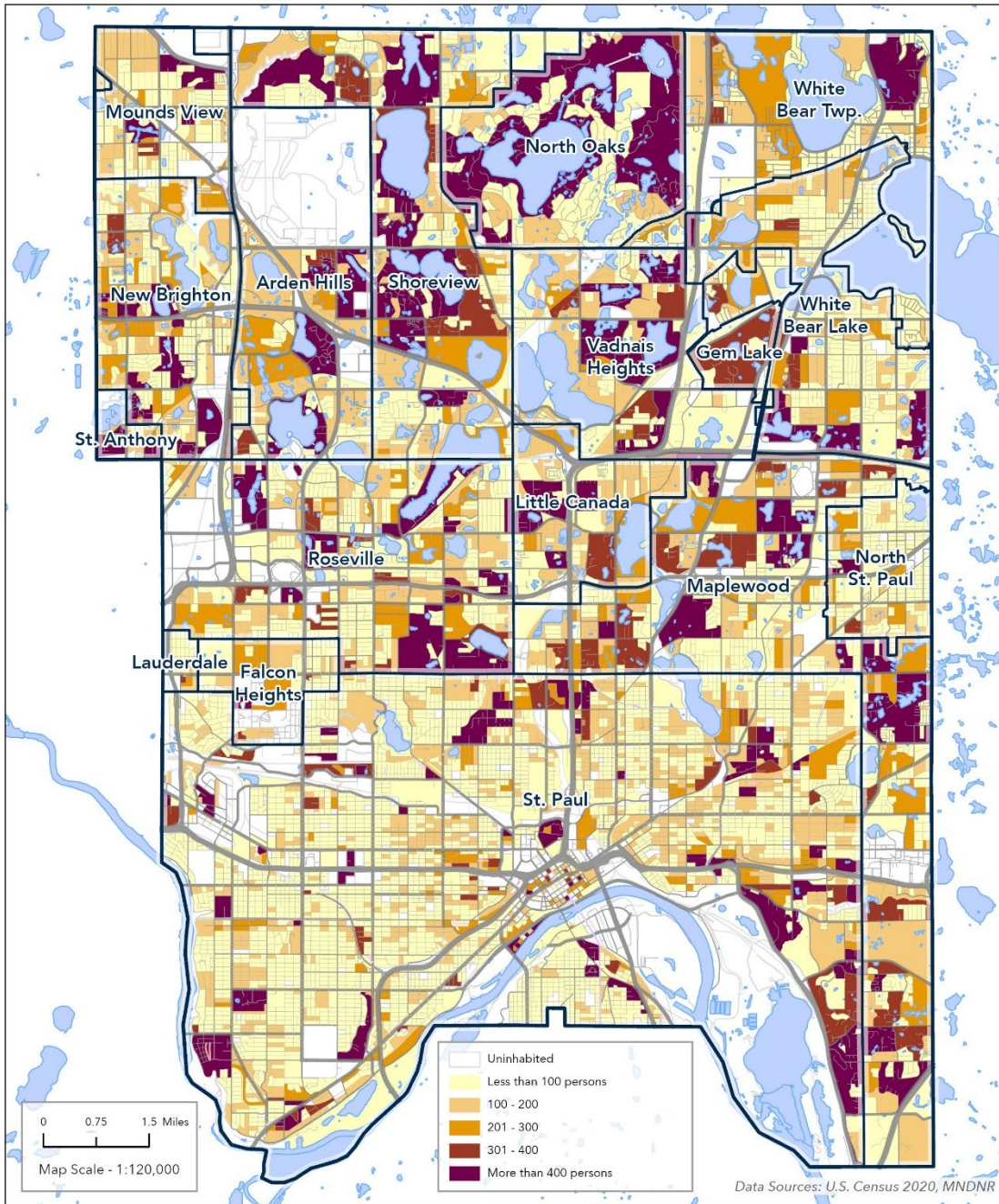
Demographic Overview

Ramsey County is home to a diverse population that reflects a rich tapestry of racial, ethnic, and cultural groups. Understanding the demographic makeup of the county is critical to ensuring that hazard mitigation efforts are equitable and address the needs of all community members.

Population Composition

As of the most recent U.S. Census, Ramsey County has a population of 552,352 residents. Figure 1 shows Ramsey population density by U.S. Census block.

Figure 1. Ramsey County Population by Census Block



The racial and ethnic composition of the county is as follows:

- White: 59.6%
- Black or African American: 12.9%
- Hispanic or Latino: 8.2%
- Asian: 15.6%

- Native American or Alaska Native: 0.8%
- Other: 2.9%

Minnesota is a designated refugee settlement area, and the county's diverse population includes significant immigrant communities. In 2018, the largest groups of foreign-born Minnesotans were born in Mexico (about 64,500); Somalia (33,500); India (30,200); Laos, including Hmong (24,400); Vietnam (18,600); China, excluding Hong Kong and Taiwan (18,600); Ethiopia (21,900); and Thailand, including Hmong (18,500). These estimates do not include U.S.-born children of these immigrants. They also likely underestimate the size of our immigrant populations because trust and language issues reduce response rates to Census surveys. Fifty-one percent of Minnesota's foreign-born population are naturalized U.S. citizens.

Age Distribution

The age distribution in Ramsey County reflects both a growing youth population and an aging community, with a median age of 36.4, slightly younger than the state median age of 39.1:

- 17 years and younger: 23.1%
- 18-24 years: 9.6%
- 25-34 years: 16.2%
- 35-44 years: 13.1%
- 45-54 years: 10.9%
- 55-64 years: 11.9%
- 65 years and older: 15.1%

Understanding the composition, geographical distribution, and capability considerations of these diverse populations is essential, as these groups traditionally have heightened vulnerabilities before, during and after hazard events, particularly young children, the elderly, people with disabilities and serious health conditions, people who are socially isolated, and households with limited English proficiencies.

2.4 Social Vulnerability

The Social Vulnerability Index (SVI) is a critical tool used to assess the resilience of communities in the face of hazards. The SVI measures various factors that influence a community's ability to prepare for, respond to, and recover from disasters. In Ramsey County, these factors are essential for identifying populations that may be disproportionately affected by natural and human-made hazards.

According to the latest SVI data, Ramsey County has an overall SVI score of 0.9419 (from a range of 0 to 1), indicating that the county's vulnerability level is high compared to other counties across the country. Higher SVI scores reflect greater social vulnerability, which can increase the risks associated with hazard events.

Disparities that persist in society, including social, economic, and health inequities, and which have impacted the historically disadvantages and underserved populations throughout the County, can be exacerbated by the impacts of extreme weather events. Periods of extreme heat, winter storms or

floods can cause increases in utilities and other expenses that are not easily absorbed by low-income families. Additionally, low-income communities and communities of color are the most vulnerable to a rapidly changing climate.

2.4.1 SOCIOECONOMIC STATUS

Socioeconomic status affects hazard vulnerability because lower-income populations often have limited access to resources, such as safe housing, insurance, and emergency services, making them less resilient to disasters. Additionally, they may face greater challenges in recovery, prolonging the impacts of hazards.

- The percentage of residents living below the poverty line in Ramsey County is 12.9 %.
- Unemployment rates stand at 4.6%, with certain areas of the county experiencing even higher levels of joblessness.
- Household income in more vulnerable areas of the county is significantly lower than the countywide average, with 20.5% of countywide households reporting incomes of \$35,000 or less.
- Housing cost-burdened occupied units (30%+ of income spent on housing costs) equal approximately 26.4% of the available housing stock.
- Data shows that educational attainment also plays a role, with 8.8% of residents over age 25 lacking a high school diploma.
- In the metro area, 4 of every 5 Areas of Concentrated Poverty are also census tracts where at least half of residents are people of color.

Areas with lower income, more poverty and unemployment, and fewer adults with high school diplomas have a higher vulnerability score. Areas of moderate to high vulnerability are found along and north of I-94, Saint Paul's East and West Sides, and in areas in Roseville and Mounds View.

2.4.2 HOUSEHOLD COMPOSITION AND DISABILITY

The U.S. Census defines four major categories of disabilities:

- Sensory disabilities include blindness, deafness, or severe vision or hearing impairment.
- Physical disabilities are long-lasting conditions that substantially limit one or more basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying things.
- Self-care disabilities are conditions lasting six or more months that make it a challenge to dress, bathe, or move around inside the home.
- Go-outside-the-home disabilities are conditions lasting six or more months that make it difficult for people to shop or to visit a doctor's office by themselves.

Household composition and disability affect hazard vulnerability as families with young children, elderly members, or individuals with disabilities may face greater difficulties in evacuating, accessing emergency information, and receiving appropriate care during disasters. These groups often require additional support and tailored resources to ensure safety and resilience.

- Vulnerability is also shaped by the composition of households in the county. Individuals under the age of 18 make up 23.1% of the population, while individuals over the age of 65 represent 15.1%.
- Additionally, 12.0% of individuals in Ramsey County report having a disability, which can affect the ability to prepare for, respond to and recover from disasters.
- Single-parent households account for 5.7% of all households in Ramsey County, a group that may face heightened vulnerability due to resource constraints.

Areas with more elderly, youth, people with disabilities and single parent households with young children have a higher vulnerability score. Areas of moderate to high vulnerability are found along & north of I-94, Saint Paul's East and West Sides, and in areas in Mounds View, New Brighton, Maplewood, White Bear Lake, Roseville and Little Canada.

2.4.3 MINORITY STATUS AND LANGUAGE

Minority status and language barriers increase hazard vulnerability as marginalized communities may face systemic discrimination, limited access to resources, and reduced trust in authorities. Language barriers can hinder the ability to receive critical emergency information and access services. Limited English proficiency can put individuals at higher risk because they might not be aware of or fully understand evacuation orders and other warnings, instructions on how to access critical City services, or other communication from first responders. This barrier exacerbates efforts for preparedness, increases their risks during disasters, and prolongs the recovery process.

- Ramsey County is home to a diverse population, with 40.4% of residents identifying as a racial or ethnic minority. These groups often face barriers to accessing resources and services during emergencies.
- Language proficiency is a significant factor in vulnerability. Ramsey County has a significant portion of the population with limited English proficiency. 23.5% of residents speak a language other than English at home, with the most common languages being Asian and Pacific Island languages (10.6%) and Spanish (5.3%). This may indicate potential communication challenges in the event of an emergency.

Areas with more minorities and people age 5+ who speak English "less than well" have a higher vulnerability score. Areas of moderate to high vulnerability are shown in areas along and north of I-94, Saint Paul's East and West sides, and in areas in Mounds View, Saint Anthony, Maplewood, Lauderdale, Falcon Heights, and Little Canada.

2.4.4 HOUSING AND TRANSPORTATION

Housing and transportation affect hazard vulnerability because individuals in substandard housing or densely populated areas are more likely to experience severe damage during disasters. Access to affordable housing can be a challenge and disasters that result in property damage can further constrain the housing market. For some low income or diverse populations, they may have only been able to purchase homes in areas with increased hazard risk exposure as they have limited income or have experienced issues with housing access due to historic discriminatory practices.

Limited access to reliable transportation can hinder evacuation efforts and reduce the ability to access emergency services or resources. The evacuation of people with disabilities and access and functional needs poses additional requirements. Many people who are otherwise self-sufficient may have special circumstances due to short-term issues such as physical or mental health issues, or have temporary resource shortages (e.g., fuel, transportation).

- Housing instability is a concern in Ramsey County, with 41.0% of residents living in renter-occupied units. Renters may have fewer resources to recover from hazard events and are often more vulnerable to displacement.
- In terms of transportation, 9.7% of households do not have access to a vehicle, making evacuation and accessing services more difficult in an emergency.
- The percentage of residents living in housing units with more than one occupant per room (overcrowded conditions) is 4.0%, which may increase the spread of illness and reduce resilience.
- The percentage of residents living in housing built in 1939 or earlier is 27.5%, increasing the likelihood of damage during hazard events.

Areas with more multi-unit housing, mobile homes, crowded homes, homes with no vehicle access, and institutionalized group quarters have a higher vulnerability score. Areas of moderate to high vulnerability are found along and north of I-94, Saint Paul's East and West sides, and in areas in Mounds View, New Brighton, Saint Anthony, Maplewood, North Saint Paul, Lauderdale, Falcon Heights, Blaine, White Bear Lake, Roseville, Vadnais Heights and Little Canada.

2.4.5 SPATIAL DISTRIBUTION OF VULNERABILITY

Centers for Disease Control (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) SVI data shows that social vulnerability is not evenly distributed across Ramsey County. Certain areas have notably higher SVI scores. These areas are more likely to experience compounded challenges during disasters due to the concentration of vulnerable populations and limited resources.

An interactive, visual, spatial distribution by census tract of Ramsey County's SVI by each of the four key themes can be viewed at

<https://www.arcgis.com/apps/MapSeries/index.html?appid=2bd18bc999dd452db6c680eba697f916>.

2.4.6 HEALTH DISPARITIES

Health disparities play a significant role in shaping a community's vulnerability to hazards, as underlying health conditions and unequal access to healthcare can hinder the ability to prepare for, respond to, and recover from disasters. In Ramsey County, understanding these disparities is critical to ensuring that mitigation strategies address the unique needs of all residents.

2.4.6.1 Chronic Health Conditions

Chronic health issues such as asthma, diabetes, heart disease, and respiratory conditions can exacerbate the impacts of disasters, especially for populations with limited access to healthcare. Pre-existing and underlying health conditions can elevate a heat event to a life-threatening situation. Those with less disposable income are affected disproportionately due to the inability to provide safe shelter, air

conditioning, medical care, and quality foods, and are also least able to obtain information related to extreme event risks and adaptation strategies.

In Ramsey County:

- The hospitalization rate for asthma among residents is 7.7 per 10,000, but among youth ages 5 to 19, the asthma hospitalization rate is much higher at 15.4 per 10,000. Asthma hospitalization rates for children living in the Twin Cities metropolitan area are 67% higher than for children living in Greater Minnesota.
- In 2016, the rate of death from diabetes in the county was 20.8 per 100,000. In a 2014 metro survey, 13.9 percent of those from lower income households were diagnosed with diabetes, compared to 5.4 percent of those from higher income households. That's an 8.5 percentage point gap between the two income groups. The same survey found that 15.8 percent of those with only a high school education reported being told they had diabetes compared to 4.3 percent of those with bachelor's degrees. That's an 11.5 percentage point gap between the groups.
- For 2012-2016, the five-year age adjusted rates for stroke deaths in Minnesota was 32.7 per 100,000 compared to a Ramsey rate of 39.6 per 100,000. During that same period, the five-year age adjusted rates for heart disease deaths in Minnesota was 116.6 per 100,000 compared to a Ramsey rate of 110. According to a 2014 survey in the Metro area, those with less education or lower income have a much higher risk of coronary heart disease, strokes and heart attacks. Among those with high school education, 12.1% report being diagnosed with heart disease compared to 3.1% of those with a bachelor's degree.

These chronic health conditions can increase the severity of harm experienced during events such as poor air quality from wildfires, extreme heat, or power outages.

2.4.6.2 Healthcare Access and Insurance Coverage

Access to healthcare is a critical factor in resilience, as individuals without adequate healthcare are less likely to receive the care they need during and after disasters. In Ramsey County:

- 5.1% of the population is uninsured.
- In Ramsey County in 2014, among adults 25 years or older that take prescription medications, about 10 percent could not afford their prescriptions.

2.5 Economy

Overall, the county has a stable and diverse economy with public administration, education, healthcare, and manufacturing as foundational pillars. According to the 2023 American Community Survey 1-Year Estimate, the median household income in Ramsey County is \$77,812, and the employment rate 67%, with 63.6% working for private sector businesses. In comparison, the median household income for Minnesota is \$85,086.

2.6 Community Services and Infrastructure

The following section offers an overview of community services and infrastructure in Ramsey County. Community services include essential functions such as healthcare, public safety, and emergency services. In terms of infrastructure, examples include the county's power utilities, water and sewer systems, and its transportation network, which supports both public and private transit options.

2.6.1 HEALTH CARE PROVIDERS

Ramsey County has a robust healthcare system with a variety of providers, including major hospitals like Regions Hospital, United Hospital, and M Health Fairview St. John's Hospital. These facilities offer services ranging from emergency care and surgery to mental health and specialized treatments. In addition to large healthcare networks like HealthPartners and Allina Health, there are numerous clinics providing primary and specialty care. The county also has an extensive network of long-term care facilities, skilled nursing centers, and hospice services, supporting the elderly and those with chronic health conditions or end-of-life care needs.

2.6.2 PUBLIC SAFETY

Ramsey County is served by a comprehensive network of public safety agencies, including police, fire, and emergency medical services (EMS), to ensure the safety and well-being of its residents.

- **Police Services:** The primary law enforcement agency in the county is the Ramsey County Sheriff's Office, which provides patrol, investigative services, and emergency response for unincorporated areas and supports municipal police departments. Cities like Saint Paul and Maplewood have their own police departments, with the Saint Paul Police Department being the largest in the county, offering full-service law enforcement, including specialized units like homicide, narcotics, and Special Weapons and Tactics (SWAT).
- **Fire Services:** Ramsey County's fire protection is provided by municipal fire departments, including the Saint Paul Fire Department, one of the largest and most comprehensive in the region. These departments handle fire suppression, fire prevention, rescue operations, and hazardous materials response. Many fire departments are integrated with EMS to provide rapid emergency medical assistance.
- **Emergency Medical Services:** EMS in Ramsey County are primarily provided by agencies like Allina Health EMS, Saint Paul Fire Department EMS, and other local first responders. These services provide advanced life support (ALS) and basic life support (BLS) care in emergencies, handling medical crises, accidents, and disasters.

2.6.3 UTILITIES

Ramsey County provides its residents with a comprehensive array of utility services, including water, sewer, natural gas, and electricity, managed by various public and private entities.

2.6.3.1 Water and Sewer Services

Water services in Ramsey County are primarily managed by local municipalities. The City of Saint Paul operates its own water utility, providing safe drinking water sourced from the Mississippi River and treated at the Saint Paul Regional Water Services facility. The water system is regularly monitored to

ensure compliance with federal and state safety standards. Similarly, wastewater treatment is handled by the Metropolitan Council, which manages a regional sewer system that collects and treats sewage from multiple municipalities in the area, including Saint Paul and surrounding suburbs.

2.6.3.2 Natural Gas

Natural gas services in Ramsey County are primarily provided by Xcel Energy, which supplies natural gas to homes and businesses throughout the region. Xcel Energy is responsible for the maintenance and operation of gas pipelines, ensuring reliable delivery and adherence to safety regulations. The company also offers programs aimed at energy efficiency and conservation.

2.6.3.3 Electricity

Xcel Energy also provides a significant portion of the county with electricity. The company offers various programs, including renewable energy options, rebates for energy-efficient appliances, and initiatives to help customers reduce their energy usage. Other utility providers in the area include Dakota Electric Association and the City of Saint Paul, which offers electricity services to some residents.

2.6.3.4 Transportation

Comprehensive transportation infrastructure that encompasses an extensive network of roads, highways, and public transit systems, which are crucial for the mobility of residents and the efficiency of local commerce. The county manages approximately 250 miles of roads. Major highways such as I-94, I-35W, and Highway 36 serve as key corridors for both local and regional traffic.

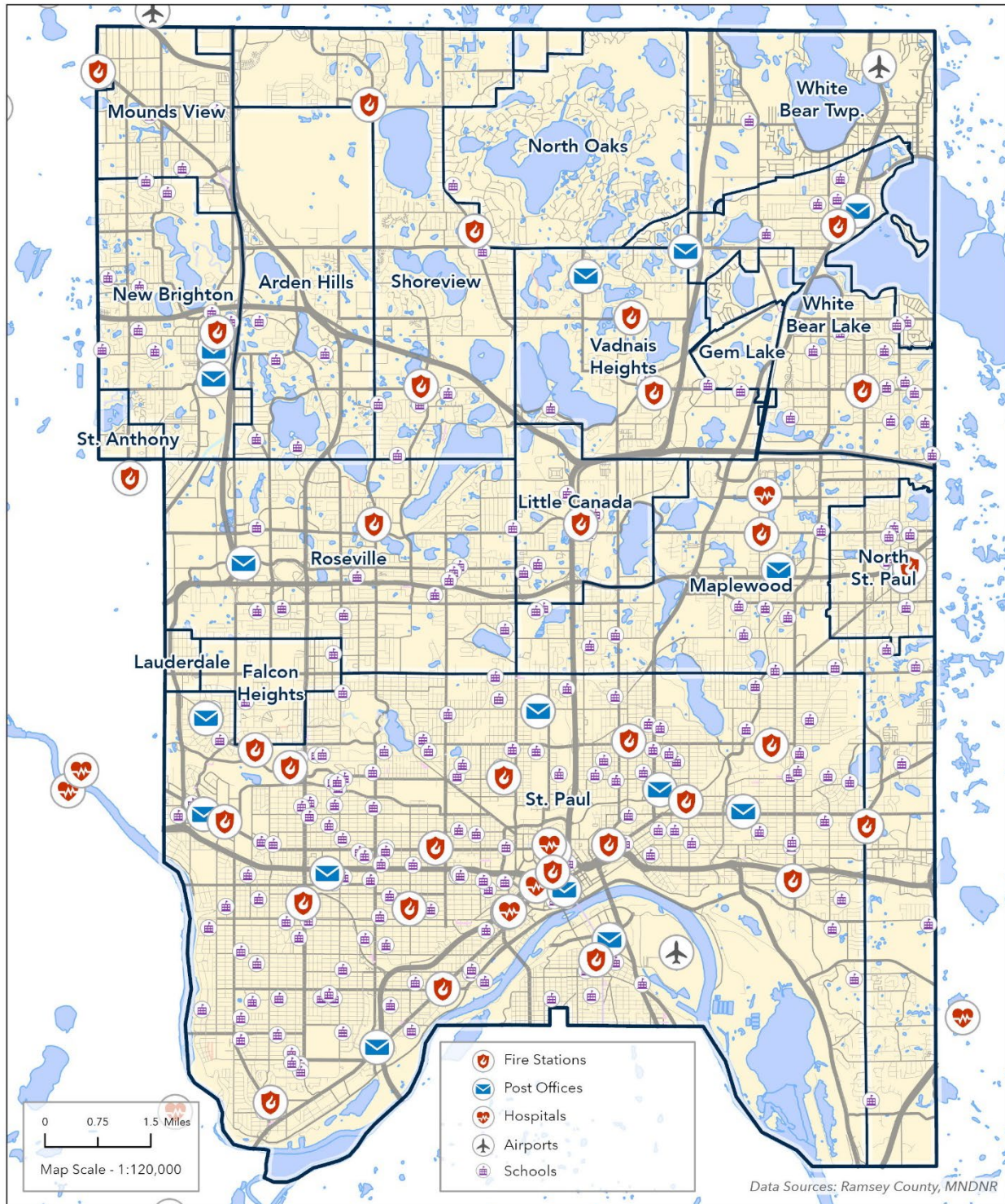
Public transit services in Ramsey County are provided by Metro Transit, which operates various bus routes and light rail lines, including the upcoming Riverview Corridor streetcar line aimed at enhancing connectivity between major areas like Downtown Saint Paul and the Mall of America. Additionally, several Bus Rapid Transit (BRT) projects, such as the Rush Line and Gold Line, are planned to improve access to surrounding communities.

Planned activities include expanding the capacity of major highways to accommodate growing traffic, implementing the "All Abilities Transportation Network" to promote inclusivity in transportation, and coordinating bike and pedestrian trails across the county. These initiatives align with the County's strategic goal of developing a sustainable, efficient, and multimodal transportation system that meets the needs of all residents.

2.7 Critical Facilities

Critical facilities are interspersed throughout Ramsey County. Figure 2 shows all fire stations, post offices, schools, hospitals and airports in the county.

Figure 2. Critical Facilities in Ramsey County



2.8 Land Use and Ownership

Ramsey County features a mix of urban, suburban, and natural land use. The county is heavily urbanized, particularly in Saint Paul, which occupies much of the county's land. Residential, commercial, and

industrial zones dominate, with neighborhoods of single-family homes and high-density apartments, along with business districts and manufacturing centers.

In terms of ownership, a significant portion of the land is privately owned, especially residential and commercial properties. Public lands, managed by county and city authorities, include parks, government buildings, and protected areas. The county has been actively balancing development with conservation efforts, particularly in managing urban sprawl and preserving green spaces. There are approximately 229,000 housing units, with close to 60% as owner-occupied. Almost 90% of the housing units were built prior to 2000.

2.9 Climate Change and Trends

Climate trends in Ramsey County, Minnesota, are reflective of broader regional patterns in the Upper Midwest, which has been experiencing noticeable shifts due to climate change. Key trends, as reported by the University of Minnesota's Climate Adaptation Partnership and the Minnesota Department of Natural Resources include:

- **Rising Temperatures:** Over the past few decades, Ramsey County has experienced a steady increase in average annual temperatures. Warmer winters, with fewer extreme cold days, are a prominent feature, though summers are also seeing more frequent heat waves. Ramsey County has already observed an average annual temperature increase of 3.5 degrees F, with much of this warming occurring during the coldest months of the year.
- **Increased Precipitation:** There has been a rise in annual precipitation, with heavier rainfall events becoming more common. This trend is contributing to localized flooding and increased stormwater management challenges in urban areas like Saint Paul. The region has experienced an increase in annual precipitation of 4.1 inches, while statewide an increase of 3.3 inches annually has been observed. By the end of the century, winter and spring precipitation are expected to increase by 30%, as projected by the University of Minnesota's Climate Adaptation Partnership.
- **Seasonal Shifts:** Winters are becoming shorter and less severe, while springs and autumns are extending. Snowfall patterns are shifting, with less frequent but more intense snowstorms, followed by quicker melts. It has been observed that winters in Minnesota are warming dramatically, and spring weather is arriving up to two weeks earlier than in the early 1900s. Climate change is expected to continue altering the timing of the seasons in the future. Winters are predicted to become shorter, warmer, and wetter, with an increase in both spring and heavy precipitation. Summers are likely to grow longer and hotter, beginning earlier and extending later into the year. The last freeze of spring is projected to occur increasingly earlier, while the first freeze of fall will likely be delayed, further lengthening the growing season.
- **More Extreme Weather Events:** The region, including Ramsey County, has seen more intense storms, such as thunderstorms, tornadoes, and flash flooding events. This is consistent with a broader trend toward more frequent and severe extreme weather across the Midwest. For example, the term "mega-rain" is used to describe when at least six inches of rain fall over an area of at least 1,000 square miles. Since 1973, Minnesota has experienced 16 mega-rains, 11 of

those events have occurred since 2000, indicating a trend toward an increase in frequency and intensity of heavy rainfall events.

2.10 Community Capabilities Assessment

Participating jurisdictions completed assessments of community capabilities, focusing on the following capability areas:

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach

Assessment results were utilized by communities to identify both capability gaps and existing capabilities that could be used to mitigate hazards. It is important to remember that the capabilities assessment was not a test, and most communities had very valid reasons for having or not having specific capabilities.

The following sections indicate specific capabilities in each community, as identified by that community.

2.10.1 PLANNING AND REGULATORY CAPABILITIES

Planning and regulatory capabilities include codes, ordinances, policies, laws, plans and programs that guide growth and development. These capabilities can either support risk reduction or create areas that are more vulnerable to disaster.

Table 4. Planning Capabilities in Ramsey County

Plans	Capital Improvement Plan	Climate Change Adaptation Plan	Community Wildfire Protection Plan	Comprehensive/Master Plan	Continuity of Operations Plan	Economic Development Plan	Land Use Plan	Local Emergency Operations Plan	Stormwater Management Plan	Transportation Plan
Arden Hills	•			•	•		•	•	•	
Falcon Heights	•			•			•	•		
Gem Lake				•			•	•	•	
Lauderdale	•			•			•		•	
Little Canada	•			•	•	•	•	•	•	•
Maplewood	•	•		•		•	•	•	•	•
Mounds View	•		•	•	•	•	•	•	•	
New Brighton	•			•	•		•	•	•	
North Oaks	•			•		•	•	•	•	

Plans	Capital Improvement Plan	Climate Change Adaptation Plan	Community Wildfire Protection Plan	Comprehensive/Master Plan	Continuity of Operations Plan	Economic Development Plan	Land Use Plan	Local Emergency Operations Plan	Stormwater Management Plan	Transportation Plan
North Saint Paul	•			•	•		•		•	
Roseville	•			•	•		•	•		
Saint Anthony	•					•			•	
Saint Paul	•	•		•	•	•	•	•	•	•
Shoreview	•	•		•	•	•	•	•	•	•
Vadnais Heights	•			•	•	•	•		•	
White Bear Lake	•				•	•	•	•		
White Bear Township	•		•	•	•	•	•	•	•	
Ramsey County	•	•		•	•	•	•	•	•	

Table 5. Regulatory Capabilities in Ramsey County

Land Use and Planning Ordinances	Land Acquisition	Building Code	Flood Insurance Rate Maps (FIRMS)	Floodplain Ordinance	Substantial Damage Plan	Natural Hazard-Specific Ordinances	Subdivision Ordinances	Zoning Ordinance
Arden Hills	•	•	•	•		•	•	•
Falcon Heights	•	•				•	•	•
Gem Lake	•	•		•				•
Lauderdale	•	•		•		•	•	•
Little Canada	•	•	•	•	•	•	•	•
Maplewood	•	•	•	•	•	•	•	•
Mounds View	•	•	•	•	•	•	•	•
New Brighton	•	•	•	•			•	•
North Oaks		•		•		•	•	•
North Saint Paul		•		•			•	•
Roseville		•					•	•
Saint Anthony		•						•

Land Use and Planning Ordinances	Land Acquisition	Building Code	Flood Insurance Rate Maps (FIRMS)	Floodplain Ordinance	Substantial Damage Plan	Natural Hazard-Specific Ordinances	Subdivision Ordinances	Zoning Ordinance
Saint Paul	•	•	•	•	•	•	•	•
Shoreview	•	•	•	•	•	•	•	•
Vadnais Heights		•						•
White Bear Lake	•	•				•	•	•
White Bear Township	•	•		•		•	•	•
Ramsey County	•		•					

2.10.2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Administrative and technical capabilities include staff, skills and tools. These capabilities can be used for mitigation planning and to carry out specific mitigation actions. They also include the ability to access, coordinate and implement these resources effectively.

Table 6. Administrative and Technical Capabilities in Ramsey County

Administrative and Technical Capabilities	Chief Building Official	Civil Engineer	Community Planner	Emergency Manager	Floodplain Administrator	GIS Coordinator	Planning Board	Zoning Official	Grant Writing Capability	Hazard Data and Information	GIS Analysis	Mutual Aid Agreements
Arden Hills	•	•	•	•	•	•	•	•		•	•	•
Falcon Heights	•	•	•	•	•		•	•				•
Gem Lake	•	•	•	•			•	•				•
Lauderdale	•	•	•	•		•		•	•		•	•
Little Canada	•	•	•	•			•	•				•
Maplewood	•	•	•	•		•	•	•	•		•	•
Mounds View	•	•	•	•	•	•	•	•	•	•	•	•
New Brighton	•	•	•	•		•	•	•			•	•
North Oaks	•	•	•	•	•	•	•	•	•	•	•	•
North Saint Paul	•	•	•		•	•	•	•	•	•	•	•
Roseville	•	•	•	•		•	•	•	•		•	•

Administrative and Technical Capabilities	Chief Building Official	Civil Engineer	Community Planner	Emergency Manager	Floodplain Administrator	GIS Coordinator	Planning Board	Zoning Official	Grant Writing Capability	Hazard Data and Information	GIS Analysis	Mutual Aid Agreements
Saint Anthony	•	•	•			•		•	•			•
Saint Paul	•	•	•	•	•	•	•	•	•	•	•	•
Shoreview	•	•	•	•	•	•	•	•	•	•	•	•
Vadnais Heights	•	•		•		•	•	•			•	•
White Bear Lake	•	•	•	•		•	•					•
White Bear Township	•	•	•	•		•	•	•	•		•	•
Ramsey County	•	•	•	•		•	•			•	•	•

2.10.3 FINANCIAL CAPABILITIES

Financial capabilities include resources to fund mitigation actions.

Table 7. Financial Capabilities in Ramsey County

Financial Capabilities	Capital Improvement Project Funding	Community Development Block Grant	Federal Funding Programs (Non-FEMA)	Water, Gas, Sewer or Electric Fees	Impact Fees for New Development	State Funding Programs	Stormwater Utility Fees
Arden Hills	•	•	•	•	•	•	•
Falcon Heights	•		•	•	•	•	•
Gem Lake	•		•	•			
Lauderdale	•	•		•	•		•
Little Canada	•	•		•	•	•	•
Maplewood	•			•	•		•
Mounds View	•			•	•	•	•
New Brighton	•		•	•	•	•	•
North Oaks	•		•	•	•	•	
North Saint Paul	•	•	•	•	•	•	
Roseville	•		•	•	•	•	•
Saint Anthony	•			•	•		

Financial Capabilities	Capital Improvement Project Funding	Community Development Block Grant	Federal Funding Programs (Non-FEMA)	Water, Gas, Sewer or Electric Fees	Impact Fees for New Development	State Funding Programs	Stormwater Utility Fees
Saint Paul	•	•	•	•	•	•	•
Shoreview	•	•	•	•	•	•	•
Vadnais Heights				•	•		•
White Bear Lake				•			
White Bear Township	•	•		•		•	•
Ramsey County							

2.10.4 EDUCATION AND OUTREACH CAPABILITIES

Education and outreach capabilities include programs and methods that Ramsey County and its communities can use to communicate about and encourage risk reduction.

Table 8. Education and Outreach Capabilities in Ramsey County

Education and Outreach Capability	Community Newsletters	Hazard Awareness Programs	Local News	Organizations that Represent, Advocate for or Interact with Underserved and Vulnerable Communities	Local Grassroots Initiatives Targeted to Diverse Populations at Risk	Social Media
Arden Hills	•	•	•	•		•
Falcon Heights	•		•	•		•
Gem Lake	•	•	•			•
Lauderdale	•		•			•
Little Canada	•	•	•			•
Maplewood	•	•	•	•	•	•
Mounds View	•	•	•	•	•	•
New Brighton	•	•	•	•	•	•
North Oaks	•	•	•	•		•
North Saint Paul	•	•	•	•	•	•
Roseville	•	•	•	•	•	•
Saint Anthony	•	•	•			•

Education and Outreach Capability	Community Newsletters	Hazard Awareness Programs	Local News	Organizations that Represent, Advocate for or Interact with Underserved and Vulnerable Communities	Local Grassroots Initiatives Targeted to Diverse Populations at Risk	Social Media
Saint Paul	•	•	•	•	•	•
Shoreview	•	•	•	•	•	•
Vadnais Heights			•			
White Bear Lake	•	•	•			•
White Bear Township						
Ramsey County		•	•			•

3. Risk Assessment

3.1 Risk Assessment

A risk assessment is the process of measuring the potential loss of life, personal injury, and economic and property damage resulting from identified hazards. It allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. Results of the risk assessment are used to inform mitigation planning processes, including determining and prioritizing mitigation actions that reduce a community's risk to a specified hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for each jurisdiction. The Ramsey County risk assessment includes the following:

- Identification of hazards of concern that impact Ramsey County
- Methodology and tools used to conduct the risk assessment
- Hazard ranking
- Hazards of concern profiles and vulnerability assessment

3.2 Hazard Summary

3.2.1 IDENTIFICATION OF HAZARDS

Ramsey County considered a full range of natural hazards that could impact the planning area. Hazard identification began with a review of the hazards assessed in the 2019 Ramsey County plan, the City of Saint Paul Hazard Mitigation Plan, and the State of Minnesota Hazard Mitigation Plan. A total of eight natural hazards and three human-caused hazards of concern were identified as significant hazards affecting the entire planning area, to be addressed in this plan:

- Dam/Levee Failure
- Drought
- Floods
- Geologic Hazards
- Hazardous Materials
- Summer Weather Hazards
- Tornado and Windstorm
- Winter Weather Hazards
- Human-Caused Hazards
- Infrastructure Failure

3.2.2 RAMSEY COUNTY DISASTER DECLARATIONS

Table 9 lists FEMA declarations in Ramsey County.

Table 9. Disaster Declarations in Ramsey County

Ramsey County Disaster Declarations						
Declaration	Type	Date	Year Declared	Incident Type	Declaration Title	Designated Area
DR-80-MN	DR	1957-06-22	1957	Flood	Floods	Statewide
DR-188-MN	DR	1965-04-11	1965	Flood	Flooding	Ramsey (County)
DR-255-MN	DR	1969-04-18	1969	Flood	Flooding	Ramsey (County)
EM-3013-MN	EM	1976-06-17	1976	Drought	Drought	Ramsey (County)
FM-2018-MN	FM	1976-09-08	1976	Fire	Huntersville	Statewide
FM-2023-MN	FM	1976-09-11	1976	Fire	Galvin Line	Statewide
FM-2022-MN	FM	1976-09-11	1976	Fire	Little Swan	Statewide
FM-2021-MN	FM	1976-09-11	1976	Fire	Tate	Statewide
FM-2020-MN	FM	1976-09-11	1976	Fire	Tamarack	Statewide
FM-2019-MN	FM	1976-09-11	1976	Fire	Tower	Statewide
FM-2024-MN	FM	1976-10-01	1977	Fire	McGregor Fire	Statewide
DR-560-MN	DR	1978-07-08	1978	Severe Storm	Severe Storms, Flooding, Hail & Tornadoes	Ramsey
DR-797-MN	DR	1987-08-06	1987	Severe Storm	Severe Storms, Tornadoes & Flooding	Ramsey
DR-993-MN	DR	1993-06-11	1993	Severe Storm	Severe Storms, Tornadoes & Flooding	Ramsey
DR-1175-MN	DR	1997-04-08	1997	Flood	Severe Flooding, High Winds, Severe Storms	Ramsey
DR-1187-MN	DR	1997-08-25	1997	Severe Storm	Severe Storms, Tornadoes, High Winds, Flooding	Ramsey
DR-1225-MN	DR	1998-06-23	1998	Tornado	Severe Storms, Straight Line Winds, & Tornadoes	Ramsey
DR-1333-MN	DR	2000-06-27	2000	Severe Storm	Severe Storms and Flooding	Ramsey
DR-1370-MN	DR	2001-05-16	2001	Flood	Severe Winter Storms, Flooding, & Tornadoes	Ramsey
EM-3242-MN	EM	2005-09-13	2005	Hurricane	Hurricane Katrina Evacuation	Ramsey
EM-3310-MN	EM	2010-03-19	2010	Flood	Flooding	Ramsey
DR-1900-MN	DR	2010-04-19	2010	Flood	Flooding	Ramsey
DR-1982-MN	DR	2011-05-10	2011	Flood	Severe Storms and Flooding	Ramsey
DR-4182-MN	DR	2014-07-21	2014	Flood	Severe Storms, Straight-Line Winds, Flooding, Landslides, & Mudslides	Ramsey

Ramsey County Disaster Declarations						
DR-4442-MN	DR	2019-06-12	2019	Flood	Severe Winter Storm, Straight-Line Winds, & Flooding	Ramsey
EM-3453-MN	EM	2020-03-13	2020	Biological	Covid-19	Ramsey
DR-4531-MN	DR	2020-04-07	2020	Biological	Covid-19 Pandemic	Ramsey

Source: FEMA

3.3 Assessment Methodology

The LPT utilized a risk-based formula for assessing hazards in Ramsey County, where Risk = Threat x Vulnerability x Consequence. Specific sections of the hazard assessment are tied to each of these variables, giving a well-rounded and thorough examination of each hazard and its relation to Ramsey County and its communities.

3.3.1 THREAT

Hazards were first assessed for the threat they pose to the county and communities. Elements of threat were assessed in the following sections in each hazard chapter:

- Hazard Profile
- Location
- Extent
- History
- Probability
- Climate Change Impacts

3.3.2 VULNERABILITY

Ramsey County and its communities were also assessed for vulnerabilities to each disaster. The following vulnerabilities were assessed in each hazard chapter:

- Vulnerability of People
- Vulnerability of Property
- Vulnerability of the Environment
- Vulnerability of County and Community Operations

3.3.3 CONSEQUENCE

Finally, hazards were assessed for the consequences Ramsey County and its communities could reasonably expect from an instance of the hazard. While a full scenario wasn't used for each hazard, general impacts were reasonable extrapolated for each hazard.

- Impact on the Public
- Impact on Responders

- Impact on Continuity of Operations
- Impact on Property, Facilities, and Infrastructure
- Impact on the Environment
- Impact on the Economy of the Jurisdiction
- Impact on Public Confidence in the Jurisdiction's Governance

3.4 Hazard Rankings

Each hazard was given a ranking based on three key elements of risk – threat, vulnerability and consequence.

Table 10. Hazard Rankings

Hazard	Threat	Vulnerability	Consequence	Score	Hazard Rank
Dam/Levee Failure	Rare – 1	Localized - 2	Limited – 2	5	Medium
Drought	Occasional – 2	Extensive – 4	Limited – 2	8	Medium
Floods	Frequent – 3	Localized – 2	Critical – 3	8	Medium
Geologic Hazards	Occasional – 2	Limited – 1	Negligible – 1	4	Low
Hazardous Materials	Occasional – 2	Limited – 1	Limited - 2	5	Medium
Summer Weather Hazards	Likely – 4	Widespread – 3	Limited – 2	9	High
Tornado and Windstorm	Frequent – 3	Widespread – 3	Catastrophic – 4	10	High
Winter Weather Hazards	Likely – 4	Widespread – 3	Limited – 2	9	High
Human-Caused Hazards	Rare – 1	Limited – 1	Catastrophic – 4	6	Medium
Infrastructure Failure	Rare – 1	Limited – 1	Catastrophic - 4	6	Medium

3.5 Community Hazard Rankings

Table 11. Hazard Rankings shows hazard rankings by community.

Table 11. Hazard Rankings

Jurisdiction	Dam/ Levee Failure	Drought	Floods	Geologic Hazards	Hazardous Materials	Summer Weather Hazards	Tornado and Windstorm	Winter Weather Hazards	Human-Caused Hazards	Infrastructure Failure
Arden Hills	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Falcon Heights	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Gem Lake	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Lauderdale	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Little Canada	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Maplewood	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Mounds View	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
New Brighton	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
North Oaks	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
North Saint Paul	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Roseville	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Saint Anthony	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Saint Paul	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Shoreview	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Vadnais Heights	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
White Bear Lake	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
White Bear Township	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium
Ramsey County	Medium	Medium	Medium	Low	Medium	High	High	High	Medium	Medium

3.6 Dam/Levee Failure

3.6.1 PROFILE

Dams are structures built across a river, stream, or other body of water designed to control and manage water flow. Dams create reservoirs, which can supply water for domestic, agricultural, and industrial use, manage water resources, and provide recreational opportunities. Levees are an embankment or natural ridge constructed along the edges of a river or other body of water to prevent flooding of the adjacent land. Levees serve to protect populated areas, agricultural lands, and infrastructure from floodwaters. Failures of dams and levees can result in sudden and severe flooding. The causes of such failures include natural hazards (earthquakes, flooding severe weather conditions), human-made threats (terrorism, human error) or other key factors such as structural deficiencies or improper maintenance, leading to compromise the integrity of the dam/levee. When a dam/levee fails, the rapid release of water can inundate downstream areas, leading to loss of life, extensive property damage, and environmental destruction. Populated areas, agricultural lands, and infrastructure located downstream are particularly vulnerable to impacts. The cascading effects can also include disruption of utilities, transportation networks, and other critical infrastructure. There are seven dams and no levees located in Ramsey County.

3.6.2 LOCATION

Table 10 shows dams that are located within the Ramsey County geographical boundaries. There are also three additional dams outside the county’s borders that have been identified as potential risks to the county: Coon Rapids Dam in Anoka County and St. Anthony Falls Upper and Lower Lock and Dams in Hennepin County.

Table 12. Dams Located in Ramsey County

Name	Owner	River	Primary Purpose	Year Built	NID Height	Dam Type	Classification
Arlington Detention	City of Saint Paul	Phalen Creek tributary	Flood Risk Reduction	1989	15'	Earth	Significant
Battle Creek	WD of Ramsey-Washington Metro	Battle Creek	Flood Risk Reduction	1982	30'	Earth	High
Battle Creek Middle	WD of Ramsey-Washington Metro	Battle Creek	Flood Risk Reduction	1983	16'	unk	High
Battle Creek Upper	WD of Ramsey-Washington Metro	Battle Creek	Flood Risk Reduction	1983	18'	unk	High
Hansen Park	City of New Brighton	Rice Creek tributary	Recreation		7'		Low
Keller Lake	RWMWD	Keller Creek	Recreation	1938	12'	Gravity	Low

Name	Owner	River	Primary Purpose	Year Built	NID Height	Dam Type	Classification
Round Lake	USFWS	Rice Creek tributary	Water Supply	1960	10'	Other, Earth	Low

Source: National Inventory of Dams, Minnesota DNR

3.6.3 EXTENT

In the U.S., a common practice among federal and state dam safety officials is to classify dams according to the potential impact a dam failure or breach would have on upstream or downstream areas or locations remote from the dam. Three classification levels are used: Low, Significant, and High. Table 13 explains these classifications.

Table 13. Dam Hazard Potential Classification System

Dam Hazard Potential Classification System			
Classification	Summary	Potential Loss of Life	Economic, Environmental, and Lifeline Losses
Low Hazard	Dams assigned the Low Hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.	None expected	Low; generally limited to owner
Significant Hazard	Dams assigned the Significant Hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant Hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.	None Expected	Yes
High Hazard	Dams assigned the High Hazard potential classification are those where failure or misoperation will probably cause loss of human life.	Probable; one or more expected	Yes (but not necessary for this classification)

Source: National Inventory of Dams

Any owner of a dam with a hazard potential classification of High is required to develop an emergency action plan (EAP). An EAP is a formal document that identifies potential emergency conditions at a dam

and specifies preplanned actions to be followed to minimize potential property damage and loss of life. Every EAP must be tailored to site-specific conditions but generally contains six basic elements:

- Notification flowchart
- Emergency detection, evaluation, and classification
- Roles and responsibilities
- Preparedness activities
- Inundation maps
- Appendices

Dam failure is the collapse or failure of an impoundment that causes significant downstream flooding. The principal consequences of dam failure are injury, loss of life, and significant downstream property damage. The energy of water stored behind even a small dam is capable of causing loss of life and significant property damage to people living downstream. The collapse or structural failure of a dam may be caused by severe storm, earthquake, improper maintenance, erosion, or acts of terrorism. A failure in a dam upstream can cause additional strain and failure risk to dams further downstream. The Battle Creek dams are the only dams located within Ramsey County that are classified as High and have developed EAPs for review. The Coon Rapids Dam and the St. Anthony Falls Upper and Lower Locks and Dams are classified as significant and have also written EAPs.

3.6.4 HISTORY

There have been no dam failures in Ramsey County in the past, though there have been several dam failures within the State of Minnesota. Most reported failures have been in low hazard dams, with at least one exception; the Thomson Dam in northeastern Minnesota overtopped in 2012 due to heavy rains, causing significant damage to its hydroelectric station and contributing to flooding downstream. There have been no known deaths, injuries, or property damage from dam or levee failures in the county. The effects on life and property in the area could be significant if a dam were to fail because of the nature of the built environment underneath it.

3.6.5 PROBABILITY

The probability of a specific dam failing in any given year is extremely low. Some common causes of dam failures include overtopping, foundation defects, cracking, inadequate maintenance, or piping and seepage. According to the Association of State Dam Safety Officials, the primary cause of reported dam failures between 2010 – 2019 was overtopping, most often due to flooding events.

3.6.6 CLIMATE CHANGE IMPACTS

Climate change can significantly affect the risk and severity of dam and levee failures. The changes most likely to impact Ramsey County are:

- Changes in seasonal patterns and increased precipitation intensity – more frequent and intense rainfall events or earlier spring snowmelt can result in higher risk of flooding, putting additional stress on dams and levees. According to the Minnesota Department of Natural Resources Climate Change Information website, heavy rains are now more common in Minnesota and

more intense than at any time on record. Climate projections indicate these big rains will continue increasing into the future.

- Increased extreme weather events – more frequent and severe storms can cause a higher risk for dam or levee overtopping.
- Temperature changes, including increased freeze-thaw cycles – this could impact the integrity of dam and levee foundations.
- Increased demand on water resources – increased demand has the potential for more frequent drawdowns of reservoirs and added stress on dam operations and structures.

3.6.7 VULNERABILITY ASSESSMENT

3.6.7.1 People

All individuals who live, work, and recreate in areas downstream of the dams are at risk if they are unable to escape the inundation zone following a failure. Inadequate warning from public warning systems, such as those provided through Everbridge, local radio stations, and other means can increase the number of people at risk.

Rising water from a dam failure can cause the same type of impacts as riverine and/or flash flooding, including injuries and fatalities from drowning, blunt force trauma, or exposure. If inundation is expected, populations will likely need to be evacuated and may lose access temporarily or long-term to housing, workplace, and other facilities. Not only can this have immediate physical impacts on people, it can also have longer-term mental health impacts as people work through the process of having their lives drastically altered.

3.6.7.2 Property

Inundation from dam failure can cause minor damage up to total loss of structures, utilities, and roadways. In addition, inundation is likely to impact phone lines, potable water, cable, and electricity; wastewater and recovery time for these lifelines may be extended. The one high hazard dam located in Ramsey County, Battle Creek Dam, is situated within Battle Creek Regional Park. Battle Creek runs through the central eastern metropolitan area of the county. It primarily flows through wooded parks before emptying into Pigs Eye Lake and eventually discharging to the Mississippi River. Neighborhoods and public spaces adjacent to the creek, particularly near Pigs Eye Lake could be inundated by a sudden release of water if the Battle Creek Dam were to fail.

3.6.7.3 Environment

The natural environment is also at risk for impacts caused by dam failure. River habitats, and nearby wetlands, meadows, and wooded areas may suffer from sedimentation and pollution caused by hazardous materials (e.g., pesticides, fuel, sewage). Floodwaters may cause significant erosion and can harm wildlife through drowning, disease, and disruption of habitat. A sudden release of water could erode stream banks, damage wetlands, and disrupt the ecosystems and wildlife habitats of Battle Creek Park. A failure of Battle Creek Dam could also send sediment, debris, and pollutants into Pigs Eye Lake and, eventually, into the Mississippi River, impacting water quality and aquatic life.

3.6.7.4 County and Community Operations

Of the dams located in Ramsey County, the Battle Creek dams (Battle Creek, Battle Creek Middle, and Battle Creek Upper) are classified as High. These are located within the Battle Creek Regional Park which should limit the impact to county and community operations if there is a failure.

3.6.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Loss of life and injury due to sudden flooding.
- Displacement of residents from inundated areas, leading to temporary or long-term evacuation.
- Contamination of water systems, leading to public health impacts.
- Disruption of daily life and access to essential services (e.g., healthcare, education).

Impact on Responders

- Increased risk and operational challenges to emergency responders due to rapid onset of flooding and compromised access to affected areas, complicating rescue and relief efforts.
- Strain on emergency services, including search and rescue operations and medical response.
- Potential exposure to hazardous materials released during the flood.

Continuity of Operations

- Disruption of governmental and critical services (e.g., water treatment, power supply).
- Long-term impacts on the ability to resume normal operations.

Impact on Property, Facilities, and Infrastructure

- Destruction or severe damage to homes, businesses, and public buildings.
- Short- and long-term structural damage to affected infrastructure, requiring extensive repair or rebuilding.
- Potential for cascading failures in other infrastructure (e.g., electrical grid, transportation systems).

Impact on the Environment

- Extensive erosion and sedimentation, altering waterways and landscapes.
- Long-term damage to ecosystems, including loss of habitat and biodiversity.
- Contamination of soil and water, affecting agriculture and drinking water sources.

Impact on the Economy of the Jurisdiction

- Immediate and long-term economic losses due to damage to businesses and property.
- Costs associated with emergency response, recovery, and reconstruction.
- Loss of income and employment in affected areas.

- Decreased property values and potential long-term economic decline in the region.

Impact on Public Confidence in the Jurisdiction's Governance

- Erosion of public trust in local and regional authorities if the dam failure is perceived as preventable or if the response is inadequate.
- Increased scrutiny and criticism of regulatory and oversight bodies responsible for dam safety.

3.7 Drought

3.7.1 PROFILE

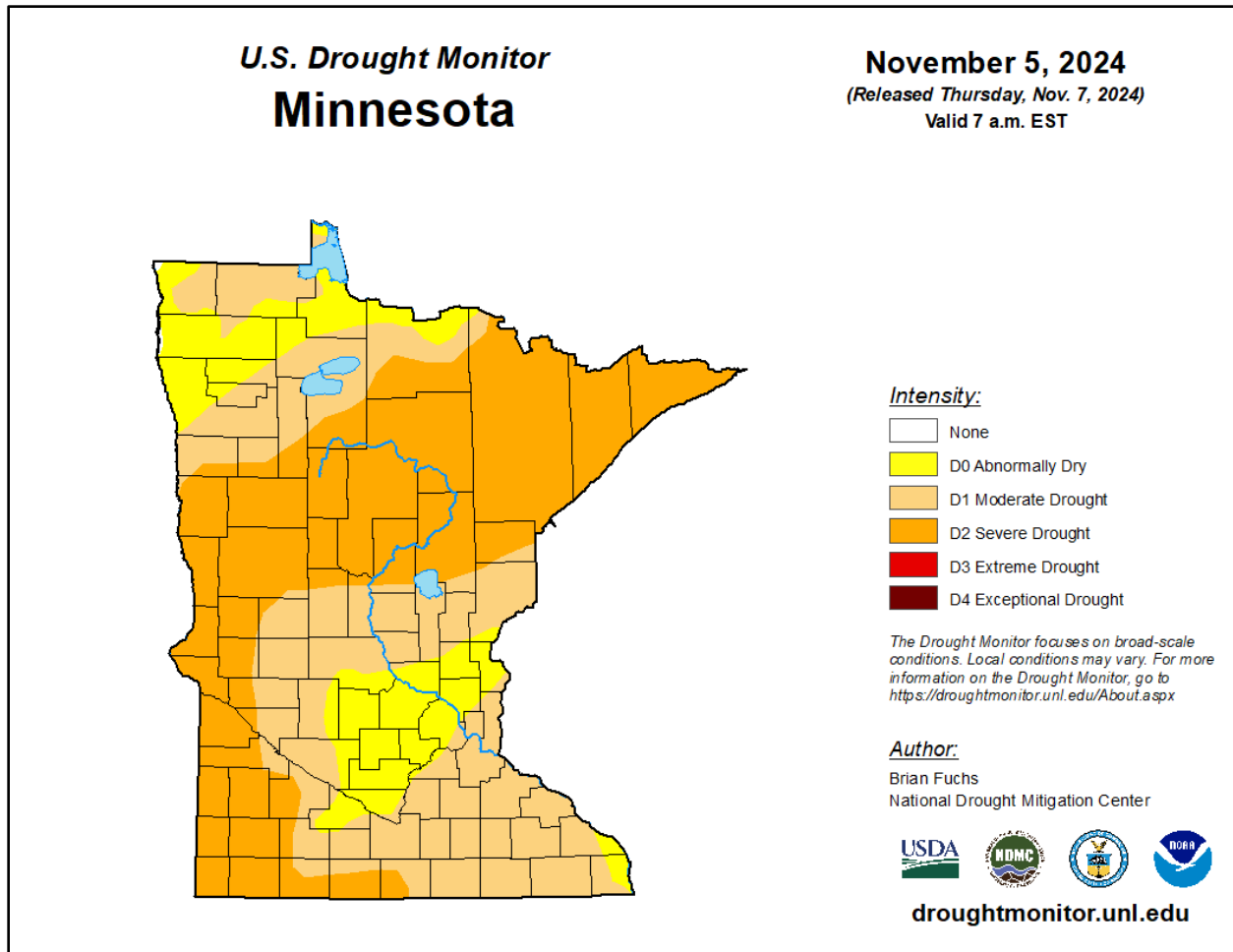
Drought is a prolonged period of significant below-average precipitation in a given location. It is a normal phase in the climate cycle of most regions, originating from a deficiency of precipitation over an extended period of time, usually a season or more. Drought can lead to water shortages.

Droughts are climate patterns that occur over long periods of time as the result of many causes. These patterns are often exacerbated by climatic patterns such as La Nina, human activities such as over-extraction of groundwater, and inefficient water use practices. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depend on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of global weather systems.

3.7.2 LOCATION

Drought is a regional hazard, impacting large areas of land at once. The entire planning area is susceptible to drought conditions. Figure 3 shows an example of drought conditions from November 2024. Drought condition maps are updated weekly.

Figure 3. Drought Conditions



Source: United States Drought Monitor

3.7.3 EXTENT

The entirety of the county is susceptible to any of the classifications of drought, up to and including D4 drought as outlined in Figure 4. Drought Classification Categories

Figure 4. Drought Classification Categories

Class	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slows growth of crops/pastures. Coming out of drought: some lingering water deficits; crops/pastures not fully recovered.
D1	Moderate Drought	Some damage to crops/pastures; streams, reservoirs, or wells are low with some water shortages developing or imminent; voluntary water-use restrictions requested.
D2	Severe Drought	Crop/pasture losses are likely; water shortages are common and water restrictions are imposed.
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions.
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.

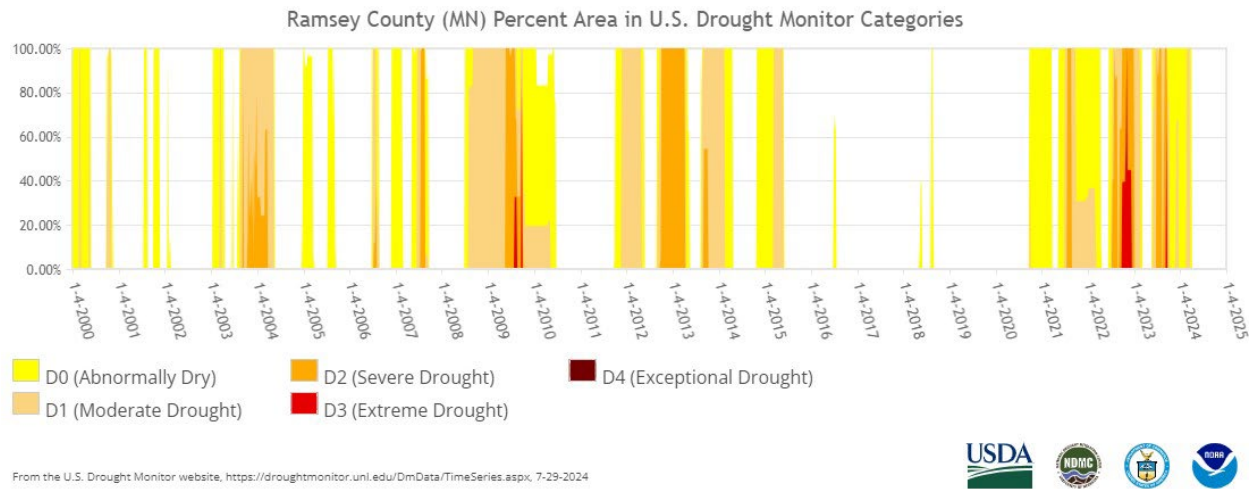
Source: United States Drought Monitor

3.7.4 HISTORY

Minnesota typically experiences some degree of drought each year. Throughout the years, these droughts have varied in severity and duration. Major droughts were recorded in the 1930s, peaking between 1934 and 1936, in 1950s, peaking in 1956, and one of the driest winters on record, the winter of 1976-1977. More recently, notable droughts were recorded in 1988, 2006-2009, and 2012-2013. One of the most severe droughts in recent years, the 2021 drought affected much of Minnesota. Extremely low precipitation and high temperatures led to water shortages, record-low lake levels, and significant impacts on agriculture and ecosystems. Relevant to this, wildfires were also a major concern, with several large fires occurring in the state.

Figure 5 illustrates the proportion of land area within the county that has been affected by different levels of drought severity since 2000, and the slight trend toward more frequent and severe drought activity in recent years. Monitoring drought trends provides critical data to assess risk, enhance preparedness, and make informed policy decisions.

Figure 5. Historical Droughts in Ramsey County



Source: United States Drought Monitor

Members of the LPT noted that most jurisdictions in Ramsey County have instituted water restrictions, mostly focusing on lawn watering on even/odd days. The LPT also noted that only the Governor of Minnesota can completely restrict water usage.

3.7.5 PROBABILITY

The probability of a drought in Ramsey County depends on various climatic factors, which vary from year to year. The United States Drought Monitor tracks drought impacts weekly at a variety of jurisdiction levels, including at the county level. Drought conditions were reviewed for a total of 1,257 weeks between the first week of January 2000 and the week of August 20, 2024. Ramsey County experienced some level of drought condition in 44% of the recorded weeks, with the vast majority of those drought conditions spent in the lower echelon of drought severity.

FEMA’s National Risk Index tool notes that Ramsey County is at a very low risk of drought, although this is based on agricultural impacts only.

3.7.6 CLIMATE CHANGE IMPACTS

Climate change is expected to alter precipitation patterns, temperatures, and extreme weather events, which could all contribute to the frequency, severity, and duration of droughts.

Changes in precipitation patterns. It is anticipated that there will be increased variability in precipitation including irregular rainfall and seasonal shifts which could impact the availability of water throughout the year. For Ramsey County, warmer winter temperatures could lead to a shift from snow to more rainfall, resulting in reduced snowpack and less water stored for spring thaw. This could impact the availability of water for critical growing seasons. Since 1866, the MN Department of Natural Resources (DNR) has identified 19 historical “mega-rain” events, in which six inches of rain fall over more than 1,000 square miles. More than half of these events occurred in the past 10 years. These mega-rain events have become four times more frequent since the year 2000 as compared to the previous 30 years. According to the University of Minnesota Climate Change Partnership, future Minnesotans will likely see longer dry periods and more flash droughts with heavier rain events in between.

Temperature increases. Higher temperatures will likely lead to increased evaporation rates and soil moisture depletion, both have the potential to significantly impact plants, crops, and vegetation. More frequent and prolonged heatwaves, which can stress water resources and increase the likelihood of drought conditions, are also a potential impact. According to DNR, the average temperatures in Minnesota have increased by almost 3 degrees (F) since 1895, and the 10 warmest years on record for Minnesota have occurred in the past 20 years. Increases in temperature are expected to continue.

Extreme weather events. Droughts are expected to increase in severity and lead to persistent dry conditions. Additionally, it is also predicted that intense rainfall events will increase, leading to flash floods. This will not ease drought conditions and could, in fact, lead to intensified flood-drought cycles.

3.7.7 VULNERABILITY ASSESSMENT

3.7.7.1 People

According to the National Drought Mitigation Center, droughts have both direct and indirect impacts on people. All individuals who live, work, and recreate within the county are at risk from the impacts of drought. Drought can lead to impacts on the water supply, and agriculture impacts. Health effects such as an increased risk of respiratory issues due to dry, dusty conditions can also impact residents of Ramsey County.

3.7.7.2 Property

Structures, utilities, and transportation are minimally impacted by drought. Drought's impacts on soils can impact home and building foundations; according to the Drought Impact Reporter (DIR), the Mankato Free Press reported on some Twin Cities homes having developed cracks in foundations and interior walls due to drought conditions in 2022. All property in the county is vulnerable to the impacts of drought.

Drought can also create water supply challenges by reducing groundwater availability for domestic and government uses. The DIR notes multiple instances since the year 2000 of water usage restrictions.

3.7.7.3 Environment

Drought is significantly impactful to the environment and natural resources. Long-term drought can impact lake and river levels. It impacts agriculture through crop loss, insect infestations, plant diseases, and wind erosion. Algae blooms occur in the river, and streams may be cut off. Environmental losses also include plants and wildlife, because air and water quality can plummet with associated dust, wildland fires, and habitat loss. Extreme heat alongside drought may amplify these impacts.

3.7.7.4 County and Community Operations

The impact of a drought on a community can be profound, impacting water supply, agriculture, economy, public health, and the environment. Drought can strain on water systems and infrastructure – increased demand and decreased supply can stress the water infrastructure, possibly leading to failure and the need to invest in costly maintenance and/or new infrastructure to ensure a reliable water supply. Drought can impact operations that requires water to function; a key example is the fire service. Drought can also reduce the availability of potable water, leading to water rationing and restrictions, for residential areas and agriculture.

3.7.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Water scarcity, leading to restricted access to potable water for drinking, hygiene, and sanitation.
- Increased health risks, including dehydration, malnutrition, and respiratory issues from poor air quality due to dust.
- Rising food prices and potential food shortages due to reduced agricultural output.
- Mental health impacts from prolonged stress, uncertainty, and potential displacement.

Impact on Responders

- Strain on emergency services to manage water distribution, firefighting, and health services. Increased demand for medical services due to heat-related illnesses and poor air quality.
- Challenges in managing public order, particularly if water shortages lead to unrest or conflicts over resources.

Continuity of Operations

- Disruption of water-dependent operations, including agriculture, industry, and public utilities.
- Need for water rationing or prioritizing critical services, such as healthcare and firefighting.
- Challenges in maintaining normal government operations due to resource scarcity and increased demands on infrastructure.

Impact on Property, Facilities, and Infrastructure

- Damage to infrastructure such as water treatment plants, reservoirs, and pipelines due to overuse or drying up.
- Increased wear and tear on buildings and roads due to heat stress and lack of moisture.
- Potential for increased fire hazards, leading to property loss and infrastructure damage.

Impact on the Environment

- Degradation of ecosystems, including loss of wetlands, forests, and wildlife habitats.
- Reduced water levels in rivers, lakes, and reservoirs, impacting aquatic life and biodiversity.
- Increased soil erosion and desertification, leading to long-term land degradation.

Impact on the Economy of the Jurisdiction

- Decreased river levels impacting movement of goods in/out of the county.
- Significant economic losses in agriculture, particularly in crop and livestock production.
- Reduced industrial productivity due to water shortages, impacting sectors like manufacturing, energy, and mining.

- Long-term economic downturn from loss of revenue, increased unemployment, and higher costs for water and food imports.

Impact on Public Confidence in the Jurisdiction's Governance

- Criticism of water management policies, including allocation, conservation, and infrastructure investment. Potential for social unrest or political challenges if the public perceives inequities or failures in drought response efforts.

3.8 Floods

3.8.1 PROFILE

Floods occur when water inundates land that is typically dry. This can occur during periods of intense rainfall, high tides coupled with storm surges, rapid snowmelt, or the failure of dams or levees. Damaging floods may happen with only a few inches of water, or it may cover a house to the rooftop. Flood events can develop in a matter of minutes or evolve over an extended timeframe, persisting for days, weeks, or more. Among all natural disasters related to weather, floods are the most frequent and have the broadest impact, often being the primary type of weather-related calamity affecting reservations.

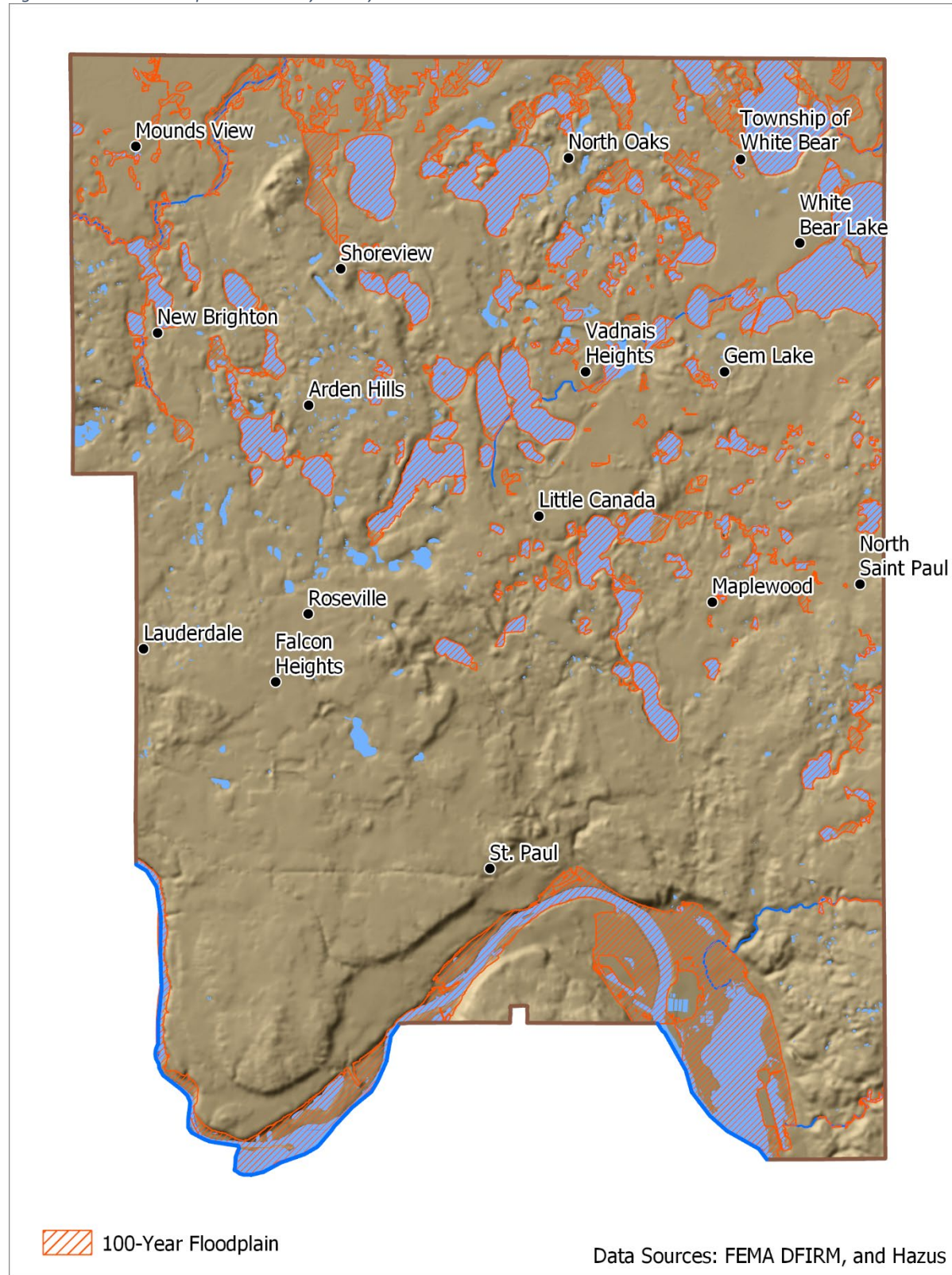
Flash or urban flooding occurs when storm sewers and other drainage systems are overwhelmed by the amount of rain falling in a short period of time. The National Weather Service (NWS) gives the advice “Turn Around, Don’t Drown” for flash floods. What makes flash floods dangerous is their sudden nature and fast-moving water.

Flooding is a hazard that can strike in any U.S. state or territory, as well as any global location prone to rainfall. In the United States, floods claim more lives annually than tornadoes, hurricanes, or lightning strikes. High-risk areas for flash floods include densely populated regions, vicinities adjacent to rivers, and locales near dams. Intense downpours have the potential to induce floods even on parched ground; areas recently affected by wildfires in mountainous regions are particularly vulnerable, and ice jams along with snowmelt are additional factors that can contribute to flash floods.

3.8.2 LOCATION

Those communities along the banks of the Mississippi, including the City of Saint Paul, are particularly vulnerable to riverine flooding.

Figure 6. 100-Year Floodplain in Ramsey County



Source: 2019 MHMP Ramsey County

The National Flood Insurance Program (NFIP) is a federal program that provides flood insurance to property owners, renters and business located in communities with mapped floodplains that opt to participate in the program. To participate in the NFIP, a community must:

- Adopt a floodplain ordinance that meets or exceeds minimum NFIP criteria, including regulations on land use, development controls, and building codes within the floodplain, as defined by the community's Flood Insurance Rate Map (FIRM).
- Pass a resolution of intent to participate in the program.
- Comply with FEMA minimum standards for floodplain management.
- Enforce enacted regulations.

The following Ramsey County communities participate in the NFIP:

- City of Arden Hills
- City of Blaine (Ramsey/Anoka County)
- City of Falcon Heights
- City of Gem Lake
- City of Lauderdale
- City of Little Canada
- City of Maplewood
- City of Mounds View
- City of New Brighton
- City of North Saint Paul
- City of Roseville
- City of Shoreview
- City of Spring Lake Park (Ramsey/Anoka Counties)
- City of St. Anthony (Ramsey/Hennepin Counties)
- City of Saint Paul
- City of Vadnais Heights
- City of White Bear Lake (Ramsey/Washington Counties)
- Township of White Bear

The City of North Oaks has a current effective map date of June 4, 2010, but is not a member of the NFIP.

3.8.3 EXTENT

In hazard analysis, the 100-year and 500-year floodplains maps are utilized for understanding flood risk and informing land-use planning, emergency response, and infrastructure development. These designations represent areas that have a 1% (100-year) and 0.2% (500-year) chance of flooding in any given year. These maps help identify areas most at risk of flooding, which is vital for minimizing damage and ensuring public safety.

100-Year Floodplain: This area is commonly used as the baseline for regulatory and insurance purposes. It is the standard by which flood insurance requirements are determined, and it guides zoning regulations, construction codes, and infrastructure projects. Because these areas are more likely to experience flooding, they are most often prioritized for flood prevention and mitigation measures.

500-Year Floodplain: Although the likelihood of flooding in these areas is lower, the 500-year floodplain helps to identify areas that could be affected by more extreme events, including critical infrastructure,

such as hospitals, emergency facilities, and power plants, where the consequences of flooding would be severe.

3.8.4 HISTORY

The National Climatic Data Center Storm Events Database was consulted for records of historical floods and flash flooding. The earliest records occurred in 1997. Since 1997, Ramsey County has experienced six major flood events, causing \$4.3 million in property damage and no injuries or fatalities. The county has also experienced fifteen major flash flood events causing over \$700k in property damage, one fatality and one injury. Figure 7 shows flood and flash flood history in Ramsey County.

Figure 7. Ramsey County Historical Floods, 1997 - August 2024

Location or County	Date	Type	Deaths	Injuries	Property Damage	Federally Declared Disaster
Saint Paul	7/5/2020	Flash Flood	0	0	Unknown	
Ramsey County	March – April 2019	Flood	0	0	unknown	Yes
Saint Paul	9/17/2015	Flash Flood	0	0	unknown	
Saint Paul	6/18/2014	Flood	0	0	\$1,900,000	Yes
Falcon Heights	6/21/2013	Flash Flood	0	0	unknown	
Saint Paul	6/21/2013	Flash Flood	0	0	unknown	
New Brighton	8/16/2011	Flash Flood	0	0	unknown	
White Bear Lake	7/16/2011	Flash Flood	0	0	\$500,000	
Ramsey County	3/16/2011	Flash Flood	Unk	Unk	Unknown	Yes
Little Canada	8/10/2010	Flash Flood	0	0	unknown	
Saint Paul	6/26/2010	Flash Flood	0	0	unknown	
Saint Paul	3/20/2010	Flood	0	0	\$2,400,000	Yes
Saint Paul	9/20/2007	Flash Flood	1	0	\$200,000	
Countywide	10/4/2005	Flash Flood	0	0	unknown	
Ramsey County	10/4/2005	Flood	0	0	unknown	
North Portion	9/21/2005	Flash Flood	0	0	unknown	
Ramsey Co.	6/20/2005	Flash Flood	0	0	\$2,000	
Saint Paul	6/25/2003	Flash Flood	0	0	unknown	
Vadnais Heights	7/28/2002	Flash Flood	0	0	unknown	

Location or County	Date	Type	Deaths	Injuries	Property Damage	Federally Declared Disaster
Ramsey County	5/1/2001	Flood	0	0	<i>unknown</i>	Yes
Ramsey County	4/1/2001	Flood	0	0	<i>unknown</i>	
Roseville	9/2/2000	Flash Flood	0	0	<i>unknown</i>	
Saint Paul	7/1/1997	Flash Flood	0	1	<i>unknown</i>	
Ramsey County	4/4/1997	Flood	0	0	<i>unknown</i>	

Source: NOAA National Centers for Environmental Information

Flooding in 2010 was caused by accumulating snowfall across the Upper Midwest and Northern Plains, with snowfall water equivalent amounts as high as six inches. Freezing temperatures broke in March of that year, accelerating melting and unleashing 3-6 inches of liquid water on the surface. Ice jams exacerbated flooding problems. The flooding caused \$2.4 million in property damages, and no deaths or injuries.

Flooding in 2014 directly impacted Saint Paul. Parts of Minnesota received 10-12 inches of rain over a week in June, which was anywhere from 400-600% above normal amounts. The Twin Cities had their wettest start of the year since 1871. Saint Paul Airport deployed a flood wall which closed two of their shorter runways. Due to floodwaters affecting downtown Saint Paul and covering Harriet Island, the Taste of Minnesota and 4th of July fireworks show were moved to different locations. High water on the Mississippi also forced the Minnesota Centennial Showboat to postpone a week of shows. This flooding caused \$1.9 million in property damages, and no deaths or injuries.

A flood’s crest is the level at which a river peaks before it starts to recede. Figure 8 shows historical flood crests for flooding in the Mississippi River at Saint Paul and South Saint Paul, as well as historical flood crests for Rice Creek in Mounds View.

Figure 8. Historical Flood Crests

Historical Flood Crests for Mississippi River at Saint Paul, MN		Historical Flood Crests for Mississippi River at South Saint Paul, MN		Historical Flood Crests for Rice Creek in Mounds View, MN	
Date	Height (Feet)	Date	Height (Feet)	Date	Height (Feet)
4/16/1965	26.01	4/29/2001	703.04	6/19/2014	12.25
4/15/1969	24.52	4/18/2001	703.03	8/16/2011	11.17
4/18/2001	23.76	4/13/1997	702.90	5/24/2012	10.49
4/30/2001	23.20	6/26/2014	700.94	5/19/2013	10.43
4/13/1997	22.37	6/25/1993	699.98	3/22/2010	9.55
4/16/1952	22.02	3/30/2011	698.95	7/6/2015	9.45
3/31/2013	20.19	3/24/2010	698.56		
6/29/2024	20.17 (P)	7/02/2013	694.84		
6/26/2014	20.13	6/03/2012	694.02		
		4/01/2009	693.87		

Source: NOAA Water Prediction Service

3.8.5 PROBABILITY

Minor flooding is an annual occurrence in Ramsey County. According to the Storm Events Database, six major flood events occurred over the 32-year period presented, with a probability of a major flood event every 5 years. Fifteen flash/urban flooding events occurred in the same period, presenting a probability of almost one major flash flood every two years. As storms become more severe and rainfall becomes heavier, these probabilities may increase.

3.8.6 CLIMATE CHANGE IMPACTS

Climate change could significantly impact riverine flooding through changes in seasonal and increased precipitation and intensity, changes in snowmelt and runoff patterns, increased stress on flood management infrastructure, such as dams, levees, and stormwater systems, and altered river and watershed dynamics. These changes may result in rising river levels, increased risk of flood-related damage, and more intense and frequent flooding events.

Similarly to potential changes to riverine flooding, climate change could also impact flash flooding through increased frequency and intensity of heavy rainfall, altered seasonal precipitation patterns, and stress on stormwater infrastructure. In addition, increased urbanization and expanded impervious surfaces, changes in land use and vegetation, and changing soil and drought cycles may lead to more frequent and severe flash floods, with higher runoff and rapid onset, particularly in urban areas of the county.

3.8.7 VULNERABILITY ASSESSMENT

3.8.7.1 People

Flash floods and river flooding can lead to injury or loss of life. In urban areas, rapidly rising water levels can trap residents in their homes, vehicles, or other spaces, often in immediate danger and requiring rescue. The poorest residents suffer disproportionately to flood situations, especially those who have been less able to fund homeowner's insurance to protect against flood losses. Mental health issues are experienced by people who have experience flood losses, including anxiety, fear, anger, anger, sadness and grief.

3.8.7.2 Property

Homes and businesses in low-lying areas and in flood-prone areas are at significant risk of flooding and damage. It is common for these structures to suffer structural damage, water in lower levels, and loss of personal property. Facilities in these areas can also see declines in property values and increased insurance costs.

Hazus runs from the 2019 plan estimate the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that may require accommodations in temporary public shelters. The model estimates 2,015 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 342 people (out of a total population of 508,640) may seek temporary shelter in public shelters.

Repetitive loss properties are defined as properties that have had 2 or more flood insurance claims of \$1,000 or more in any rolling 10-year period. Property owners are asked to consider mitigation activities such as acquisition, relocation, or elevation, among other options. FEMA's Repetitive Loss (RL) properties strategy is to eliminate or reduce the damage to property and the disruption to life caused by repeated flooding of the same properties. Property owners are notified of their status by FEMA.

There are two repetitive loss properties in Ramsey County, both located in the City of Saint Paul. Four losses have been recorded between the two properties, with an average payment of \$10,610. None are classified as "Severe Repetitive Loss" (SRL). An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least 4 NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- For which at least 2 separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
- For both (a) and (b) above, at least 2 of the referenced claims must have occurred within any 10-year period and must be greater than 10 days apart.

3.8.7.3 Environment

Detrimental environmental effects of flooding can include soil and bank erosion, bed erosion, siltation or landslides. It can damage vegetation and pollutants carried by flood water can impact on water quality,

habitats and flora and fauna. Flooding also brings with it the potential for contamination that leads to waterborne diseases, as well as hazardous material, raw sewage, and debris contamination. Flood waters often pollute drinking water supplies. When flood waters recede, toxic mold may remain, which can increase incidences of asthma and other respiratory distress. Flooding can however play a beneficial role in natural habitats.

3.8.7.4 County and Community Operations

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). However, none of Ramsey County's essential facilities (care facilities, fire stations, police stations and schools) included in the 2019 Hazus analysis are located within the flood boundary.

3.8.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Risk of drowning, injury, or death due to sudden and fast-moving floodwaters.
- Displacement of residents, leading to temporary or permanent relocation and the loss of personal property.
- Health risks from contaminated water, including waterborne diseases and hazardous materials.
- Disruption of daily life, including access to transportation, healthcare, and basic services.

Impact on Responders

- Increased danger to emergency responders operating in hazardous conditions, including swift water, debris, and unstable structures.
- Overextension of resources and personnel due to the immediate and widespread nature of the response required.
- Challenges in coordinating rescue and relief efforts, particularly in rapidly changing flood conditions and possible damage to roads, bridges, and other critical infrastructure.

Continuity of Operations

- Disruption of essential services, including power outages, water supply interruption, and communication failures.
- Challenges in maintaining public safety and order, particularly if critical infrastructure is compromised.
- Delays in recovery efforts due to damage to roads, bridges, and other transportation networks.

Impact on Property, Facilities, and Infrastructure

- Extensive damage or destruction of homes, businesses, and public buildings due to inundation and debris impact.

- Severe damage to critical infrastructure such as roads, bridges, sewage systems, healthcare, and electrical grids.
- High costs for repairs, reconstruction, and mitigation efforts, potentially overwhelming local resources.

Impact on the Environment

- Erosion of soil, riverbanks, and landscapes, leading to long-term ecological changes.
- Pollution of rivers, lakes, and groundwater with debris, chemicals, and sewage from floodwaters.
- Destruction of natural habitats, negatively affecting wildlife and biodiversity.

Impact on the Economy of the Jurisdiction

- Immediate economic losses from damage to commercial properties, agricultural lands, and infrastructure.
- Long-term economic challenges due to the cost of rebuilding and the potential for reduced investment and tourism.
- Potential loss of jobs and income.

Impact on Public Confidence in the Jurisdiction's Governance

- Erosion of public trust if the flooding is perceived as preventable or if the response is inadequate.
- Increased scrutiny of floodplain management, land-use planning, and emergency preparedness policies.

3.9 Geologic Hazards

3.9.1 PROFILE

A geologic hazard is an adverse geological condition causing damage or loss of property or life. These hazards only become hazards when they impact life or property and are very much a normal part of environmental processes. Ramsey County is at risk of a variety of geologic hazards, the most common of which are:

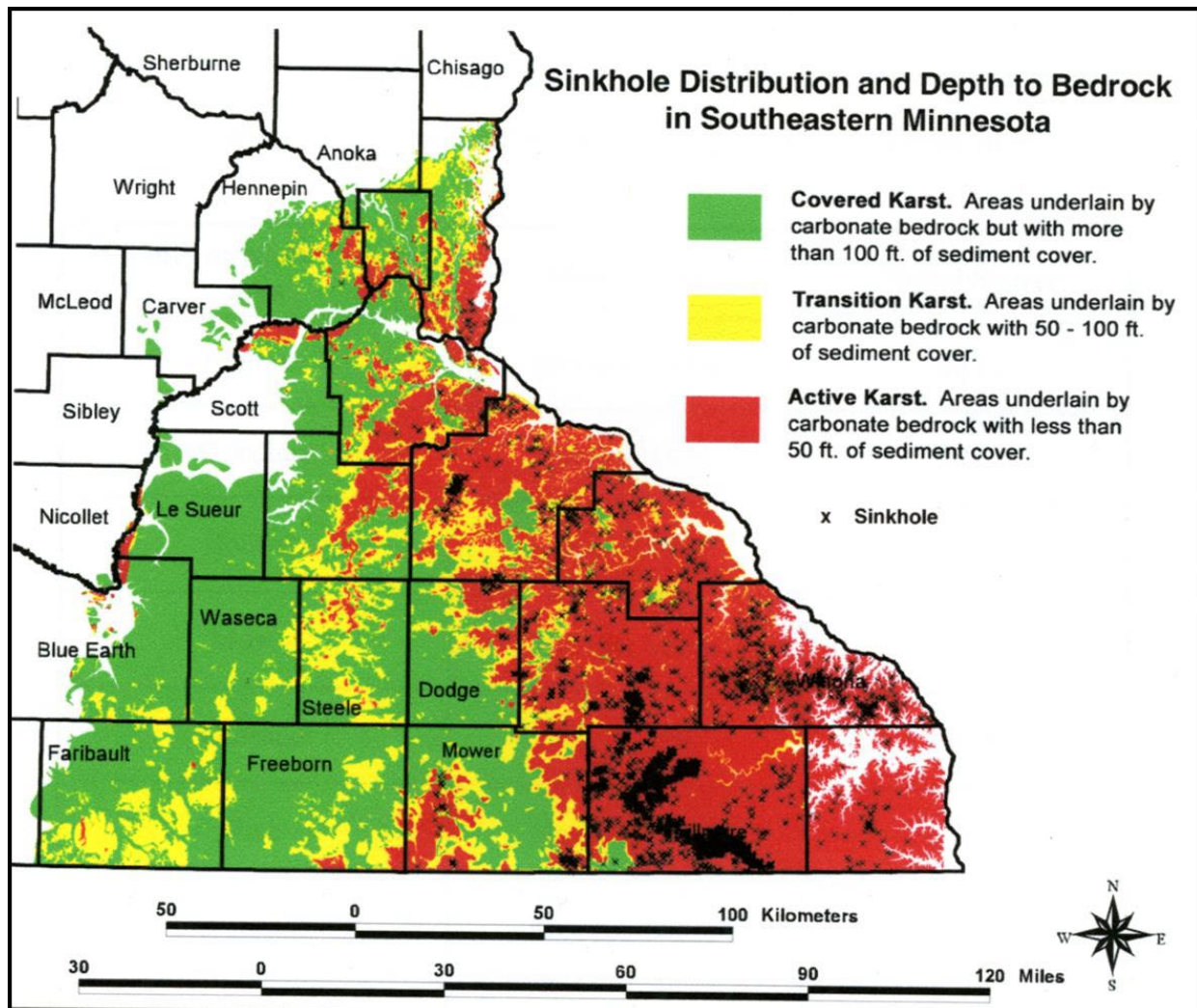
- **Landslide:** The downward movement of a mass of rock, soil, and debris along a slope or cliff face. This movement can range from gradual, slow displacement to rapid, catastrophic events. Landslides are typically triggered by factors such as heavy rainfall, earthquakes, volcanic activity, or human activities that destabilize slopes. Examples of landslides include rock falls and debris flows. According to the United States Geological Survey (USGS), the most common type of landslides in Minnesota are shallow slope failures that occur during heavy rain.
- **Land subsidence:** The gradual sinking or settling of the earth's surface, often due to the compaction of underground layers of soil, sediment, or rock. This phenomenon can occur naturally or be exacerbated by human activities such as groundwater extraction, oil and gas extraction, mining, or the drainage of organic soils. Examples of land subsidence include

sinkholes and soil compaction. According to the USGS, more than 80% of the identified subsidence in the United States is a consequence of human impact on subsurface water and is an often-overlooked environmental consequence of land and water-use practices. Increasing development can exacerbate subsidence problems and initiate new ones.

3.9.2 LOCATION

Parts of Ramsey County sit on a thick layer of limestone rock that is riddled with small holes and caves, known as karst topography. Its large rivers and hills also create many slopes and cliffs. Heavy surface rains may cause karst landscapes to fail causing landslides or sinkholes. Figure 9 shows karst distribution throughout Minnesota.

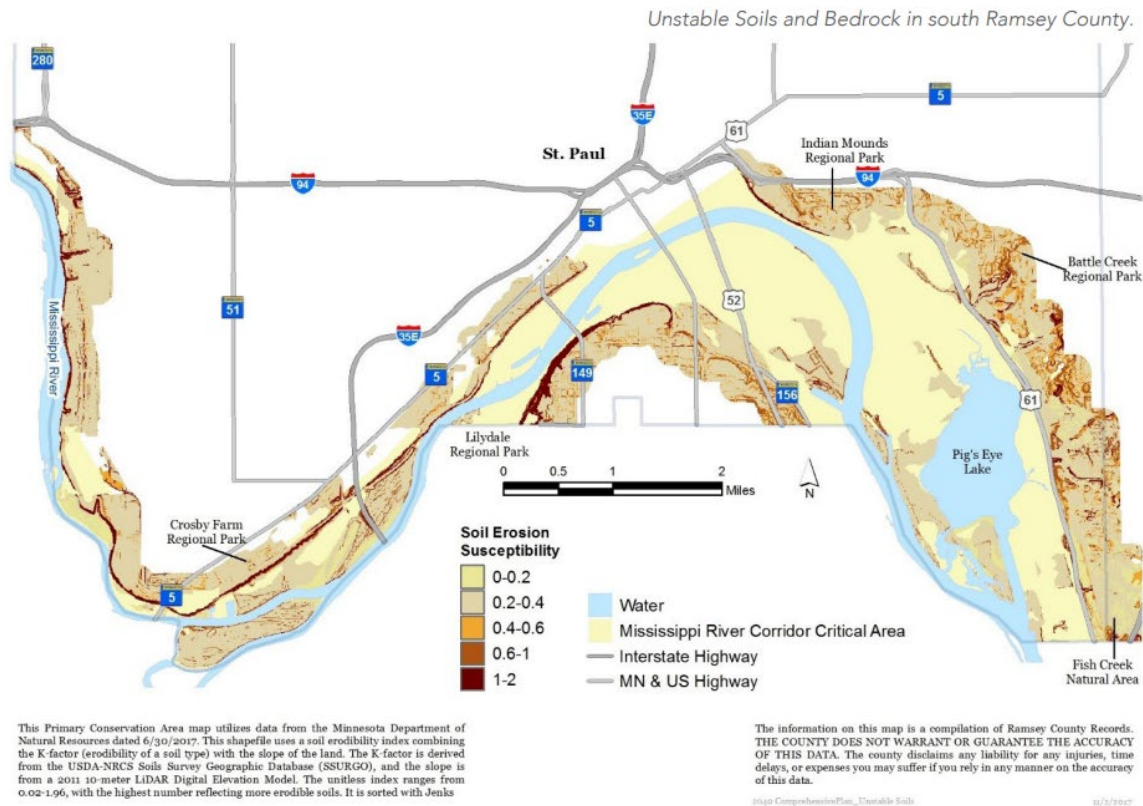
Figure 9. Karst Distribution in MN



Source: www.ramseycounty.us

Figure 10 displays unstable soils and bedrock in south Ramsey County.

Figure 10. Unstable Soils and Bedrock in South Ramsey County



Source: Ramsey 2040 Comprehensive Land Use Plan

3.9.3 EXTENT

3.9.3.1 Landslide

To determine the extent of a landslide hazard, it is essential to identify affected areas and assess the probability of a landslide occurring within a specified period. Key natural variables that influence landslide activity include soil properties, topographic position and slope, and historical occurrences. Predicting landslides remains challenging, even with ideal conditions and reliable data. Consequently, landslide hazards are often represented by landslide incidence and/or susceptibility, as defined below:

- Landslide incidence refers to the number of landslides occurring in a specific geographic area. A high incidence indicates that over 15% of the area has experienced landslides. Medium incidence means that 1.5% to 15% of the area has been affected, while low incidence indicates that less than 1.5% of the area has experienced landslides.
- Landslide susceptibility refers to the likelihood of geologic formations responding to natural or artificial alterations, such as slope cutting, loading, or unusually high precipitation. Areas with a history of numerous landslides are particularly vulnerable to new movements under these conditions. Susceptibility is influenced by slope angle and the underlying geologic material. It identifies potential landslide-prone areas but does not specify a time frame for when a landslide might occur. High, medium, and low susceptibility are categorized using the same percentages as landslide incidence: over 15% for high, 1.5% to 15% for medium, and less than 1.5% for low.

Common techniques for measuring and monitoring the extent of landslides include field surveys (e.g., geological mapping, slope measurements), remote sensing (e.g., satellite imagery, aerial photography), ground-based monitoring (e.g., GPS, inclinometers, extensometers), and Light Detection and Ranging (LiDAR).

3.9.3.2 Land Subsidence

Subsidence can develop gradually or suddenly due to natural processes, such as karst sinkholes in areas with soluble bedrock, or due to human activities. In the U.S., subsidence has affected over 17,000 square miles across 45 states, with annual costs estimated at \$125 million. The primary causes include aquifer-system compaction, organic soil drainage, underground mining, hydro compaction, natural compaction, sinkholes, and thawing permafrost.

Common techniques for measuring and monitoring the extent of land subsidence include geodetic surveys (e.g., leveling surveys, GPS/GNSS monitoring), remote sensing (e.g., Interferometric Synthetic Aperture Radar [InSAR], satellite imagery), borehole measurements (e.g., extensometers, piezometers), and LiDAR.

3.9.4 HISTORY

Ramsey County has a moderate history of impactful geologic incidents. The MN Department of Natural Resources (DNR) paper *Historical Landslide Inventory for the Twin Cities Metropolitan Area* was consulted for incident records.

Table 14. Significant Geological Hazard Events in Ramsey County, MN

Est. Date	Type	Location	Deaths/ Injuries	Property Damage	Description
May 13, 1879	Landslide	Saint Paul	u/k	u/k	Rock and sediment
July 28, 1892	Landslide	Saint Paul	u/k	u/k	Unknown
Winter 1969	Landslide	Saint Paul	u/k	u/k	Sediment
July 24, 1987	Landslide	Saint Paul	u/k	u/k	Glacial sediment. This was a late-night event associated with a slow-moving thunderstorm.
April 8, 2011	Landslide	Saint Paul	u/k	u/k	Rock. A boulder the size of two minivans struck and demolished a local bakery.
May 1, 2011	Landslide	Saint Paul	u/k	u/k	Glacial sediment and fill
May 22, 2013	Landslide	Saint Paul	2/4	u/k	Rock and sediment. A rockslide killed two and injured two fourth graders at Lilydale Regional Park. Two firefighters were also

Est. Date	Type	Location	Deaths/ Injuries	Property Damage	Description
					injured in the response.
June 19, 2014	Landslide	Saint Paul	u/k	u/k	Sediment. Heavy rainfall caused a landslide beneath a hospital at the University of Minnesota.
April 28, 2018	Landslide	Saint Paul	0/0	\$766k	An estimated 400,000 pounds of rock and soil came loose on the bluff to cover Wabasha Street between Plato Boulevard and Cesar Chavez Street.
9 Significant Incidents	--	--	2/4	\$766,000 total claimed	--

Sources: MN DNR and 2019 Ramsey MHMP

During Planning Meeting #2, members of the LPT noted a landslide in Gem Lake that caused disruption to nearby railroad tracks, although further research didn't find any written record of it.

3.9.5 PROBABILITY

Geologic hazard incidents are an occasional occurrence within Ramsey County. Six significant incidents have occurred since 1970, giving a probability of approximately an 11% chance of a significant geologic hazard incident occurring within any given year. During Planning Meeting #2, the LPT noted that mitigation of geologic hazard risks has been implemented across the county; as mitigation continues, probability of incidents will decrease.

3.9.6 CLIMATE CHANGE IMPACTS

Climate change can significantly influence geologic hazards in Ramsey County through various mechanisms. Here are some key impacts:

- Increased Frequency of Heavy Rainfall:** More intense and frequent heavy rainfall can saturate soils, increasing the likelihood of landslides, especially in areas with steep slopes or unstable terrain. It can also lead to more frequent and severe flooding, which can erode riverbanks and destabilize the ground, potentially triggering landslides and soil erosion. Heavy rains in Minnesota are now more frequent and intense than ever recorded. Long-term observation sites have shown significant increases in 1-inch and 3-inch rainfalls, as well as the heaviest annual rainfall events. Since 2000, the state has also experienced a notable rise in widespread extreme rainstorms. Rainfalls that historically ranked in the top 2% are becoming more common. Climate projections suggest that these heavy rains will continue to increase in the future.
- Temperature Extremes:** Increased variability in temperatures can lead to more frequent freeze-thaw cycles, which can cause soil and rock to expand and contract. This process can weaken slopes and contribute to landslides and rockfalls. Minnesota has warmed by 3.0°F between 1895 and 2020, with the most dramatic changes occurring in recent decades. Since 1970, nearly every

year has been warmer than the 20th-century average. Each of the top 10 warmest years on record occurred between 1998 and 2020. These warming trends are expected to continue through the 21st century.

- **Drought:** Extended periods of drought can dry out soils, making them more susceptible to erosion when rains do return. This can lead to a loss of fertile topsoil and increased sediment in waterways. Groundwater depletion during droughts can cause land subsidence, particularly in areas where groundwater is heavily relied upon for agriculture and other uses.
- **Changes in Vegetation:** Vegetation helps to stabilize slopes by binding soil with roots. Changes in vegetation patterns due to climate change, such as increased prevalence of invasive species or loss of native plants, can reduce slope stability and increase landslide risk. Northern tree species in Minnesota, such as paper birch, quaking aspen, balsam fir, and black spruce, may begin to decline and shift further north. In their place, warmer-climate species like maples, oaks, and hickories could become more prevalent. These shifts in tree cover will also bring changes to soil habitats.

By understanding these impacts, communities in the Ramsey County can develop more effective strategies for mitigating the risks associated with geologic hazards in the context of a changing climate.

3.9.7 VULNERABILITY ASSESSMENT

3.9.7.1 People

People living in areas with steep terrain are at greater risk of landslides, and those living in floodplains and river valleys may experience greater incidences of flooding and erosion, leading to increased risk of land subsidence and landslides. Additionally, populations in older cities and towns with aging infrastructure are more susceptible to damage from geologic hazards. Similarly, those living in affordable housing may be located in areas more prone to geologic hazards and may be less structurally resilient.

3.9.7.2 Property

In residential and commercial areas, houses and critical infrastructure built on or near steep slopes are vulnerable to landslides, especially during periods of heavy rainfall or rapid snowmelt. Subdivisions built on filled land or areas with unstable soils may be prone to over time. Infrastructure like roads and highways traversing hilly or unstable terrain are susceptible to landslides and slope failures, as are structures spanning rivers or valleys which can be impacted by erosion and subsidence, affecting stability and safety. Geologic hazards can threaten underground infrastructure such as pipelines for water, wastewater, gas, and electricity, as well as communication cables.

3.9.7.3 Environment

Landslides and subsidence can fragment habitats and disrupt ecosystems, affecting wildlife and plant communities. Sedimentation from landslides can degrade water quality in rivers, lakes, and streams, impacting aquatic ecosystems and drinking water sources. Finally, erosion and sedimentation can reduce soil fertility and agricultural productivity, affecting food security and livelihoods.

3.9.7.4 County and Community Operations

Roads, bridges, and railways are essential for transporting goods and people. Landslides and land subsidence can block roads or damage bridges, disrupting transportation and emergency response efforts. Utility and communication system grids can be damaged, leading to service interruptions and potentially affecting public health and safety.

3.9.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Risk of injuries or fatalities from sudden landslides or gradual subsidence leading to ground collapse.
- Evacuation and temporary relocation of residents from affected areas.
- Mental health impacts from displacement and trauma; physical health risks from injuries or exposure to hazardous conditions.

Impact on Responders

- Difficult terrain and unstable ground conditions hindering emergency response efforts.
- Increased risk to responders working in unstable areas prone to further landslides or subsidence.
- Need for specialized equipment and training to safely conduct rescue and recovery operations.

Impact on Continuity of Operations

- Disruption to government services and operations located in or near affected areas.
- Potential interruption of critical infrastructure systems, including utilities and transportation networks, if located in landslide or subsidence zones.

Impact on Property, Facilities, and Infrastructure

- Structural damage or total destruction of buildings located in landslide or subsidence zones.
- Damage to schools, hospitals, and other public facilities, necessitating repairs or reconstruction.
- Road closures, rail line disruptions, and damage to bridges affecting mobility and logistics.
- Damage to water, gas, and electricity lines, leading to service outages and potential hazards.

Impact on the Environment

- Disruption to local ecosystems and wildlife habitats due to ground movement and landscape alteration.
- Increased erosion, sedimentation of water bodies, and potential contamination from disrupted underground utilities.
- Loss of vegetation cover contributing to further erosion and destabilization of slopes.

Impact on the Economy of the Jurisdiction

- Decrease in property values in high-risk areas, impacting homeowners and local tax revenue.
- Disruption to local businesses, leading to financial losses, job displacement, and reduced economic activity.
- Significant expenses for rebuilding and repairing damaged infrastructure and properties.
- Increased insurance premiums and potential difficulty in obtaining coverage for properties in high-risk zones.

Impact on Public Confidence in the Jurisdiction's Governance

- Public perception of the government's ability to manage and mitigate geologic hazards effectively.
- Importance of clear and timely communication with the public regarding risks, mitigation measures, and response efforts.
- Potential for increased scrutiny of government officials and policies, leading to political challenges or changes in leadership.

3.10 Hazardous Materials

3.10.1 PROFILE

Materials considered hazardous are commonly and safely used across communities daily. When a chemical or other substance that may harm health or the environment has been released into the air, water or ground, it is considered a hazardous materials incident. Incidents can occur when materials are being produced, stored, transported, used, or disposed of. Most hazardous incidents are quickly, easily and safely contained; however, potential exists for longer lasting and harmful incidents. This chapter focuses on the following types of incidents:

- **Spills:** Accidental release of hazardous substances can lead to contamination of soil, water, and air.
- **Pipelines:** Leaks or ruptures in pipelines can release hazardous materials into the environment.
- **Trucking:** Transportation accidents involving trucks can result in the release of hazardous cargoes.
- **Railways:** Train derailments or collisions can lead to significant spills of hazardous materials.

3.10.2 LOCATION

Due to the unexpected nature of a hazardous materials event, the entirety of Ramsey County would be considered at risk for these types of events. Hazardous materials incidents are classified as either fixed incidents or mobile incidents. Approximately 80%-90% of incidents occur at fixed sites, such as factories and storage facilities. Impacts are typically limited to the site itself, and the immediate surrounding area. Ramsey County is home to a number of chemical plants and facilities, ranging from manufacturing to processing and distribution of chemicals, including 3M Company Headquarters in Maplewood, Ecolab Inc. in Saint Paul, and HB Fuller, located in Vadnais Heights. There are also several large waste and

recycling facilities in the county which handle various types of waste, including hazardous materials. The notable facilities include the Ramsey County Recycling and Energy Center and the Ramsey County Household Hazardous Waste Facility. Other adjacent facilities and private waste management companies also pose hazardous materials risks. Ramsey County is home to several major including on the University of Minnesota, Saint Paul Campus, 3M Company, MN Department of Public Health Laboratory, and EcoLab. Hospitals and healthcare facilities can also be sites for hazardous materials incidents. A number of hospitals and health care facilities located within Ramsey County handle materials as part of their regular operations.

The remainder of incidents occur while a material is in transit. These incidents can occur on major roadways, railways, or in pipelines. The following are the most likely locations for mobile accidents to occur within the county:

- **Transportation Routes**
 - Roadways – Ramsey County is served by a number of major roadways including Interstates 94 (I-94), 35E (I35E), and 694 (I-694); US Highways 52 and 61; and MN State Highways 36 (MN-36), 51 (MN-51), and 280 (MN-280). Additionally, there are a number of major county roads that transverse the region as well.
 - Intersections/Interchanges – Major intersections/interchanges in Ramsey County include I-94 and I-35E, I-94 and MN-280, and I-694 and I-35E. Other significant urban and suburban intersections are located across the county as well.
 - Bridges and Overpasses – Ramsey County has a number of key bridges and overpasses including a number that span the Mississippi River and interstate and highway overpasses.
 - Railroads – Ramsey County is a significant hub for rail transportation in the region, with BNSF Railway, Union Pacific Railroad, Canadian Pacific Railway, and Amtrak providing freight and passenger services with the county.
 - Airports – While the major airport that services Ramsey County (Minneapolis – Saint Paul International Airport (MSP)) is located in adjacent Hennepin County, portions of Ramsey County will be in the flight path for MSP. In addition, there are two smaller airports located within the County: Saint Paul Downtown Airport (STP) and Lake Elmo Airport.
- **Pipelines**
 - Oil and Gas Pipelines – Oil and gas pipelines are present in Ramsey County, including natural gas and petroleum products, such as gasoline, diesel, and jet fuel.

3.10.3 EXTENT

The extent of a hazardous material event can vary widely depending on several factors including physical area affected, environmental impact, population affected, duration, severity of health risks, economic impact, infrastructure affected, response required, and legal and regulatory implications.

Hazardous materials are organized into nine classes:

- **Class 1: Explosives**

- Class 2: Gases
- Class 3: Flammable Liquids
- Class 4: Flammable Solids
- Class 5: Oxidizer
- Class 6: Poisonous Materials
- Class 7: Radioactive Materials
- Class 8: Corrosive Materials
- Class 9: Miscellaneous Hazardous Materials

Figure 11. Hazardous Materials Classes



Source: Federal Motor Carrier Safety Administration

3.10.4 HISTORY

Ramsey County has experienced several notable hazardous materials incidents in recent years, including:

- **University Avenue Chemical Spill.** Occurring in Saint Paul in November 1992. A tanker truck carrying hazardous chemicals overturned on University Avenue, causing a significant spill of industrial solvents. This led to an evacuation of nearby businesses and residents, traffic disruption, and road closures for several hours. The spill was contained and cleaned but did pose a risk to public health and the environment.
- **H.B. Fuller Plant Fire (2002).** Occurring in June 2002 at the H.B. Fuller Company plant in Vadnais Heights. A fire broke out at the H.B. Fuller adhesive manufacturing plant, causing the release of hazardous fumes and chemicals. This led to the evacuation of employees and nearby residents

due to the risk of toxic smoke inhalation, resulting in significant property damage and concerns about air quality.

- **Saint Paul Riverfront Chemical Leak.** Occurring in May 2007 in the riverfront industrial area in Saint Paul. A leak of anhydrous ammonia occurred at an industrial facility near the Mississippi River. This release led to the evacuation of nearby residents and workers and raised concerns about industrial safety and environmental protection along the riverfront.
- **BNSF Railway Chemical Spill.** Occurring in September 2010 at the BNSF Railway yard, Saint Paul. A derailment of a train carrying hazardous materials occurred at the BNSF Railway yard, causing a spill of chemicals, including sulfuric acid. This spill required the evacuation of the immediate area and the deployment of hazmat teams to contain and clean up the hazardous substances. The incident disrupted rail operations and posed a risk to public health and the environment, prompting concerns about potential groundwater contamination and air quality.
- **Energy Park Drive Industrial Fire.** Occurring in July 2015, in the industrial area along Energy Park Drive, Saint Paul. A fire at an industrial facility led to the release of hazardous smoke and chemicals, prompting the evacuation of workers and nearby residents. The incident caused significant property damage and raised concerns about industrial safety and emergency preparedness.

A search was run for incidents recorded by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Between 1980 and August 2024, the PHMSA database records 1,828 separate mobile hazardous materials incidents both large and small occurring in the county. Of these, 1,692 occurred on a highway, 95 occurred on rail lines, 39 occurred in the air, and one occurred on the water.

3.10.5 PROBABILITY

Determining the exact probability of a hazardous materials incident is challenging due to the variability of factors involved. Smaller hazardous materials incidents are likely to occur frequently due to the large volume of hazardous materials in the county, but a widespread event is less likely to occur due to the controls and regulations in place at larger facilities. The following considerations may influence the likelihood of such incidents:

- Presence of industrial facilities, including chemical plants and refineries
- Major transportation routes, such as highways, railways, and waterways
- Population density in urban areas

It is safe to say that minor hazardous materials incidents are a relatively routine occurrence across the county. Large-scale hazardous materials incidents are much rarer.

3.10.6 CLIMATE CHANGE IMPACTS

Climate change has the potential to increase the number of hazardous materials incidents, due to changes in population, environment, and production capacity. It is also expected that climate change impacts may exacerbate the impacts of the incidents themselves, depending on the weather, location and type of material.

3.10.7 VULNERABILITY ASSESSMENT

Vulnerability in a hazardous materials incident is highly contingent on the location of the incident and the substance released.

3.10.7.1 People

- Health Risks - Hazardous materials can be toxic, flammable, corrosive, or reactive, posing immediate and long-term health risks. Hazardous materials vary greatly in the types of health risks they pose to humans, including the following potential health risks from hazardous materials: thermal, radiological, asphyxiation, chemical, etiological, or mechanical (TRACEM).
- Population Density – Areas with high population density, including much of Ramsey County, can increase the number of people potentially impacted by a hazardous material incident.
- Proximity to Facilities – Communities located near industrial plants, chemical storage facilities, transportation routes, or waste disposal sites are at a greater risk of exposure. There are a significant number of transportation routes (both rail and road) that traverse the county, on which hazardous materials are carried every day. The City of Roseville has several fuel tank facilities, with approximately 370 semi-trucks, carrying hazardous materials, entering and exiting on a daily basis.

3.10.7.2 Property

- Damage to infrastructure – Hazardous materials can cause significant damage to buildings, roads, bridges, and other infrastructure. Corrosive chemicals can degrade materials, and explosions and fires can cause widespread damage.
- Economic Costs – the economic impact of hazardous materials incidents can be substantial, including cleanup, property devaluation, and business interruptions.
- Long-term contamination – Contamination can persist in buildings and infrastructure, rendering them unusable or requiring costs decontamination or demolition efforts.

3.10.7.3 Environment

- Water contamination – Hazardous materials can seep into groundwater or run off into rivers, lakes, and reservoirs, contaminating drinking water and impacting aquatic ecosystems. Jurisdictions, such as Gem Lake, utilize a well water infrastructure, and spills impacting groundwater could have significant impacts to drinking water.
- Soil degradation – Hazardous material incidents can lead to soil contamination which can affect plant growth and soil health. Contaminants can persist in the soil for long periods of time which can make land unsuitable for habitation and/or agriculture.

- Air pollution – Hazardous gases or particulates can be released into the air. These can impact air quality and pose respiratory risks for humans and animals.
- Ecosystem disruption – Toxic substances can disrupt ecosystems, reduce biodiversity, and affect food chain, possibly causing long-term ecological imbalances.

3.10.7.4 County and Community Operations

A hazardous materials incident can have a significant impact on a community. The impacts can be immediate, short-term, and long-term, affecting various aspects of the community including health, environmental, economy, and social well-being.

3.10.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Immediate and long-term health risks, including exposure to toxic substances, chemical burns, respiratory issues, or poisoning.
- Potential for widespread panic or fear due to the nature of the hazardous material.
- Evacuation of affected areas, leading to temporary displacement and disruption of daily life.

Impact on Responders

- High risk of exposure to hazardous materials, requiring specialized protective equipment and training.
- Challenges in managing the scene, including containment, decontamination, and medical treatment.
- Potential injuries or fatalities among responders due to the dangerous nature of the incident.
- Strain on emergency response resources, including medical facilities, hazmat teams, and fire services.

Continuity of Operations

- Disruption of critical services, including transportation, healthcare, and public utilities, due to contamination or evacuation.
- Potential shutdown of government buildings or facilities in the affected area, delaying administrative functions.

Impact on Property, Facilities, and Infrastructure

- Contamination of buildings, public spaces, and infrastructure, leading to costly cleanup and decontamination efforts.
- Potential destruction or long-term damage to property due to explosions, fires, or chemical corrosion.
- Temporary or permanent closure of affected facilities, impacting businesses, schools, and public services.

- Long-term implications for infrastructure integrity if materials seep into soil, groundwater, or air systems.

Impact on the Environment

- Contamination of air, water, and soil, potentially affecting large areas and leading to short- and long-term ecological damage.
- Destruction of natural habitats, with harmful effects on wildlife and plant life.
- Challenges in restoring affected environments, with potential for lasting degradation of ecosystems.
- Risk of bioaccumulation of hazardous substances in the food chain, affecting both wildlife and human populations.

Impact on the Economy of the Jurisdiction

- Significant economic losses due to business closures, property damage, and costs associated with cleanup and decontamination.
- Potential long-term economic downturn if the incident affects key industries in the region.
- Increased healthcare costs due to treatment of affected individuals and long-term health monitoring.
- Potential decrease in property values and attractiveness of the area for investment or development.

Impact on Public Confidence in the Jurisdiction's Governance

- Erosion of public trust if the incident is perceived as preventable or if the response is seen as inadequate.
- Increased scrutiny and criticism of regulatory and oversight agencies responsible for hazardous materials management.
- Pressure to improve safety regulations, emergency response capabilities, and communication strategies to prevent future incidents.

3.11 Summer Weather Hazards

3.11.1 PROFILE

The summer weather hazards chapter encompasses natural weather hazards most likely to occur in the spring and summer months. The most common types of summer weather hazards experienced in Ramsey County are described below.

- **Extreme heat:** The NWS does not have a set definition for extreme heat, but instead calibrates the point at which forecasters warn residents based on the region's climate. For central states, including Minnesota, Heat Advisories are issued when the heat index exceeds 100 degrees. Excessive Heat Warnings are issued when the heat index exceeds 105 degrees.

- **Heatwave:** Heatwaves are periods of abnormally hot weather generally lasting more than two days. Heat waves can occur with or without high humidity.
- **Hail:** Hail forms inside a thunderstorm or other storms with strong updrafts of warm air and downdrafts of cold water. If a water droplet is picked up by the updrafts, it can be carried well above the freezing level. Water droplets freeze when temperatures reach 32 degrees Fahrenheit (°F) or colder. As the frozen droplet begins to fall, it may thaw as it moves into warmer air toward the bottom of the thunderstorm. However, the droplet may be picked up again by another updraft and carried back into the cold air and refreeze. With each trip above and below the freezing level, the frozen droplet adds another layer of ice. The frozen droplet, with many layers of ice, falls to the ground as hail. Most hail is small and typically less than two inches in diameter.
- **Lightning:** Lightning is a bright flash of electrical energy produced by a thunderstorm. All thunderstorms produce lightning and are very dangerous. Lightning ranks as one of the top weather killers in the U.S., where an average of 300 people are injured and 80 are killed each year. Lightning can occur anywhere there is a thunderstorm, often strikes outside the heavy rain in a thunderstorm, and may occur as far as 10 miles away from any rainfall.

Note that a single summer weather event may include one or more of these hazards.

3.11.2 LOCATION

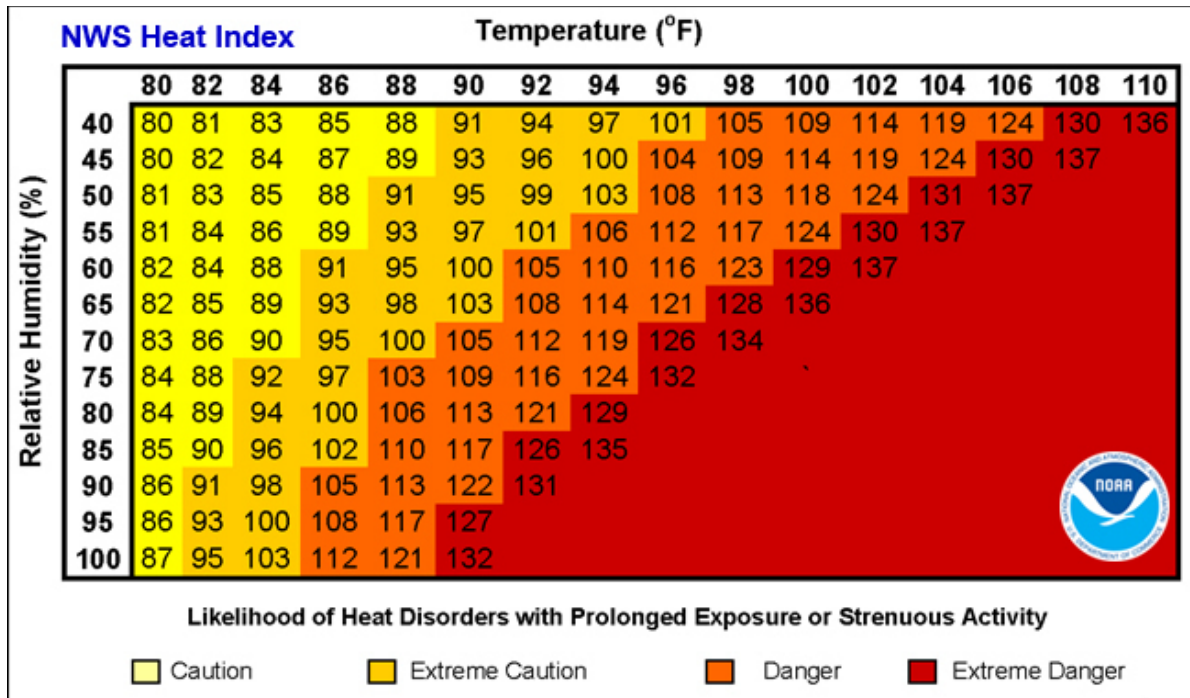
All communities within Ramsey County are vulnerable to summer weather.

3.11.3 EXTENT

3.11.3.1 Extreme Heat and Heatwaves

Each NWS Forecast Office issues heat-related alerts as needed. Local offices often work with partners to decide when to issue an alert for a specific area. The Heat Index is a measure of how hot it feels when factoring in the relative humidity at a given location. This can be used as a decision-making tool when issuing heat-related products. The Heat Index is provided as Figure 12.

Figure 12. Heat Index



Source: www.weather.gov

Heat-related products are described in Table 15.

Table 15. NWS Heat-Related Products

Product	Description
Excessive Heat Warning—Take Action!	An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least 2 days and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you may become seriously ill or even die.
Excessive Heat Watches—Be Prepared!	Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
Heat Advisory—Take Action!	A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least 2 days, and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat

	conditions. Take precautions to avoid heat illness. If you don't take precautions, you may become seriously ill or even die.
Excessive Heat Outlooks—Be Aware!	The outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead time to prepare for the event.

Source: www.weather.gov

3.11.3.2 Hail

Hail size typically refers to the diameter of the hailstones. Warnings and reports may report hail size through comparisons with real-world objects that correspond to certain diameters. To be considered severe, hail stones must be at least 1 inch in diameter. Hail naming convention, damage estimate, description, and size are provided in Table 16.

Table 16. Hail Descriptions and Damage Estimates

Hail Name	Damage	Description	Diameter (in.)
Small Hail	Unlikely	Pea	0.25
		Marble or Mothball	0.50
		Penny or Dime	0.75
		Nickel	0.88
Large Hail	Minor damage	Quarter	1.00
		Half Dollar	1.25
		Walnut or Ping Pong Ball	1.50
		Golf ball	1.75
Very Large Hail	Moderate damage	Hen's Egg	2.00
		Tennis Ball	2.50
		Baseball	2.75
Giant Hail	Major damage	Teacup	3.00
		Grapefruit	4.00
		Softball	4.50

Source: www.weather.gov

3.11.3.3 Lightning

The threat of lightning is largely based on the likelihood that cloud-to-ground lightning (CG) from thunderstorms will occur combined with the anticipated flash rate. With CG lightning, every strike is potentially lethal and has the potential to contribute to other hazards such as wildfire. Flash rate is defined in Table 17.

Table 17. CG Lightning Flash Rate

Term	Description
Occasional	CG lightning at the rate of 1 to 3 flashes per minute (about 5 to 15 flashes per 5 minutes) associated with a given lightning storm.

Frequent	CG lightning at the rate of 4 to 11 flashes per minute (about 20 to 55 flashes per 5 minutes) associated with a given lightning storm.
Excessive	CG lightning rate of 12 flashes or more per minute (about 60 flashes or more per 5 minutes) and is nearly continuous associated with a given lightning storm.

Source: www.weather.gov

Lightning risk is also defined as low, moderate, or high as shown in Table 18.

Table 18. Lightning Risk

Level	Definition
Low Risk	Atmospheric conditions do not support frequent cloud-to-ground lightning strikes.
Moderate Risk	Thunderstorms are forecast to be scattered in coverage (30-50% chance). Atmospheric conditions support frequent cloud-to-ground lightning strikes.
High Risk	Thunderstorms are forecast to be numerous or widespread in coverage (60-100% chance). Atmospheric conditions support continuous and intense cloud-to-ground lightning strikes.

Source: www.weather.gov

3.11.4 HISTORY

Ramsey County has a significant history of damaging windstorms and tornadoes. The National Centers for Environmental Information (NCEI) Storm Events Database was consulted for incident records.

According to NCEI records, there have been 243 significant summer weather incidents reported between 1950 and July 2024. This dataset recorded five deaths and two injuries since 1950. Notable summer weather hazard incidents since 1950 are displayed in Table 19.

Table 19. Notable Summer Weather Hazard Incidents in Ramsey County, MN

Date	Type	Deaths/ Injuries	Property Damage	Description
August 9, 1998	Lightning	1/0	None reported	One man died because of a lightning strike while under a tree.
May 1, 2001	Hail	0/0	\$2M	Numerous vehicles and buildings were damaged.
June 7, 2005	Lightning	0/0	None reported	Lightning struck a home on Timberline Trail. The northwest corner of the home caught fire and sheetrock fell on a person lying in bed.
August 8, 2005	Lightning	0/0	None reported	Lightning struck a home and a nearby tree on Whitaker Street. The bolt that struck the home damaged the electrical equipment inside. The bolt that struck the tree caused the tree to split in two, and one of the pieces fell through a window.

Date	Type	Deaths/ Injuries	Property Damage	Description
July 24, 2009	Hail	0/0	\$15k	A strong cold front moved through the region Friday morning and generated a line of strong to severe thunderstorms that affected areas from far east central Minnesota, into west central Wisconsin. Several reports of golf ball size hail were observed in the east metro of the Twin Cities.
September 21, 2010	Hail	0/0	\$5M	Several reports of large hail, up to the size of half dollars, occurred from the Highland Park area of Saint Paul, northeast across the north side of the city.
August 25, 2013	Excessive Heat	0/216	None reported	Heat indices of 105° F occurred during the Minnesota State Fair. 216 people were treated at State Fair medical aid stations for heat-related illnesses. Of those 216, 10 were transported to area hospitals. Minneapolis schools also canceled outdoor athletic practices during this period of extreme heat.
July 2015	Extreme Heat	0/0	None reported	Several observations across Ramsey County measured heat indices over 105° F for two days in a row. The highest heat index value was 116° F.
8 Significant Incidents	-	1/216	\$7,015,000 total claimed	--

Sources: NCDC; 2019 Ramsey MHMP

3.11.5 PROBABILITY

Summer weather hazards are an annual occurrence and are likely to occur each year. Eight significant summer weather incidents have occurred since 1970, giving a probability of approximately a 14.5% chance of a significant summer weather incident occurring within any given year.

3.11.6 CLIMATE CHANGE IMPACTS

Climate change is expected to have dramatic impacts on weather patterns in Minnesota. These include more extreme weather patterns, including increased periods of extreme heat, enhanced lightning activity, changes in hail patterns and more intense storms. Climate change could have the following impacts:

- **Increased Extreme Heat:** This includes more frequent and severe heatwaves, higher average summer temperatures, and longer duration of hot spells. Minnesota is getting warmer, especially winter nights in the northern parts of the state. Daily average minimum temperatures during winter (Dec-Feb) have increased 4.9 degrees in southern Minnesota.
- **Enhanced Lightning Activity:** Increased atmospheric instability may lead to more thunderstorms, with higher temperatures and humidity levels contributing to more frequent lightning strikes.

- **Changes in Hail Patterns:** There is the potential for increase in the size and frequency of hail due to more intense thunderstorms, as well as shifts in the geographic distribution of hailstorms.
- **More Intense Storms:** Greater frequency of severe thunderstorms with high winds and heavy rainfall and subsequent increased risk of flash flooding.
- **Health Risks:** Extreme heat can lead to increased heat-related illnesses and mortality and a higher risk of respiratory problems due to poor air quality. Higher temperatures can exacerbate air quality issues, leading to more smog and ground-level ozone.
- **Economic Costs:** Rising temperatures create a greater demand for energy to cool homes and businesses, and there may be increased costs for repairing damage from severe weather incidents. Ecosystem impacts can have trickle down effects on related industries such as fishing and tourism. Likewise, agricultural impacts affect the agricultural and farming sectors.
- **Ecosystem Disruptions:** Increased heat, along with more frequent, intense, and prolonged storms, may alter plant and animal behavior and distribution by stressing native species and ecosystems. Over the past 50 years, Minnesota lakes have lost an average of 10 to 14 days of ice cover, and July-August water temperatures have risen by 3.0 to 3.9°F, impacting lake and fish health. Algae blooms, exacerbated by warmer water, can deplete oxygen levels, suffocating fish, even those species like bass that typically thrive in warmer conditions. Northern tree species such as paper birch, quaking aspen, balsam fir, and black spruce may decline and migrate further north, while warmer-climate species like maples, oaks, and hickories could take their place. These shifts in tree cover will also lead to changes in wildlife and soil habitats.

While the exact relationship between climate change and summer weather is complex and still under active research, the evidence suggests that climate change is likely to impact the frequency, intensity, and distribution of summer weather hazards in the Midwest. Improved understanding and modeling of these changes are essential for developing effective mitigation and adaptation strategies.

3.11.7 VULNERABILITY ASSESSMENT

3.11.7.1 People

Extreme heat poses serious health risks, particularly for the elderly, children, and those with pre-existing health conditions, as well as people without access to air conditioning. Extreme heat is the leading weather-related killer in the United States, killing more people than other types of extreme weather. Changing temperatures bring illnesses related to frequency and severity of allergic illnesses (e.g., asthma and hay fever). Prolonged heatwaves can lead to heat exhaustion, heatstroke, and increased mortality rates. During the second planning meeting, attendees noted that in Ramsey County, many of the recent immigrants are not used to hotter weather and often live many people to a home, often without air conditioning.

Hailstorms, often accompanying severe thunderstorms, can cause significant injury to individuals caught outside and disrupt daily activities. Lightning presents another serious threat, with the potential to cause direct injuries or fatalities and ignite fires, posing additional risks to both urban and rural communities.

3.11.7.2 Property

Extreme heat can cause asphalt and concrete to buckle, strain power grids due to increased air conditioning usage, and degrade building materials, leading to higher maintenance and repair costs. Hailstorms pose a significant threat to homes, vehicles, and agricultural assets, often resulting in shattered windows, damaged roofs, and destroyed crops. These storms can also disrupt transportation networks and necessitate costly repairs. Lightning strikes can cause power outages, fires, and severe damage to electrical and communication systems.

3.11.7.3 Environment

The environment in the Midwest is particularly vulnerable to summer weather hazards such as extreme heat, hail, and lightning. Extreme heat can lead to drought conditions, stressing water resources, and reducing soil moisture, which negatively impacts plant and animal life. Prolonged high temperatures can also alter ecosystems, driving some species to migrate while threatening others that cannot adapt quickly enough. Hailstorms can cause significant physical damage to vegetation, strip leaves from trees, and destroy crops, disrupting local ecosystems and agricultural productivity. Lightning, besides posing a direct threat to wildlife, can ignite wildfires, which rapidly spread and devastate large areas of forest and grassland, leading to habitat loss and long-term ecological shifts. These summer weather hazards collectively strain the resilience of the Midwest's natural environment, disrupt the balance of local ecosystems, and contribute to biodiversity loss.

3.11.7.4 County and Community Operations

Government and community operations in the Midwest are significantly vulnerable to summer weather hazards such as extreme heat, hail, and lightning. Extreme heat can overwhelm public health systems with heat-related illnesses and fatalities, strain energy resources due to increased air conditioning use, and disrupt daily operations in schools, government buildings, and public transportation. Hailstorms can cause extensive damage to public infrastructure necessitating costly repairs and diverting funds from other essential services. Lightning can disrupt power and communication networks, leading to outages that hinder emergency response efforts and critical services. These disruptions can impede the delivery of essential services, compromise public safety, and place a significant financial burden on local governments. The number of languages spoken in the county makes public messaging difficult.

3.11.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Increased risk of heat-related illnesses and fatalities, especially among vulnerable populations (elderly, children, and those with pre-existing health conditions).
- Potential overburdening of healthcare facilities due to heat-related emergencies.
- Disruption of daily activities and potential evacuation of individuals from areas without adequate cooling facilities.
- Extreme heat creates heat-related physical stress on the population and is exacerbated in the metropolitan areas where greater amounts of heat-absorbing surfaces (e.g., asphalt and

concrete) trap heat and emit higher temperatures throughout the night. Injuries from hailstones or lightning, particularly if individuals are caught outdoors.

- Damage to personal vehicles and homes leading to financial strain on households.
- Risk of lightning strikes causing injuries or fatalities to individuals outdoors.
- Potential for lightning-induced fires affecting residential areas and leading to evacuations.

Impact on Responders

- Increased risk of heat exhaustion, heatstroke, and hail or lightning strikes among emergency responders.
- Need for additional resources and protocols to ensure responder safety in high temperatures.

Impact on Continuity of Operations

- Potential for power outages due to increased demand for electricity (air conditioning).
- Need for implementation of heat emergency plans and continuity strategies.
- Possible damage to government buildings, vehicles, and communication systems.
- Disruption of essential services and potential delays in government response and recovery efforts.

Impact on Property, Facilities, and Infrastructure

- Strain on power grids and potential infrastructure failures due to high heat.
- Significant damage to buildings, vehicles, and outdoor infrastructure (e.g., traffic signals, power lines) due to hail or lightning.
- Damage to electrical systems, communication networks, and buildings due to lightning.

Impact on the Environment

- Stress on local ecosystems and wildlife, particularly aquatic systems due to higher water temperatures.
- Damage to crops and natural vegetation due to hail.
- Forest and grass fires due leading to habitat destruction and air quality issues due to lightning.

Impact on the Economy of the Jurisdiction

- Potential impacts on agriculture and tourism sectors.
- Potential disruptions to businesses, leading to loss of revenue and jobs.

Impact on Public Confidence in the Jurisdiction's Governance

- Public dissatisfaction if government response is perceived as inadequate, particularly in providing cooling centers and emergency services.

3.12 Tornado and Windstorm

3.12.1 PROFILE

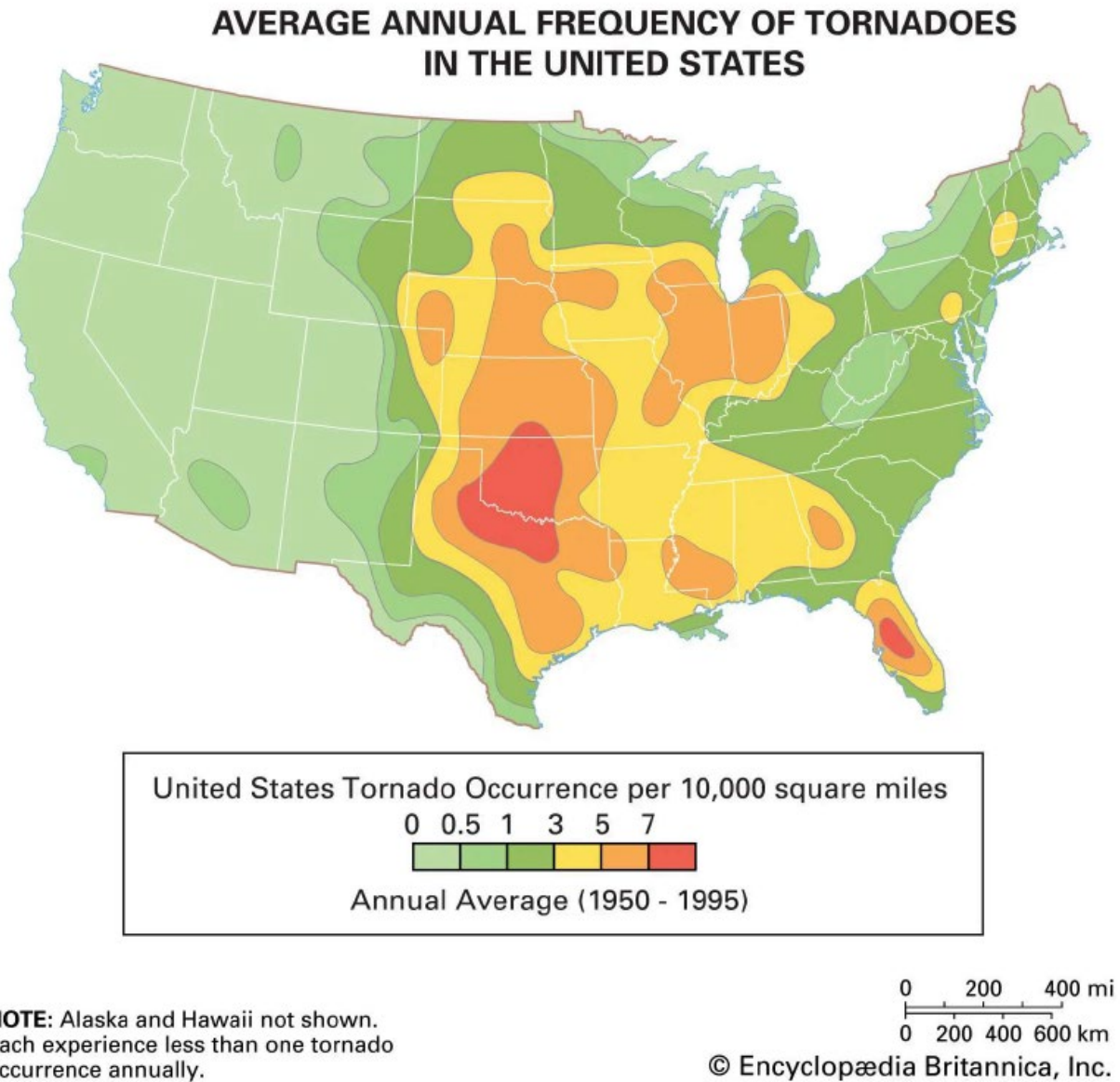
High winds can be produced during severe thunderstorms, with other strong weather systems, or by flow down a mountain. There are several types of damaging winds possible in Minnesota:

- **Straight-line winds** describe any thunderstorm wind that is not associated with rotation and is used mainly to differentiate from tornadic winds.
 - A **downdraft** is a small-scale column of air that rapidly sinks toward the ground.
 - A **downburst** is the general term used to broadly describe macro and microbursts. Downburst is the general term for all localized strong wind events that are caused by a strong downdraft within a thunderstorm, while microburst simply refers to an especially small downburst that is less than 4 km across.
 - A **gust front** is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
 - A **derecho** is a widespread, long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho.
 - A **haboob** is a wall of dust that is pushed out along the ground from a thunderstorm downdraft at high speeds.
- **Tornadoes** are defined as violently rotating columns of air extending from thunderstorms to the ground, with wind speeds between 40-300 mph. They develop under 3 scenarios: (1) along a squall line; (2) in connection with thunderstorm squall lines during hot, humid weather; and (3) in the outer portion of a tropical cyclone. Funnel clouds are rotating columns of air not in contact with the ground; however, the column of air can reach the ground very quickly and become a tornado.

3.12.2 LOCATION

All communities within Ramsey County are vulnerable to windstorms and tornadoes. Minnesota lies along the northern border of Tornado Alley, a loosely defined area first described in 1952 in the central United States where tornadoes are more likely to occur than in other parts of the continent. Interestingly, tornado activity has been shifting away from the Great Plains and toward the Midwestern and Southeast U.S. according to a report published in the April 2024 issue of the Journal of Applied Meteorology and Climatology.

Figure 13. Tornado Alley



NOTE: Alaska and Hawaii not shown.
Each experience less than one tornado
occurrence annually.

Source: *Encyclopedia Britannica*

3.12.3 EXTENT

Winds are classified by the NWS using the categories shown in Table 20.

Table 20. Wind Speed Classifications

Description	Speed
Strong Wind Gusts	Between 39 mph and 57 mph
Damaging Wind Gusts	Between 58 mph and 74 mph causing minor damage
Very Damaging Wind Gusts	Between 75 mph and 91 mph causing moderate damage
Violent Wind Gusts	Greater than 92 mph causing major damage

Source: National Weather Service

Since 2007, tornado strength in the United States has been ranked based on the Enhanced Fujita scale (EF scale), replacing the Fujita scale introduced in 1971. The EF scale, shown in Table 21 uses similar principles to the Fujita scale, with 6 categories from 0-5, based on wind estimates and damage caused by the tornado. The EF Scale is used extensively by the NWS in investigating tornadoes (all tornadoes are now assigned an EF Scale number), and by engineers in correlating damage to buildings and techniques with different wind speeds caused by tornadoes. It uses three-second gusts estimated at the point of damage based on a judgment of damage.

When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DIs) and Degrees of Damage (DoD) which help estimate better the range of wind speeds the tornado likely produced. Each damage indicator is rated on a scale of 1-8 DoD. From that, a rating (from EF0 to EF5) is assigned.

Table 21. Enhance Fujita Scale

EF Rating	3 Second Gust (mph)	Description
0	65-85	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
1	86-110	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
2	111-135	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.
3	136-165	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.
4	166-200	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
5	200+	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

Source: National [Weather Service](#)

3.12.4 HISTORY

Ramsey County has a significant history of damaging windstorms and tornadoes. The NCEI Storm Events Database was consulted for incident records.

3.12.4.1 Windstorm History

According to NCEI records, there have been 168 significant non-tornadic windstorm incidents reported between 1950 and July 2024, with wind speeds of up to 99 mph. These winds can inflict damage to buildings and in some cases, overturn high-profile vehicles. This dataset recorded zero deaths, 11 injuries, and over \$25 million in property damage since 1950. Notable non-tornadic windstorm incidents since 1950 are displayed in Table 22.

Table 22. Notable Non-Tornadic Windstorm Incidents in Ramsey County, MN

Date	Location	Magnitude (mph)	Deaths/Injuries	Property Damage	Description
April 26, 1984	u/k	u/k	0/6	u/k	--
May 1998	Saint Paul	100	0/0	\$48M	A derecho damaged 2,000 homes and fell thousands of trees.
May 9, 2004	Saint Paul	72	0/0	\$330k	Many reports of tree and structure damages.
September 21, 2005	Countywide	75	0/1	\$25M	Many homes were destroyed by falling trees, and the roof of a mobile home in Mounds View was blown off. Roads were blocked throughout the county.
August 2007	Saint Paul	69	0/1		One home was destroyed when a tree fell on it, and one man was injured by a window crashing in on him. Part of the grandstand's roof at the State Fair was blown off, and dozens of vendor booths were damaged. XCEL Energy reported 250,000 outages in the metro region.
June 10, 2012	Saint Paul	70	0/0	\$50k	Blew down a large swath of trees from the Highland Park area toward Randolph Avenue.

Date	Location	Magnitude (mph)	Deaths/Injuries	Property Damage	Description
November 10, 2012	Saint Paul	64	0/0	\$50k	Most of the damage was the result of trees landing on cars, houses and sheds.
July 5, 2016	Lauderdale	60	0/0	\$25k	138,000 people were without power during the storm.
June 11, 2017	Saint Paul	58	0/2	u/k	--
August 2, 2022	Little Canada, Saint Paul, Vadnais Heights	60	0/0	\$30k	--
10 Significant Incidents	--	--	0/10	\$73,485,000 total claimed	--

Sources: NCEI; 2019 Ramsey MHMP

3.12.4.2 Tornado History

According to NCEI records, eight tornadoes were reported in Ramsey County between 1950 and July 2024, causing one death, 168 injuries, and over \$151 million in reported property damage. Tornado classification ranged from F0/EF0 to F4. Notable tornadic incidents since 1950 are displayed in Table 23.

Table 23. Notable Tornadic Incidents in Ramsey County, MN

Date	Location	Magnitude	Deaths/Injuries	Property Damage	Description
May 6, 1965	u/k	F4	0/108	\$25M	Part of one of the worst tornado outbreaks in Minnesota history. Six tornadoes affected six counties around the Twin Cities with 13 fatalities and over 500 injured.
June 28, 1979	u/k	F1	0/0	\$250k	Part of another large outbreak of 16 tornadoes.
June 14, 1981	Roseville	F3	1/60	\$25M	The Lt. Governor activated 120 National Guard military police to prevent the looting of damaged businesses and homes.
April 26, 1984	St. Anthony	F3	1/53	\$25M	Four churches and a mall were among the damages.
May 15, 1998	Roseville	F1	0/0	\$150M	Seven houses were destroyed, and 102 severely damaged. Along with the tornado there was widespread hail.
May 22,	Mounds	EF-0	0/0	\$20k	Most of the damage was due to

2011	View				sporadic trees being blown down.
July 18, 2015	Shoreview (North Oaks)	EF-0	0/0	\$500k	The highest numbers of toppled and snapped trees occurred at Deep Lake. Some trees fell on houses, vehicles, and other structures.
August 27, 2022	Saint Paul	EF-0	0/0	\$150k	Several homes had damage (mainly roof damage) which occurred as multiple large trees were either uprooted or blown down along the tornado's path. The maximum width was 100 yards with a peak wind of 75 mph.

Sources: NCDC; 2019 Ramsey MHMP

3.12.5 PROBABILITY

Windstorms are an annual occurrence and are likely to occur each year. Seven significant tornadoes have occurred since 1970, giving a probability of approximately a 13% chance of a significant tornado occurring within any given year.

3.12.6 CLIMATE CHANGE IMPACTS

While the exact relationship between climate change and tornadoes is complex and still under active research, the evidence suggests that climate change is likely to impact the frequency, intensity, and distribution of severe windstorms and tornadoes in the Midwest.

3.12.7 VULNERABILITY ASSESSMENT

3.12.7.1 People

All individuals who live, work, and recreate within Ramsey County are at risk of impact from windstorms and tornadoes. The most likely impacts are from electrical outages (which affects heating/cooling, food storage, communications, and use of durable medical equipment), although individuals may also suffer transportation disruptions from downed trees, medical conditions from debris cleanup, auto accidents, and injuries or fatalities from downed trees or blown objects. Taking cover during inclement weather reduces many of these impacts.

3.12.7.2 Property

In "strong wind" conditions, small branches break off trees, and loose objects are blown about. Isolated occurrences of wind damage to porches, carports, awnings, or pool enclosures may take place. Power outages are common, especially in winter months.

In "damaging wind" conditions, wind damage occurs to unanchored mobile homes, porches, carports, awnings, and pool enclosures, with some shingles blown from roofs. Large branches break off trees, with weak or diseased trees blown down. Loose objects are easily blown about and can become dangerous projectiles. Power outages are likely to be more extensive. Other utility outages, such as

communication, may also occur. Damaging high winds are considered extremely dangerous for high-profile vehicles.

In “very damaging” and “violent wind” conditions, including tornadic winds, a wide range of impacts on property may occur, depending on intensity, duration, and the vulnerability of the structures in their path. This may include but is not limited to, uplifting of roofs; severe damage up to the complete destruction of walls, windows, and doors; larger projectiles including vehicles; and widespread and long-lasting power outages.

3.12.7.3 Environment

The environment is at high exposure to windstorms and tornadoes. Common types of environmental damage include severe damage to trees that can lead to habitat loss and soil erosion, wind erosion in agricultural areas leading to reduction of soil fertility and dust storms, wildlife displacement including the destruction of nesting sites, increased debris in water bodies leading to disruption of aquatic habitats, and the introduction of invasive species.

3.12.7.4 County and Community Operations

Damaging windstorms and tornadic incidents can have significant impacts on County and community operations. Emergency services may be overwhelmed and communication, including 911, may be damaged leading to difficulties in coordinating response efforts. Utility and transportation infrastructure may be compromised, delaying assistance. Public health may also be impaired by disruptions to sanitation and crowded shelters. Public services may also be disrupted, including schools, libraries, parks, and community centers, affecting community resources and recreation.

3.12.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Significant risk of injuries and fatalities, especially for individuals caught in the path of tornadoes or in structures unable to withstand high winds.
- Displacement of residents due to destroyed or severely damaged homes.
- Mental health impacts, including trauma and stress, particularly among children and those who experience severe losses.

Impact on Responders

- High risk of injury or death for responders during rescue and recovery operations in hazardous conditions.
- Strain on emergency services due to increased demand for rescue, medical, and logistical support.
- Potential for responder fatigue and mental health challenges due to prolonged and intense operations.

Impact on Continuity of Operations

- Disruption of government operations due to damage to administrative buildings, communication networks, and essential infrastructure.
- Potential delays in providing public services, impacting community support and recovery efforts.

Impact on Property, Facilities, and Infrastructure

- Extensive damage or destruction of residential, commercial, and industrial buildings, including critical infrastructure, including power lines, water supply systems, and transportation networks.
- High repair and reconstruction costs, leading to prolonged recovery periods.

Impact on the Environment

- Uprooting of trees and destruction of natural habitats, impacting local wildlife.
- Potential for hazardous material spills from damaged industrial sites, contaminating soil and water sources.

Impact on the Economy of the Jurisdiction

- Economic losses due to business closures, property damage, and interruption of commercial activities.
- Significant financial burden on local government and residents for recovery and rebuilding efforts.
- Potential decline in property values and loss of tax revenue.

Impact on Public Confidence in the Jurisdiction's Governance

- Public scrutiny and potential dissatisfaction with the government's preparedness and response efforts.

3.13 Winter Weather Hazards

3.13.1 PROFILE

According to the NWS, a winter weather event is “a winter weather phenomenon (such as snow, sleet, ice, wind chill) that impacts public safety, transportation, and/or commerce”. The most common types of winter weather phenomena experienced in Ramsey County are described below.

- **Blizzard:** A dangerous winter storm that contains large amounts of snow or blowing snow, coupled with winds above 35mph and visibility less than a quarter of a mile.
- **Extreme cold:** The NWS doesn't have a set definition for extreme cold, but instead calibrates the point at which forecasters warn residents based on the region's climate. In Ramsey County, the NWS issues “extreme cold” warnings when it feels like -25° F or colder across a wide area for several hours.
- **Ice storm:** A storm that deposits at least .25” of ice on exposed surfaces.

Note that a single winter weather incident may include one or more of these, or other, winter phenomena.

3.13.2 LOCATION

All communities within Ramsey County are vulnerable to winter weather.

3.13.3 EXTENT

Winter weather is typically forecasted three to seven days in advance by the NWS and can lead to the issuance of a winter weather watch, warning, or advisory in a Hazardous Weather Outlook bulletin. There are several types of these notices depending on conditions. Forecast certainty increases as the time for storm onset decreases.

3.13.3.1 Winter Weather Watch

A watch is issued 24 to 72 hours in advance when there is a 50 to 80% chance of hazardous winter weather meeting warning thresholds. It aims to give enough lead time for people to prepare and take necessary actions.

Table 24. Winter Weather Watch Types

Watch Type	Description
Winter Storm Watch	Conditions are favorable for a winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) to meet or exceed local winter storm warning criteria in the next 24 to 72 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50 percent of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger a watch (i.e. 5 to 8 inches of snow = watch). Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population. This includes lake-effect snow.
Wind Chill Watch	Conditions are favorable for wind chill temperatures to meet or exceed local wind chill warning criteria in the next 24 to 72 hours. Wind chill temperatures may reach or exceed -25°F.

Source: National Weather Service

3.13.3.2 Winter Weather Warning

These products are issued when hazardous winter weather is occurring, imminent, or highly likely (over 80% probability). A warning indicates conditions that threaten life or property.

Table 25. Winter Weather Warning Types

Warning Type	Description
Blizzard Warning	Blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for three or more hours.
Ice Storm Warning	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population.
Winter Storm Warning	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50 percent of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger warning (i.e 5 to 8 inches of snow = warning). Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population.
Wind Chill Warning	Wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.

Source: www.weather.gov

3.13.3.3 Winter Weather Advisory

These products are issued when hazardous winter weather is occurring, imminent, or highly likely (over 80% probability). An advisory is for less serious conditions that cause significant inconvenience and could become life-threatening if caution is not exercised.

Table 26. Winter Weather Advisory Types

Advisory Type	Description
Winter Weather Advisory	A winter storm event (sleet, snow, freezing rain, snow and blowing snow, or a combination of events) is expected to meet or exceed local winter weather advisory criteria in the next 12 to 36 hours but stay below warning criteria. Criteria for snow is 4 inches or more in 12 hours or less covering at least 50 percent of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger advisory (i.e 2 to 5 inches of snow = advisory). Criteria for ice is any ice accumulation less than 1/2 inch over at least 50 percent of the zone or encompassing most of the population. Winter Weather Advisory can also be issued for black ice. This is optional.

Wind Chill Advisory	Wind chill temperatures are expected to meet or exceed local wind chill advisory criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -15°F.
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Source: www.weather.gov

3.13.4 HISTORY

Ramsey County has a significant history of damaging windstorms and tornadoes. The NCEI Storm Events Database was consulted for incident records.

According to NCEI records, there have been 109 significant winter weather incidents reported between 1950 and July 2024. This dataset recorded five deaths and two injuries since 1950. Notable winter weather incidents since 1950 are displayed in Table 27.

Table 27. Notable Winter Weather Incidents in Ramsey County, MN

Date	Type	Deaths/ Injuries	Description
January 17, 1996	Ice storm	0/0	Up to 1" of ice accumulated over much of the Minneapolis/Saint Paul region, resulting in significant tree damage and power outages. More than 180,000 metro residents were without power, and 5 Red Cross shelters were open to assist people who were forced from their homes due to lack of heat.
February 2, 1996	Extreme cold/ wind chill	0/0	A new record low temperature for Minnesota was set in the town of Tower at -60° F. Numerous record low temperatures were set during the period at St. Cloud, Rochester and the Twin Cities. Minneapolis/Saint Paul set 3 new record low temperatures as well as recording the 2nd coldest day on record. A mean temperature of -25° F was measured that day with a high of -17° F and a low of -32° F in the Twin Cities. This was within 2 degrees of tying the all-time record low temperature set in the Twin Cities and the coldest temperature recorded this century. Many central and southern Minnesota locations set new record low temperatures. The Governor closed all schools that day.
January 12, 2000	Heavy snow	0/0	9" of snow fell at the Twin Cities International Airport, and the Minnesota Highway Patrol responded to over 325 crashes in the Twin Cities – however, most were minor without injuries.
January 19, 2001	Heavy snow	0/0	8" of snow was recorded at the Twin Cities International Airport.
January 15, 2005	Cold/ wind chill	1/0	A disabled woman was found dead of exposure outside of Como Park Conservatory. The low temperature during the night that she was missing was 9 degrees below zero.

Date	Type	Deaths/ Injuries	Description
January 15, 2009	Cold / wind chill	2/0	Wind chill fell below -35° F.
December 10, 2010	Winter storm	0/0	This was the biggest snowstorm since the Halloween Blizzard of 1991, and the average snowfall in Ramsey County was 18".
February 20, 2011	Winter storm	0/0	Lightning was observed by several people, amidst a storm that brought 12-16" of snow.
December 31, 2011	Winter weather	0/0	Heavy, wet snow fell during the holiday, resulting in numerous accidents across the county.
December 9, 2012	Winter storm	0/0	12-16" of snow were reported across the county.
January 2014	Extreme cold/ wind chill	0/0	Wind chill values dropped below -35° F for several hours, during a prolonged period of cold. Propane supplies in the region became very low, leading to the Governor declaring a Peacetime State of Emergency. Earlier in the month the Governor canceled all public-school classes in the state due to extreme wind chills. It was the first such closing in 17 years.
February 2, 2016	Winter storm	0/0	10-13" of snow fell, resulting in 175 flights canceled or delayed at the Minneapolis-Saint Paul International Airport.
December 12, 2016	Extreme cold/ wind chill	1/1	A woman froze to death in Saint Paul, outside of her apartment building when the wind chill dropped to -19° F.
January 1, 2018	Extreme cold/ wind chill	1/1	A man was found in Saint Paul who had died from exposure.
January 22, 2018	Winter storm	0/0	8-12" of snow fell across the county.
April 13, 2018	Winter storm	0/0	Multiple waves of winter precipitation occurred, including sleet and snow, resulted in total snowfall amounts of 16-20".
16 Significant Incidents	--	5/2	--

Sources: NCEI and 2019 Ramsey MHMP

3.13.5 PROBABILITY

Winter storms affect Ramsey County each year, so there is a nearly 100% probability of winter weather in a single year. Extreme cold temperatures also affect the county nearly every year. The amount of snow and ice, the number of blizzards, and days of sub-zero temperatures each year are unpredictable.

3.13.6 CLIMATE CHANGE IMPACTS

Climate change may affect winter storms in the Midwest United States in several ways:

- **Temperature Fluctuations:** Temperature fluctuations are increasingly causing cycles of melting and refreezing, which heightens the risk of ice storms and hazardous driving conditions. In Minnesota, most of the observed warming has occurred during the coldest periods. Since records began in January 1895, average daily low temperatures have increased at more than twice the rate of high temperatures. The winter season (December through February) has warmed 2-3 times faster than summer (June through August).

This winter warming has accelerated in recent decades. From 1970 to 2021, average daily winter low temperatures rose over 15 times faster than summer high temperatures. The frequency of extreme cold temperatures, such as -35°F in northern Minnesota and -25°F in the southern region, has decreased by up to 90%. While Minnesota will continue to experience periodic severe cold spells, the long-term decline in extreme cold is almost certain to persist.

- **Increased Intensity:** Warmer temperatures can lead to more moisture in the atmosphere, potentially resulting in heavier snowfall and more intense winter storms.
- **Frequency of Extreme Events:** While overall winter precipitation might decrease in some areas, the frequency of extreme winter weather events could increase.
- **Shift in Snowfall Patterns:** Changes in temperature and precipitation patterns could shift where and when snow falls, affecting traditional snowfall regions and potentially leading to unexpected snowstorms in areas that usually receive less snow.
- **More Rain than Snow:** Warmer winter temperatures might lead to more winter precipitation falling as rain rather than snow, increasing the risk of flooding and reducing snowpack.
- **Prolonged Storm Duration:** Changes in atmospheric circulation patterns could lead to slower-moving storms, resulting in longer-lasting and potentially more damaging winter weather events.
- **Changes in Storm Tracks:** Alterations in the jet stream and other atmospheric patterns may change the paths that winter storms take, affecting which areas are most impacted.
- **Increased Energy Costs:** More intense and frequent storms could lead to higher energy demands for heating and storm response, impacting infrastructure and increasing costs for residents.
- **Public Health Impacts:** Greater variability and intensity in winter storms can lead to increased risks to public health, such as hypothermia, frostbite, and accidents related to icy conditions.

While the exact relationship between climate change and tornadoes is complex and still under active research, the evidence suggests that climate change is likely to impact the frequency, intensity, and distribution of winter weather in the Midwest. Improved understanding and modeling of these changes are essential for developing effective mitigation and adaptation strategies.

3.13.7 VULNERABILITY ASSESSMENT

3.13.7.1 People

Blizzards can cause whiteout conditions, making travel dangerous and leading to numerous accidents. They can also disrupt transportation and supply chains, leaving people stranded and unable to access

essential services. Extreme cold poses serious health risks such as hypothermia and frostbite, particularly for the elderly, young children, and those without adequate heating. Unhoused individuals and those living in poorly insulated homes are especially at risk. Ice storms create hazardous conditions by coating roads, power lines, and trees with ice, often resulting in widespread power outages and dangerous driving conditions. The loss of power can leave people without heat, light, and communication, exacerbating the risks, especially for those dependent on electricity for medical devices. Additionally, ice can make walkways treacherous, increasing the risk of falls.

3.13.7.2 Property

Blizzards can lead to significant snow accumulation, causing roofs to collapse under the weight. Extreme cold can cause pipes to freeze and burst, resulting in extensive water damage and costly repairs for homes and businesses. It can also strain heating systems, leading to potential failures during peak demand periods. Ice storms are particularly damaging as they coat power lines, trees, and structures with a heavy layer of ice. This can cause trees to fall and power lines to snap, leading to widespread power outages that may take days or even weeks to repair. The combined effects of these winter weather events pose significant challenges to maintaining the safety and functionality of property and infrastructure.

3.13.7.3 Environment

Winter weather can alter habitats and potentially disrupt the food sources and migratory patterns of wildlife. Heavy snow cover and ice accumulation can damage vegetation, particularly trees and shrubs that are not adapted to withstand such weight, leading to long-term ecological impacts. Extreme cold spells can be detrimental to both flora and fauna, with prolonged exposure to freezing temperatures causing frost damage to plants and endangering animals that lack sufficient shelter or are unable to find adequate food. Additionally, ice buildup on rivers and lakes can impact aquatic ecosystems by altering water flow and potentially causing fish kills due to reduced oxygen levels. The cumulative effect of these winter weather events can lead to significant disruptions in the natural environment, affecting biodiversity and the overall health of ecosystems.

3.13.7.4 County and Community Operations

Government and community operations can be greatly impacted by winter weather. Blizzards and ice storms can cripple transportation systems, making roads impassable and hindering the movement of emergency vehicles, public transportation, and supply chains. Extreme cold can strain public infrastructure, leading to increased demand for heating and energy, which can overwhelm utilities and cause power outages. Ice storms are particularly devastating as they can lead to widespread power outages by bringing down power lines and damaging infrastructure. The result of any of these can halt government operations, disrupt communication networks, and impede the delivery of critical services. Additionally, the cleanup and repair efforts following such events can place a significant financial burden on local governments and communities, diverting resources from other important projects and services.

3.13.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Risk of injuries and fatalities due to exposure, traffic accidents, and falls on icy surfaces, and exacerbation of existing health conditions, such as cardiovascular and respiratory issues.
- Isolation due to impassable roads, leading to shortages of food, water, and medical supplies.
- Increased demand on healthcare facilities due to weather-related injuries and illnesses.
- Power outages caused by ice accumulation on power lines and trees, leading to heating issues and potential carbon monoxide poisoning from alternative heating sources.

Impact on Responders

- Difficult and hazardous conditions for emergency responders, increasing the risk of injuries during response efforts.
- Delayed response times due to impassable roads and treacherous conditions.
- Increased demand for emergency services, leading to responder fatigue and resource depletion.

Continuity of Operations

- Disruption of government operations due to office closures and staff inability to commute.
- Strain on infrastructure, such as heating systems and power grids, impacting the ability to maintain essential services.

Impact on Property, Facilities, and Infrastructure

- Structural damage to buildings and homes due to heavy snow loads and wind.
- Risk of burst pipes and water damage in homes and public facilities.
- Increased wear and tear on heating systems, potentially leading to failures and costly repairs.
- Damage to power lines, trees, and structures from ice accumulation.

Impact on the Environment

- Potential for water contamination from road salt and chemical de-icers.
- Damage to trees and vegetation from heavy snow and ice accumulation.
- Stress on local wildlife and ecosystems, particularly aquatic systems that may freeze over.

Impact on the Economy of the Jurisdiction

- Economic losses from business closures, supply chain disruptions, and increased costs for snow and ice removal.
- Increased energy costs for heating, impacting household budgets and business operations.

Impact on Public Confidence in the Jurisdiction's Governance

- Public dissatisfaction if government response is perceived as inadequate or slow, particularly in terms of snow and ice removal, power restoration, and emergency services.
- Potential erosion of trust if communication is not clear, timely, and effective during and after the event.

3.14 Human-Caused Hazards

3.14.1 PROFILE

Many human-caused hazards may affect Ramsey County. These include, but are not limited to:

- **Active shooter/hostile incident:** A situation in which one or more individuals are actively engaged in killing or attempting to kill people in a populated area, typically using firearms. These incidents are characterized by their unpredictability and rapid evolution, often involving multiple victims and posing significant threats to public safety.
- **Civil Unrest:** A situation in which one or more individuals are actively engaged in killing or attempting to kill people in a populated area, typically using firearms. These incidents are characterized by their unpredictability and rapid evolution, often involving multiple victims and posing significant threats to public safety.
- **Cyberattack:** A deliberate and malicious attempt by an individual or group to breach the information systems of another individual, organization, or government. These attacks aim to steal, alter, or destroy data, disrupt operations, or cause harm in various other ways. Cyberattacks can take many forms, including malware, phishing, Denial-of-Service (DoS), ransomware, Man-in-the-Middle (MitM), SQL injection, and zero-day exploits. Cyberattacks can cause significant financial, operational, and reputational damage.
- **Terrorism:** The unlawful use of violence or threats of violence, especially against civilians, to create fear and achieve political, religious, or ideological objectives. Terrorism can be perpetrated by individuals, groups, or state-sponsored actors and often aims to influence an audience beyond the immediate victims. Examples of terrorism include bombings, shootings, hijackings, kidnappings, and cyberattacks that are intended to cause widespread disruption or fear.

Although not natural hazards, these hazards have been included to address and reduce the risks they pose to public safety, infrastructure, and essential services.

3.14.2 LOCATION

Active shooter events are most likely to take place in locations with high concentrations of people, such as schools, workplaces, shopping centers, places of worship, and public events. These settings are often targeted due to the presence of numerous potential victims and the ability to create widespread fear and disruption.

Civil unrest is most likely to take place in urban areas and locations where large groups of people can gather, such as city centers, public squares, government buildings, and university campuses. These areas

are often chosen for protests and demonstrations due to their visibility, accessibility, and symbolic significance.

Cyberattacks are most likely to target critical infrastructure, financial institutions, government agencies, healthcare systems, large corporations, and any organizations that handle sensitive or valuable data. Additionally, cyberattacks can affect individual users through personal devices, social media accounts, and online services. These targets are chosen due to the potential for significant disruption, financial gain, or access to sensitive information.

Terrorism is most likely to take place in high-profile public spaces, government buildings, transportation hubs, tourist attractions, and large gatherings or events such as concerts, festivals, or sports arenas. These locations are targeted for their potential to cause maximum casualties, widespread fear, and significant media attention.

3.14.3 EXTENT

The extent of a human-caused hazard can be defined by several key factors:

- **Geographic Scope:** The specific geographical area affected by the hazard, which could range from a single location (e.g., a building or city block) to a broader region or even global impact in the case of cyberattacks.
- **Intensity and severity:** The level of violence, disruption, or damage caused by the hazard, including casualties, injuries, property damage, and economic impact.
- **Duration:** The period over which the hazard persists, from the initial incident to the resolution or containment by authorities.
- **Psychological and social impact:** The emotional and psychological effects on individuals and communities, including fear, trauma, and social unrest.
- **Response and recovery efforts:** The effectiveness and timeliness of emergency response, law enforcement actions, and recovery efforts to mitigate the hazard's effects and restore normalcy.
- **Broader implications:** The potential for the hazard to impact societal norms, public policy, international relations, and the overall sense of security and resilience within affected communities.

Defining the extent of a human-caused hazard involves assessing these dimensions to understand its full impact and implications for preparedness, response, and mitigation efforts.

3.14.4 HISTORY

Ramsey County has several notable human-caused hazard incidents in its history. News archives and local government agencies were consulted to obtain this information. According to these records and accounts, there have been at least 5 significant human-caused hazard incidents reported between 1950 and July 2024. This dataset recorded at least 3 deaths and an indeterminable number injuries since 1950; at least \$354M in damages were recorded from these incidents. Notable incidents since 1950 are displayed in Table 28.

Table 28. Notable Human-Caused Hazard Incidents in Ramsey County, MN

Date	Type	Deaths/ Injuries	Property Damage	Description
July 20, 1967	Civil unrest	0/24	\$4.2M	In response to a pre-meditated plot by Black Panther leader Stokely Carmichael. Widespread violence, including rock and bottle-throwing at law enforcement and fires set to businesses along Plymouth Avenue, quickly engulfed the area and lasted three days.
April 4, 1968	Civil unrest – Active shooter	1/0	u/k	Following the assassination of Dr. Martin Luther King, a wave of protesters marched in the streets but remained non-violent. One individual, stating anger at King’s death, vowed to avenge it by killing the first white man he saw and did so using a .45 caliber weapon.
September 1, 2008	Civil unrest	0/0	u/k	In a crowd of 10,000 protesters at the Republican National Convention, a group of approximately 300 turned to civil unrest and broke windows, slashed tires, and harassed delegates. Arrests led to the discovery of additional weapons including Maltov cocktails.
May 26, 2020	Civil unrest	2/0	\$350M	In response to the death of George Floyd, public outrage developed into the second-most destructive period of civil unrest in U.S. history, after the 1992 Los Angeles riots.
December 2, 2020	Cyber attack	0/0	None reported	A vendor that provides technology services to Ramsey County advised the county that its security had been breached by a hacker seeking to extort payment through a ransomware scheme. Information of up to 8,700 clients of the Family Health Division may have been compromised.
July 19, 2024	Cyber outage	0/0	None reported	A technical problem of global cybersecurity firm CrowdStrike caused software failures across the country, including Ramsey County. Of most significance, hospitals and airports were impacted, disrupting operations.

3.14.5 PROBABILITY

Human-caused hazards are relatively rare compared to other hazards but have the potential for significant impacts.

3.14.6 CLIMATE CHANGE IMPACTS

Climate change may influence human-caused hazards in several ways:

- **Incident catalyst:** Protests and incidents may be caused by a person or persons concerned about the future impacts of climate change.
- **Resource scarcity:** Climate change can exacerbate competition for resources such as water and food, potentially leading to social unrest and conflicts that could escalate into human-caused hazards like civil unrest or terrorism.
- **Migration and displacement:** Rising sea levels, extreme weather events, and other climate-related factors can force populations to migrate or become displaced. Displaced populations may face social, economic, and political challenges that contribute to instability and increase the likelihood of human-caused hazards.
- **Infrastructure vulnerability:** Climate change can increase the vulnerability of critical infrastructure to damage from extreme weather events, such as hurricanes, floods, or wildfires. This damage can disrupt essential services and create conditions that are conducive to human-caused hazards.
- **Changing patterns of disease:** Climate change can alter the geographic distribution and prevalence of diseases, potentially leading to public health crises that strain healthcare systems and social stability, contributing to human-caused hazards.

While climate change itself is not a direct cause of human-caused hazards, its complex interactions with socio-economic and environmental factors can create conditions that increase the likelihood or severity of such hazards.

3.14.7 VULNERABILITY ASSESSMENT

3.14.7.1 People

Children and youth may lack the awareness, experience, or physical capabilities to respond effectively during emergencies such as active shooter incidents or civil unrest. They are also at increased risk of physical injury, psychological trauma, disrupted education, and long-term emotional effects due to exposure to violence or dangerous situations. Elderly individuals and those with disabilities may have limited mobility, sensory impairments, or chronic health conditions that hinder their ability to evacuate or seek safety during emergencies. This population also has a higher likelihood of physical harm, exacerbation of existing health conditions, and increased dependency on caregivers or emergency services during and after human-caused hazards. Minority and immigrant communities may face an increased risk of being targeted in hate crimes, limited access to timely and accurate information, and challenges in accessing support services or legal protection.

3.14.7.2 Property

Critical infrastructure such as power plants, water treatment facilities, transportation hubs (airports, train stations), and communication networks essential for societal functioning may be targeted as disruption to these systems can have cascading effects on public safety, health, and economic stability. Government buildings such as courthouses, legislative centers, and civic centers represent symbols of authority, governance, and democracy and attacks on these can lead to physical damage, loss of critical records, disruption of government services, and psychological impact on the community and workforce. Locations where large numbers of people gather, such as stadiums, concert halls, shopping malls, and

cultural venues are also vulnerable as a result of those seeking maximum casualties and media attention.

3.14.7.3 Environment

The environment tends to be less vulnerable to human-caused hazards than natural hazards, but terrorist activities, particularly those involving sabotage or arson, can target natural resources such as forests, wildlife reserves, and water bodies. Destruction of these resources can lead to ecological damage, loss of biodiversity, and long-term environmental degradation. Contamination from chemical attacks, biological agents, or radioactive materials can also have severe and long-lasting environmental consequences.

3.14.7.4 County and Community Operations

Attacks on government facilities or critical infrastructure can disrupt essential services such as law enforcement, emergency response, public utilities, and healthcare systems. This can compromise public safety and hinder effective response to emergencies. They can also erode public trust in the government's ability to provide security and protect citizens, leading to increased fear, anxiety, and uncertainty. In addition, attacks on economic targets or disruptions to business operations can lead to financial losses, reduced investor confidence, and economic instability within the community. Lastly, human-caused hazard incidents can create fear, trauma, and social unrest within communities, impacting mental health, social cohesion, and community resilience.

3.14.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- Risk of injuries and fatalities among civilians caught in the incident. Risk of mass casualties and widespread injuries.
- Psychological trauma and long-term mental health issues for survivors and witnesses.
- Increased fear and anxiety within the community, potentially leading to changes in daily behavior and routines.
- Heightened community tensions and divisions, potentially leading to long-term social unrest.
- Personal data breaches, leading to identity theft and financial losses.
- Disruption of access to essential online services, impacting communication, banking, and healthcare.
- Increased anxiety and mistrust regarding digital security and privacy.

Impact on Responders

- High-risk conditions for law enforcement and emergency medical responders, with potential for responder injuries and fatalities.
- Psychological impact on responders, including stress and trauma from witnessing or experiencing violence.
- Strain on resources and personnel, leading to fatigue and reduced effectiveness over time.

- Negative public perception and backlash against responders.

Impact on Continuity of Operations

- Immediate disruption of operations in affected areas, including lockdowns and evacuations.
- Disruption of government operations and essential services, especially if including government operations, healthcare, banking, and utilities are targeted.
- Long-term impacts on service delivery due to damaged infrastructure and ongoing security concerns.

Impact on Property, Facilities, and Infrastructure

- Significant risk of property damage, including vandalism, arson, looting, explosions, fires, or other destructive methods.
- Damage to digital infrastructure, including servers, networks, and databases.
- High repair and replacement costs for damaged infrastructure and facilities and strengthening of cybersecurity measures.

Impact on the Environment

- Damage from fires, chemical spills, or other destructive actions.
- Long-term impacts from contamination, structural damage, and delayed environmental remediation.

Impact on the Economy of the Jurisdiction

- Economic losses from business closures, decreased tourism, and reduced consumer confidence.
- Costs associated with increased security measures and mental health support services.
- Long-term impacts on economic growth and stability due to ongoing social tensions and security concerns.
- Economic losses from disrupted business operations, data breaches, and decreased consumer confidence in digital services.

Impact on Public Confidence in the Jurisdiction's Governance

- Erosion of public trust if response is perceived as inadequate or slow.
- Increased public dissatisfaction and mistrust in government if response is perceived as heavy-handed or ineffective.
- Erosion of public trust in digital services and government cybersecurity measures.
- Erosion of confidence in government's ability to ensure safety and security.

3.15 Infrastructure Failure

3.15.1 PROFILE

Infrastructure failure encompasses a range of events that disrupt the normal functioning of essential systems and services in the community, and can have widespread and severe consequences for communities, economies, and the environment. Failures may include:

- **Transportation Accidents:** These are incidents that disrupt the transportation system, such as vehicle collisions, train derailments, or aircraft crashes, which can lead to significant delays, injuries, or fatalities.
- **Electrical/Fuel Shortages:** These occur when the supply of electricity or fuel is insufficient to meet demand, often due to infrastructure damage, supply chain issues, or increased consumption. This can result in power outages and hinder transportation and other critical services.
- **Supply Chain Disruption:** This refers to interruptions in the flow of goods and services, which can be caused by natural disasters, manufacturing problems, or transportation failures. Such disruptions can lead to shortages of essential items and economic losses.
- **Water Contamination:** This involves the pollution of water supplies with harmful substances, which can occur due to infrastructure breakdowns, such as leaks or breaches in containment systems. Contaminated water poses serious health risks and can affect a wide range of activities, from drinking water provision to agriculture.

Although not natural hazards, these hazards have been included to address and reduce the risks they pose to public safety, infrastructure, and essential services.

3.15.2 LOCATION

Infrastructure failures have significant impacts on a given community. Below are the likely locations for infrastructure failures within Ramsey County:

Transportation

- **Roadways** – Ramsey County is served by a number of major roadways including Interstates 94 (I-94), 35E (I35E), and 694 (I-694); US Highways 52 and 61; and MN State Highways 36 (MN-36), 51 (MN-51), and 280 (MN-280). Additionally, there are a number of major county roads that transverse the region as well.
- **Intersections/Interchanges** – Major intersections/interchanges in Ramsey County include I-94 and I-35E, I-94 and MN-280, and I-694 and I-35E. Other significant urban and suburban intersections are located across the county as well.
- **Bridges and Overpasses** – Ramsey County has a number of key bridges and overpasses including a number that span the Mississippi River and interstate and highway overpasses.
- **Railroads** – Ramsey County is a significant hub for rail transportation in the region, with BNSF Railway, Union Pacific Railroad, Canadian Pacific Railway, and Amtrak providing freight and passenger services with the county.

- Airports – While the major airport that services Ramsey County, Minneapolis – Saint Paul International Airport (MSP) is located in adjacent Hennepin County, portions of Ramsey County will be in the flight path for MSP. In addition, there are two smaller airports located within the County: Saint Paul Downtown Airport (STP) and Lake Elmo Airport.

Electrical/Fuel Shortages

- Power plants – The county has a number of power generation facilities that provide service to local and regional energy supply. Two significant stations include Xcel Energy – High Bridge and District Energy Saint Paul.
- Transmission Lines – The exact location of electrical transmission lines can vary, and are typically mapped by utility companies, such as Xcel Energy. They are usually strategically located along major transportation routes, utility corridors, and near industrial zones.
- Substations – In Ramsey County, several substations are operated by utility companies to manage and distribute electrical power. Some of the key locations include Riverside Substation, Rice Street Substation, Dale Street Substation, Midway Substation, Downtown Substation, and Roseville Substation. Exact locations can be identified by the electrical companies.
- Fuel Storage Facilities – Fuel storage facilities are distributed across the region to support residential, commercial, and industrial fuel needs.
- Distribution Networks – Distribution networks consist of a combination of overhead and underground power lines, transformers, and substations. These networks are typically managed by utility companies.
- Pipelines – Ramsey County is intersected by several major pipelines that transport various types of products, including oil, natural gas, and refined products.

Supply Chain Disruption

- Warehouses and distribution centers – Ramsey County has several significant warehouses and distribution centers that support a range of industries. They are typically located in close proximity to major highways, transportation hubs, and industrial zones.
- Transportation Hubs – There are a number of transportation hubs that facilitate the movement of goods throughout the region including MSP, rail lines, and key interstate interchanges such as I-94 and I-35E and I-694 and I-35E.
- Manufacturing Plants – Ramsey County is home to a number of notable manufacturers that support a diverse range of industries including machinery, food production, and consumer goods. Key industrial areas include Maplewood Industrial Area, Midway Industrial Area, and Roseville Industrial Area.

Water Contamination

- Water Treatment Plants – the key water treatment facilities in Ramsey are Saint Paul Regional Water Services, Metro Wastewater Reclamation Point, Saint Paul Water Treatment Plant, all located within Saint Paul. There are also a number of facilities located across the county, operated by Ramsey County Regional Water, which service specific communities and townships.

- Industrial Sites – There are a number of industrial sites within the county that have the potential to release pollutants into water sources due to chemical runoff, wastewater discharges, accidental spills/leaks, stormwater runoff, airborne contaminants, and poor waste disposal practices.
- Landfills – In addition to the Ramsey County Household Hazardous Waste Facility and the Ramsey/Washington Recycling & Energy Center, a number of landfills and waste management facilities handle municipal solid waste, construction debris, and other types of waste with the potential to impact water sources. Some former sites are now currently closed but continue to be monitored.

3.15.3 EXTENT

The extent of infrastructure failure can vary widely due to several factors including the scale of the incident, the affected location, and the resilience of the infrastructure.

- Transportation incidents – can cause localized disruptions, safety risks, and economic impacts.
- Electrical/Fuel Shortages – widespread outages can affect homes, businesses, and critical services, creating economic impacts and public health and safety concerns.
- Supply chain disruptions – can have cascading effects across any number of industries, leading to shortages of goods, increased prices, and economic instability. Delays in the delivery of raw materials can affect manufacturing processes and operations.
- Water contamination – can have significant health risks, short- and long-term environmental impacts, and costly economic impacts.

3.15.4 HISTORY

Ramsey County has experienced various infrastructure failures over the years, significantly impacting the community, local economy, and the environment.

- Transportation incidents – the most notable transportation accident in Minnesota history was the I-35W Bridge Collapse in 2007. While the event occurred in Minneapolis, it significantly impacted the broader Twin Cities area, including Ramsey County.
- Electrical/Fuel Shortages – Severe winter storms have caused widespread power outages over the year, impacting homes, business, and critical infrastructure.
- Supply chain disruptions – COVID-19 caused global and local supply chain disruptions, including in Ramsey County. Additionally, significant floods in the 1960, and most recently 2024, disrupted transportation routes and logistics.
- Water contamination – In 2017, elevated levels of lead were detected in drinking water in sections of Saint Paul, prompting a response to improve water safety measures.

3.15.5 PROBABILITY

The overall probability of infrastructure failures in Ramsey County is likely moderate, with some high risk during extreme weather events. The most likely causes of such failures include severe winter weather, flooding, and other weather-related events. Aging transportation infrastructure, such as road and

bridges, and human caused impacts to communication systems and power grids can also increase the probability of failure.

3.15.6 CLIMATE CHANGE IMPACTS

Climate change may have profound impacts on infrastructure, leading to failures in the identified systems. Extreme weather events, specifically temperature extremes, are most likely to impact Ramsey County.

Possible impacts include:

- Transportation - Damaged roads, bridges, and railways from buckling road washouts, landslides, and structural failures.
- Electrical and Fuel Shortages – Damage to power lines, substations, and power plants, leading to outages. Extreme temperatures can also lead to increased demand, putting additional strain on electrical grids.
- Supply Chain Disruption – temperature changes can affect transportation infrastructure, delaying or restricting the delivery of goods and raw materials, as well as affecting the storage and preservation of goods. Climate change can also lead to resource scarcity, affecting the availability of raw materials.
- Water Contamination – Flooding and increased runoff can overwhelm sewage and wastewater systems, introducing pollutants into water supplies

3.15.7 VULNERABILITY ASSESSMENT

Communities, including Ramsey County, are increasingly vulnerable to various types of infrastructure failures, which can significantly impact daily life, economic stability, and public health.

3.15.7.1 People

Infrastructure failure can have immediate and long-term health consequences, including injuries and fatalities, disease outbreaks, and limited access to healthcare and emergency services. The community can also suffer economic impacts from job losses, increased costs for basic needed, and economic instability.

3.15.7.2 Property

Residents and businesses can suffer damages from accidents, power surges, and structural failures. Supply chain disruptions can impact property development and ongoing maintenance.

3.15.7.3 Environment

Transportation incidents and proximity to industrial areas can impact the environment by contaminating soil and water, harming aquatic life, soil quality, and broader ecosystems from pollutants and toxins. Increased reliance on non-renewable energy sources can lead to higher emissions and environmental degradation as well.

3.15.7.4 County and Community Operations

Infrastructure failures can stress the community's ability to respond quickly and effectively, disrupting public services and increasing costs for repairs and recovery. Increased public health responsibilities, delays in procurement, and long-term environmental remediation and management can also result from any number of infrastructure failures.

3.15.8 CONSEQUENCE ASSESSMENT

Impact on the Public

- **Transportation Failure:**
 - Restricted mobility and access to essential services (e.g., hospitals, grocery stores).
 - Increased risk of accidents and injuries due to unsafe road conditions or lack of public transportation.
 - Potential isolation of communities, especially in rural or remote areas
- **Electrical and Fuel Shortages:**
 - Loss of heating, cooling, and lighting in homes, leading to discomfort or health risks. This could be particularly consequential for vulnerable populations, particularly those who rely on power for medical equipment.
 - Disruption of communication channels (e.g., internet, phone) that rely on electricity.
 - Fuel shortages affecting transportation, emergency services, and daily commuting.
- **Supply Chain Disruption:**
 - Shortages of essential goods, including food, medicine, and other critical supplies.
 - Panic buying, leading to further scarcity and possible civil unrest.
 - Increased prices due to scarcity, disproportionately affecting low-income households.
- **Water Contamination:**
 - Health risks from consuming or using contaminated water, leading to outbreaks of waterborne diseases.
 - Need for boil water advisories or reliance on bottled water, adding to public stress and expense.
 - Disruption of daily hygiene practices and sanitation, exacerbating public health issues.

Impact on Responders

- **Transportation Failure:**
 - Delayed response times due to blocked or damaged roads and bridges.
 - Limited access to affected areas, hampering rescue and relief efforts.
- **Electrical and Fuel Shortages:**
 - Compromised communication systems and reduced operational capacity.
 - Difficulty maintaining emergency power in critical facilities, including public safety, hospitals, and shelters.

- Fuel shortages affecting transportation and emergency services.
- **Supply Chain Disruption:**
 - Shortages of necessary equipment and supplies for responders (e.g., medical supplies, fuel).
 - Increased operational strain due to the need to source and transport scarce resources.
- **Water Contamination:**
 - Increased demand on emergency medical services to address waterborne illnesses.
 - Challenges in ensuring safe water supply for responders and affected populations.

Continuity of Operations

- **Transportation Failure:**
 - Inability to maintain essential services and logistics, affecting government operations.
 - Delays in implementing recovery and rebuilding efforts.
- **Electrical and Fuel Shortages:**
 - Disruption of critical infrastructure operations, including communication, healthcare, and public safety systems.
 - Reduced capacity to maintain order and provide public services.
- **Supply Chain Disruption:**
 - Delays or failures in delivering essential goods and services, including food, medicine, and emergency supplies.
 - Increased pressure on government resources to manage and mitigate shortages.
- **Water Contamination:**
 - Interruptions in water-dependent services, such as sanitation, healthcare, and firefighting, and manufacturing.
 - Increased need for emergency water distribution and purification efforts.

Impact on Property, Facilities, and Infrastructure

- **Transportation Failure:**
 - Damage to roads, bridges, and public transit systems, requiring costly repairs.
 - Potential secondary impacts, such as flooding or erosion, due to compromised transportation infrastructure.
- **Electrical and Fuel Shortages:**
 - Damage to electrical grids and fuel supply systems, leading to prolonged outages.
 - Increased wear and tear on backup systems, requiring additional maintenance and replacement.
- **Supply Chain Disruption:**

- Increased demand on storage and distribution facilities, possibly leading to infrastructure strain.
- **Water Contamination:**
 - Damage to water treatment plants and distribution systems, requiring extensive repairs.
 - Short- and long-term degradation of water quality, affecting property values and infrastructure resilience.

Impact on the Environment

- **Transportation Failure:**
 - Increased environmental damage from alternative routes or modes of transportation (e.g., off-road driving, increased air travel).
 - Potential for environmental contamination from damaged transport vehicles or infrastructure.
- **Electrical and Fuel Shortages:**
 - Increased reliance on backup generators, leading to higher emissions and environmental degradation.
 - Potential for fuel spills or leaks, contaminating soil and water sources.
- **Supply Chain Disruption:**
 - Increased waste from spoiled goods and unused inventory, leading to environmental pollution.
 - Potential for illegal dumping or improper disposal of hazardous materials.
- **Water Contamination:**
 - Harm to aquatic ecosystems and wildlife due to polluted water sources.
 - Long-term soil and water degradation, affecting agriculture and natural habitats.

Impact on the Economy of the Jurisdiction

- **Transportation Failure:**
 - Economic losses due to costs to repair and replace transportation systems, reduced productivity, disrupted trade, and increased transportation costs.
 - Long-term impacts on tourism, commerce, and investment due to damaged infrastructure.
- **Electrical and Fuel Shortages:**
 - Increased operational costs for businesses and households due to reliance on alternative power sources.
 - Potential business closures or relocations due to unreliable power and fuel supply.
- **Supply Chain Disruption:**

- Loss of revenue for both public and private sectors due to inventory shortages and delayed deliveries.
- Increased inflation due to scarcity of goods and rising transportation costs.
- **Water Contamination:**
 - Economic impact on agriculture, fisheries, and industries dependent on clean water.
 - Increased healthcare costs due to illness and long-term water treatment expenses.

Impact on Public Confidence in the Jurisdiction's Governance

- **Transportation Failure:**
 - Public dissatisfaction with government preparedness and response to infrastructure failures.
 - Perception of government incompetence in maintaining essential services.
- **Electrical and Fuel Shortages:**
 - Loss of public trust in the government's ability to ensure reliable energy and fuel supplies.
 - Increased public pressure on leadership to address energy infrastructure vulnerabilities.
- **Supply Chain Disruption:**
 - Erosion of confidence in government oversight and regulation of supply chains.
 - Potential for civil unrest or protest due to perceived government inaction or mismanagement.
- **Water Contamination:**
 - Significant loss of public trust in the government's ability to protect public health and safety.
 - Heightened scrutiny of water management policies and possible legal or political repercussions.

4. Hazard Mitigation Strategy

4.1 Plan Goals

The planning process included a review and update of the prior mitigation goals and objectives as a basis for the planning process and selection of appropriate mitigation actions addressing all hazards of concern. Of particular importance was addressing hazards disproportionately affecting populations with increasing risk to climate impacts. Upon consideration, participating jurisdictions opted to change the goals from the 2019 plan update to better align with county and community mitigation efforts. The 2025 goals are:

Goal 1. Mitigate impacts to life, property, the economy and the environment from natural, technological, and human-caused hazards.

Goal 2. Build and support local capacity to create resiliency from natural, technological, and human-caused hazards.

Goal 3. Build resilience for critical infrastructure and systems against impacts of natural, technological and human-caused hazards.

Goal 4. Increase education, outreach and awareness to the whole community to build resiliency.

Communities were encouraged to use these goals as guideposts when reviewing, updating and adding new hazard mitigation actions.

4.2 Strategy Development

Using the updated goals as a planning tool to guide mitigation planning efforts, the LPT collaborated to identify a 2025 hazard mitigation strategy that is both effective and feasible for the county and participating communities. As part of the process, communities reviewed the mitigation strategy from the previous plan and reported on the status of specific hazard mitigation actions, and then reviewed capabilities and risks to identify new hazard mitigation actions as appropriate.

At the beginning of the planning process, the planning team set out participation requirements for jurisdictions to be considered full participants in the hazard mitigation plan. Among these requirements, each participating jurisdiction was required to identify at least one new or continuing hazard mitigation action to reduce risk in their community.

4.3 2019 Mitigation Action Reporting

Communities were asked to review and update the hazard mitigation actions that were identified in the 2019 plan to better understand the progress that they had made, and to identify actions that they wanted to keep for the 2025 plan update. Communities reviewed each action and identified it in one of four categories:

- **Completed.** The action has been completed.
- **Not started.** The action has not been started but should be included in the updated strategy.
- **In progress.** The action has been started but should still be included in the updated strategy.

- **Cancelled.** The action is no longer relevant and should be cancelled.

4.4 Completed Actions

Community reporting on actions from the 2019 plan yielded the following completed actions.

Action	Community/Communities	Justification
Continue to enforce burning permits/ restrictions.	Arden Hills, North Oaks, Shoreview, Falcon Heights, Gem Lake, Little Canada, Mounds View, New Brighton, North Saint Paul, Lauderdale	Permits and restrictions are in place; maintenance action.
Continue to ensure the strong coordination between local fire departments to provide fire protection.	Arden Hills, North Oaks, Shoreview, Gem Lake, Lauderdale, Little Canada, Mounds View, New Brighton	Coordination is in place; maintenance action.
Continue to provide for public safety on roads through anti-icing (application of brine solution before an event), snow removal, salting and sanding to minimize the impacts of snow/ice accumulations on roadways.	Gem Lake, Little Canada, Mounds View, Arden Hills, North Oaks, Shoreview, Vadnais Heights	System to apply this action in place; maintenance action.

4.5 Cancelled Actions

Community reporting on actions from the 2019 plan yielded the following cancelled and completed actions.

Action	Community/Communities	Justification
Identify risks and issues preserving safety and security to users in parks and associated facilities shared by school district and city (LGUs).	St. Anthony	This is a public safety action.
Continue to provide for public safety on roads through anti-icing (application of brine solution before an event), snow removal, salting and sanding to minimize the impacts of snow/ice accumulations on roadways.	Vadnais Heights	This is a response action.
Identify risks and issues preserving safety and security to users in parks and associated facilities shared by school district and city (LGUs).	Vadnais Heights	This is a public safety action.
Implement construction or retrofit projects for safe rooms or storm shelters in identified vulnerable locations.	Vadnais Heights	Included in different action.
Promote water conservation measures to residents during periods of drought and enforce water conservation ordinances when needed.	Vadnais Heights	This is a response action.

In addition, some 2019 actions were re-worded or combined with other actions. These actions are reflected in the strategy in Section 4.8.

Finally, some 2019 actions were removed from the 2025 strategy due to being outside the scope of hazard mitigation. While not true hazard mitigation actions, they are still considered important by the communities that listed them. A list of these actions is included in Appendix A.

4.6 2025 Mitigation Strategy Elements

For all new and continuing actions, communities were asked to provide background information on the action. Each action includes:

- Mitigation action name
- What is the problem the action is solving?
- How does the action solve the problem?
- Action status
- Hazards the action helps mitigate
- Plan goal(s) the action helps implement
- Lead and support agencies for each action
- Potential funding sources to support each action
- Benefits of implementing the action
- Estimated cost of the action
- Estimated timeline for the action

4.7 Action Prioritization

Communities were asked to score each action on a set of metrics. These metrics were:

- Potential for lives saved
- Potential for reduced property damages
- Potential for reduced response actions
- Whether the benefits of the action exceed the costs
- Internal community action priority ranking

Each metric was scored on a scale of 1 – 3, and the total scores were tallied up to identify a final priority ranking. Final rankings were based on a minimum score of 5 and a maximum score of 15.

- 5 – 8 Low Priority
- 9 – 12 Medium Priority
- 13 – 15 High Priority

Once scoring was tallied, they were presented to the LPT and communities during the internal plan review process, along with the invitation to review and edit scores and prioritization as warranted based on specific community needs. Committee members were invited to review the scoring further during the committee plan review period and provide any additional comments or concerns on action prioritization; any comments received were reviewed and incorporated.

4.8 2025 Hazard Mitigation Strategy

Ramsey County's comprehensive hazard mitigation strategy features a wide range of alternatives that make real progress toward buying down the County's and its communities' risk from the impacts of hazards.

4.8.1 BASELINE INFORMATION

Table 29. Mitigation Strategy - Baseline Information

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
1	Arden Hills, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Maplewood, Mounds View, New Brighton, North Oaks, North Saint Paul, Roseville, Shoreview, Saint Anthony, Vadnais Heights, White Bear Township	Ramsey Everbridge	Public Notification during emergencies	Continue to ensure that all Ramsey County residents are aware of and sign-up for the County's Everbridge Emergency Notification System.	Yes	In Progress
2	Arden Hills, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Mounds View, New Brighton, North Oaks, North Saint Paul, Roseville, Shoreview, Vadnais Heights, Saint Anthony	Water Conservation Measures	Groundwater conservation	Promote water conservation measures to residents during periods of drought and enforce water conservation ordinances when needed.	Yes	In Progress
3	Arden Hills, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Mounds View, New Brighton, North Saint Paul, Roseville, Shoreview, Vadnais Heights, Saint Anthony	NFIP Participation	Property Damage Mitigation	Participate in the National Flood Insurance Program (NFIP) and enforce local floodplain ordinances to ensure that new construction is built above regulatory flood protection elevation.	Yes	In Progress
4	Arden Hills, Falcon Heights, Gem Lake, Little Canada, Mounds View, North Oaks, North Saint Paul, Roseville, Shoreview, Saint Anthony, Vadnais Heights, Lauderdale, New Brighton	Weather Awareness	Public alerts of potentially hazardous conditions	Continue to promote the use of NOAA weather radios by residents, schools, businesses, and facilities that house persons with functional and access needs.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
5	Arden Hills, Falcon Heights, Gem Lake, Mounds View, New Brighton, North Oaks, Shoreview, Saint Anthony, White Bear Township, Maplewood, North Saint Paul, Lauderdale	Critical Infrastructure Identification	Life safety	Identify critical facilities or infrastructure that do not have generator backup power in the event of a major power outage resulting from severe winter or summer storms. (Examples of critical facilities include Police/Fire departments, EOC's, health care facilities, water & sewer treatment facilities, and other facilities deemed as critical, i.e. public schools and sheltering facilities).	Yes	In Progress
6	Arden Hills, Falcon Heights, Lauderdale, Little Canda, Mounds View, New Brighton, North Oaks, North Saint Paul, Shoreview, Saint Anthony, White Bear Township, Gem Lake, Roseville	Comprehensive Plan Updates	Emergency Planning	Update County/City Comprehensive Plans and Zoning Ordinances to include mitigation considerations that help to reduce risk from natural hazards. Utilize data of past hazard events and future climate projections to help inform updates.	Yes	In Progress
7	Arden Hills, Falcon Heights, Little Canada, Mounds View, New Brighton, North Oaks, North Saint Paul, Roseville, Shoreview, Vadnais Heights, Gem Lake, Lauderdale, Saint Anthony, Ramsey County	Flood Reduction	Property Damage Mitigation	Identify, prioritize, and implement localized flood reduction measures to improve drainage systems and reduce over-the-road flooding to County or municipal roads.	Yes	In Progress
8	Arden Hills, Falcon Heights, Little Canada, North Oaks, Mounds View, Shoreview, Vadnais Heights, White Bear Township, Lauderdale, New Brighton, North Saint Paul, Roseville, Saint Anthony	Storm Shelter	Life safety	Implement construction or retrofit projects for safe rooms or storm shelters in identified vulnerable locations.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
9	Arden Hills, Falcon Heights, Mounds View, New Brighton, North Oaks, Shoreview, Vadnais Heights, Gem Lake, Lauderdale, Maplewood, North Saint Paul, Roseville, Saint Anthony, White Bear Township	Community Vulnerability Assessment	Life safety	Identify community areas, parks, and facilities (i.e., schools, government buildings, manufactured home parks) that are vulnerable to tornadoes and evaluate for potential construction or retrofit of safe rooms or storm shelters.	Yes	In Progress
10	Arden Hills, Falcon Heights, Mounds View, North Oaks, Shoreview, Vadnais Heights, White Bear Township, Gem Lake, North Saint Paul, Saint Anthony, Lauderdale	Generator Backups	Provide backup power to critical facilities	Purchase and install generator hook-ups and encourage local generator purchases for identified critical facilities that should have backup power.	Yes	In Progress
11	Arden Hills, Gem Lake, Little Canada, Falcon Heights, Maplewood, Mounds View, New Brighton, North Oaks, North Saint Paul, Roseville, Shoreview, Saint Anthony, Vadnais Heights, Lauderdale	All Hazards Education and Awareness	Public Empowerment	Continue to promote education & awareness on all-hazards and emergency preparedness for schools, individuals, families, and businesses.	Yes	In Progress
12	Arden Hills, Little Canada, Mounds View, New Brighton, North Oaks, North Saint Paul, Shoreview, Falcon Heights, Gem Lake, Lauderdale, Maplewood, Roseville, Saint Anthony, Ramsey County	Flood Technical Assistance	Property Damage Mitigation	Provide information & technical assistance to property owners to help mitigate against localized flooding during high-rain events (i.e., landscaping / green infrastructure applications).	Yes	In Progress
13	Arden Hills, Little Canada, Mounds View, North Oaks, Roseville, Shoreview, Gem Lake, North Saint Paul, Lauderdale, Saint Anthony	Flooding Risk Assessment	Identifying infrastructure prone to flooding for future mitigation projects	Identify residential, commercial, government facilities, and/or critical infrastructure properties that may experience damage from future flooding and work to implement appropriate mitigation measures (including buy-out for property acquisition & structure demolition or relocation). Areas of focus may include previously unidentified flooding locations.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
14	Arden Hills, New Brighton, North Oaks, North Saint Paul, Shoreview, Saint Anthony, Vadnais Heights, White Bear Township, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Mounds View, Roseville	Overhead Powerlines	Reduction in power outages	Work with municipal electrical cooperative and power companies to reduce overhead exposure of power lines that are vulnerable to damage from severe winter/summer storms (i.e., high winds, ice, and heavy snow). Replace overhead power lines with underground lines in areas with high-risk exposure (i.e. high tree concentration areas).	Yes	In Progress
15	Gem Lake, Little Canada, Mounds View, New Brighton, Falcon Heights, Arden Hills, North Oaks, Shoreview, North Saint Paul, Saint Anthony, Vadnais Heights	De-Icing	Ice buildup	Continue to provide for public safety on roads through anti-icing (application of brine solution before an event), snow removal, salting and sanding to minimize the impacts of snow/ice accumulations on roadways.	Yes	In Progress
16	Maplewood	Outdoor Warning Siren Coverage	Delayed outdoor notification to community members for severe weather.	Ensures the community has adequate outdoor warning siren coverage.	No	Not Started
17	Mounds View, North Saint Paul, Shoreview, Vadnais Heights, White Bear Township	Wellhead Protection Plan	Safe Drinking Water	Ensure that wellhead protection plans are in place to address flooding that may lead to contaminated drinking water.	Yes	In Progress

18	Ramsey County	Outdoor warning sirens	This mitigation action addresses Ramsey County's ability to warn residents and visitors who are outdoors of impending hazards.	Ramsey County will continue to maintain the three base Federal Signal siren systems and three repeater sites for Ramsey County's outdoor warning siren system. Ramsey County also encourages the addition of new outdoor warning sirens in areas where sound propagation is limited or does not exist.	Yes	In Progress
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Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
19	Ramsey County	County and municipal planning programs	This mitigation action addresses planning for long-term future growth in Ramsey within a community and ensuring communities are using standard, up-to-date zoning, floodplain management, building, and other codes	Ramsey County will, every five years, review and update comprehensive plans to include mitigation considerations that help to reduce risk from natural hazards and utilize data from past hazard events as well as future climate projections to help inform updates.	Yes	In Progress
20	Ramsey County	Building retrofits	This mitigation action addresses the potential for damages to public or private property from severe spring, summer, and winter storms due to poor construction practices or construction materials.	This mitigation strategy aims to promote annually at fire department open houses, retrofitting homes, buildings, schools, or public facilities with building materials such as wind resistant film for windows or installing lightning grounding systems, which will reduce the impacts of tornados, windstorms, or summer and winter storm events that can cause damage to property, personal injury or loss of life.	Yes	In Progress
21	Ramsey County	Manufactured home tie-down straps	This mitigation action addresses the potential for damages to manufactured homes from severe spring, summer, and winter storms.	This mitigation strategy aims to promote annually at fire department open houses, retrofitting of manufactured homes with tie-down straps and skirting to reduce the impacts of severe spring, summer, and winter storms or tornadoes.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
22	Ramsey County	NOAA weather radios	This mitigation action addresses the problem of limited or delayed access to timely warnings for severe weather and other hazards, particularly for vulnerable populations such as those with functional and access needs.	This mitigation strategy aims to promote annually at fire department open houses, the use of NOAA weather radios, ensuring Ramsey County's residents, schools, businesses, and facilities receive immediate alerts, enabling faster response and protective actions thereby reducing the risk of injury, loss of life, and property damage during hazardous events.	Yes	In Progress
23	Ramsey County	Cyber security	This mitigation action addresses the problem of vulnerabilities in the cyber security and physical infrastructure of Ramsey County's operations, which can be exposed to disruption from various hazards.	This mitigation strategy aims to strengthen the cybersecurity measures and physical infrastructure resilience of municipal and county operations to reduce vulnerability to potential hazards, ensuring continuous service delivery and protection of critical systems against both natural, technological, and human-caused hazards.	Yes	In Progress
24	Ramsey County	Slope stabilization	This mitigation action addresses the problem of erosion and slope failure, which can threaten critical infrastructure, roads, natural resources, and recreation areas.	Working with Ramsey County Public Works, Parks & Recreation, and the Soil & Water Conservation District, municipal, and watershed districts over the next three to five years, Ramsey County EMHS will identify and prioritize areas where hillsides, banks or bluffs can be stabilized thereby reducing impacts to critical infrastructure, roads, natural resources, and recreation areas from erosion and slope failure.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
25	Ramsey County	Enrollment in the NFIP program	This mitigation action addresses the non-participation of a community in Ramsey County that is currently not enrolled in the National Flood Insurance Program (NFIP).	Working with the municipal EMA over the next two to three years, Ramsey County EMHS will work to enroll this municipality in the National Flood Insurance Program (NFIP). Without NFIP participation, residents are at greater financial risk during flood events and may face higher recovery costs of flooding.	Yes	In Progress
26	Ramsey County	County-wide Everbridge enrollment	This mitigation action addresses Ramsey County's ability to notify residents, including those who use a language other than English, or may have other special needs such as vision or hearing impairment, of impending or on-going hazards that may affect them or their property.	Ramsey County will conduct outreach annually to ensure Ramsey County residents, including those who use a language other than English, or may have other special needs such as vision or hearing impairment, are aware of and can sign up for the County's Everbridge Emergency Notification System.	No	New Action
27	Ramsey County	Schools and higher education participation	This mitigation action addresses the problem of insufficient disaster preparedness and resilience within educational institutions, which are often vulnerable to disruptions from natural hazards.	This mitigation strategy aims to collaborate with local public and private school districts, as well as institutes of higher learning, to enhance their disaster preparedness and resilience through tailored risk assessments, emergency response plans, and structural mitigation measures. By integrating educational institutions into community-wide hazard mitigation strategies, the project aims to safeguard lives, protect critical infrastructure, and ensure continuity of education during and after disasters.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
28	Ramsey County	Natural systems preservation	This mitigation action addresses the effects of wind and water erosion in natural systems such as lake shores, stream and riverbanks, and wetlands.	This mitigation strategy aims to mitigate the effects of wind and water erosion by implementing targeted restoration and preservation strategies for impacted natural systems, such as wetlands. This involves activities such as reestablishing native vegetation, reinforcing soil stability, and enhancing hydrological functions to restore ecological balance.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
29	Ramsey County	Community outreach and public education	This mitigation action addresses the problem of insufficient knowledge or preparedness among residents, businesses, schools, and facilities housing persons with access and functional needs.	This mitigation strategy aims to provide annually at fire department open houses, education and awareness of the natural, technological, and human-caused hazards Ramsey County is exposed to and may impact the residents, visitors, businesses, schools, and facilities housing persons with access and functional needs, and actions they can take to lessen those impacts.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
30	Ramsey County	FEMA flood map updates	This mitigation action addresses the problem of outdated or inaccurate flood risk information, which can leave residents, businesses, schools, and governments unaware of newly vulnerable structures or areas.	Working with Ramsey County GIS over the next two to three years, this mitigation strategy aims to update flood maps potentially identifying structures in the floodplain thereby allowing residents, businesses, schools, and local and county governments to identify structures not previously set in the floodplain and make decisions about mitigation projects in new developments.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
31	Ramsey County	Safe rooms or storm shelter identification	This mitigation action addresses the problem of insufficient protection for residents and visitors in Ramsey County's community areas, parks, and facilities that are vulnerable to tornados, windstorms, and summer weather hazards.	This mitigation action aims to identify and prioritize Ramsey County's community areas, parks, and facilities that are vulnerable to the impacts of tornados, windstorms, and summer weather hazards and evaluate the need for the construction of a safe room or storm shelter.	Yes	Not Started
32	Ramsey County	Underground utility construction	This mitigation action addresses the vulnerability of overhead utility lines in high winds or from ice and snow.	This mitigation strategy aims to encourage placing power and other utilities underground to reduce overhead exposure of power and cable lines that may be vulnerable to damage from severe winter/summer storms (i.e., high winds, ice, and heavy snow). Replace overhead power lines with underground lines in areas with high-risk exposure (i.e. high tree concentration areas).	Yes	Not Started
33	Ramsey County	Backup generator needs	This mitigation action addresses the problem of power outages impacting critical infrastructure, such as emergency services, healthcare facilities, and communication systems, which rely on continuous power to function effectively.	This mitigation strategy aims to obtain generators and install generator hookups for critical infrastructure that does not have access to backup power in the event of power outages.	Yes	Not Started

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
34	Ramsey County	Climate-based construction	This mitigation action aims to address the problems of increased risks to public health, infrastructure, and environmental degradation caused by extreme heat events in Ramsey County.	This mitigation strategy aims to reduce the effects of extreme heat by implementing measures that enhance urban cooling and reduce heat absorption. Key initiatives include installing permeable paving to improve stormwater management and reduce surface temperatures, creating greenways and planting trees to provide natural shade and lower ambient air temperatures. Additionally, the use of white or reflective roofs on buildings will help minimize heat absorption and reduce energy consumption for cooling.	Yes	Not Started
35	Ramsey County	Water conservation	This mitigation action addresses potential water shortages during periods of drought.	This mitigation strategy aims, during times of drought, to promote water conservation measures to the residents of Ramsey County through social media during periods of drought.	Yes	Not Started
36	Ramsey County	Lightning detection systems	This mitigation action addresses the use of lightning detection systems in parks, beaches, and other open spaces due to insufficient warning from lightning strikes in outdoor recreational areas, where users are particularly vulnerable.	This mitigation strategy, over the next two to three years, aims to identify and prioritize the installation of lightning detection systems in Ramsey County beaches, waterparks, picnic areas, and other open spaces providing an additional means of warning for lightning to the residents and visitors of Ramsey County's parks.	Yes	Not Started

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
37	Ramsey County	CIKR exposure assessments	This mitigation action addresses Ramsey County's need to identify and evaluate Ramsey County's critical infrastructure and key resources to exposure to risk and vulnerability, then identify potential mitigation efforts.	This mitigation strategy, over the next two to three years, aims to identify Ramsey County's facilities that are the most vulnerable to natural and man-made hazards, such as flooding, severe storms, or cyber-attacks, and evaluate their current protective measures. Based on this evaluation, the county can develop targeted mitigation efforts such as infrastructure upgrades, enhanced physical security, and redundant systems to reduce exposure and vulnerabilities.	Yes	Not Started
38	Ramsey County	Enrollment in the CRS program	This mitigation action addresses Ramsey County and its municipalities non-participation in FEMA's Community Rating System (CRS) program.	Working with the municipalities over the next two to three years, Ramsey County EMHS will explore participation in FEMA's Community Rating System (CRS). The Community Rating System is essential for enhancing Ramsey County's resilience by incentivizing proactive floodplain management and hazard mitigation activities.	Yes	Not Started
39	Saint Paul	Infrastructure Hardening	This action mitigates the risk of infrastructure failures due to terrorism, natural disasters, or other hazards, ensuring the continuity of essential services and protecting public safety and the economy.	Infrastructure Hardening - Conduct study to identify eligible projects and build capacity by mitigating key infrastructure nodes to harden against terrorism and other hazards	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
40	Saint Paul	Business Continuity Planning	<p>Business disruptions during and after a hazard by ensuring that businesses can:</p> <ul style="list-style-type: none"> - Maintain operations during an emergency - Minimize financial losses - Protect critical assets and resources - Reduce downtime - Enhance resilience 	Business Continuity Plan Development - Assist businesses in developing plans and resources to minimize hazard impacts.	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
41	Saint Paul	Flood Mitigation - Chestnut Plaza	Solves problems related to flooding risks, maintenance costs, operational disruptions, safety hazards, and long-term infrastructure sustainability.	Chestnut Plaza - Feature Fountain Pump Pit Relocation	Yes	In Progress
42	Saint Paul	Fire Safety Initiative	This initiative addresses inadequate fire protection, fire-related injuries and deaths, rapid fire spread, property loss, inconsistent safety standards in publicly funded projects, and outdated fire codes, ultimately improving fire safety and resilience in residential buildings.	Enact Combined Enhanced Fire Safety Ordinances - Automatic Fire Sprinkler Mitigation Initiatives a. DSI and Mayor's Intergovernmental Relations personnel should continue to push for the adoption of the most current International Residential Code without any redactions of fire sprinkler requirements b. OFS, PED, and elected officials should pass an ordinance and make it standard practice that any housing renovations or construction of residential buildings funded in part or in total by city funding or tax incentives include the requirement to install fire sprinkler systems	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
43	Saint Paul	Flood Mitigation - Flood Plain Review	This project addresses problems related to flood risk awareness, preparedness, emergency response coordination, regulatory compliance, and decision-making in the floodplain areas of Saint Paul, helping reduce the impacts of flooding on at-risk structures	Flood Plain Structure Inventory Project - Inventory all structures that are at flood risk within the Mississippi River flood plain at Saint Paul. Determine individual Risk Assessments for existing structures. Includes: inventorying (marrying-up with Conditional Use Permits), developing Key Contacts Lists, facilitate accomplishment of Flood Response Plans and the creation of maps.	Yes	In Progress
44	Saint Paul	Flood Mitigation - Hidden Falls Park	This action solves problems related to flooding, erosion, public safety, high maintenance costs, environmental degradation, and accessibility issues in Hidden Falls Park.	Hidden Falls Park - Pathway Removal/Realignment near low spots along river	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
45	Saint Paul	Fire Safety Initiative	This initiative solves problems related to inadequate fire protection, high fire risk in public buildings, limited public awareness, post-fire safety rebuilding, legislative barriers, and financial constraints, ultimately improving fire safety, reducing fire-related damage, and promoting community resilience.	Incorporating Fire Sprinkler Technology in New and Existing Buildings - Automatic Fire Sprinkler Mitigation Initiatives	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
46	Saint Paul	Public Outreach & Education	Emergency preparedness, public safety, weather resilience, terrorism awareness, community emergency planning, and economic development by equipping the public with information, tools, and resources to protect themselves, their properties, and their communities from a wide range of hazards.	Promote the use of Family Emergency Plans, NOAA Weather radios, and Severe Weather Awareness activities... Winter; Promote use of home and auto survival kits and urge public to heed winter weather warnings... Summer; Coordinate with Libraries and Parks & Rec for cooling sites, and urge public to heed winter weather warnings... Terrorism; Educate and disseminate info on "See Something, Say Something" campaign, common sense terrorism & CBRNE awareness... EOP and ESF's; Community Outreach Education, Planning Discussions... Economic Development; Educate citizens on low interest loans for improving structural ability of homes & businesses	Yes	In Progress
47	Saint Paul	Fire Safety Initiative	This program addresses problems related to lack of smoke detectors, low public awareness, fire-related injuries and deaths, improper installation and maintenance, and fire safety gaps in vulnerable communities, ultimately enhancing fire safety and saving lives.	Smoke Detector Education Program - Continue to implement smoke detector education and giveaway program	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
48	Saint Paul	Flood Mitigation - Upper Landing	Relocating the pump pits for the Upper Landing Feature Fountains solves problems related to flooding, maintenance costs, operational disruptions, safety hazards, and extended downtime, ensuring long-term functionality and safety of the fountains.	Upper Landing Feature Fountains (4) - Pump Pit Relocation	Yes	In Progress
49	Saint Paul	Flood Mitigation	Reduces flooding, improves public safety, minimizes disruptions, and lowers maintenance costs, ensuring long-term resilience for Water Street.	Water Street – Due to persistent flooding events, elevate the street in numerous low areas. Finalize plans and complete	Yes	In Progress
50	Saint Paul	Flood Mitigation - Watergate Marina	This action solves problems related to flooding vulnerability, operational disruptions, high maintenance costs, safety risks, and environmental hazards, ensuring the long-term resilience and safety of Watergate Marina's electrical and fueling systems.	Watergate Marina - Define and develop new facility electrical and fueling station systems to protect against annual flooding	Yes	In Progress

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
51	Saint Paul	Flood Mitigation	Improves resilience against flooding, prevents sewage issues, protects utilities, minimizes service disruptions, and enhances public health and safety.	City House Building - Utility Protection & Sewage Ejector Relocation	Yes	Not Started
52	Saint Paul	Flood Mitigation - Flood Plain Review	The CRS Project addresses problems related to inadequate floodplain management, high insurance costs, flood vulnerability, community engagement, and non-compliance with best practices, ultimately enhancing flood resilience in Saint Paul and reducing insurance premiums for its residents.	Community Rating System Project – This voluntary program recognizes and encourages community floodplain management activities exceeding the minimum National Flood Insurance Program standards. This action tailors Saint Paul’s own particular hazards, character, and goals. The city implementing standards in turn ultimately leads to discounted premiums rates.	Yes	Not Started

53	Saint Paul	Flood Mitigation - Crosby Park	<p>Repositioning the fishing pier during high water events addresses problems related to flooding, structural damage, public safety, accessibility, and maintenance costs, ensuring continued safe use of the pier.</p>	Crosby Bog Walk – Fishing Pier needs to be repositioned during high water events	Yes	Not Started
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Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
54	Saint Paul	Emergency Evacuation Planning	This action solves problems related to transportation disruption, emergency response delays, economic impact, public safety, traffic congestion, and commuter accessibility, ensuring continued movement and safety after a critical bridge failure.	Develop alternate transportation plan for post-failure City-owned river or critical bridge failure or damage	Yes	Not Started
55	Saint Paul	Flood Mitigation - Harriet Island	This action addresses problems related to debris entanglement, high maintenance costs, dock damage, operational disruptions, and environmental impacts, ultimately improving the long-term functionality and sustainability of the Harriet Island Public Dock	Harriet Island Public Dock - Add more structural support related to debris entanglement to reduce repetitive costs for contract debris and dredging	Yes	Not Started

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
56	Saint Paul	Flood Mitigation - NOAA Data Update	This project solves problems related to outdated flood data, inaccurate floodplain boundaries, ineffective mitigation planning, regulatory non-compliance, and higher insurance costs, improving flood risk management and resilience in Saint Paul.	Localized NOAA Atlas 14 Map Assessment Update Project - Utilize current data and provide updated assessment for Saint Paul flood plain.	Yes	Not Started
57	Saint Paul	Flood Mitigation - Mechanical Gate	The mechanical gate prevents water entry, reducing the need for expensive post-flood repairs and clean-up efforts. The mechanical gate helps ensure continuous operations by preventing water intrusion.	Mechanical gate used as a levee system to block water from infrastructure	No	Not Started
58	Saint Paul	Flood Mitigation	Addresses problems related to erosion, structural damage, navigation hazards, maintenance costs, public safety, and environmental protection, ensuring the long-term resilience of the bridge and surrounding area.	Raspberry Island - Bridge Deflector Project needed. Develop plan and complete programming and construction	Yes	Not Started

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
59	Saint Paul	Flood Mitigation - West Levee	This project solves problems related to outdated data, inaccurate flood risk assessments, ineffective planning, regulatory compliance, and insurance pricing, improving overall flood resilience in Saint Paul.	West Levee - Determine FEMA re-certification and PAL status	Yes	Not Started
60	St. Anthony	Water Supply Protection	The City's main water supply is not sufficiently protected from contamination.	Protect the City's municipal water supply from contamination	Yes	In Progress
61	St. Anthony	Severe Weather Protocols	Lack of safe policies and procedures during severe weather	Develop safe policies, procedures and facilities to reduce injuries and losses resulting from severe weather	Yes	Not Started
62	St. Anthony	Fire Flow Capacity Expansion	Lack of sufficient flow capacity of water mains	Increase fire flow capacity of water main, provide sufficient water to the public	Yes	Not Started
63	St. Anthony	Surface Stormwater Mitigation	Stormwater overflows existing capacity to carry surface water.	Increase the amount of storm water removed from surface grade during rain events	Yes	Not Started
64	St. Anthony	Safe Space Development	A lack of safe spaces against hazards for local populations.	Locate and create facilities capable of providing protection against likely hazards Identify and construct optimal safe structures to protect against probable hazards	Yes	Not Started
65	St. Anthony	Control System Hardening	A lack of prevention/protection measures against vulnerabilities of municipal weather systems.	Prevent failure of control systems for water treatment facilities and municipal wells 3, 4, & 5	Yes	Not Started

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
66	St. Anthony	Sanitary Sewer Inflow/Infiltration Mitigation	Inflow and infiltration into sanitary sewers, leading to sewer system backups	Prevent inflow and infiltration into sanitary sewer, prevent sanitary sewer system backups	Yes	Not Started
67	All	Urban Green Space Initiative	Addresses the problem of urban heat islands, where densely developed areas experience higher temperatures due to minimal vegetation and heat-retaining surfaces.	Identify priority urban areas with high heat island effects to develop green spaces, such as parks, green roofs, and shaded corridors. This project will involve planting native trees, installing permeable surfaces, and creating shaded recreational areas. By increasing vegetation cover, this action will help lower temperatures, improve air quality, and reduce energy demands for cooling. Additionally, green spaces can enhance stormwater management, reducing the risk of flooding during heavy rainfall by allowing for natural absorption.	No	New Action
68	All	Business Resilience Preparedness Initiative	Many small and medium-sized businesses in Ramsey County lack adequate preparedness for natural, technological, or human-caused hazards, leaving them vulnerable to disruptions that could jeopardize their long-term viability and impact the county's economic stability.	This action would equip businesses with the knowledge, tools, and training needed to prepare for, respond to, and recover from various hazards. The program would use educational materials from Ready.gov, facilitate business continuity assessments, guide program planning, and provide hands-on training and exercises to build resilience within the business community.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
69	All	Cultural Competency Communication Audit	Hazard education, outreach, and public warning efforts in Ramsey County may not fully address the diverse cultural, linguistic, and accessibility needs of its population, leading to ineffective communication and reduced preparedness for certain communities.	This action will assess current internal communication methods to identify gaps in cultural competency, especially regarding hazard information dissemination. By identifying barriers and recommending inclusive communication practices, the audit will help ensure that hazard messages reach and resonate with all community members.	No	New Action
70	All	Senior Hazard Awareness and Preparedness Outreach	Seniors in Ramsey County may be more vulnerable to the impacts of natural, technological, and human-caused hazards due to physical limitations, limited access to emergency information, and specific medical or mobility needs. Limited awareness or preparedness could heighten their risk in disaster situations.	This action would deliver targeted education and outreach to the senior population, focusing on hazard awareness, preparedness actions, and mitigation strategies. This initiative includes informational sessions, accessible resources, and guidance on personal preparedness actions, such as emergency supply kits, evacuation plans, and home adaptations to mitigate hazard risks.	No	New Action

Action Number	Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?	Is this a continuing action from 2019 plan?	Action Status
71	All	Enhanced Flood Risk Mapping and Vulnerable Population Assessment (EFRM-VPA)	Current FEMA flood maps may not accurately reflect actual floodplain boundaries in Ramsey County, potentially leaving residents and businesses unprepared for flooding events. Additionally, vulnerable populations who are more likely to be impacted by flooding are not identified, which limits the county's ability to provide targeted support and resources during flood events.	This action will update FEMA flood maps to reflect current floodplain boundaries and assess structures at risk of flooding. Simultaneously, the project will map the locations of vulnerable populations within the flood-prone areas, such as low-income, elderly, and disabled residents, allowing the county to prioritize resources and develop targeted outreach and evacuation plans.	No	New Action

4.8.2 IMPLEMENTATION INFORMATION

Table 30. Mitigation Strategy – Implementation Information

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
1	All Hazards		Goal #4		Ramsey County Emergency Management & Homeland Security (RCEMHS) & Municipal Emergency Management Agencies (EMAs)		County, municipal funding
2	Drought		Goal #1		RCEMHS, RC Conservation District & Local City planning depts.		County, municipal funding
3	Flooding		Goal #1	Goal #4	RCEMHS, Municipal EMAs local city planning depts.		County, municipal funding
4	Summer Weather Hazards	Winter Weather Hazards	Goal #1		RCEMHS & Municipal EMAs		County, municipal funding
5	Summer Weather Hazards	Winter Weather Hazards	Goal #3		RCEMHS, RC Property Management & Municipal EMAs		County, municipal funding
6	All Hazards		Goal #1		RCEMHS in coordination with Ramsey County Community and Economic Development and local municipal administrators, Planning & Zoning Committees		County funding
7	Flooding		Goal #1		RC Public Works, City Public Works, MnDOT, Watershed Districts,		County/City Budgets, MnDOT, Possible MN DNR Flood Hazard Grants or FEMA HMA grant for Localized Flood Reduction Projects / Infrastructure Retrofit
8	Summer Weather Hazards		Goal #3		RCEMHS, RC Parks & Rec, Municipal parks & rec, and EMAs		County, municipal funding, Possible FEMA HMA grant for Safe Rooms
9	Summer Weather Hazards		Goal #1		RCEMHS, RC Parks & Rec, Municipal parks & rec, and EMAs		County, municipal funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
10	Summer Weather Hazards	Winter Weather Hazards	Goal #3		RCEMHS, RC Property Management & Municipal EMAs		County, municipal funding, Possible FEMA HMA grant for Generators
11	All Hazards		Goal #2		RCEMHS & Municipal EMAs		County, municipal funding
12	Flooding		Goal #1	Goal #4	RC Public Works, RC Conservation District, and municipal planning/public works		County/City Funding, Possible FEMA HMA grant for Property Acquisition & Structure Demolition or Relocation
13	Flooding		Goal #1		RCEMHS, RC Public Works, RC Property Management, RC Conservation District, municipal EMA		County, municipal funding, DNR Flood Mitigation Grant, US Army Corps of Engineers (USACE), Possible FEMA HMA grant for Property Acquisition & Structure Demolition or Relocation
14	Summer Weather Hazards	Winter Weather Hazards	Goal #1		RC Public Works, Municipal Public Works in cooperation the appropriate utility company.		Coop / Electric Company funding, Possible FEMA HMA grant for Infrastructure Retrofit
15	Winter Weather Hazards				RC Public Works & Municipal Public Works		County, municipal funding
16	Tornado and Windstorm	Summer Weather Hazards	Goal #1	N/A	Municipal EMAs	RCEMHS	County, municipal funding
17	Flooding	None	Goal #1	none	RC Public Works, MN Dept. of Health and local city public works depts.	RC Public Works, MN Dept. of Health and local city public works depts.	MDH Source Water Protection grant funding for wellhead improvement projects

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
18	All Hazards		Goal 1	Goal 2	Ramsey County EMHS	Ramsey County Emergency Communications Center (ECC), municipal EMAs	County funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
19	All Hazards		Goal 1	Goal 3	Ramsey County Community and Economic Development		County funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
20	Tornado and Windstorm	Summer Weather Hazards, Winter Weather Hazards	Goal 1	Goal 2	Ramsey County EMHS	Ramsey County Property Management, Parks & Rec, Saint Paul/Ramsey County Public Health, municipal EMAs, school districts	County funding
21	Tornado and Windstorm	Summer Weather Hazards, Winter Weather Hazards	Goal 1	Goal 2	Ramsey County EMHS	Municipal EMAs, manufactured home park owners	County funding, municipal funding, MHP owner funding
22	All Hazards		Goal 1	Goal 4	Ramsey County EMHS	Ramsey County CPR	County funding
23	All Hazards		Goal 3	Goal 1, Goal 2	Ramsey County EMHS	Ramsey County IS	County funding
24	Geological Hazards		Goal 1		Ramsey County EMHS	Ramsey County Public Works, Parks & Recreation, Soil & Water Conservation District, municipal EMAs, local watersheds	County funding, municipal funding, SWCD State Cost-Share Program, FEMA HMA grants, USDA grants, watershed funding
25	Flooding		Goal 4	Goal 2, Goal 3	Ramsey County EMHS	Municipal EMA	County funding, municipal funding
26	All Hazards		Goal 4	Goal 1, Goal 2	Ramsey County EMHS	Saint Paul-Ramsey County Public Health (SPRCPH) in partnership with Twin Cities Public Television (TPT), Ramsey County Emergency Communications Center (ECC); Ramsey County Communications & Public Relations (CPR)	County, Twin Cities Public Television (TPT)
27	All Hazards		Goal 1	Goal 2, Goal 3	Ramsey County EMHS		County funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
28	Flooding	Geologic hazards	Goal 1		Ramsey County Soil & Water Conservation	Local watersheds	Ramsey County Soil & Water Conservation funding, other watershed funding, private funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
29	Summer Weather Hazards	Drought Flooding Geologic hazards Tornado and windstorms Winter weather hazards	Goal 4	Goal 1, Goal 2	Ramsey County EMHS	Saint Paul/Ramsey County Public Health, municipal EMAs, school districts	County funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
30	Flooding		Goal 1	Goal 3	Ramsey County EMHS	Ramsey County GIS	County funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
31	Tornado and Windstorm	Summer Weather Hazards	Goal 1		Ramsey County EMHS	Ramsey County Parks & Rec, Ramsey County Property Management	County funding
32	Summer Weather Hazards	Winter weather hazards; Tornados	Goal 3	Goal 2	Ramsey County EMHS	Ramsey County Public Works, Municipal Public Works, utility companies	Utility company funding, FEMA HMA grants
33	Summer Weather Hazards	Winter weather hazards; Tornados	Goal 3	Goal 2	Ramsey County EMHS	Ramsey County Property Management	County funding
34	Summer Weather Hazards		Goal 1	Goal 2, Goal 3	Ramsey County EMHS	Ramsey County Public Works, Ramsey County Property Management	County funding
35	Drought		Goal 4		Ramsey County EMHS	Ramsey County Soil & Water, local watersheds	County funding, watershed funding
36	Summer Weather Hazards		Goal 1		Ramsey County EMHS	Ramsey County Parks & Rec	County funding
37	All Hazards		Goal 3	Goal 1, Goal 2	Ramsey County EMHS	Ramsey County departments and agencies	County funding
38	Flooding		Goal 4	Goal 2, Goal 3	Ramsey County EMHS	Municipal EMAs	County funding, municipal funding
39	Flooding	Infrastructure	Goal 1		Emergency Management, Police, Public Works & Regional Water	Parks	Annual Operating Budgets and Law Enforcement Training and Terrorism Prevention (LETPP) grants

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
40	All Hazards				Emergency Management, Police, MNDot & Public Works	PED	Annual Operating Budget; public- private partnerships; grants
41	Flooding				P&R	PW	Annual Operating Budget; grant funding (FMA)
42	All Hazards	Fire Safety			FD, DSI		Grant funding, Annual Operating Budget
43	Flooding				DSI	EM, Parks, PW	Annual Operating Budget, Federal USACE funding, grant funding (FMA)
44	Flooding				P&R		Annual Operating Budget; grant funding (HMA)

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
45	All Hazards	Fire Safety			FD, DSI	MN VOADs	Grant funding, Annual Operating Budget

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
46	All Hazards				EM & topic related departments and organizations	Department PIOs	Annual Operating Budget
47	All Hazards	Fire Safety			FD	DSI, Red Cross	Grant funding, partnership with Red Cross
48	Flooding				P&R		Annual Operating Budget; grant funding (FMA)
49	Flooding				PW		Annual Operating Budget; transportation funding
50	Flooding				P&R	PW	Annual Operating Budget; grant funding (FMA)
51	Flooding				P&R	PW	Annual Operating Budget; grant funding (FMA)
52	Flooding				DSI	EM	Annual Operating Budget, Federal grant funding
53	Flooding				P&R	PW	Annual Operating Budget; grant funding
54	Infrastructure Failure				PW		Annual Operating Budget, various grant programs,
55	Flooding				P&R		Annual Operating Budget; transportation funding
56	Flooding				DSI	EM	Annual Operating Budget, Federal grant funding
57	Flooding	Infrastructure			PW		Grant funding
58	Flooding				P&R and PW		Annual Operating Budget, grant funding, transportation funding

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
59	Flooding				DSI	PW	Annual Operating Budget, Federal USACE funding, grant funding (FMA)
60	Flooding		Goal 3		Saint Anthony Public Works		Utility fees
61	Summer Weather Hazards	Winter weather hazards, tornadoes and high winds	Goal 2		Saint Anthony Fire Department		County/municipal funding
62	Flooding		Goal 2		Saint Anthony Public Works		County/municipal funding
63	Flooding		Goal 3		Saint Anthony Public Works		County/municipal funding
64	All Hazards		Goal 2		Saint Anthony Fire Department; School District		Grants
65	All Hazards		Goal 3		Saint Anthony Public Works		Utility fees
66	Flooding		Goal 3		Saint Anthony Public Works		County/municipal funding
67	Summer Weather Hazards	Flooding	Goal 1	Goal 2	Ramsey County Parks & Recreation Department	Public Works Department, Environmental Health Department, Community & Economic Development Department, and the Public Health Department	Ramsey County's Site Assessment Grants (SAG), Minnesota Department of Employment and Economic Development (DEED) Redevelopment Grant, U.S. Department of Agriculture (USDA) Forest Service Urban and Community Forestry Program, National Oceanic and Atmospheric Administration (NOAA) Community Heat Resilience Grants

Action Number	Main Hazard Mitigated	Additional Hazards Mitigated	Main Goal	Additional Goals	Responsible Agency	Support Agencies	Potential Funding Sources
68	All Hazards	N/A	Goal 2		Ramsey County Economic Development Department	EMHSD, Public Health Department, and local chambers of commerce and business associations	FEMA's Pre-Disaster Mitigation (PDM) Program and Building Resilient Infrastructure and Communities (BRIC) Program, DEED Small Business Assistance Grants, and local foundation (e.g., McKnight)
69	All Hazards	N/A	Goal 4	Goal 2	Ramsey County Communications Department	EMHSD, Public Health Department, and the Human Services Department	FEMA's Hazard Mitigation Grant Program (HMGP), Minnesota Department of Public Safety's Homeland Security and Emergency Management (HSEM) grants, and local foundations such as Saint Paul & Minnesota Foundation
70	All Hazards	N/A	Goal 4	Goal 2	Ramsey County Public Health Department	EMHSD, Human Services Department, and local senior centers and nonprofits (e.g., Meals on Wheels, etc.)	HMGP, BRIC, Minnesota Board on Aging's Community Grants, AARP Foundation grants
71	Flooding	N/A	Goal 1	Goal 3	Ramsey County Public Works Department	EMHSD, Community and Economic Development Department, and the Public Health Department	FEMA's Flood Mitigation Assistance (FMA) Program, BRIC, and the Minnesota Department of Natural Resources (DNR) Flood Hazard Mitigation Grant Assistance Program

4.8.3 RANKING AND PRIORITIZATION

Table 31. Mitigation Strategy - Action Ranking and Prioritization

Action Number	What is the estimated cost of this action?	What is the estimated timeline for this action to be implemented?	Potential for Lives Saved 1 - Little Potential 2 - Some Potential 3 - Major Potential	Potential for Reduced Property Damages 1 - Little Potential 2 - Some Potential 3 - Major Potential	Potential for Reduced Response Actions 1 - Little Potential 2 - Some Potential 3 - Major Potential	Number of Hazards the Action Addresses 1 - Addresses One Hazard 2 - Addresses More Than One Hazard	Benefits Exceed Costs 1 - BCA equal 2 - Minor Exceedance 3 - Major Exceedance	Community Action Priority Ranking 1 - Low Priority 2 - Medium Priority 3 - High Priority	Total
1	Under \$50k	Over 5 years	2	2	1	2	3	3	13
2	Under \$50k	2-3 years	1	1	1	1	3	1	8
3	Under \$50k	2-3 years	1	3	2	1	3	1	11
4	Under \$50k	Over 5 years	2	1	1	2	3	2	11
5	Under \$50k	4-5 years	2	1	2	1	1	1	8
6	Under \$50k	4-5 years	1	2	2	2	3	2	12
7	Over \$1M	Over 5 years	1	2	2	1	1	1	8
8	\$501k - \$750k	Over 5 years	2	1	1	1	1	1	7
9	Under \$50k	2-3 years	2	1	1	1	1	1	7
10	\$250k-\$750k	Over 5 years	2	1	2	1	1	1	8
11	Under \$50k	4-5 years	2	2	2	2	3	2	13
12	Under \$50k	Over 5 years	1	2	1	1	3	1	9
13	Over \$1M	Over 5 years	1	2	2	1	1	1	8
14	Over \$1M	Over 5 years	1	1	3	1	1	1	8
15	-	-	-	-	-	-	-	-	-
16	Under \$50k	Under 1 year	3	1	2	1	3	3	13
17	Under \$50k	Over 5 years	1	2	1	2	1	1	8
18	\$51k to \$250k	Under 1 year	3	1	3	2	3	3	15
19	\$51k to \$250k	4-5 years	2	2	2	2	2	2	12
20	\$51k to \$250k	Under 1 year	3	3	3	2	3	3	17
21	\$51k to \$250k	4-5 years	3	3	3	2	3	3	17
22	Under \$50k	Under 1 year	3	1	3	2	3	3	15
23	\$51k to \$250k	2-3 years	1	3	3	1	2	2	12
24	Over \$1M	4-5 years	2	2	2	1	3	1	11
25	Under \$50k	2-3 years	2	3	1	1	3	1	11

Action Number	What is the estimated cost of this action?	What is the estimated timeline for this action to be implemented?	Potential for Lives Saved	Potential for Reduced Property Damages	Potential for Reduced Response Actions	Number of Hazards the Action Addresses	Benefits Exceed Costs	Community Action Priority Ranking	Total
			1 - Little Potential 2 - Some Potential 3 - Major Potential	1 - Little Potential 2 - Some Potential 3 - Major Potential	1 - Little Potential 2 - Some Potential 3 - Major Potential	1 - Addresses One Hazard 2 - Addresses More Than One Hazard	1 - BCA equal 2 - Minor Exceedance 3 - Major Exceedance	1 - Low Priority 2 - Medium Priority 3 - High Priority	
26	Under \$50k	Under 1 year	3	1	3	2	3	3	15
27	Under \$50k	2-3 years	3	3	3	2	3	2	16
28	\$251k to \$500k	4-5 years	1	2	1	1	1	1	7
29	Under \$50k	Under 1 year	2	1	1	2	1	1	8
30	\$251k to \$500k	2-3 years	3	3	3	1	3	1	14
31	Under \$50k	2-3 years	3	1	1	2	3	2	12
32	Over \$1M	4-5 years	1	3	1	2	3	1	11
33	\$51k to \$250k	2-3 years	1	2	2	2	3	3	13
34	\$751k - \$1M	4-5 years	2	1	3	1	2	3	12
35	Under \$50k	Under 1 year	1	1	1	1	1	1	6
36	\$51k to \$250k	2-3 years	3	1	3	1	3	3	14
37	\$51k to \$250k	2-3 years	2	2	1	2	2	1	10
38	Under \$50k	2-3 years	2	3	3	1	3	2	14
39	\$51k to \$250k	Over 5 years	3	3	2	2	1	3	14
40	Under \$50k	2-3 years	1	2	1	2	1	1	8
41	Under \$50k	2-3 years	1	1	1	1	1	1	6
42	Under \$50k	2-3 years	3	3	3	2	1	2	14
43	Under \$50k	Under 1 year	1	1	1	1	1	1	6
44	\$51k to \$250k	2-3 years	1	2	2	1	1	1	8
45	\$251k to \$500k	4-5 years	3	3	3	2	1	2	14
46	Under \$50k	Under 1 year	2	2	1	2	1	2	10
47	Under \$50k	Under 1 year	3	1	1	2	1	2	10
48	Under \$50k	2-3 years	1	1	1	1	1	1	6
49	Over \$1M	Over 5 years	1	2	3	2	1	2	11
50	\$51k to \$250k	2-3 years	1	2	2	2	1	1	9
51	\$51k to \$250k	4-5 years	1	2	2	2	1	1	9
52	Under \$50k	Under 1 year	1	1	1	1	1	1	6
53	Under \$50k	2-3 years	1	2	1	1	1	1	7
54	\$51k to \$250k	Over 5 years	3	1	1	2	1	2	10
55	\$51k to \$250k	2-3 years	1	2	1	1	1	1	7

Action Number	What is the estimated cost of this action?	What is the estimated timeline for this action to be implemented?	Potential for Lives Saved 1 - Little Potential 2 - Some Potential 3 - Major Potential	Potential for Reduced Property Damages 1 - Little Potential 2 - Some Potential 3 - Major Potential	Potential for Reduced Response Actions 1 - Little Potential 2 - Some Potential 3 - Major Potential	Number of Hazards the Action Addresses 1 - Addresses One Hazard 2 - Addresses More Than One Hazard	Benefits Exceed Costs 1 - BCA equal 2 - Minor Exceedance 3 - Major Exceedance	Community Action Priority Ranking 1 - Low Priority 2 - Medium Priority 3 - High Priority	Total
56	Under \$50k	Under 1 year	1	1	1	1	1	1	6
57	Over \$1M	2-3 years	1	3	3	2	3	2	14
58	\$251k to \$500k	4-5 years	1	2	2	2	1	1	9
59	Under \$50k	Under 1 year	1	1	1	1	1	1	6
60	\$251k to \$500k	2-3 years	2	2	2	2	2	1	11
61	\$51k to \$250k	2-3 years	2	2	2	2	2	2	12
62	\$751k - \$1M	4-5 years	2	2	2	2	2	2	12
63	\$751k - \$1M	4-5 years	2	2	2	2	2	2	12
64	\$251k to \$500k	2-3 years	2	2	2	2	2	2	12
65	\$251k to \$500k	2-3 years	2	2	2	2	2	1	11
66	\$751k - \$1M	4-5 years	2	2	2	2	2	2	12
67	\$251k to \$500k	2-3 years	1	2	2	2	2	2	11
68	\$51k to \$250k	2-3 years	1	2	2	2	3	2	12
69	Under \$50k	2-3 years	3	2	3	2	3	2	15
70	Under \$50k	Under 1 year	3	2	3	2	3	2	15
71	\$51k to \$250k	2-3 years	3	2	3	1	3	2	14

5. Plan Implementation and Maintenance

Maintaining and ensuring the plan is kept up to date are integral components of the hazard mitigation plan life cycle. A structured process for these updates keeps the HMP current, informs any changes in risk, and maintains eligibility to applicable funding sources for Ramsey County and its communities. Plan maintenance will be coordinated by:

- The Ramsey County Emergency Management Coordinator.
- The Ramsey County Hazard Mitigation Plan Coordinator, as assigned.
- The Ramsey County LPT, made up of representatives from each participating jurisdiction in Ramsey County.

5.1 Plan Implementation

5.1.1 FORMAL ADOPTION

Formally adopting the Ramsey County HMP secures buy-in, raises awareness of the HMP, and formalizes the HMP's implementation. Each jurisdiction participating in this plan will adopt it following all jurisdictional procedures. A copy of the generic resolution and the executed copies are included in the appendices.

5.1.2 IMPLEMENTATION

Once the plan is adopted, each participating community may begin implementing the hazard mitigation strategy in Section 4 of this document. The mitigation strategy identifies responsible agencies and entities, general timelines, prioritization, and potential funding sources to assist in strategy implementation.

5.1.3 INTEGRATION WITH OTHER COMMUNITY INITIATIVES

During the HMP annual review process, each participating municipality will be asked to document how they are utilizing and incorporating the Ramsey County HMP in tandem to their day-to-day operations and planning and regulatory processes. Additionally, each municipality will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions. Jurisdictions will ensure that mitigation efforts will translate into inclusive actions that enhance culturally competent practices that distribute resources fairly and justly to meet the needs of the whole community. The capabilities identified in in Section 2.10 offer a good starting point for further integration of the hazard mitigation plan into other community mechanisms.

5.1.4 CONTINUED PUBLIC INVOLVEMENT

Ramsey County and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. Public outreach and dissemination of the HMP will include:

- Links to the plan on municipal websites of each jurisdiction with that capability.
- Continued utilization of existing social media outlets to inform the public of natural hazard events. Educate the public via jurisdictional websites on how these applications can be used in an emergency.

- Expansion of outreach engagement strategies and use of alternative media platforms to reach the county's hard-to-reach, diverse populations.

5.2 Monitoring, Evaluating and Updating the Plan

Ramsey County Emergency Management & Homeland Security (RCEMHS) will manage the maintenance and update of the plan during its performance period.

5.2.1 MONITORING

Each year, beginning one year after plan development, Ramsey County and local community representatives will collect and process information from the departments, agencies and organizations involved in implementing mitigation projects or activities identified in their jurisdictional annexes by contacting persons responsible for initiating and/or overseeing the mitigation projects. Efforts will be made to equitably collect data from organizations and agencies serving disproportionately impacted populations.

In addition to progress on the implementation of mitigation actions, including efforts to obtain outside funding; and obstacles or impediments to implementation of actions, the information that Planning Partnership representatives shall be expected to document, as needed and appropriate include:

- Any grant applications filed on behalf of any of the participating jurisdictions.
- Hazard events and losses occurring in their jurisdiction.
- Additional mitigation actions believed to be appropriate and feasible.
- Public and stakeholder input.
- Fostering of new resilience relationships and partnerships.
- Evidence of the leveraging and strengthening of social infrastructure, networks and assets.

5.2.2 EVALUATION

The evaluation of the mitigation plan is an assessment of whether the planning process and actions have been effective, if the HMP goals are being achieved, and whether changes are needed. The HMP will be evaluated on an annual basis to determine the effectiveness of the programs, and to reflect changes that could affect mitigation priorities or available funding.

The status of the HMP will be discussed and documented at an annual plan review meeting of the Planning Partnership, to be held either in person or via teleconference approximately one year from the date of local adoption of this update, and successively thereafter. At least two weeks before the annual plan review meeting, the Ramsey County HMP Coordinator will advise the Planning Partnership of the meeting date, agenda and expectations of the members.

The Ramsey County HMP Coordinator will be responsible for calling and coordinating the annual plan review meeting and soliciting input regarding progress toward meeting plan goals and objectives. Plan evaluation will focus on four key areas:

- Changes in capabilities

- Changes in hazard threat, vulnerability and consequences
- Progress on achieving plan goals
- Monitoring the implementation of the mitigation strategy, including project closeout

Ramsey County will utilize an Annual Review Tool to assist in this process. This reporting tool allows for continual tracking of evolving risks to Ramsey County as well as progress toward the mitigation of the risks and impacts on all members of the community.

The HMP will also be evaluated and revised following any major disasters, to determine if the recommended actions remain relevant and appropriate.

5.2.3 PLAN UPDATES

Local hazard mitigation plans must be reviewed, revised as appropriate, and resubmitted for approval to remain eligible for benefits awarded under the DMA 2000. It is the intent of Ramsey County to update this plan on a five-year cycle from the date of initial plan adoption.

Appendix A – Additional Emergency Management Actions

Through the process of developing specific actions focused on hazard mitigation, a number of participating jurisdictions identified additional actions that while not directly mitigating hazards, still provide value to the community in the preparedness, response and recovery phases of emergency management. These actions are presented in Table 32.

Table 32. Additional Emergency Management Actions

Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?
Saint Paul	Emergency Evacuation Planning	This action solves the problem of having no organized and effective evacuation strategy for downtown areas during emergencies, ensuring a well-coordinated response that prioritizes safety, traffic management, and rapid emergency services access.	Assist in development Downtown Evacuation Plan
Saint Paul	Infrastructure Failure Planning	Improves preparedness, public safety, traffic management, and interagency coordination in response to bridge infrastructure failures.	Bridge Infrastructure Failure Plans - Assist in development of response plans of MnDOT owned bridges
St. Anthony	CIKR Access	A need to regulate access to government offices and properties.	Connect all city facilities to City Hall along with security system cameras and access key cards: develop the ability to provide a secure environment both from an entry access and visual standpoint of all city facilities from a central location. Facilities include water treatment plant, well houses, city hall, fire station, public works, park shelters/ warming houses and storage garage.
Arden Hills, North Oaks, Shoreview, Falcon Heights, Gem Lake, Little Canada, Mounds View, New Brighton, North Saint Paul, Lauderdale	Fire coordination	Fire departments oftentimes need to partner and work together to provide fire service.	Continue to ensure the strong coordination between local fire departments to provide fire protection.
St. Anthony	Command Facility Continuity	A lack of continuity planning related to command facilities.	Develop contingency plans to ensure secure remote command center for local emergency responders in case of destruction or incapacity of primary facilities or infrastructure

Jurisdiction	Mitigation Action Name	What is the problem the action is solving?	How does the action solve the problem?
St. Anthony	School Threat Protocols	Lack of safe policies and procedures during school threat incidents.	Develop safe policies, procedures and facilities to protect students, faculty and staff in situations with dangerous intruders have entered the campus
Saint Paul	Disaster Exercises	Improves preparedness, response, recovery, and mitigation efforts for flood disasters by simulating real-world scenarios in disaster exercises.	Disaster Exercise Development - Develop flood recovery and mitigation scenarios and integrate into disaster exercises
Saint Paul	Extreme Temperature Sheltering	This action addresses problems related to vulnerability to extreme temperatures, lack of preparedness, health and safety risks, uncoordinated resource allocation, gaps in shelter access, and strain on emergency services, ensuring safer and healthier outcomes during extreme weather events.	Extreme Temperature Shelters - Coordinate with the Department of Parks & Recreation (P & R) to identify, procure, supplies and plans for implementation.
Vadnais Heights	Mass Shelter	Providing safe space during evacuation	Identify and prioritize an acceptable area(s) to house victims during a natural wintertime disaster
St. Anthony	Threat Identification and Risk Assessment (Property)	A lack of understanding regarding the vulnerability of public spaces.	Identify ongoing concerns and risks facing facilities and spaces (schools, parks, etc.) and identify critical infrastructure
St. Anthony	Threat Identification and Risk Assessment (People)	A lack of understanding regarding the vulnerability of people in LGUs.	Identify risks and issues preserving safety and security to users in parks and associated facilities shared by school district and city (LGUs).
St. Anthony	Traffic Control Signage	Need to provide traffic control during signal failure (e.g., during power outages)	Provide traffic control upon signal failure by obtaining 50 temporary, portable stop signs
St. Anthony	Law Enforcement Protections	LE staff require protection from hazardous working conditions.	Working in Hazardous Environment: Allow our Police Officers functional capabilities in a hazardous or potentially hazardous environment
Arden Hills, North Oaks, Shoreview, Falcon Heights, Gem Lake, Little Canada, Mounds View, New Brighton, North Saint Paul, Lauderdale	Emergency Operations and COOP/COG plan updates	EOPs and COOP/COG plans are vital to community readiness for disasters.	Continue to update Emergency Operation Plans and COOP/COG plans to ensure that they adequately detail the needed steps to respond to all-hazards and ensure continuity of key government functions in the event of a disaster.

Appendix B – Studies and References

Source	Use
United States Census	Population data and statistics
Centers for Disease Control (CDC) Social Vulnerability Index (SVI)	Population data and statistics
Ramsey County GIS	Data and mapping
Ramsey County Website	County and community data
University of Minnesota Climate Adaptation Partnership	Climate data
Minnesota Department of Natural Resources	Climate data, specific hazards data
Participating jurisdictions	Community capability inputs
2019 Ramsey County Hazard Mitigation Plan	Community, hazard and mitigation data
Saint Paul Hazard Mitigation Plan	Community, hazard and mitigation data
FEMA	Declared disaster data
National Inventory of Dams	Dams data
Association of State Dam Safety Officials	Dams data
United States Drought Monitor	Drought data
FEMA's National Risk Index	Hazard risk data
National Drought Mitigation Center	Drought data
Drought Impact Reporter	Drought impact data
National Weather Service	Weather hazards data
National Flood Insurance Program	Flood insurance and program data
National Centers for Environmental Information	Hazard history and impact data
National Oceanic and Atmospheric Administration	Hazard history and impact data
Hazus	Hazard impact data
United States Geological Survey	Hazard data
Ramsey County 2040 Comprehensive Land Use Plan	Hazard data
Federal Motor Carrier Safety Administration	Hazard data
Pipeline and Hazardous Materials Safety Administration	Hazard data
Weather.gov	Hazard data
Journal of Applied Meteorology and Climatology	Hazard data
Encyclopedia Britannica	Hazard data

Appendix C – Sample Adoption

(LOCAL GOVERNMENT, INCLUDING SPECIAL DISTRICTS), (STATE)

RESOLUTION NO.

A RESOLUTION OF (LOCAL GOVERNMENT) ADOPTING THE (TITLE AND DATE OF MITIGATION PLAN).

WHEREAS the (local governing body) recognizes the threat that natural hazards pose to people and property within (local government); and

WHEREAS the (local government) has prepared a multi-hazard mitigation plan, hereby known as (title and date of mitigation plan) in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS (title and date of mitigation plan) identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in (local government) from the impacts of future hazards and disasters; and

WHEREAS adoption by the (local governing body) demonstrates its commitment to hazard mitigation and achieving the goals outlined in the (title and date of mitigation plan).

NOW THEREFORE, BE IT RESOLVED BY THE (LOCAL GOVERNMENT), (STATE), THAT:

Section 1. In accordance with (local rule for adopting resolutions), the (local governing body) adopts the (title and date of mitigation plan). While content related to (local government) may require revisions to meet the plan approval requirements, changes occurring after adoption will not require (local government) to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of ____ in favor and ____ against, and ____ abstaining, this ____ day of _____, _____.

By: _____ (print name)

ATTEST: By: _____ (print name)

APPROVED AS TO FORM: By: _____ (print name)

Appendix D – Planning Process Documentation

From: [Kyle Karsjen](#)
To: [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [Mayer, Bryan L](#); [Kymmie Scott](#); [Kerry Evans](#); [Jessica Henry](#); [melissa.lawrence@gemlakemn.org](#)
Cc: [Ryan Schroeder](#); [Jim Bownik](#)
Subject: Ramsey County Hazard Mitigation Plan Update - Planning Meeting #1
Start: Thursday, June 13, 2024 12:00:00 PM
End: Thursday, June 13, 2024 2:00:00 PM
Location: Microsoft Teams Meeting

The first meeting of the Ramsey County Hazard Mitigation Plan update process will be held Thursday, June 13 at 1 PM. The meeting will be held virtually via Microsoft Teams – the login information is below.

At this meeting, we will discuss:

- * Hazard mitigation planning and why it is important
- * The hazard mitigation plan update process and schedule
- * The role of communities in hazard mitigation planning
- * Capabilities assessment
- * Reporting on 2019 hazard mitigation actions
- * Public participation

ALL jurisdictions are encouraged to participate. If you are unable to attend this meeting yourself, please forward it to someone else from your jurisdiction who can sit in for you.

If you have any questions, please let me know at kyle.karsjen@tidalbasinggroup.com <<mailto:kyle.karsjen@tidalbasinggroup.com>> or 515-460-4711, or contact Bryan Meyer at brian.meyer@co.ramsey.mn.us <<mailto:brian.meyer@co.ramsey.mn.us>> or 651-266-1017.

Kyle

Microsoft Teams Need help? <<https://aka.ms/JoinTeamsMeeting?omkt=en-US>>
Join the meeting now <https://teams.microsoft.com/l/meetup-join/19%3ameeting_Mm15MGYwNWMtNjQ1Yy00YzRiLTkzMDItODc1M2EzNTVkJzYx%40thread.v2/0?context=%7b%22Tid%22%3a%22f009051e-b7f6-444f-87ae-3622c748f8ed%22%2c%22Oid%22%3a%223f6eb921-0475-4639-8851-cc3c6cbcf59%22%7d>
Meeting ID: 243 061 722 000
Passcode: pvgPYv

Dial in by phone
+1 914-294-5479,,929315462# <<tel:+19142945479,,929315462>> United States, Yonkers
Find a local number <<https://dialin.teams.microsoft.com/f9a8d180-71df-478e-aaf7-54711b1b13cb?id=929315462>>
Phone conference ID: 929 315 462#
For organizers: Meeting options <https://teams.microsoft.com/meetingOptions/?organizerId=3f6eb921-0475-4639-8851-cc3c6cbcf59&tenantId=f009051e-b7f6-444f-87ae-3622c748f8ed&threadId=19_meeting_Mm15MGYwNWMtNjQ1Yy00YzRiLTkzMDItODc1M2EzNTVkJzYx@thread.v2&messageId=0&language=en-US> | Reset dial-in PIN <<https://dialin.teams.microsoft.com/usp/pstnconferencing>>



RAMSEY COUNTY, MN HAZARD MITIGATION PLAN UPDATE

Kickoff Meeting – Thursday, June 13, 2024 – 1 p.m. – 2 p.m. CT

Last Name	First Name	Representing	Contact
Brosnahan	David	Roseville	David.Brosnahan@cityofroseville.com
Christopherson	Pat	White Bear Township	pat.christopherson@whitebeartownship.org
Diaz	Izzy	St. Anthony	izzy.diaz@savmn.com
Freed	Judd	Ramsey County	Judd.freed@ramseycountymn.gov
Hearden	Chris	Vadnais Heights	christopher.hearden@cityvadnaisheights.com
Krause	Nick	Vadnais Heights	nate.krause@cityvadnaisheights.com
Lawrence	Melissa	Gem Lake	melissa.lawrence@gemlakemn.org
Lovas	Mike	St. Paul	Mike.lovas@ci.stpaul.mn.us
Mayer	Bryan	Ramsey County	bryan.mayer@CO.RAMSEY.MN.US
Peterson	Greg	White Bear Lake	gpeter@whitebearlake.org
Richter	Mike	Vadnais Heights	mike.richter@cityvadnaisheights.com
Sather	Matt	Arden Hills, North Oaks & Shoreview	msather@ljfd.org
Schroeder	Ryan	Maplewood	ryan.schroeder@maplewoodmn.gov
Sieben	Terry	St. Paul	terry.sieben@ci.stpaul.mn.us
Smiley	Don	Little Canada	don.smiley@littlecanadafire.org
Zender	Ben	Mounds View	ben.zender@moundsviewmn.org
Karsjen	Kyle	Tidal Basin	kyle.karsjen@tidalbasingroup.com
Evans	Kerry	Tidal Basin	kerry.evans@tidalbasingroup.com
Henry	Jessica	Tidal Basin	jessica.henry@tidalbasingroup.com
Scott	Kymmie	Tidal Basin	kymmie.scott@tidalbasingroup.com

Agenda / Discussion

Welcome and Introductions

- Kyle Karsjen, Tidal Basin Project Manager welcomed the group and asked attendees to sign in via Teams Chat, leaving their name, title, jurisdiction, phone, and email. He introduced himself and the team. The meeting was recorded.
- Judd Freed and Bryan Mayer from Ramsey County also welcomed the group and thanked them for their participation, noting that this is the first time the City of St. Paul was participating in the multijurisdictional plan. Judd hopes this updated plan will not be just aspirational, but truly actionable. Bryan will be the primary point of contact for the County.

Meeting Purpose: Update the Ramsy County Hazard Mitigation Plan

Kyle discussed the purpose for the plan update, explaining FEMA's requirements for Hazard Mitigation Plans and the five-year life cycle of FEMA approval. The previous plan was approved by FEMA in 2019. Kyle defined hazard mitigation and explained what a hazard mitigation plan is and does. A hazard mitigation plan:

- Helps a community assess its level of capability in a disaster.
- Helps a community conduct a data-driven review of their hazards, vulnerabilities, and risks.
- Helps a community develop a hazard mitigation strategy.
 - o What can we do? How can a community build off the capabilities in place to buy down the level of risk and vulnerability identified in the plan?
 - o A hazard mitigation strategy can include things like building a flood wall, removing brush off wooded areas to remove some of the risk of forest fire, building earthquake-resistant structures, and removing structures from the floodplain, for example.

What is Hazard Mitigation?

Kyle spoke about what is covered in a hazard mitigation program and taking sustained actions to mitigate against the hazards. Mitigation takes place at the beginning and the end of the disaster process. It breaks the cycle of damage and repair in hazardous areas.

He spoke about why hazard mitigation is important, including gaining eligibility for hazard mitigation funding sources. Kyle covered the mission areas of emergency management and where hazard mitigation fits in, at both the beginning and end of the emergency management cycle.

What is a Hazard Mitigation Plan?

Hazard Mitigation is a comprehensive process that allows the participating jurisdictions to answer:

- o Who are we?
- o What are our current community capabilities?

- What are our hazards and risks?
- What can we realistically do to mitigate those risks?
- Hazard Mitigation Plans:
 - Guide community hazard mitigation actions
 - Are created with the whole community
 - Are comprehensive and data driven.
 - Ensures eligibility for hazard mitigation funding sources.

Major Focus Areas of the Update

- Reporting on community progress
- Updating community and hazards information where needed
- Additional climate change focus
- Meaningfully include underserved communities in the planning process
- Reviewing and tightening the hazard mitigation strategy

Planning Process Overview

- Phase 1 – Kickoff and Community Reporting

- Kyle outlined the participating jurisdictions, the community benefits from participation, and the requirements for participation, listed below:
 - Attend planning meetings and participate in the process.
 - This meeting serves as the first of 3 planning meetings.
 - Identify/update status of community capabilities.
 - Update status of any previous hazard mitigation actions.
 - Share public survey and public review drafts.
 - Develop at least one new or continuing hazard mitigation action.
 - Review and provide input on the plan and plan elements.
 - Adopt the plan once approved by FEMA.
- Public Outreach
 - Public Survey
 - Traditionally Underrepresented Populations Engagement
 - Public Review Draft

- Phase 2 – Hazard Identification and Risk Assessment

Tidal Basin will conduct an analysis on the following hazards:

- | | |
|-----------------------------|------------------------|
| • Animal Infectious Disease | • Dam/levee failure |
| • CBRNE/Terrorism | • Earthquake |
| • Cyber Attack | • Extreme temperatures |
| • Civil Unrest | • Flooding |

- Hazardous Materials
- Human Infectious Diseases
- Invasive Species
- Slope Failure
- Summer Storm Events
- Supply Chain Disruption
- Tornado and High Wind Events
- Utility Failure
- Wildland Fire
- Winter Storm Events

Each hazard listed will have a hazard analysis and a risk assessment and will be ranked in order of threat, vulnerability and impact.

- **Phase 3 – Develop a Mitigation Strategy**
 - Following the identification of capabilities and the analysis of hazards, the planning team and participating jurisdictions will work to identify mitigation actions that will buy down identified levels of risk. Each participating jurisdiction will be required to have at least one hazard mitigation action that they support.
- **Phase 4 – Plan Review and Approval**
 - Kyle went over the review processes with the planning committee, public review, state review, and finally FEMA review.

Immediate Next Steps

- **Community Reporting**
 - Kyle discussed initial community reporting that each jurisdiction must submit. Jurisdictions will be asked to review and update their community capabilities assessment, as well as provide information on the status of projects identified in the 2019 hazard mitigation strategy. Tidal Basin will follow up with a separate email sent to each of the jurisdictional representatives identified in a community's Letter of Intent to Participate. **Forms will be sent no later than end of day, Monday, June 17, and reporting will be due June 28, 2024**
- **Public Engagement**
 - The survey will be open to all members of the public. The response period for this will be **June 24 through July 12.**
 - Once the first draft of the plan update is completed, Tidal Basin will work with jurisdictions to post a public review draft in multiple public places, complying with jurisdictional rules on notifying the public and gaining their input.

Future Steps

- Planning Meeting #2 – NLT July 31
- HIRA Update – NLT August 30
- Planning Meeting #3 – August/September
- Draft Mitigation Strategy – NLT September 30
- Plan Finalization and Review – NLT November 30
- Plan Approval and Adoption – NLT December 31

From: [Kyle Karsjen](#)
To: [Kymmie Scott](#); [Kerry Evans](#); [Jessica Henry](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [Mayer, Bryan L](#); [melissa.lawrence@gemlakemn.org](#); [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Cc: [Jennifer Minwegen](#); [Paul Peltier](#)
Subject: Ramsey County Hazard Mitigation Plan - Meeting #2
Start: Tuesday, July 30, 2024 9:00:00 AM
End: Tuesday, July 30, 2024 11:00:00 AM
Location: Microsoft Teams Meeting

The second meeting of the Ramsey County Hazard Mitigation Plan update process is scheduled for July 30, 2024 at 10 AM CT over Microsoft Teams. During this meeting, we will review Tidal Basin's initial findings for the updated risk assessment and discuss feedback and insights that the planning team can provide to ensure that the risk assessment provides a robust and accurate understanding of risk over the entire planning area. We will also discuss plan goals and begin the formulation of the updated hazard mitigation strategy.

Community participation is vitally important to the hazard mitigation planning process. Please plan to attend this meeting, or if you cannot attend, please identify an alternate representative to attend in your place to ensure that your community remains an active part of the process.

If you have any questions, please let me (kyle.karsjen@tidalbasinggroup.com <<mailto:kyle.karsjen@tidalbasinggroup.com>>) or Bryan Mayer (bryan.mayer@co.ramsey.mn.us <<mailto:bryan.mayer@co.ramsey.mn.us>>) know.

Thank you, and I look forward to talking hazards and risks with everyone on 7/30.

Kyle

Kyle Karsjen
Senior Preparedness Specialist
Policy, Mitigation and Resilience

M:
515.460.4711
kyle.karsjen@tidalbasinggroup.com <<mailto:kyle.karsjen@tidalbasinggroup.com>>
[tidalbasinggroup.com](https://www.tidalbasinggroup.com/) <<https://www.tidalbasinggroup.com/>>

Microsoft Teams Need help? <<https://aka.ms/JoinTeamsMeeting?omkt=en-US>>

Join the meeting now <https://teams.microsoft.com/l/meetup-join/19%3ameeting_NThlMjU1MzYtODAzZS00NDg2LWJjNDktOTIxZjRkYWY4N2I0%40thread.v2/0?context=%7b%22Tid%22%3a%22f009051e-b7f6-444f-87ae-3622c748f8ed%22%2c%22Oid%22%3a%223f6eb921-0475-4639-8851-cc3c6cbcf59%22%7d>

Meeting ID: 277 310 207 922

Passcode: S7EvuZ

Dial in by phone

+1 914-294-5479,,935026685# <tel:+19142945479,,935026685> United States, Yonkers

Find a local number <<https://dialin.teams.microsoft.com/f9a8d180-71df-478e-aaf7-54711b1b13cb?id=935026685>>

Phone conference ID: 935 026 685#

For organizers: Meeting options <https://teams.microsoft.com/meetingOptions/?organizerId=3f6eb921-0475-4639-8851-cc3c6cbcf59&tenantId=f009051e-b7f6-444f-87ae-3622c748f8ed&threadId=19_meeting_NThlMjU1MzYtODAzZS00NDg2LWJjNDktOTIxZjRkYWY4N2I0@thread.v2&messageId=0&language=en-US> | Reset dial-in PIN <<https://dialin.teams.microsoft.com/usp/pstnconferencing>>



RAMSEY COUNTY, MN HAZARD MITIGATION PLAN UPDATE

Planning Meeting #2 – Tuesday, July 30, 2024 – 10 a.m. – 12 p.m. CT

Last Name	First Name	Representing	Contact
Brosnahan	David	Roseville	David.Brosnahan@cityofroseville.com
Butkowski	Heather	Lauderdale	heather.butkowski@lauderdalemn.org
Diaz	Israel	St. Anthony	izzy.diaz@savmn.com
Freed	Judd	Ramsey County	Judd.freed@ramseycountymn.gov
Hearden	Chris	Vadnais Heights	christopher.hearden@cityvadnaisheights.com
Krause	Nick	Vadnais Heights	nate.krause@cityvadnaisheights.com
Linder	Jim	Gem Lake	Jim.linder@gemlakemn.org
Linehan	Jack	Falcon Heights	jack.linehan@falconheights.org
Lovas	Mike	St. Paul	Mike.lovas@ci.stpaul.mn.us
Mayer	Bryan	Ramsey County	bryan.mayer@CO.RAMSEY.MN.US
Mallinger	Jason	North St. Paul	Jason.mallinger@northstpaul.org
Minwegan	Jen	New Brighton	jennifer.minwegan@newbrightonmn.gov
Montain	Matt	Mounds View	mmontain@sbfmfire.org
Peltier	Paul	White Bear Township	paul.peltier@whitebeartownship.org
Peterson	Greg	White Bear Lake	gpeter@whitebearlake.org
Richter	Mike	Vadnais Heights	mike.richter@cityvadnaisheights.com
Sather	Matt	Arden Hills, North Oaks & Shoreview	msather@ljfd.org
Schroeder	Ryan	Maplewood	ryan.schroeder@maplewoodmn.gov
Sieben	Terry	St. Paul	terry.sieben@ci.stpaul.mn.us
Zender	Ben	Mounds View	ben.zender@moundsviewmn.org
Karsjen	Kyle	Tidal Basin	kyle.karsjen@tidalbasingroup.com
Evans	Kerry	Tidal Basin	kerry.evans@tidalbasingroup.com

Agenda / Discussion

Welcome and Project Review

- Kyle Karsjen, Tidal Basin Project Manager welcomed the group and asked attendees to sign in via Teams Chat, leaving their name, title, jurisdiction, phone, and email. He introduced himself and the team, and the attendees introduced themselves. The meeting was recorded.
- Kyle reviewed the purpose for the plan update, explaining the importance of mitigation. He then provided the plan update status; Task 1 – Project Initiation has been completed. The team is in the process of Task 2 – Capabilities and Hazard Identification which will be the focus of this meeting (Planning Meeting #2). The next meeting (Planning Meeting #3) will focus on mitigation strategies. Once the plan is drafted, it will be provided to the state and then FEMA for review and approval.
- After reviewing the participant requirements, Kyle reminded the attendees that each jurisdiction will need to return their capability assessment and mitigation action status worksheets, if they have not already done so.

Hazard Review

Kyle walked the group through a discussion about each of the identified hazards listed below, including the understanding of the hazard, any updates to the hazard history since 2019, and any local context to provide in the final plan. The HMP will include both a hazard analysis and vulnerability assessment for each hazard.

Dam/Levee Failure

There are 5 identified dams in the county.

- Classification: 1 High Hazard, 1, Significant Hazard, and 4 Low Hazard.
- History: There is no history of dam failures/issues.
- Impacts: St. Anthony Falls and Coon Dam could have some impact to the county water flow if they fail.
- Ongoing Strategies: Battle Creek and Ford dams are required to and have EAPs. St. Paul has been involved in some planning efforts, but do not believe Battle Creek has ever conducted an exercise. This dam is the responsibility of the watershed.

Drought

- History: There is some history of drought in the region. Previous droughts have caused stoppage of passenger vessels and impacts to the port.
- Impacts: In addition, White Bear Lake's levels can impact recreational and residential used of the lake. There is an ongoing lawsuit regarding White Bear Lake.
- Ongoing Strategies: Many, if not most, jurisdictions have instituted an even/odd watering schedule for residential use. Only the Governor can completely restrict water usage.

Flood

- History: MN has received 30 federal disaster declarations due to flooding since 1957. Recent major Ramsey flood occurred in June 2014, July 2011, March 2010, and Sept 2007.
- Impact: Ramsey is likely to be impacted by riverine and urban flooding. Heavy rains in conjunction with freezing temperatures and snowfall have caused impacts to urban areas. Areas of St. Paul (Water St. area) has low-lying roads, with both a number of local businesses and the Metro Water Treatment Plant have repetitive issues due to flooding and could be good to have a better flood water system considered for this area.
- Ongoing strategies: There has been planning and additional mitigation strategies conducted for flooding in the county. This has helped mitigate past issues around the airport, Fort Snelling, and other park areas.

Geological Hazards (Landslide, Slope Failure, Karst Soils)

- History: There is a history of small landslides in the county, including in St. Paul and Gem Lake in the past few years. The landslide in St. Paul killed 2 children, and injured 2 more in 2013, when a bluff gave way. The landslide in Gem Lake caused a disruption to the railroad tracks.
- Impact: Even with some sealing, there are still caves within the rock walls of the bluff which cause confined space issues. Additionally there are a number of old landfill sites which cause issues for development.
- Ongoing strategies: Standard building permits do require soil analysis in most, if not all, jurisdictions. St. Paul has conducted some mitigation strategies including building a wall to protect from falling rocks.

Hazardous Materials (Spills, Pipeline, Trucking, Rail)

- History: There have been a few major events reported in recent history, in addition many smaller events have occurred which typically have a smaller footprint and don't require widespread evacuation.
- Impact: Gem Lake, and other jurisdictions, do not have city water, but utilize private wells. Chemical spills can impact ground water. There are a number of transportation routes (both rail and road) that traverse the county, carrying hazardous materials. Roseville has several fuel tank facilities, with approximately 370 semi trucks coming in and out on a daily basis.
- Ongoing strategies: There were none identified during this meeting.

Summer Weather Hazards (Heat, Hail, Lightning)

- History: Ramsey County has reported at least \$7M in damages due to summer weather events, primarily hail. Hail damage is covered by insurance and is typically underreported publicly.
- Impact: Due to ongoing climate change, summers are expected to be higher temperatures with increased precipitation. Heat is a growing and significant concern. The population is changing, and recent immigrants are not used to the weather and tend to live with many people in homes without AC. Providing educational information about the impacts is also a challenge due to the number of languages spoken in the county. The unhoused population number is also growing.

- Ongoing Strategies: The Twin Cities metro area is starting an experimental program to analyze wet blub impacts. Traditional cooling centers have not been utilized. Public is instructed to use public facilities. The county is starting to look at resilience hubs as a potential mitigation strategy.

Tornado and Windstorm

- History: The largest recorded tornado in the county was in 1965, but given its geography, the county typically experiences straight line winds annually.
- Impact: Typically there are not long lasting effects from these types of events, but property damage and power outages are always a concern.
- Ongoing Strategies: 98% of the county is covered by outdoor warning sirens, but the technology is aging. Utility companies tend to maintain trees along major power lines. Small shelters, typically brick restrooms, are available in many public parks.

Winter Weather Hazards (Cold, Blizzard, Ice Storm)

- History: Since 1950, Ramsey County has reported 109 significant weather events.
- Impact: There is an almost 100% probability of a severe winter storm in a given year, and climate change is expected to result in heavier snowfall and more extreme events, including warmer temperatures. Ongoing concern is not from snowfall, but an ice storm that causes significant and long duration power outages.
- Ongoing Strategies: Ramsey typically uses a shelter in place strategy during a major winter event, with some facilities open on highways for trucks and passenger vehicles.

Infrastructure Failure (Transportation, Electricity and Fuel, Supply Chain Disruption, Water Systems)

- History: There have been some notable failures in recent history, such as the I-35 bridge collapse in 2007, water contamination in St. Paul in 2017, nationwide supply chain shortages during COVID, and electrical/fuel shortages due to annual winter storms.
- Impact: Major concerns include aging infrastructure, such as roads and bridges, water infrastructure, and human caused impacts to communications systems and power grids.
- Ongoing Strategies: These are not traditionally included in hazard mitigation plans as they are more random, without clearly defined areas, and are hard to build resiliency against, unlike most natural hazards.

Human Caused Hazards (Terrorism, Active Shooter/Hostile Incidents, Civil Disturbance, Cyber Attack)

- History: In addition to the incidents presented (cyber-attack in 2020, civil unrest in response to George Floyd killing in 2020, and protests and civil unrest surrounding the 2008 RNC), there have been at least 3-4 major incidents, including officer involved shootings, and the aftermath of presidential election results that need to be included. The county was also recently impacted by a major cyber outage, CrowdStrike.

- Impact: Hazards such as cyber attack can impact the county even if they are not located within the county as the city relies on outside services. Civil disturbances have caused damage to property and blocked roads and highways.
- Ongoing Strategies: These are not traditionally included in hazard mitigation plans as they are more random, without clearly defined areas, and are hard to build resiliency against, unlike most natural hazards.

Mitigation Strategy

The focus of the next meeting, Kyle started the discussion around mitigation strategies including goals which describe the overall direction of the plan and actions which describe specific activities of projects designed to achieve the goals.

Goals

Common categories of Mitigation Goals are: public education, policies/planning/training/communication, reduce risk to life and property, and the protection of critical/essential facilities. It was decided to make the 2025 HMP goals more specific than were outlined in the 2019 plan. This will be a discussion item at Meeting #3.

Actions

These will be partly based on the information provided by each jurisdictions' Mitigation Action Worksheet for reporting status updates of remaining 2019 actions and the development of any additional mitigation actions. It was noted that each participating jurisdiction must have at least one mitigation action in the plan, and that all jurisdictions that participate in the National Flood Insurance Program (NFIP) must have an additional action that relates to the continued compliance in the program. Ahead of the next meeting, jurisdictions are encouraged to discuss potential mitigation actions with other representatives in their jurisdiction.

Planning Meeting #3

The next planning meeting is set for Tuesday, August 27 at 1pm CT. This will be a virtual meeting focused on mitigation actions, including what actions should be included in the plan update.

Next Steps

Future Steps

- Collect outstanding Capability Assessments and Mitigation Action Status spreadsheets - ASAP
- HIRA Update – NLT August 30
- Planning Meeting #3 – August 27 at 1PM CT
- Draft Mitigation Strategy – NLT September 30
- Plan Finalization and Review – NLT November 30



- Plan Approval and Adoption – NLT December 31

From: [Kyle Karsjen](#)
To: [Mayer, Bryan L](#); [Jessica Henry](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [melissa.lawrence@gemlakemn.org](#); [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Cc: [Christopher Hearden](#); [Jim Lindner](#)
Subject: Ramsey County Hazard Mitigation Plan - Meeting #3
Start: Tuesday, August 27, 2024 12:00:00 PM
End: Tuesday, August 27, 2024 2:00:00 PM
Location: Microsoft Teams Meeting

The third and final planning meeting for the Ramsey County Hazard Mitigation Plan update will be held Tuesday, August 27th from 1-3 PM via Microsoft Teams. This meeting will focus on mitigation action planning – we’ve identified community capabilities and identified community risks. What actions can each community identify to buy down those levels of risk?

We will also use the meeting to button up some final elements of the plan. Please plan to attend this meeting; if you cannot attend, please identify an alternate representative to attend in your place to ensure your community remains up to speed on the planning process.

If you have any questions, please contact me at kyle.karsjen@tidalbasingroup.com <<mailto:kyle.karsjen@tidalbasingroup.com>> or Bryan Mayer at bryan.mayer@co.ramsey.mn.us <<mailto:bryan.mayer@co.ramsey.mn.us>> .

Thank you,

Kyle

Microsoft Teams Need help? <<https://aka.ms/JoinTeamsMeeting?omkt=en-US>>

Join the meeting now <https://teams.microsoft.com/l/meetup-join/19%3ameeting_NzExN2Q5MTgtMmM2ZS00NGY3LThmOTgtYWZkZWZhNjE4ODk5%40thread.v2/0?context=%7b%22Tid%22%3a%22f009051e-b7f6-444f-87ae-3622c748f8ed%22%2c%22Oid%22%3a%223f6eb921-0475-4639-8851-cc3c6bcfcf59%22%7d>

Meeting ID: 233 606 703 437

Passcode: jpZuYv

Dial in by phone

+1 914-294-5479,,103758743# <<tel:+19142945479,,103758743>> United States, Yonkers

Find a local number <<https://dialin.teams.microsoft.com/f9a8d180-71df-478e-aaf7-54711b1b13cb?id=103758743>>

Phone conference ID: 103 758 743#

For organizers: Meeting options <https://teams.microsoft.com/meetingOptions/?organizerId=3f6eb921-0475-4639-8851-cc3c6bcfcf59&tenantId=f009051e-b7f6-444f-87ae-3622c748f8ed&threadId=19_meeting_NzExN2Q5MTgtMmM2ZS00NGY3LThmOTgtYWZkZWZhNjE4ODk5@thread.v2&messageId=0&language=en-US> | Reset dial-in PIN <<https://dialin.teams.microsoft.com/usp/pstnconferencing>>



RAMSEY COUNTY, MN HAZARD MITIGATION PLAN UPDATE

Planning Meeting #3 – Tuesday, August 27, 2024 – 1 p.m. – 2 p.m. CT

Last Name	First Name	Representing	Contact
Artig-Swomley	Gretchen	Gem Lake	
Bownik	Jim	Lauderdale	Jim.bownik@lauderdalemn.org
Brosnahan	David	Roseville	David.Brosnahan@cityofroseville.com
Christopherson	Patrick	White Bear Township	pat.christopherson@whitebeartownship.org
Hamdorf	Trevor	New Brighton	Trevor.hamdorf@newbrightonmn.gov
Hearden	Chris	Vadnais Heights	christopher.hearden@cityvadnaisheights.com
Linehan	Jack	Falcon Heights	jack.linehan@falconheights.org
Lovas	Mike	St. Paul	Mike.lovas@ci.stpaul.mn.us
Mayer	Bryan	Ramsey County	bryan.mayer@CO.RAMSEY.MN.US
Mallinger	Jason	North St. Paul	Jason.mallinger@northstpaul.org
Montain	Matt	Mounds View	mmontain@sbmfire.org
Peterson	Greg	White Bear Lake	gpeter@whitebearlake.org
Sather	Matt	Arden Hills, North Oaks & Shoreview	msather@ljfd.org
Schroeder	Ryan	Maplewood	ryan.schroeder@maplewoodmn.gov
Sieben	Terry	St. Paul	terry.sieben@ci.stpaul.mn.us
Smiley	Don		
Karsjen	Kyle	Tidal Basin	kyle.karsjen@tidalbasingroup.com
Evans	Kerry	Tidal Basin	kerry.evans@tidalbasingroup.com
Henry	Jessica	Tidal Basin	Jessica.henry@tidalbasingroup.com
Scott	Kymmie	Tidal Basin	Kymmie.scott@tidalbasingroup.com

Agenda / Discussion

Welcome and Project Review

- Kyle gave a reminder on what hazard mitigation means, and how it relates to the other

phases of emergency management (preparedness, response and recovery). According to FEMA, hazard mitigation is “any sustained action taken to reduce or eliminate long-term risk to life and property from hazard events.” Hazard mitigation can also be defined as “any action that breaks the cycle of damage and repair in hazardous areas.” Kyle encouraged communities to keep these definitions in mind as they began updating their hazard mitigation strategies.

- Hazard Mitigation is important for a variety of reasons, not the least of which is that it ensures eligibility for hazard mitigation funding sources.

Risk Assessment Review

- Planning Meeting #2 focused on Ramsey County’s vulnerability to each of the listed failures. As a reminder, for a more well-rounded view of hazards, the County has included human-caused and infrastructure failures.
- Kyle reviewed information on the risk assessment, including hazards assessed and the risk assessment components (threat, vulnerability, and consequence)
- The risk assessment will be provided via email following this meeting for review and comment through Friday, September 13. Kyle encouraged the group to review and provide feedback, noting that communities know and understand their hazards and risks better than anyone, and we want to make sure that the information is included in the updated assessment.

Mitigation Strategy Overview

- Kyle reviewed the next step in the process – developing a hazard mitigation strategy with mitigation actions from each participating jurisdiction. Based on the risk assessment and available capabilities, the 2025 updated mitigation strategy will align with the County’s mitigation goals and objectives.
- This strategy will guide a community’s approach for implementing mitigation activities that are cost effective, technically feasible, and environmentally sound as well as allowing strategic investment of limited resources.
- Kyle reminded each jurisdiction that they have a baseline mitigation strategy to work from – the actions each community identified on the mitigation strategy worksheets, during the reporting process in the early summer as continuing in the new plan.
- Kyle reviewed the goals for the 2025 hazard mitigation plan update. The goals are:

Goal 1: Mitigate impacts to life, property, the economy, and the environment from natural, technological, and human-caused hazards.

Goal 2: Build and support local capacity to create resiliency from natural, technological, and human-caused hazards.

Goal 3: Build resilience for critical infrastructure and systems against the impacts of natural, technological, and human-caused hazards.

Goal 4: Increase outreach and awareness to the whole community to build resilience.



- Communities were encouraged to focus on hazard mitigation actions when developing and updating their mitigation strategies.
- Kyle reviewed the information needed for each carryover and new mitigation action. He also reviewed some helpful hints on what counts as mitigation and what doesn't. Each action will include the following information to inform development and prioritization:
 - Problem statement/background
 - Method of implementation
 - Hazard(s) to be mitigated
 - Responsible party/parties
 - Estimated costs and benefits
 - Budget range
 - Potential funding sources
- Each mitigation action will be scored and ranked in the final plan, based on potential lives saved, potential for reduced property damages, potential for reduced response actions, benefits exceeding costs, and community priority.
- Each community has two options when it comes to mitigation planning:
 - Option 1: If a community would like some additional support, Tidal Basin invites you to set up a virtual meeting to further discuss your specific mitigation strategy and potential ideas for additional actions.
 - Option 2: If a community doesn't need additional support, Tidal Basin will share materials and instructions to submit new mitigation actions.
- All updated mitigation strategies and information are due no later than Friday, September 13.

Next Steps

Tidal Basin

- Each community will receive a follow up email NLT end of week regarding information from this meeting.
- Email will include current hazard mitigation strategy, instructions on setting up community meetings, instructions to submit new mitigation actions.

Communities

- Decide whether you want a community meeting. Let us know sooner rather than later.
- Review and provide feedback on Draft #1 of Hazard Analysis and Risk Assessment.
- Update carryover mitigation actions and submit any new mitigation actions **NLT Friday, September 13**



Timeline for Future Activities

- Draft plan compiled – Early October
- Draft plan sent to communities for review – Early October
- Public review draft – Mid October
- State review – Early November
- FEMA review – Mid November
- FEMA approval – December
- Plan adoption – December/January

Action Items

Task	Responsibility	Date
Provide first draft of hazard analysis and risk assessment	Tidal Basin	August 30, 2024
Distribute meeting materials and materials for updating community mitigation strategies	Tidal Basin	August 30, 2024
Complete community meetings	Tidal Basin	September 11, 2024
Review and provide comment on first draft of hazard analysis and risk assessment	Participating jurisdictions	September 13, 2024
Provide new mitigation actions and updated mitigation strategies for each community	Participating jurisdictions	September 13, 2024

RAMSEY COUNTY, MN HAZARD MITIGATION PLAN UPDATE

2025 Plan Update Goals

- Goal 1** Mitigate impacts to life, property, the economy and the environment from natural, technological, and human-caused hazards.

- Goal 2** Build and support local capacity to create resiliency from natural, technological and human-caused hazards.

- Goal 3** Build resilience for critical infrastructure and systems against the impacts of natural, technological and human-caused hazards.

- Goal 4** Increase outreach and awareness to the whole community to build resiliency.

Ramsey County, MN Hazard Mitigation Plan Update

Mitigation Action Planning

What does my community need to complete by Friday, September 13? Communities are asked to utilize the excel spreadsheet attached to this document to refine the actions already included, and to add new any mitigation actions as appropriate. Answer the questions at the top of each column for each action added or refined. Please answer every question. Some questions include a drop-down menu where respondents can select from a pre-identified list of answers. Answers do not have to be perfect but should give an idea of the parameters of the mitigation actions. The excel spreadsheet is currently populated with all mitigation actions contained in the 2019 hazard mitigation plan, along with some Tidal Basin recommendations.

Why Is mitigation action planning important? Throughout the mitigation planning process, each community has already provided multiple inputs into the process – you’ve reported on the status of your 2019 hazard mitigation actions, you’ve provided an update on community capabilities, and you’ve reviewed and provided comment on the hazard analysis and risk assessment. The next step is mitigation action planning – now that we have a new and better understanding of our risk, what should we do to mitigate the impacts of the hazards to which we are vulnerable? When implemented, a good hazard mitigation strategy effectively buys down risk and is “where the rubber meets the road” in the hazard mitigation plan update.

What tools are available to help my community refine mitigation actions and add additional actions to our mitigation strategy? There are a few resources communities should utilize when refining and adding new mitigation actions to their mitigation strategy.

- Plan Goals – the goals were updated from the 2019 plan update. These goals can be used to generate mitigation actions. A list of the goals can be found [here](#).
- We also discussed some helpful hints for mitigation action development during our third planning meeting Tuesday, August 27. I encourage you to review that recording if you weren’t able to attend (found [here](#)).

What do I do if my community is totally lost and needs some additional help? If your community could use some extra help, Tidal Basin is offering to hold 30 – 60 minute virtual meetings to help walk you through the process and provide some additional insights. Virtual meetings can be set up by email Kymmie Scott at kymmie.scott@tidalbasingroup.com.

My community provided updates to the projects listed in our strategy from the 2019 plan – why do I have to do anything else? The actions identified by each community in the 2019 plan serve as a baseline for the 2025 update, but communities are asked to review the list again, refine their existing migration actions, and add new ones based on updated hazard and risk information found in the updated plan.

From: [Kyle Karsjen](#)
To: [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [Mayer, Bryan L](#); [melissa.lawrence@gemlakemn.org](#); [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Cc: [Kymmie Scott](#); [Kerry Evans](#); [Jessica Henry](#)
Subject: Ramsey County Hazard Mitigation Survey - please share far and wide
Date: Monday, June 24, 2024 1:15:00 PM
Attachments: [image002.png](#)
[Ramsey County HMP Survey Flyer.jpg](#)
[Ramsey County HMP Survey Flyer.pdf](#)
[image001.jpg](#)

Good afternoon,

As discussed during our hazard mitigation plan kickoff earlier this month, we are pleased to announce that the public survey intended to gather information from respondents on their experiences, knowledge, and concerns about local hazards as a component of the *Ramsey County Hazard Mitigation Plan* is live and will remain open through **Friday, July 12th**. We are asking each community to share the survey far and wide, using whatever methods you would traditionally use to share information with your residents. This can include posting the information on public websites, sharing it through a community's social media such as Facebook, or utilizing messaging systems to invite the public to complete the survey. Please share the survey **no later than Wednesday, June 26th**. When you share it, **please send screenshots of what you've shared to kyle.karsjen@tidalbasingroup.com** so that we can include those records as part of the plan.

Please let me know if your community has any questions on the resources below or need any additional information. The survey can be found at <https://forms.office.com/r/tk5ySqn1Ha>. I've also attached a flyer in both jpeg and adobe pdf you can use as you see fit to share. See below for some sample text that you can use to share the survey:

Use or adapt the following when posting or communicating the availability of this survey to the public:

Ramsey County has begun the process of updating the 2019 Hazard Mitigation Plan (HMP) so all municipalities in Ramsey County remain eligible to receive certain types of federal mitigation funding to reduce hazard risk. The HMP focuses on understanding the natural risks and hazards that threaten the county, identifying community capabilities that can be used to mitigate risks, and laying out a comprehensive hazard mitigation strategy to buy down risks from those hazards.

Public participation and feedback is an important part of the hazard mitigation planning process. Ramsey County Emergency Management and Homeland Security has developed a brief survey to assist in providing the public with an opportunity to contribute to the plan update. The survey focuses on the public's experiences with hazards, including recommendations for hazard reduction. The input provided is vital to completing the plan update.

All information collected from this survey will be anonymous. Please complete the survey by

Friday, July 12th at: <https://forms.office.com/r/tk5ySqn1Ha>.

Kyle Karsjen

Senior Preparedness Specialist
Policy, Mitigation and Resilience

M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



WE NEED YOUR INPUT!

RAMSEY COUNTY HAZARD MITIGATION PLAN UPDATE

Ramsey County and participating municipalities are preparing an update of the Hazard Mitigation Plan. The goal of this plan is to identify ways that Ramsey County communities can reduce damages from future hazards.

As part of the planning process, we seek your input on which hazards impact you most and in what ways.

Ramsey County resident, or work in the county?

Take our survey!

<https://forms.office.com/r/tk5ySqn1Ha>

Or Scan:



From: [Kyle Karsjen](#)
Bcc: mmountain@sbfmfire.org; [Mayer, Bryan L](#); [Jessica Henry](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); Judd.Freed@co.ramsey.mn.us; [Sieben, Terry - External Contact](#); [Don Smiley](#); melissa.lawrence@gemlakemn.org; [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Subject: Ramsey County Hazard Identification and Risk Assessment - Review Draft
Date: Friday, August 30, 2024 2:26:00 PM
Attachments: [image001.png](#)
[image004.jpg](#)

Good afternoon, and happy long weekend!

The first draft of the Hazard Identification and Risk Assessment (HIRA) for Ramsey County's Hazard Mitigation Plan (HMP) update is ready for review and comment. This draft represents our first stab at reviewing Ramsey County's hazards and their potential impacts on the community. The draft also includes an initial hazard prioritization based on three factors – threat, vulnerability and consequence.

Please note that **you** have direct control over everything in the HIRA – please provide me any feedback on where we may have gotten something wrong on hazards, or other edits we can make. As you read through the document, I would also be appreciative if you share any additional anecdotal experience you may have with these hazards so that we can add some of that color to the document.

- The draft HIRA can be found [here](#).
- Please provide any comments on the document using the comment collection tool, which can be found [here](#).
- Please input all comments into this form **no later than Friday, September 13**.

If you have any questions or have any issues accessing the document, please let me know.

Also as a reminder, the Tidal Basin planners assigned to your communities should have sent the worksheet out to each community this week to develop each community's mitigation strategy. This information is also due **no later than Friday, September 13**. Please let us know if we can provide any assistance as you develop your updated mitigation strategy.

I hope everyone has a great holiday weekend.

Thank you,

Kyle

Kyle Karsjen
Senior Preparedness Specialist
Resilience, Mitigation and Policy

M: 515.460.4711

kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: [Kyle Karsjen](#)
Bcc: mmountain@sbfmfire.org; [Mayer, Bryan L](#); [Jessica Henry](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); Judd.Freed@co.ramsey.mn.us; [Sieben, Terry - External Contact](#); [Don Smiley](#); melissa.lawrence@gemlakemn.org; [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Subject: RE: Ramsey County Hazard Identification and Risk Assessment - Review Draft
Date: Friday, September 6, 2024 11:39:00 AM
Attachments: [image001.png](#)
[image004.jpg](#)
[image005.jpg](#)

Good afternoon, and happy Friday! This email serves as a reminder of some deadlines coming up next **Friday, September 13th**:

- The first draft of the Hazard Identification and Risk Assessment (HIRA) is available for review and comment. Please scroll down to see the links and information for the HIRA, or reference the original email sent Friday, August 30.
- Updated community hazard mitigation strategy information is also due next Friday. Each community received a specific email tailored to their community, sent Wednesday, August 28. As a reminder, Tidal Basin staff are available to provide support to each community in developing mitigation strategies if needed.

Thank you and have a great weekend.

Kyle

Kyle Karsjen

Senior Preparedness Specialist

Resilience, Mitigation and Policy



M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: Kyle Karsjen

Sent: Friday, August 30, 2024 2:27 PM

Subject: Ramsey County Hazard Identification and Risk Assessment - Review Draft

Good afternoon, and happy long weekend!

The first draft of the Hazard Identification and Risk Assessment (HIRA) for Ramsey County's Hazard Mitigation Plan (HMP) update is ready for review and comment. This draft represents our first stab at reviewing Ramsey County's hazards and their potential impacts on the community. The draft also includes an initial hazard prioritization based on three factors – threat, vulnerability and consequence.

Please note that **you** have direct control over everything in the HIRA – please provide me any feedback on where we may have gotten something wrong on hazards, or other edits we can make. As you read through the document, I would also be appreciative if you share any additional anecdotal experience you may have with these hazards so that we can add some of that color to the document.

- The draft HIRA can be found [here](#).
- Please provide any comments on the document using the comment collection tool, which can be found [here](#).
- Please input all comments into this form **no later than Friday, September 13**.

If you have any questions or have any issues accessing the document, please let me know.

Also as a reminder, the Tidal Basin planners assigned to your communities should have sent the worksheet out to each community this week to develop each community's mitigation strategy. This information is also due **no later than Friday, September 13**. Please let us know if we can provide any assistance as you develop your updated mitigation strategy.

I hope everyone has a great holiday weekend.

Thank you,

Kyle

Kyle Karsjen

Senior Preparedness Specialist

Resilience, Mitigation and Policy

M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: [Kyle Karsjen](#)
Bcc: mmountain@sbfire.org; [Mayer, Bryan L](#); [Jessica Henry](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); Judd.Freed@co.ramsey.mn.us; [Sieben, Terry - External Contact](#); [Don Smiley](#); melissa.lawrence@gemlakemn.org; [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#)
Subject: RE: Ramsey County Hazard Identification and Risk Assessment - Review Draft
Date: Thursday, September 12, 2024 8:47:00 AM
Attachments: [image001.png](#)
[image002.jpg](#)
[image003.jpg](#)

Good morning! Thank you to those communities who have already sent in their updated strategies, and those communities who have met with us this week to further discuss mitigation action planning. This email serves as a final reminder of some deadlines coming up **tomorrow, September 13th**:

- The first draft of the Hazard Identification and Risk Assessment (HIRA) is available for review and comment. Please scroll down to see the links and information for the HIRA, or reference the original email sent Friday, August 30.
- Updated community hazard mitigation strategy information is also due next Friday. Each community received a specific email tailored to their community, sent Wednesday, August 28. As a reminder, Tidal Basin staff are available to provide support to each community in developing mitigation strategies if needed.

Thank you!

Kyle

Kyle Karsjen
Senior Preparedness Specialist
Resilience, Mitigation and Policy

M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: Kyle Karsjen
Sent: Friday, August 30, 2024 2:27 PM
Subject: Ramsey County Hazard Identification and Risk Assessment - Review Draft

Good afternoon, and happy long weekend!

The first draft of the Hazard Identification and Risk Assessment (HIRA) for Ramsey County's Hazard Mitigation Plan (HMP) update is ready for review and comment. This draft represents our first stab at reviewing Ramsey County's hazards and their potential impacts on the community. The draft also includes an initial hazard prioritization based on three factors – threat, vulnerability and consequence.

Please note that **you** have direct control over everything in the HIRA – please provide me any feedback on where we may have gotten something wrong on hazards, or other edits we can make. As you read through the document, I would also be appreciative if you share any additional anecdotal experience you may have with these hazards so that we can add some of that color to the document.

- The draft HIRA can be found [here](#).
- Please provide any comments on the document using the comment collection tool, which can be found [here](#).
- Please input all comments into this form **no later than Friday, September 13**.

If you have any questions or have any issues accessing the document, please let me know.

Also as a reminder, the Tidal Basin planners assigned to your communities should have sent the worksheet out to each community this week to develop each community's mitigation strategy. This information is also due **no later than Friday, September 13**. Please let us know if we can provide any assistance as you develop your updated mitigation strategy.

I hope everyone has a great holiday weekend.

Thank you,

Kyle

Kyle Karsjen

Senior Preparedness Specialist

Resilience, Mitigation and Policy

M: 515.460.4711

kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: [Kyle Karsjen](#)
Bcc: [Mayer, Bryan L](#); [Jessica Henry](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [melissa.lawrence@gemlakemn.org](#); [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#); [Christopher Hearden](#); [Jim Lindner](#)
Subject: Ramsey County DRAFT Hazard Mitigation Plan for Review - Due Wednesday, October 30
Date: Wednesday, October 16, 2024 12:13:00 PM
Attachments: [image001.png](#)
[image004.jpg](#)

Good morning!

As you know, Ramsey County and its communities have been participating in an update of the county's hazard mitigation plan. Thank you to everyone who has participated – attending meetings, providing information, updating your hazard mitigation strategies and other actions that have contributed to plan development. We are pleased to share the first full draft of the updated hazard mitigation plan with the Local Planning Team (LPT) and provide a final opportunity for community review and comment. **Please read this whole email, as it is each community's last opportunity to provide review and input on the draft plan before finalization.**

We ask that communities review two separate documents:

- Base Plan
- Hazard mitigation strategy (you only need to review for your community)

The deadline for these reviews is **no later than 4 PM CT, Wednesday October 30.**

Base Plan

The Base Plan document encompasses the main portions of the plan. It can be viewed [here](#). The base plan includes:

- Section 1 Introduction and Planning Process
- Section 2 Community Profile and Capabilities
- Section 3 Risk Assessment
- Section 4 Hazard Mitigation Strategy
- Section 5 Plan Implementation and Maintenance

You'll notice a few areas still highlighted in yellow as you read through the document; these are areas where we are still collecting information through the process and will be finalized before the plan goes out for public review. You'll also notice a few references to appendices; these will be developed with the final draft.

Hazard Mitigation Strategy

Thank you to each community that submitted updates to its hazard mitigation strategy. Please click [this link](#) to access it. It should open up an Excel file with the mitigation strategy for the plan compiled. *You only need to review the actions for your community.* The strategy contains each mitigation action identified through the update process. **Please make sure you review your community's strategy for accuracy.** For most communities, we made some additional edits and added any information that was missing. We also filled in some of the prioritization for each action where it wasn't provided. If you see anything that we did that you don't agree with or want me to change, please let me know and I'm happy to do it.

In addition to reviewing the document, please let me know if your community has any other hazard mitigation actions you would like to add. We didn't get many new hazard mitigation actions added during the strategy update process, and **we are asking communities to review and provide at least ONE new hazard mitigation action to its strategy if the community hasn't done so already.** There is still time to edit before we finalize the document and send it off to public review. If you'd like any additional support in identifying and adding actions, please let me know.

Timeline and Next Steps

Please complete a review of this documentation and submit any new mitigation actions no later than **4 PM CT, Wednesday October 30**. Send any feedback on your community information or the base plan to me at kyle.karsjen@tidalbasingroup.com. If you have any questions or would like support in adding any more hazard mitigation actions, please let me know. Also please let me know if you have any access issues with the folder and we'll figure something else out.

Once each community has completed its review, the document will go out for public review. We'll ask for your help in sharing that document. I will send a separate email about that process soon.

Thank you,

Kyle

Kyle Karsjen

Senior Preparedness Specialist

Resilience, Mitigation and Policy



M: 515.460.4711

kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com



From: [Kyle Karsjen](#)
Bcc: [Mayer, Bryan L](#); [Kerry Evans](#); [Kymmie Scott](#); [Artig-Swomley, Gretchen - External Contact](#); [ben.zender](#); [Brosnahan, David](#); [Christopherson, Pat - External Contact](#); [Diaz, Izzy](#); [Hamdorf, Trevor](#); [Hearden, Chris](#); [Butkowski, Heather - External Contact](#); [Jason Mallinger](#); [Linehan, Jack - External Contact](#); [Mondor, Michael](#); [msather](#); [Peterson, Greg](#); [Judd.Freed@co.ramsey.mn.us](#); [Sieben, Terry - External Contact](#); [Don Smiley](#); [melissa.lawrence@gemlakemn.org](#); [Ryan Schroeder](#); [Jim Bownik](#); [Mike Lovas](#); [Christopher Hearden](#); [Jim Lindner](#); [Matt Montain](#)
Subject: Ramsey County Hazard Mitigation Plan - Public Review Draft sharing information
Date: Tuesday, December 10, 2024 9:00:00 AM
Attachments: [WinterHazardSurveyFlyer-final.pdf.pdf](#)
[social sharing text.docx](#)
[hazardmitigation-socialmedia-Final.jpg](#)
[image001.png](#)
[image002.png](#)

Good morning!

We are pleased to announce that the Ramsey County Hazard Mitigation Plan (HMP) draft is now ready for public review. The review period will last until Sunday, December 22. We are asking communities to share the plan draft and opportunity to review using whatever mechanisms you would normally use to share important information.

I have attached the following to this email:

- A flyer has been developed that can be shared that includes the embedded links to the plan and comment sheet (WinterHazardSurveyFlyer-final.pdf). This flyer can be shared via email to any of your partners that you think would find value in reviewing the full HMP. If you share the survey via email, please cc me.
- We've developed some materials that can be used to develop a post on social media. I have attached the text that can be used (social sharing text); please ensure that the links transfer to the posting. I have also attached an image that can be used in your post if you wish as well (hazardmitigation-socialmedia-Final).

Finally, the plan will be shared on the Ramsey County website and Ramsey County social media channels today.

When you do share the document, please remember to send me screenshots of the posting so that I can include it in the plan. If you have any further questions, please let me know.

Thanks!

Kyle Karsjen
Senior Preparedness Specialist
Policy, Mitigation and Resilience

M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com

A snowplow is clearing a road in a snowy, wooded area. The plow is yellow and is moving towards the viewer, kicking up snow. The trees are heavily covered in snow, and the overall scene is a winter landscape.

We need your input!

Help us create a safer, stronger community by sharing your thoughts on the Hazard Mitigation Plan.



We need your input!

Help shape the future of Ramsey County's Hazard Mitigation Plan.

We're updating the plan to find ways to protect our communities from hazards like flooding and severe winter storms. A draft is now ready for you to review and share your thoughts.

1

Review the Plan

Review the plan.

Click the link: [Ramsey County Hazard Mitigation Plan – Public Review Draft](#)

2

Share Your Feedback

Fill out a quick survey.

Click the Link: [Ramsey County Hazard Mitigation Plan – Feedback Survey](#)

For more information about the hazard mitigation process, please contact:
Ramsey County Emergency Management & Homeland Security (RCEMHS)
(651) 266-1017

bryan.mayer@ramseycounty.us

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Help make Ramsey County safer – share your input

Ramsey County wants to be ready for disasters and keep people and property safe. Natural disasters like tornadoes, flooding, blizzards, and ice storms can cause serious harm, including loss of life, property damage, and financial hardship.

To prepare, we've created a Hazard Mitigation Plan to reduce the impact of these disasters. This plan looks at the most common hazards in our area, ranks them by how often they happen and how much damage they cause, and suggests ways to reduce the risks.

[Read the draft Hazard Mitigation Plan \(PDF\)](#).

Why your input matters

We want this plan to reflect what's important to the people who live and work in Ramsey County. Your experiences and ideas will help us create a plan that works for everyone.

Provide your feedback

We need your feedback to help us make Ramsey County safe! Share your thoughts by Dec. 22.

[Take the survey](#).

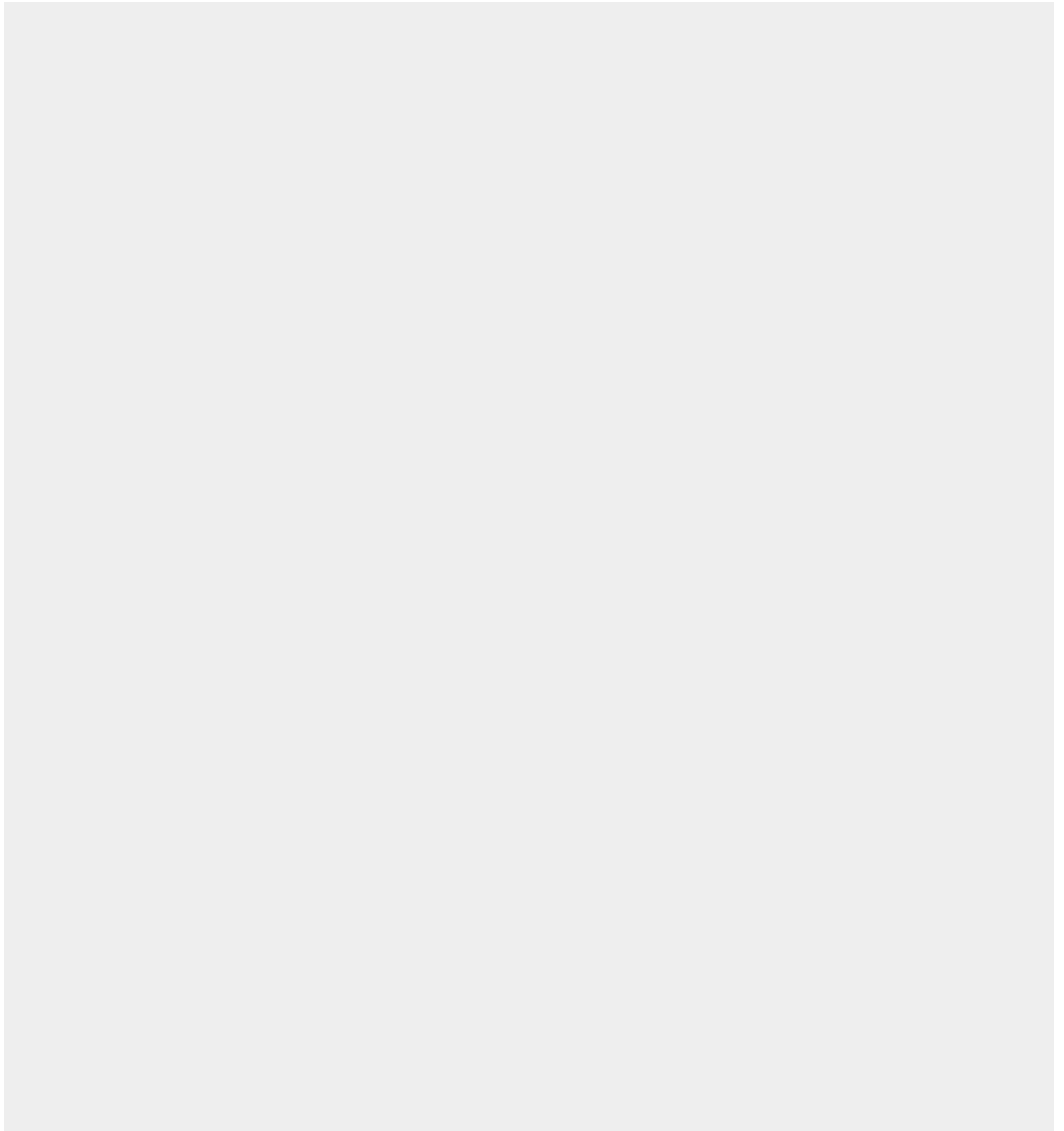
What's the goal?

- Be prepared: Understand the risks and plan ahead.
- Protect lives and property: Reduce the impact of disasters.

- Build a stronger community: Help Ramsey County recover faster when disasters happen.

Your input will make a big difference. Together, we can create a plan that keeps our community safe and prepared for the future.

Posted on Tuesday, December 10, 2024 - 2:10 p.m.



[Español](#) [Hmoob](#) [Soomaali](#) [Oromoo](#) [Karen](#)

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Emergency Management & Homeland Security

Contact us

In Ramsey County, both emergency management and homeland security are coordinated in a

comprehensive program under the Ramsey County

Emergency Management and Homeland Security

department (RCEMHS). RCEMHS works with our local municipalities, neighboring counties in the metro region, private and nonprofit organizations, and state and federal partners to better prepare for, respond to and recover from incidents ranging from tornadoes to terrorism.

In addition to coordinating and supporting our partner agencies, Ramsey County Emergency Management is committed to the preparedness of our whole community. This includes working with community groups and leaders, businesses and individuals across the diversity of Ramsey County to enhance our combined disaster resiliency from the ground up.

Ramsey County's Emergency Management program was nationally-accredited by the Emergency Management Accreditation Program in 2017.



Contact Us

Emergency Management & Homeland Security

[651-266-1020](tel:651-266-1020)

[Contact form](#)

[Department information](#)

Connect with us



www.youtube.com/user/R

Related Resources

- > [County and city Emergency Management contacts](#)
- > [Emergency Management 2017-2021 Program Strategic Plan](#) (PDF)
- > [Federal Emergency Management Agency](#) (<http://www.fema.gov/>)
- > [Minnesota Homeland Security and Emergency Management](#)
- > [Sign up for emergency notifications](#)

Provide feedback on the draft Hazard Mitigation Plan



We have been working with our communities to update the Ramsey County Hazard Mitigation Plan. We're updating the plan to find ways to protect our communities from hazards like flooding and severe winter storms. Please review the draft and share your thoughts:

- > [Review the draft plan \(PDF\)](#)
- > [Share your feedback](#)

Comments will be accepted through December 22. For more information about the hazard mitigation process, contact Ramsey County Emergency Management & Homeland Security (RCEMHS) at [651-266-1017](tel:651-266-1017) or bryan.mayer@ramseycounty.us.

+ Mission

Foster resilience in Ramsey County through development of a community-wide culture of preparedness and the coordination of public safety efforts to prevent, plan for, respond to, mitigate and recover from all hazards, disasters and emergencies – whether natural or human-caused, accidental or intentional.

Visit our [get involved](#) page for more information on our volunteering in disaster service.

+ Emergency Operations Plan and Mitigation Plan

Ramsey County Emergency Management and Homeland Security is responsible for the creation and maintenance of the county's Emergency Operations Plan and Mitigation Plan.

Emergency Operations Plan

[The Ramsey County Emergency Operations Plan](#) determines who is in charge under what situations and how the actions of all agencies participating in the response will be coordinated to ensure that people and property will be

protected in the safest and most effective way possible. Ramsey County has a comprehensive, all-hazards countywide Emergency Operations Plan. The county and its cities all use and are signatories on the same plan, which is approved by the Federal Emergency Management Agency (**FEMA** (<http://www.fema.gov/>)).

The **City of Saint Paul** maintains its own Emergency Operations Plan that coordinates with the county plan.

Multi-Hazard Mitigation Plan

The Ramsey County **Multi-Hazard Mitigation Plan** (PDF) identifies hazards in the county and how mitigation of those hazards is prioritized and coordinated. The Ramsey County All-Hazard Mitigation Plan was last updated in 2019 and is approved by FEMA.

+ About emergency management

Emergency management reduces our community's vulnerability to disasters and increases our ability to cope with them.

Emergency management is often thought of as a cycle:

- **Preparedness:** planning, training, conducting drills and exercises, testing equipment and public education.
- **Response:** all of the actions immediately after a disaster taken to save lives, as well as activities to protect property and the environment from the effects of the disaster.
- **Recovery:** Returning a disaster-affected community to "normal" after a disaster, including financial recovery and rebuilding.
- **Mitigation:** reducing or removing disaster risks in the community.

+ About homeland security

Homeland security (<http://www.dhs.gov/>) involves working with all aspects of public safety - from the federal level to individual community members - to ensure the most comprehensive and coordinated approach to the protection of public safety from acts of terrorism. It includes identification of possible threats, prevention, efforts to lessen potential impacts and preparation for events related to terrorism.

+ Resources for healthcare facilities

Healthcare facilities looking for resources to meet the new requirements from the Centers for Medicare and Medicaid (CMS), please visit our CMS toolkit page.

[Centers for Medicare & Medicaid \(CMS\) Toolkit](#)



Ramsey County, Minnesota

- Ramsey County** is responsible for this Page
- 15 Kellogg Blvd W, Saint Paul, MN, United States, Minnesota
- (651) 266-8500
- communicationshelpdesk@ramseycounty.us
- ramseycounty.us
- Open now

Photos See all photos

<p>Winter Warming Space Open Tonight Law Enforcement Center Lobby 7:30 p.m. - 7:30 a.m.</p>	<p>We need your input! Help us create a safer, stronger community by sharing your thoughts on the Hazard Mitigation Plan.</p>	<p>HIRING are committed to growth.</p>
<p>FOR tion ige</p>	<p>Winter Warming Space Open Tonight Law Enforcement Center Lobby 7:30 p.m. - 7:30 a.m.</p>	<p>W HIRI Child Protection Social Service</p>
<p>Clinic 555 in the community.</p>	<p>DON'T WAIT, VACCINATE! Measles is in our community.</p>	<p>ive you, we support ve are here for you</p>



Ramsey County, Minnesota

2 hours ago

We have been working with our communities to update the Ramsey County Hazard Mitigation Plan. We're updating the plan to find ways to protect our communities from hazards like flooding and severe winter storms. A draft is now ready for you to review and share your thoughts.

Review the plan at ramseycounty.us/HazardMitigationPlan
Share your feedback: <https://bit.ly/4iwZdDo...> See more



We need your input!


Help us create a safer, stronger community by sharing your thoughts on the Hazard Mitigation Plan.

RAMSEY COUNTY

Instagram

instagram.com/p/DDaKb41zmj/

RAMSEY COUNTY



We need your input!

Help us create a safer, stronger community by sharing your thoughts on the Hazard Mitigation Plan.

RAMSEY COUNTY

ramseycountymn • Follow

ramseycountymn We have been working with our communities to update the Ramsey County Hazard Mitigation Plan. We're updating the plan to find ways to protect our communities from hazards like flooding and severe winter storms. A draft is now ready for you to review and share your thoughts.

Review the plan at ramseycounty.us/HazardMitigationPlan
Share your feedback: <https://bit.ly/4iwZdDo>

Comments will be accepted through December 22. For more information about the hazard mitigation process, contact Ramsey County Emergency Management & Homeland Security (RCEMHS) at 651-266-1017 or bryan.mayer@ramseycounty.us.

2h

Be the first to like this
2 hours ago

Add a comment... Post

3:07 PM
12/10/2024

From: [Kyle Karsjen](#)
Cc: [Mayer, Bryan L](#)
Bcc: ryan.kelzenberg@co.anoka.mn.us; allison.strohl@co.washington.mn.us; kelly.miller@co.dakota.mn.us; eric.waage@co.hennepin.mn.us
Subject: Ramsey County Hazard Mitigation Plan - Available for Review
Date: Thursday, December 12, 2024 10:00:00 AM
Attachments: [image001.png](#)

Good morning,

Ramsey County is nearing completion toward updating its hazard mitigation plan. This plan identifies community capabilities, provides an assessment of risks to the county and its communities, and lays out community mitigation strategies that reduce risks posed by a variety of hazards. The plan must be updated and approved by FEMA every five years to keep it current and to maintain eligibility for mitigation grant assistance. The plan has been updated in accordance with FEMA's updated hazard mitigation planning guidance and is anticipated to be submitted for FEMA approval by the end of the year. During the process, Ramsey County and its communities have reviewed capabilities, assessed levels of risk to specific hazards, and developed a comprehensive hazard mitigation strategy that builds on capabilities to buy down those risks.

One of the key elements of the plan development process is inviting stakeholders to provide input during the planning process. You have been identified by Ramsey County as a key partner. The County invites you to provide any input or comment on the plan as they work through the final stages of development.

We ask that you review the draft plan, which can be accessed here: [Ramsey County Hazard Mitigation Plan – Review Draft](#)

Please provide any feedback utilizing this link: [Ramsey County Hazard Mitigation Plan – Feedback Survey](#)

The plan will be available for stakeholder review and comment until December 22.

More information about hazard mitigation and mitigation planning can be found at <https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning>.

Thank you,

Kyle

Kyle Karsjen
Senior Preparedness Specialist
Policy, Mitigation and Resilience

Be stronger than before

M: 515.460.4711 kyle.karsjen@tidalbasingroup.com
tidalbasingroup.com

