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2025 Multi-Hazard Mitigation Plan

Bismarck

Photo credit: The tornado photo included on the 2025 Multi-Hazard Mitigation Plan title page is provided courtesy of Angie Gray Photography.

Executive Summary

This updated community-specific Bismarck Multi-Hazard Mitigation Plan (MHMP) was originally developed and approved by the Federal Emergency Management Agency (FEMA) in 2015, again in January 2021, updated in 2025 and approved by FEMA and the ND Department of Emergency Services on DATE. The plan identifies and profiles the hazards to assess risk and vulnerability relating to natural, technological, and human-caused hazards, and identifies mitigation strategies and specific mitigation action items for reducing impact.

The Mitigation Strategy of this plan (see Section 2) is updated to align with and support the Bismarck Strategic Plan, approved by the city commission in 2025. Plan sections 3 through 5 identify, prioritize, and assign the mitigation action items that support the goals of this updated Multi-Hazard Mitigation Plan.

Although emergencies and disasters have impacted Bismarck, and can impact Bismarck in the future, actions can be taken ahead of time to reduce or eliminate the negative impacts. The 2025 MHMP represents the City's commitment to take action to lessen the impacts potential disasters may have on life, the economy, infrastructure and our ability to continue to operate as a community and city.

Much of the work in hazard mitigation and sustainable development must be carried out at the local level. It is at the local level where land use decisions are made, growth and development take place, and where the impacts of hazards are most direct. At the same time, some of the hazards with potential for catastrophic impact require mitigation efforts be pursued by key partners, including private industry, community partners, and state and federal government. Mitigating hazards is a "whole community" effort.

This Bismarck Multi-Hazard Mitigation Plan identifies numerous hazard-specific mitigation capabilities of our city departments and partners, as well as numerous mitigation actions (both new and ongoing) to continue mitigating all hazards. Section 3 of the MHMP provides for a summary of the following for each hazard addressed in the plan: 1) a summary of applicable mitigation action items per hazard, 2) a summary of primary vulnerabilities relating to each hazard, and 3) a summary of hazard-specific mitigation capabilities (completed or routine activities) which are relevant when analyzing hazard risk and community vulnerability to each hazard.

Throughout the plan update process, Bismarck conducted a thorough analysis of each hazard, including vulnerability assessments and identified opportunities to mitigate hazards. In addition to collaborative efforts among city staff, the plan is updated based on input from the public as well as participation from community partners. The planning process is outlined in Section 12.

The hazards identified within the table on the next page are each profiled for the purpose of identifying risk and vulnerabilities, and ultimately, to identify feasible mitigation opportunities. A hazard profile (see section 9) as well as applicable mitigation actions (see Section 3) are identified for each of the hazards.

Based on probability, potential impacts, and current response and mitigation capabilities, the hazards are prioritized as follows for the City of Bismarck:

***Hazard Ranking**

	Natural Hazards	Technological or Human Caused
High	Winter Storm Tornado	Cyberattack
Moderate	Severe Summer Weather Flood Infectious Disease	Hazardous Materials Release Train Derailment Active Threat Civil Disturbance
Low	Drought Geologic Hazard Pest Infestation Wildland Fire Space Weather	Fire Dam Failure Aircraft Accident Terrorist or Nation-State Attack

*The purpose of ranking hazards, per planning requirements established by the Federal Emergency Management Agency, is to aid in prioritizing mitigation efforts and funding. However, it's understood that all approved mitigation action items are important and may be addressed based on the availability of required resources.

Three Hazards were added to the 2025 Multi-Hazard Mitigation Plan update:

- Cyberattack
- Space Weather
- Terrorist or Nation-State Attack

Multi-Hazard Mitigation Plan (MHMP) Goals

See Section 2: Mitigation Strategy for additional information.

MHMP Goal #1: Reduce the occurrence or impact of natural and man-made emergencies that are common or have significant potential to occur in our community by planning and educating the public.

MHMP Goal #2: Strengthen public health, emergency preparedness, and environmental safety to protect community well-being.

MHMP Goal #3: Expand and strengthen community-based services to support vulnerable populations.

MHMP Goal #4: Safeguard the community by providing appropriate personnel and equipment capable of effectively mitigating natural and man-made emergencies which are common or have significant potential to occur in our community.

MHMP Goal #5: Leverage technology and infrastructure to strengthen public safety, improve emergency response, and support proactive community protection and mitigation efforts.

MHMP Goal #6: Enhance community understanding and awareness of hazards and participation in mitigation planning and emergency/disaster preparedness.

MHMP Goal #7: Strengthen cybersecurity measures and enhance data governance to protect information assets and ensure regulatory compliance.

MHMP Goal #8: Improve disaster resilience to current and future buildings, structures, and infrastructure systems.

The Mitigation Strategy of this plan (see Section 2) is updated to align with and support the Bismarck Strategic Plan, approved by the city commission in 2025. Plan sections 3 through 5 identify, prioritize, and assign the mitigation action items that support the goals of this updated Multi-Hazard Mitigation Plan.

Table of Contents

See Section 1: Introduction for a description of the purpose and content overview of each plan section.

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PLACEHOLDER

Resolution Adopting the Multi-Hazard Mitigation Plan for the City of Bismarck, ND.

After plan approval by ND Department of Emergency Services and the Federal Emergency Management Agency.

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Introduction

Defining Mitigation
Mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to people and property from natural, technological, or human-caused hazards and their effects. Effective mitigation actions will achieve one or more of the following:

- Break the cycle of damage
- Promote Community Resilience
- Reduce the risk to human life and safety

Mitigation is taking action NOW, BEFORE the next disaster or significant hazard event, to reduce human and financial consequences in the future. Effective mitigation requires that we ALL understand local risks, address the hard choices and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.

Purpose
The Bismarck Mitigation Plan has been developed to serve the Bismarck community through mitigation of potential impacts of natural and human-caused hazards. By avoiding unnecessary exposure to known hazards, a community may save lives, protect property, and minimize the social, economic, and environmental disruptions that commonly follow hazard events.

The primary purpose of the plan is to identify mitigation strategies. Therefore, in developing the plan, the focus was to identify mitigation strategies based on the significant vulnerabilities identified through the planning process.

The purpose of mitigation planning and implementing the plan is to protect life, property, environment, economy, and quality of life within the City of Bismarck from hazards/disasters.

The purpose of the mitigation plan is to:

- Serve as a consolidated, comprehensive source of hazard information.
- Inform our leaders and the public of our vulnerabilities.
- Prioritize and promote cost-effective mitigation solutions.
- Encourage long-term community sustainability.
- Improve coordination of mitigation efforts.
- Support the 2025 Bismarck Strategic Plan

Scope
The Bismarck Multi-Hazard Mitigation Plan was prepared to address those hazards identified which pose significant risk to Bismarck. Additional hazards may exist that were not apparent to the mitigation plan stakeholders through the development of this plan, and certainly, disasters can occur in unexpected ways. Future planning efforts may address additional hazards as determined appropriate.

Authority
The North Dakota Century Code, Chapter 37-17.1 Emergency Services, requires cities and to develop and maintain an emergency management program (or participate in a county or regional program).

The Disaster Mitigation Act of 2000 requires local governments to develop and submit mitigation plans as a condition of receiving Hazard Mitigation Grant Program (HMGP) and other applicable mitigation grants. The Disaster Mitigation Act of 2000 became law on October 30, 2000, and amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the "Stafford Act") (P.L. 93-288, as amended). Regulations for this activity can be found in 44 CFR, Part 201.

The City of Bismarck Multi-Hazard Mitigation Plan meets the requirements and procedures for a local mitigation plan as found in the Code of Federal Regulations (CFR), Title 44, Chapter 1, Part 201 (44 CFR Part 201). This Bismarck Multi-Hazard Mitigation Plan has been prepared by Bismarck Administration/Emergency Management.

Overview of Bismarck, North Dakota.
See plan section 7: Community Profile.

Plan Format
The plan document is formatted based on the purpose of the plan (ie: mitigation strategy) and also to ensure the document is user-friendly for those who are assigned to implement mitigation action items. Since the mitigation strategies and action items are the *results* of the planning process, the mitigation strategy including action items are the focus of the plan document. The other plan sections which contribute to and inform the mitigation strategy and specific hazard mitigation actions follow.

Plan Organization – Purpose of Plan Sections

Section 1: Introduction explains the purpose, organization, scope, and authority of the plan.
Section 2: Mitigation Strategy identifies the mitigation plan purpose and overarching goals to minimize potential impact from hazards. Sections 3 through 6, cumulatively, outline the mitigation strategy including the applicable mitigation action items.
Section 3: Hazard Vulnerability & Mitigation Actions Summary highlights the results of the mitigation planning process to include identification of mitigation actions based on vulnerabilities as well as identifying mitigation capabilities specific to each hazard. This section also summarizes vulnerabilities for each hazard based on more detailed vulnerability assessments within each hazard profile within Section 9 of the plan.
Section 4: Mitigation Implementation Action Plan identifies the mitigation action item assignments and is organized by name of city department. This section will allow for effective tracking of mitigation action items.
Section 5: Mitigation Actions – Prioritizing outlines the priority level of mitigation action items identified.
Section 6: Integration of Plans and Program and Mitigation Capabilities Inventory is an assessment of local mitigation capabilities and identifies the informational resources (ie: plan, programs) that were reviewed and integrated into the plan. Additional hazard-specific mitigation capabilities are identified in Section 3 where applicable.
Section 7: Community Profile provides an overview of the City of Bismarck, ND.
Section 8: Community Assets provides a visual representation of an inventory list of community assets including critical facilities, critical infrastructure, vulnerable populations, and hazardous materials facilities. An inventory list of community assets is used to assist in the planning efforts in developing each of the hazard profiles (ie: vulnerability).
Section 9: Hazard Profiles provides detail on each of the hazards including a hazard description, risk assessment, and vulnerability assessment. Vulnerability summaries (section 3) are based on the vulnerability assessment within each hazard profile.
Section 10: Risk Assessment provides an overview of hazards identified to be addressed in the plan as well as a summary of comparative hazard ranking based on risk (probability) and overall impact. The methodology, including additional considerations for hazard ranking and integration of the Threat and Hazard Identification and Risk Assessment (THIRA) process is explained.
Section 11: Plan Maintenance describes the approach to monitoring, evaluating, and updating the plan.
Section 12: Planning Process and Public Input explains who was involved and how the plan was prepared and describes public input opportunity and plan integration.
Appendices include Acronyms used throughout the document and Climate data for Bismarck.

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Mitigation Strategy

This section outlines the purpose of mitigation and identifies the community's mitigation goals. The Mitigation Strategy of this plan is updated to align with and support the Bismarck Strategic Plan, approved by the city commission in 2025.

Purpose of the Multi-Hazard Mitigation Plan: Identify Mitigation Goals and Action Items to minimize risk and vulnerability to protect the life and health of people, property, environment, and economy of Bismarck from potential impacts of natural, technological, and human-caused hazards.

The Bismarck Strategic Plan identifies Focus Areas, Goals, and Objectives which establish community priorities and in turn, provide direction in setting the Multi-Hazard Mitigation Plan Strategy and Goals for this Multi-Hazard Mitigation Plan update.

Strategic Plan Focus Areas	Description
Infrastructure and Development	The City of Bismarck recognizes that robust, resilient, and forward-thinking infrastructure is fundamental to the community's well-being, economic vitality, and quality of life. As our city continues to grow and evolve, it is essential to develop and maintain facilities, systems, policies and practices that not only meet today's demands but also anticipate future needs.
Economic Vitality	The City of Bismarck is committed to fostering a vibrant and resilient economy that supports sustainable growth, expands local employment opportunities, and attracts new investment. Recognizing that economic vitality is critical to the overall quality of life and long-term prosperity, this strategic focus area emphasizes collaboration with partners, modernization of business processes, and thoughtful community planning.
Safe and Healthy Community	The City of Bismarck is committed to fostering a safe, healthy, and inclusive environment where all residents can thrive. The Safe and Healthy Community strategic focus area reflects a comprehensive approach to public safety, health, and well-being—grounded in collaboration, innovation, and proactive service delivery.
Emerging Issues	As the pace of technology, organizational policy, and public expectation evolve and accelerate, the City of Bismarck must continue to adapt and be proactive in its approaches, anticipating challenges before they arise and positioning the organization to respond strategically..
Engaged and Informed Community	As Bismarck continues to grow and evolve, effective communication must go beyond simply sharing information. It should build trust, bridge divides, and empower residents to actively shape the community's future. An engaged and informed community should view the City of Bismarck as a trusted partner and the City should, in turn, recognize its residents as essential partners in shaping a vibrant and responsive community.

Desirable Lifestyle	The City of Bismarck is dedicated to cultivating a vibrant community where residents enjoy a high quality of life enriched by meaningful connections, cultural heritage, and accessible amenities. This strategic focus on Desirable Lifestyle emphasizes the importance of well-designed public spaces, strong community partnerships, and dynamic programming that engage people of all ages and backgrounds.
Organizational Excellence	The City of Bismarck is committed to achieving organizational excellence by investing in its workforce, optimizing internal operations, and fostering a culture of innovation, accountability, and service. This focus area reflects a strategic commitment to building a high-performing organization that can effectively meet the evolving needs of the community, adapt to future challenges, and deliver high-quality public services.

Five of the Strategic Focus Areas and several goals and objectives identified within the Strategic Plan are utilized to establish consistent goals within this updated Multi-Hazard Mitigation Plan (MHMP).

The mitigation actions identified within this plan to support the goals include mitigation actions classified under the following categories:

- Planning and Regulatory actions
- Structural and Infrastructure actions
- Nature-Based Mitigation
- Public Education, Technical Assistance, and Partnerships

Mitigation Action Items developed for each hazard are not all inclusive and the City of Bismarck reserves the right to modify actions, objectives, and goals as necessary to address mitigation needs as they arise. Future occurrences, new technology, or unforeseen events could result in the modification of actions outlined in this plan, or may result in the identification of a new action item not previously identified in this plan.

All of the Mitigation Action Items identified within this plan are considered Short-Term Strategies to be completed within 3 to 5 years, or prior to the next plan update. However, many of the mitigation action items are on-going or remain relevant beyond 5 years. As Mitigation Action Items are completed or become routine practice, they are identified as mitigation capabilities instead. Section 3 of this plan document identifies hazard-specific mitigation capabilities and Section 6 is an inventory mitigation capabilities relating to all hazards.

2025 Bismarck Multi-Hazard Mitigation Plan (MHMP) Updated Goals

Safe and Healthy Community Focus Area

MHMP Goal #1: Reduce the occurrence or impact of natural and man-made emergencies that are common or have significant potential to occur in our community by planning and educating the public.

MHMP Goal #2: Strengthen public health, emergency preparedness, and environmental safety to protect community well-being.

MHMP Goal #3: Expand and strengthen community-based services to support vulnerable populations.

MHMP Goal #4: Safeguard the community by providing appropriate personnel and equipment capable of effectively mitigating natural and man-made emergencies which are common or have significant potential to occur in our community.

MHMP Goal #5: Leverage technology and infrastructure to strengthen public safety, improve emergency response, and support proactive community protection and mitigation efforts.

Engaged and Informed Community Focus Area

MHMP Goal #6: Enhance community understanding and awareness of hazards and participation in mitigation planning and emergency/disaster preparedness.

Organizational Excellence Focus Area

MHMP Goal #7: Strengthen cybersecurity measures and enhance data governance to protect information assets and ensure regulatory compliance.

Infrastructure and Development, and Economic Vitality Focus Areas

MHMP Goal #8: Improve disaster resilience to current and future buildings, structures, and infrastructure systems.

Note: The goal numbering scheme above is specific to this plan document, and does not use the same goal numbers as assigned within the Bismarck Strategic Plan.

Previous Goals:
The following mitigation goals from the previous plan are integrated within the updated mitigation plan goals above (synonymous).

- Reduce the impacts natural disasters may have on people and property. (See goal 1 above)
- Reduce impacts of technological and human-caused disaster may have on people and property. (See goal 1 above)
- Enhance local planning efforts related to hazard understanding and mitigation. (See goal 6 above)
- Reduce the impact future development has on potential losses and vulnerabilities. (See Goal 8 above)

Summary of Priority Changes

MHMP Goal #3 and Goal #7 are new priorities for this updated mitigation plan, and are based on the current Strategic Plan. Applicable mitigation action items are included within this plan to support the new goals.

Additional hazards included in this plan update include Cyberattack, Space Weather, and Terrorist or Nation-State Attack. Goals #5 and #7 support the inclusion of these hazards and efforts to mitigate the hazards.

The revision to the 100-year floodplain (and flood insurance rate map) is a significant change for Bismarck and area residents. Although this change didn't require a change in mitigation goals, the identification of potential solutions and efforts to mitigate the impact were identified as a priority and have been initiated prior to the update of this mitigation plan.

The previous plan included "Shortage or Outage of Critical Materials or Infrastructure" as a hazard. The primary issues and related mitigation action items were associated with power outages. This hazard was removed from this updated plan and the relevant content such as vulnerabilities and mitigation action items were integrated into the Winter Storm, Terrorist or Nation-State Attack, and Space Weather hazards.

Mitigation Action Items

Mitigation Action Items, as part of the Mitigation Strategy, are identified within these subsequent plan sections:

- Section 3: Hazard Vulnerability & Mitigation Actions Summary
  - Identifies mitigation action items per hazard, as well as applicable vulnerabilities and mitigation capabilities applicable to each hazard.
- Section 4: Mitigation Implementation Action Plan
  - Identifies the mitigation action items and city departments assigned to implement each mitigation action item.
  - Identifies the status of mitigation action items.
- Section 5: Mitigation Actions: Prioritizing
  - Includes a cumulative list of all mitigation action items and assigns priority level based on methodology as explained within Section 5.

Developing the Mitigation Strategy

The mitigation purpose statement and goals were reviewed and updated during the plan update kick-off meeting (Mitigation Plan Steering Committee) and again as a result of completion of the city's updated Strategic Plan. Priorities and goals were again reviewed by City Administration and the Multi-Hazard Mitigation Plan Steering Committee to finalize the plan.

As part of the hazard mitigation planning kick-off meeting, hazards were identified to be included in the mitigation plan. Also, hazard specific mitigation planning teams made up of various city departments and community stakeholders were established to address each hazard for the purpose of updating or developing hazard profiles, identifying vulnerabilities, and identifying and evaluating mitigation ideas. The results of the hazard-specific mitigation planning team meetings were then reviewed by the MHMP Steering Committee for final revisions and to provide preliminary approval.

The initial public input survey conducted jointly by Bismarck and Burleigh County validated the inclusion of Cyberattack within this mitigation plan update as well as the goals identified in this plan to address technological and human-caused hazards as well as natural hazards.

As a result of the final public input opportunity, (summarize any changes to the mitigation strategy)

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Hazard Vulnerability & Mitigation Actions Summary

- Mitigation Actions Identified – Hazard Specific
- Vulnerability Summaries – Hazard Specific
- Mitigation Capabilities Inventory – Hazard Specific

This plan section outlines the mitigation actions identified to address each hazard and includes a vulnerability assessment narrative summary for each hazard based on the hazard profiles in Section 9. The identified vulnerabilities validate the need or purpose of the identified mitigation actions. Not all vulnerabilities are addressed by specific mitigation actions. In some cases, a proposed mitigation idea may not be feasible or within the authority or jurisdiction of the city. Regardless, vulnerabilities are identified, even if there is not a current solution or related mitigation action identified.

This plan section also identifies mitigation capabilities specific to each hazard. The listing of capabilities illustrates the efforts of Bismarck and community partners in mitigating each of the hazards. Capabilities listed may be completed mitigation action items that remain in place and/or routine mitigation activities conducted on a regular basis. Section 6 also provides for an inventory of mitigation capabilities applying to all hazards or multiple hazards.

Section 9 contains a hazard profile for each hazard. **The hazard profiles in Section 9 contain a description of the hazard as well as more detail regarding potential magnitude and extent of the events, vulnerability analysis, and history of previous occurrences**. The purpose of this Plan Section 3 is to highlight the identify mitigation action items to address each hazard, as well as provide for an overview of vulnerability and a listing of hazard-specific mitigation capabilities where applicable.

The summary of mitigation actions, vulnerabilities, and mitigation capabilities specific to each hazard within this section are sorted **alphabetically by hazard name.**

Active Threat

Note: For purposes of safety and security, specific vulnerabilities and mitigation projects will not be presented in this plan for this hazard. General mitigation recommendations and existing mitigation capabilities are identified. A hazard profile for this hazard is included in Section 9 of this plan.

Mitigation Actions

1. Invest in a real-time crime center and deploy advanced analytics technologies in high-traffic and high-risk areas to support rapid response, crime prevention, and data-driven decision-making.
2. Continue those mitigation capabilities already in place as summarized below.
3. Provide for training opportunities in how to plan, prepare, and mitigate potential Active Threat / Active Attack incidents. Promote opportunities internally (city departments) and externally (community). (CRASE: Civilian Response to Active Shooter Events).
4. Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the Bismarck Police Department or the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options. State Assistance Visit - NDSLIC

Public Education topics:

5. Promote availability and conduct on-going public education and training regarding the Active Attack hazard using the "Avoid, Deny, Defend" concepts outlined via ALERTT.

Capabilities

Existing Mitigation Capabilities Specific to the Active Threat Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The Bismarck Police Department has developed various crime prevention programs and conducts crime prevention presentations for the public upon request.
   - **Crime Prevention Programs include Neighborhood Crime Watch, Operation Identification, Security Surveys, Crime Stoppers, Apartment Association Background Checks, and Safe Rental Housing Program.** http://www.bismarcknd.gov/index.aspx?NID=399
   - Crime Prevention Presentations topics and descriptions are available on the web at http://www.bismarcknd.gov/index.aspx?NID=398
2. The Bismarck Police Department offers facility security assessments. Upon request, a specially trained officer will come to your home or business and make an assessment of your physical security. The officer will then make recommendations, if needed, on areas where it can be improved.
3. Bismarck PD, in conjunction with the Bismarck Public School system, has developed a Threat Assessment Team. The team includes both police and school representatives including investigators, counselors, and applicable parents. Threats are analyzed to determine viability or credibility and to determine if prosecution or other action (ie: referral) is necessary.
4. Bismarck PD conducts lethality assessments to determine the likelihood of domestic violence situations (case by case basis). As part of the lethality assessment protocol, appropriate referrals may be made.
5. Bismarck PD shares intelligence with ND State and Local Intelligence Center (ND SLIC).
6. The ND SLIC provides for public education including facility security assessment guidelines.
7. ND SLIC promotes "If You See Something, Say Something" public education awareness campaign. Signs are currently posted at the Bismarck Airport ("If You See Something, Say Something").
8. Personnel at Bismarck PD have participated in the ALERRT train-the-trainer program. http://alerrt.org/
9. Bismarck PD Officers provide "Civilian Response to Active Shooter Events" training for Bismarck

Public Schools, Bismarck City departments/staff as well as area businesses upon request.

10. MOCIC (Mid-States Organized Crime Information Center) alerts are received by Bismarck PD officials which provide information about criminal activity in the upper Midwest.
11. Bismarck PD coordinates, conducts and participates in applicable training and exercise activities with area schools and businesses, including recent full scale "active shooter" exercises.
12. Homeland Security grants are made available through the ND Department of Emergency Services. Eligible grant projects include physical safety features such as ballards, lighting, bulletproof glass, and cameras.
13. Bismarck PD response capabilities include:
    - Bismarck PD Active Threat Response Plan
    - West Dakota SWAT/Crisis Negotiation Team (multi-jurisdictional regional team)
    - Bismarck PD Bomb Team (FBI Certified)
    - Bismarck PD K9 Team
    - Bismarck PD Unmanned Aircraft Systems Team (UAS)
    - Bismarck PD Mobile Field Force Team
    - Mutual Aid with other law enforcement agencies

Mitigation Recommendations

Building Security Risk Mitigation Recommendations

Procedures:

- Conduct a realistic security assessment to determine the facility's vulnerability to an active shooter attack.
- Identify multiple evacuation routes and practice evacuations under varying conditions; post evacuation routes in conspicuous locations throughout the facility; ensure that evacuation routes account for individuals with special needs and disabilities.
- Designate shelter locations with thick walls, solid doors with locks, minimal interior windows, first-aid emergency kits, communication devices, and duress alarms.
- Designate a point-of-contact with knowledge of the facility's security procedures and floor plan to liaise with police and other emergency agencies in the event of an attack.
- Incorporate an active shooter drill into the organization's emergency preparedness procedures.
- Vary security guards' patrols and patterns of operation.
- Limit access to blueprints, floor plans, and other documents containing sensitive security information, but make sure these documents are available to law enforcement responding to an incident.
- Establish a central command station for building security.

Systems:

- Put in place credential-based access control systems that provide accurate attendance reporting, limit unauthorized entry, and do not impede emergency egress.
- Put in place closed-circuit television systems that provide domain awareness of the entire facility and its perimeter; ensure that video feeds are viewable from a central command station.
- Put in place communications infrastructure that allows for facility-wide, real-time messaging.
- Put in place elevator systems that may be controlled or locked down from a central command station.

Training:

- Train building occupants on response options outlined by ALERRT. http://alerrt.org/
  - **Avoid, Deny, Defend** These core concepts incorporate the response options of "Run, Hide, Fight," while providing for a more thorough explanation of additional response options within "Avoid, Deny, Defend."

Aircraft Accident

Mitigation Actions

1. Maintain the current airport hazard mitigation efforts, and emergency response plans and planning efforts listed within the existing Mitigation Capabilities table below.
2. Recommend Burleigh County and city of Lincoln adopt city of Bismarck aeronautical zoning where applicable based on the city of Lincoln growing nearer to the Airport. (completed)
3. Update the Wildlife Hazard Assessment.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. The city of Lincoln is within the air traffic pattern of the Bismarck Airport (within the Accident Potential Zone).
2. The highest population and number of properties within 15,000 feet (within the Accident Potential Zone (APZ)) of the Bismarck Airport are northwest of the airport based on the alignment of the runway running NW/SE. Properties and populations within that distance include CHI St. Alexius Health, Sanford Health, the State Capitol, five mobile home parks, twelve schools, and Bismarck critical facilities including Bismarck Police Department, the City/County Building and Bismarck Burleigh Public Health.
3. The most vulnerable population are the crew members and frequent travelers based on extensive use of aircraft (higher use equals higher risk or probability).
4. The potential for inappropriate (illegal) use of drones within proximiting, either intentionally or unintentionally provides for additional vulnerability (interaction between drones and aircraft).

Capabilities

Existing Mitigation Capabilities Specific to the Aircraft Accident Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The City of Bismarck utilizes ordinances to control land use and building height, as well as minimize or eliminate lighting, radio or wildlife interference with airport operations. See Title 10-09 (airport zoning regulations) and Title 14 (zoning). http://www.bismarcknd.gov/index.aspx?NID=90
2. The Bismarck Airport maintains the following Hazard Mitigation and Emergency Response Plans and Programs:
   - Airport Certification Manual
   - Airport Emergency Plan
   - Airport Security Program
   - Wildlife Hazard Management Plan
   - Environmental Assessments
   - Wetland Mitigation
   - Spill Prevention Control and Countermeasure (SPCC)
   - Bismarck Airport Master Plan Update: https://www.bismarckairport.com/143/2019-Airport-Master-Plan

The Airport Certification Manual (ACM) provides direction and lines of responsibility in the day-to-day operation of the Bismarck Airport. Various other plans including the Airport Emergency Plan, Hazardous Materials, Wildlife Hazard Management Plan, are found in the ACM. The ACM outlines specifically the duties and responsibilities of individuals responsible for meeting the requirements set forth in the various manuals.

The Airport Emergency Plan assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in responding to an emergency. As a requirement of the Airport Emergency Plan the airport must conduct on a triennial basis a “Full Scale Emergency Exercise.” The purpose of the exercise is for local emergency organizations to gain practice and preparedness for a response in the event of a major aircraft disaster. The Airport Security Program outlines specific guidelines to ensure security. The security program includes not only airport personnel but Transportation Security Administration and Security Personnel. This includes but is not limited to access control systems, background checks for hiring employees, identification systems, TSA screening, as well as response procedures for emergencies such as a civil disturbance, hijacking, bomb threat and other situations that may occur at the Bismarck Airport.

The wildlife hazard management plan developed in conjunction with the USDA is a plan to mitigate hazards before they occur and to respond to wildlife hazards whenever they are detected or reported. The plan spells out duties and responsibilities of personnel responsible for mitigating wildlife hazards. The plan established responsibilities such as a wildlife coordinator, a wildlife hazard committee that meets annually to discuss current wildlife issues, update permits, as well as changes in ongoing actions that result in preparedness and reduction of wildlife hazards. It also established a wildlife hazard patrol and spells out ongoing mitigation steps for airport staff.

Spill Prevention Control and Countermeasure provides a plan for discharge reporting procedures, containment, inspection and testing, personnel training, and security at the oil storage facilities located on site. The Airport also has a Storm Water Pollution Plan to comply with environmental laws and to protect storm water from contaminants and procedures in the event of storm water pollution.

Environmental Assessments are done whenever a project could potentially impact the environment. They provide the airport with information about the impact of the project on the environment and what needs to be done in order to disturb the environment the least.

Civil Disturbance

Note: For purposes of safety and security, specific vulnerabilities and mitigation projects will not be presented in this plan for this hazard. General mitigation recommendations and existing mitigation are identified. A hazard profile for this hazard is included in Section 9 of this plan.

Mitigation Actions

1. Continue preparedness, training, and mitigation activities already in place as summarized in the table below (see "Capabilities").
2. Encourage the state of ND to fund support for civil disturbance teams to facilitate training as well as equipment needs in order to support mitigation, prevention, and response capability.

Capabilities

Existing Mitigation Capabilities Specific to the Civil Disturbance Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Bismarck Police Department staff meet with event organizers (primary points of contact) prior to events to learn of event size (expected total participants), event location, time and date and other event specifics. A permitting process is established and permits are encouraged to be completed, but cannot be mandated based on United States case law.
2. The Bismarck Police Department, as well as the ND Highway Patrol and other larger cities within ND (Fargo, Minot, Jamestown, and Grand Forks), have staffed civil disturbance teams.
3. Following the 2016-17 DAPL civil disturbance, and the lessons learned from it, the Bismarck Police Department and other agencies began forming civil disturbance teams by sending officers to the FEMA Field Force Training Center. The BPD has a civil disturbance team (when fully staffed includes 30 officers) which includes a front line team and an extrication team. Bismarck PD is equipped with the appropriate equipment and tools to respond anywhere within our jurisdiction and to assist other agencies when requested. In May of 2025, the BPD, ND HP and ND Parole and Probation teams held a coordinated training event to better prepare for civil disturbances in and around our respective jurisdictions. This integration will continue on a yearly basis to remain prepared and equipped.
4. Homeland Security grants are made available through the ND Department of Emergency Services. Eligible grant projects include physical safety features such as ballards, lighting, bulletproof glass, and cameras.
5. Bismarck PD staff provide "Avoid, Deny, Defend" training for city staff, school staff, and the broader community upon request.
6. The NDDES-HSEM is working with the ND State Library to create mis/dis/mal information literacy kits, intended to aid the public in identifying and/or correcting these information elements and combat the spread of misinformation/misinformation/disinformation. These kits will give the public and students skills to identify bias and information variation throughout our media today in addition to safe internet practices to include online gaming platforms.

Cyberattack

Mitigation Actions

1. Review Cybersecurity policies and procedures annually.
2. Engage third parties to perform cybersecurity review and establish security goals.
3. Conduct cybersecurity training and tabletop exercises with staff.
4. Continue existing mitigation capabilities as listed within the Capabilities table on the next page.
5. Promote (internally) the recommended mitigation actions as listed within the Cyberattack hazard profile within Section 9 of this plan document.
6. Maintain internal documentation regarding mitigation goals and action items recommended. Communicate mitigation goals and priority action items internally with appropriate city staff.

Vulnerability Summary

1. The Cyberattack Hazard profile outlines typical vulnerabilities of local government organizations as well as mitigation actions recommended as best practices, applicable to the various vulnerabilities. See Section 9, Cyberattack Hazard Profile.
2. Specific vulnerabilities (to the City of Bismarck entity) are identified by the Bismarck IT department. To avoid compromise in cybersecurity, vulnerability details are not made available publicly.
3. Any computer connected to the internet has the possibility of being targeted by a cyberattack, including home computers. Any technological device that relies on the internet may also be a target.
4. In the event Electric Power is the target for a cyberattack, there would likely be a cascading effect impacting multiple critical infrastructure sectors including communications, energy production and distribution, transportation, water purification and distribution, emergency services, banking and finance, and government services.

Capabilities

Existing Mitigation Capabilities Specific to the Cyberattack Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Bismarck IT maintains a list of mitigation action items completed as well as those to be continued (on-going).
2. Specific mitigation action items are identified by Bismarck IT. To avoid compromise in cybersecurity, specific mitigation action item goals are not made available publicly.
3. Bismarck IT, via support from the Paragon Policy Program, completed the city's cyber response plan (September 2025).

Note: The City of Bismarck IT department provides internal services for Bismarck City Departments, and does not provide IT services, assessments, or cyber response to external entities.

External Capabilities

4. The ND Information Technology department has had a central authority on cybersecurity since 2019. With the passage of state Senate Bill 2110, the state has taken an approach to unify all agencies in the state, including law enforcement, local government, and public education, around a cybersecurity strategy.
5. CyberCon, a critical infrastructure and cybersecurity conference, has been held in North Dakota annually starting in 2017 at Bismarck State College, with the goal of unifying cybersecurity and critical infrastructure professionals.
6. Cybersecurity public education efforts are conducted at the state level by NDIT and entities such as Bismarck State College. www.defend.nd.gov

Dam Failure

Mitigation Actions

1. Locate new critical facilities outside inundation area when possible: When building, remodeling, or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options outside of the dam failure inundation area. Because the probability of a catastrophic dam failure is very low, locating critical facilities outside the inundation area is NOT a requirement. However, assuming there are viable location options outside of the inundation area of equal value and functionality, locating outside the inundation area would reduce the loss potential.
2. Establish Awareness (public education) of the potential impact of Heart Butte Dam. Note: It's not a new hazard or vulnerability, but not well known or understood.
3. Participate in Heart Butte Dam emergency action plan reviews.
4. Promote the purchase of flood insurance (National Flood Insurance Program) – community wide.
5. Support public awareness efforts relating to planned maintenance and repair projects relating to the Garrison Dam as well as the Heart Butte Dam.
    - Primary public communications relating to the Garrison Dam Project : US Corp of Engineers
    - Primary public communications relating to the Heart Butte Dam Project: Bureau of Reclamation

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

Based on catastrophic failuare of the Garrison Dam:

1. The City of Bismarck has a significant investment in a number of critical facilities within the inundation area as mapped including the Water Treatment Plant, Wastewater Treatment Plant, Police Department, South Fire Station, Airport, Public Works, Public Health, the Event Center, and Northern Plains Commerce Centre. Also, a new Fire Station in south Bismarck will be within the inundation area.
2. Continuity of Government and Continuity of Operations capability would be compromised as a result of personal impact to city staff as well as direct impact to an extensive number of critical facilities as noted above in #1.
3. The city's water and waste-water treatment plants are a significant vulnerability to a dam failure. Impact to these critical facilities / critical infrastructure utilities would have an adverse impact to the entire community, including the properties and population not directly flooded.
4. The most vulnerable population would be those within the inundation area who are non-ambulatory and require evacuation assistance. There is a limited amount of time to identify those persons and ensure assistance is provided after notification of a dam failure.
5. The population of those within the hospitals and other institutions requiring evacuation are highly vulnerable. Evacuation requirements for facilities and populations outside of the inundation area would depend on impact to the water treatment plant and other utility lifelines.
6. The population of the ND State Penitentiary is of high vulnerability due to limited time to evacuate.
7. Both the BNSF railroad and the DMVRR railroad are within the mapped inundation area for dam failure.

8. Structural mitigation to minimize or eliminate the inundation threat for the city is not feasible or practical; therefore, all critical facilities, property, structures, and critical infrastructure within the inundation area are vulnerable.

Based on Failure of the Jackman Coulee Dam #2:

9. An emergency action plan has been developed (2020) for the Jackman Coulee High Hazard Dam on the Tom O'Leary Golf Course.Through the breach analysis, a breach during the Inflow Design Event (0.5PMP) would result in 35 structures being impacted by flood waters.
10. Bismarck is vulnerable in the event of a catastrophic failure of the Heart Butte Dam located in Grant County as well. Based on failure of the Heart Butte Dam utilizing the Hydrologic Internal Erosion Failure scenario (worst case):
    - The Waste Water Treatment plant would have concerns for access, but is not likely to experience flood impact to the critical facilities. Other areas impacted within Bismarck would include Pioneer Park, Dakota Zoo, Riverwood Golf Course, Atkinson Park, the drainage ditch up to Washington Street, and access to the Whispering Bay development.

Capabilities

Existing Mitigation Capabilities Specific to the Dam Failure Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. An Emergency Action Plan for Jackman Coulee Dam #2. (Tom O'Leary Golf Course) has been completed and is maintained.
2. Maintenance activities at Jackman Coulee Dam #2 (Tom O'Leary Golf Course) as recommended by the State Water Commission and/or annual inspections conducted by Bismarck Public Works are completed.
3. The condition rating of Jackman Coulee Dam #2 is made available publicly by the USACE via the National Inventory of Dams website (beginning February 2022). The Jackman Coulee Dam #2 rating is "Satisfactory" which is the highest rating eligible for the dam. NID website: https://nid.sec.usace.army.mil/#/
4. Dam owners are responsible for maintenance of their dams, so their commitment is essential to reducing the risk of dam failures. (2018 ND DES Enhanced Mitigation Plan)
5. Pursuant to North Dakota Century Code, the North Dakota State Engineer and the North Dakota State Water Commission have the power, authority and general jurisdiction to regulate, control, and supervise the construction and operation of dams within the State of North Dakota. As such, the Dam Safety Program is administered by the North Dakota State Water Commission.
6. The purpose of North Dakota's Dam Safety Program is to minimize the risk to life and property associated with the potential failure of dams in the State. Functions of the Dam Safety Program include conducting dam inspections, making recommendations to dam owners regarding necessary maintenance and repairs, and maintaining an inventory of dams in North Dakota. There are currently 130 high and medium hazard dams in the State, including 24 federally owned dams. Dam Safety Program staff conduct full inspections of the 106 non-federally owned high hazard and medium hazard dams on a rotational basis. High hazard dams are currently scheduled for inspection at least once every four years. Medium hazard dams are currently scheduled for inspection at frequencies varying up to once every ten years. The Dam Safety Program is managed by the NDSWC. Source: (2018 ND DES Enhanced Mitigation Plan)

7. Although North Dakota has very low risk to seismic activity, the U.S. Army Corps of Engineers has strong motion sensors installed at the Garrison Dam site near Riverdale that measure intense ground movement. There are an additional three seismic monitoring stations throughout the State. One is located south of Bismarck near Huff, another in the Red River Valley just northwest of Fargo, and the third southeast of Devils Lake near Maddock. (Source: 2018 ND DES Enhanced Mitigation Plan).
8. The US Army Corp of Engineers (USACE) maintains an extensive dam safety program to ensure the integrity of Garrison Dam. The USACE has a system of; relief wells, instrumentation (for monitoring water pressures and movement within the embankment), and a comprehensive inspection system. As part of the inspection program, the USACE conducts formal annual inspections and more comprehensive periodic inspections every five years. All of these steps are taken to help insure the integrity of the Garrison Dam to allow the USACE to continue to operate for the eight authorized purposes of; flood control, navigation, irrigation, hydropower, water supply, water quality, recreation and fish & wildlife.
9. The USACE updated the Dam Failure Inundation Map (January 2015) regarding the Garrison Dam Project. The inundation maps are made available to approved Emergency Action Plan holders.
10. The USACE has an Emergency Action Plan that would be followed in any event where the USACE's ability to operate as designed would be in jeopardy.
11. Dam Safety Program Information:
    http://www.usace.army.mil/Missions/CivilWorks/DamSafetyProgram/ProgramActivities.aspx
12. Garrison Dam and Lake Sakakawea Information:
    http://www.nwo.usace.army.mil/Missions/DamandLakeProjects/MissouriRiverDams/Garrison.aspx
13. The Bureau of Reclamation has updated the inundation mapping relating to the Heart Butte Dam and is in the process of updating and finalizing the Heart Butte Emergency Action Plan as of October, 2025.

Drought

Mitigation Actions:

1. Provide for community-wide public education relating to landscaping and watering strategies including availability of water analytics, smart irrigation controllers, drought tolerant landscaping, and irrigation rates.

Note: In addition to local response capabilities, the existing mitigation capabilities identified within the table below adequately address vulnerabilities identified.

Vulnerability Summary

1. Typically, the most profound impact of drought is to the economy:
   a. Farm and ranching community
   b. Impact to local businesses (and employees) associated with the agricultural industry
   c. Economically disadvantaged – increased cost of food
   d. Tourism / recreation
2. Economically disadvantaged may be vulnerable due to the likelihood of increased cost of food during extended drought conditions regardless of geographic area impacted by severe drought conditions.
3. Heat waves associated with droughts create additional risk for vulnerable populations such as the elderly, young, and those required to work outdoors including first response community.
4. Drought increases fire risk. See Fire and Wildland Fire hazards for information regarding vulnerabilities and mitigation ideas.
5. The environment is vulnerable to drought:
   a. Air quality
   b. Loss of wetlands
   c. Insect infestations
   d. Invasive vegetative species (ie: leafy spurge)

In the United States, a well-developed economy and agricultural system generally protect citizens from the most critical effects of drought such as shortages of food and water. However, drought still causes extreme hardship for farm and ranch families, and individual wells may run dry. Source: National Drought Mitigation Center

Capabilities

Existing Mitigation Capabilities Specific to the Drought Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The City of Bismarck water treatment plant has two water intake systems.
   - A Horizontal Collector Well intake was placed in operation in November 2014. This water intake is 80 feet below the river's surface and collects ground water that is recharged from the river bed. This intake has a capacity of 30 MGD (million gallons per day) and is not impacted by fluctuations in river levels or short term changes in river water quality.
   - The surface water intake constructed in the 1950's provides direct withdrawal of the river via four 20 inch diameter pipes. The quality and quantity of water from this intake is potentially impacted by changes in the river's level and the migration of sandbars. This intake will be used in conjunction with the horizontal collector well intake.

2. The Bismarck Code of City Ordinances uses Chapter 2-08-03 to give the President of the Board of City Commissioners the power to issue an emergency or disaster declaration and to utilize twenty-three specific emergency powers. These powers include…
   - Require the continuation, termination, disconnection, limitation, or suspension of natural gas, electrical power, water, sewer, or other public utilities or services.
   - Control, restrict, allocate, or regulate the use, sale, production, or distribution of food, water, fuel, clothing, and/or other commodities, materials, goods, services, and resources.

Fire

Mitigation Actions

1. Continue to update and enforce zoning, building and fire code regulations.
2. Promote (not require) residential fire sprinkler systems to minimize fire risk and vulnerability.

Public Education topics:

3. Continue to provide Fire Safety public education to enhance safety for the whole community.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Occupancies that do not have working smoke detectors are at risk. Statistics indicate a higher fatality rate in fires that occur in occupancies without working smoke detectors.
2. Non-sprinklered property is at a higher risk of sustaining more damage or life loss compared to property that is protected by sprinkler systems.
3. The young (ie: Daycare) and elderly population is more vulnerable for several reasons. Age, mental state and physical limitations may make it difficult to evacuate a building involved in fire or they can become confused and not be able to take the correct actions. Many daycares and schools do not have fire sprinkler systems.
4. Some mobile homes are vulnerable due to their construction materials and close proximity to each other.
5. Apartment houses without sprinkler systems or working alarm systems are also at higher risk.

Capabilities

Existing Mitigation Capabilities Specific to the Fire Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The Bismarck Fire Department has an ISO rating of 1. It is a continued goal of the Bismarck Fire Department to maintain the Class 1 rating to enhance public safety, reduce insurance costs, and demonstrate continued excellence in fire service delivery.
2. Fire stations are strategically located throughout the city for optimum response times.
3. All fire stations are adequately staffed to provide response capability for fires that may range from a single-family dwelling to a large commercial property.
4. The Fire Department has capabilities to analyze the need for additional fire stations as the city grows. The analysis/need is based on maintaining response times and other factors which support the ISO rating.
5. The city has a modern dispatch center with many capabilities.
6. Fire hydrants are spaced throughout the city for uniform coverage.
7. Fire hydrants are flow tested to assure adequate water supply. Water Modeling is used to provide a more current and comprehensive assessment of the water supply.
8. A fire inspection program is in place. All commercial properties and larger multi-family residential rental properties are inspected annually to identify and reduce fire hazards.
9. Fire and Building codes have been adopted to ensure fire and life safety requirements are met for new and existing buildings. The following codes are currently enforced by the City of Bismarck, Fire Department:
    - International Building Code – 2021
    - International Fire Code - 2021
    - International Residential Code - 2021
    - International Mechanical Code - 2021
    - International Fuel Gas Code - 2021

- North Dakota State Plumbing Code - 2018
- National Electrical Code - 2023
- Laws, Rules, and Wiring Standards of North Dakota - 2023
- NFPA 13 Installation of Sprinkler Systems - 2019
- NFPA 13R Installation of Sprinkler Systems in Residential Occupancies up to and including 4-stories in height - 2019
- NFPA 14 Installation of Standpipe Systems - 2019
- NFPA 72 National Fire Alarm Code - 2019

10. Sprinkler requirements are in place to increase the level of life safety in certain buildings as well as to control fires that do occur.
11. Zoning and other regulations are in place to reduce the risk of fire exposure through orderly development of the community.
12. A permitting process is in place for suppression systems, alarm systems, fireworks displays and building construction.
13. Public education programs are provided to the youth in the school system.

Flood

Mitigation Actions

1. Bismarck is currently rated at Class 7 within the Community Rating System. Continue annual re-certifications to sustain the CRS program.
2. Continue Watershed master planning and updating as an on-going mitigation activity conducted jointly by Engineering, Public Works, Planning, and Building Inspections.
3. Maintain existing flood protective measures to minimize vulnerability as a result of ice jams as well as 100-year and 500-year flood events. Note: Refers to maps (Figures 1 thru 7) within "Capabilities" on pages 4-10/
4. South Bismarck Flood Control Mitigation Project: Reconstruct the South Washington Street Closure Structure (gate) and add a pump station at this location. This will create FEMA-certified flood protection at the south Bismarck drainage ditch and the South Washington street closure structure.
    a. And modify (widen) the drainage ditch in south Bismarck to enhance flood control and to assist in meeting FEMA requirements for flood protection certification.

Note: The flood insurance risk map will be revised after construction is completed. After the map update, many of the 950 structures that are currently identified in the effective map will be removed from the Missouri River flood risk. The current effective flood map was updated in June of 2024.

Public Education Topics:

5. Coordinate and/or support NFIP flood insurance promotional efforts including the availability of flood insurance for community residents and businesses.
6. Provide for Flood Mitigation and Preparedness Public Education efforts for local citizens and businesses (via website content and public presentations upon request).

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Although flood protective measures including levee structures are in place to protect south Bismarck, those protective measures are not certified by FEMA. There are also required response actions to fill gaps. Properties, population, and infrastructure within the 100 Year and 500 Year flood plains remain vulnerable to those flood events.
2. Vehicles and occupants may inadvertently enter a flooded underpass at the 7th Street or 9th Street location following an urban flooding event. There is pumping capability at the 7th Street underpass location (replaced in 2019). The 9th street location is drained via gravity flow.
3. Vulnerabilities regarding lack of access following an urban ponding event include:
    - Airport and Skyway Village
    - 12th Street (from University Drive to Bismarck Expressway)
    - Bismarck Expressway from 7th to 12th Street
    - South 3rd Street – from Arbor Avenue to Bismarck Expressway
    - Broadway Avenue – from 12th to 14th Street
    - Washington Street and Bowen Avenue
    - 2nd Street and Arbor Avenue
4. The South Fire Station is vulnerable to urban flooding (street access).
5. Stormwater management infrastructure may be impacted by more frequent heavy rain events as a result of climate change impacts.

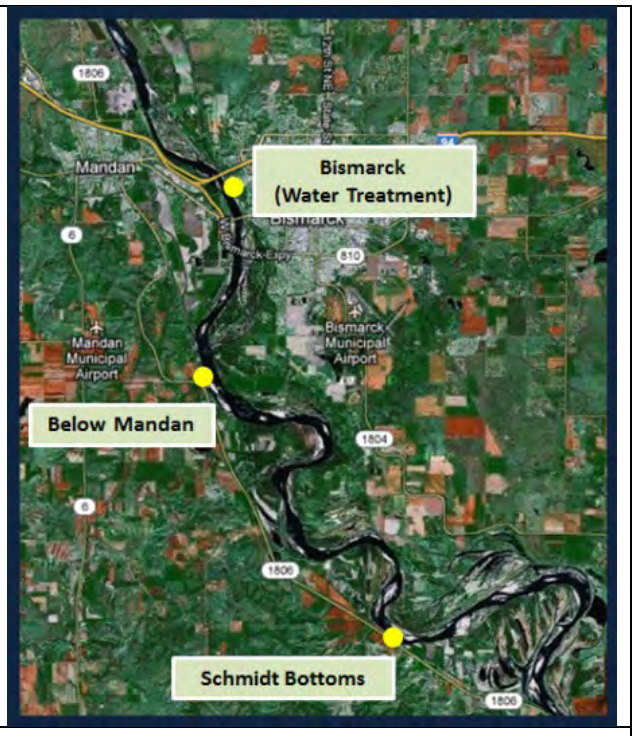
Capabilities

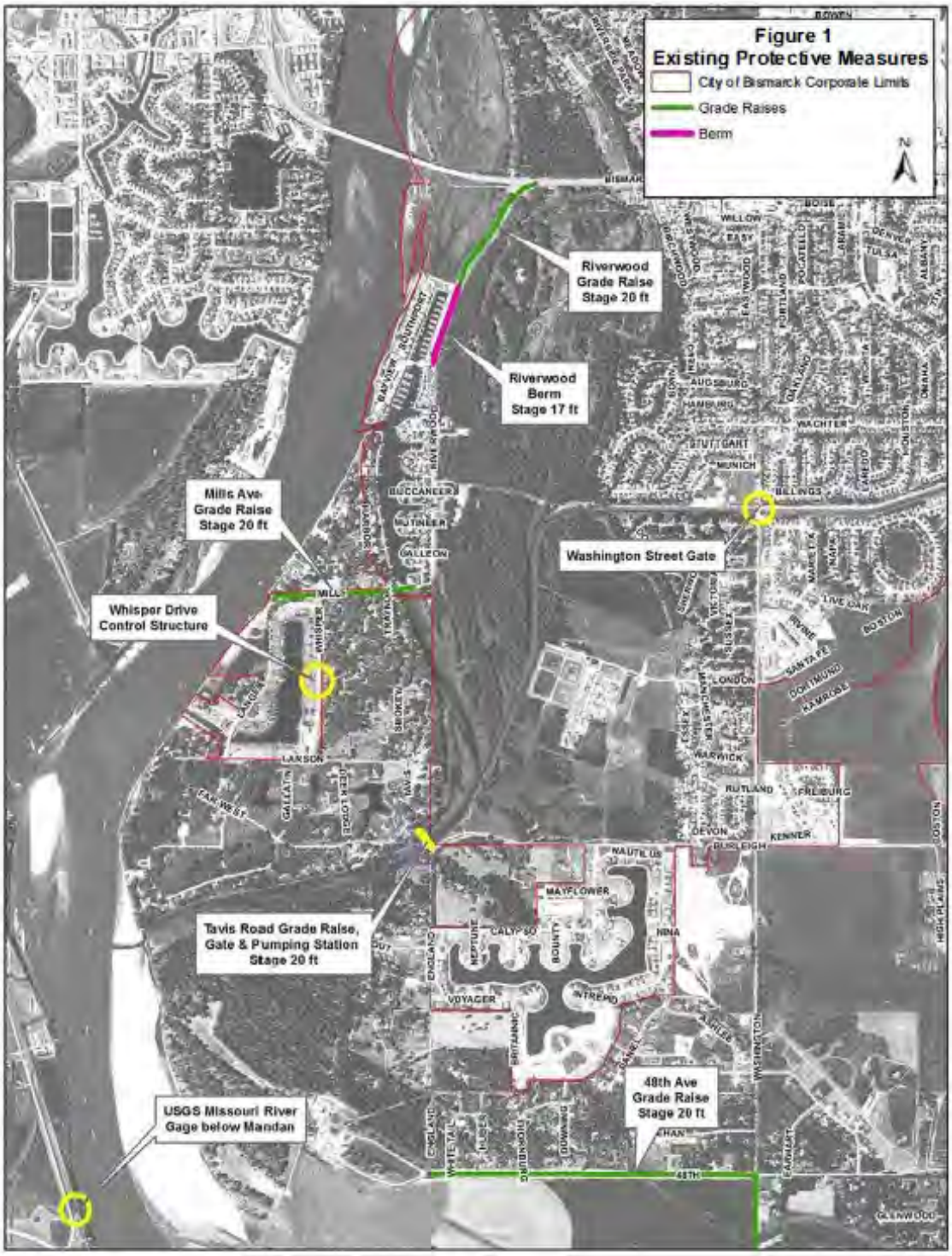
Existing Mitigation Capabilities Specific to the Flood Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. As of October 2025, a Wastewater Treatment Plan Flood Protection system was completed. Control structures were placed along the wastewater treatment plant outfall near the Tavis structure and the river to protect the wastewater treatment plant from inundation when river levels at Bismarck gage station rise to 13'.
2. The Tavis Road flood gate control structure and pumping station have been installed and are operational. Closing the flood gate control structure prevents flood waters from back-flowing into and elevating the drainage ditch level. Additionally, the pumping station establishes the capability of reducing the drainage ditch level to maximize its storage capacity and minimize the potential for flash flood impacts.
3. The grade of Tavis Road has been raised to a flood stage of 20 feet.
4. Following the 2011 flood event, the City of Bismarck installed flood gates on stormwater outfalls. See letter “C” on Figure 5 map.
5. The pumping capability at #8 is permanent. The other locations require response action to set up temporary pumping. See applicable map - Figure 5.
6. Additional ice jam protection measures were installed in 2012 by Burleigh County.
7. In 2013, the City of Bismarck completed the Riverwood Drive and Mills Ave reconstruction projects. These projects included grade raises of the existing roadways to a flood stage of 20-feet. Riverwood Drive was completed from Expressway Ave to the north entrance of Southport Loop. The grade raise portion of Mills Avenue was completed and paved in 2014. The project included several control structures with sluice gates located on the storm water outfalls and a control structure on the Mills Avenue causeway. The new sluice gates and control structure are operation and ready to be manually closed during a flood event.
8. Burleigh County completed a grade raise project in the Fox Island area which protects Bismarck from flooding. The grade raise extends from Tavis Road to Far West Drive to Gallatin Dr to Gallatin Loop, Gallatin Loop to offroad to Missouri River bank, north to Whisper Bay channel to Whisper Bay bridge. See #21 Levee Construction”

9. See also figures 1 through 7 on pages 4-10 for diagrams of existing flood protection.

River Gage Locations: See map on right. 10. A river gaging station has been installed by the USGS to collect river elevation data for both open water and ice covered periods on the Missouri River. The USGS installed the stage gage near Fort Lincoln on the west side of the river: USGS 06349070, Missouri River below Mandan, ND. This gage will provide timely stage information for South Bismarck.	
Open Space Deed Restrictions in place:	1. Lot Twenty Four (24), Block Tweny Nine (29), Stein's Fourth Addition to the City of Bismarck. This property was sold to the City of Bismarck in 2002, and must remain compliant with open space regulations in perpetuity.



See Figures 6 & 7 for additional lines of protection completed (Fox Island and MRCC projects).

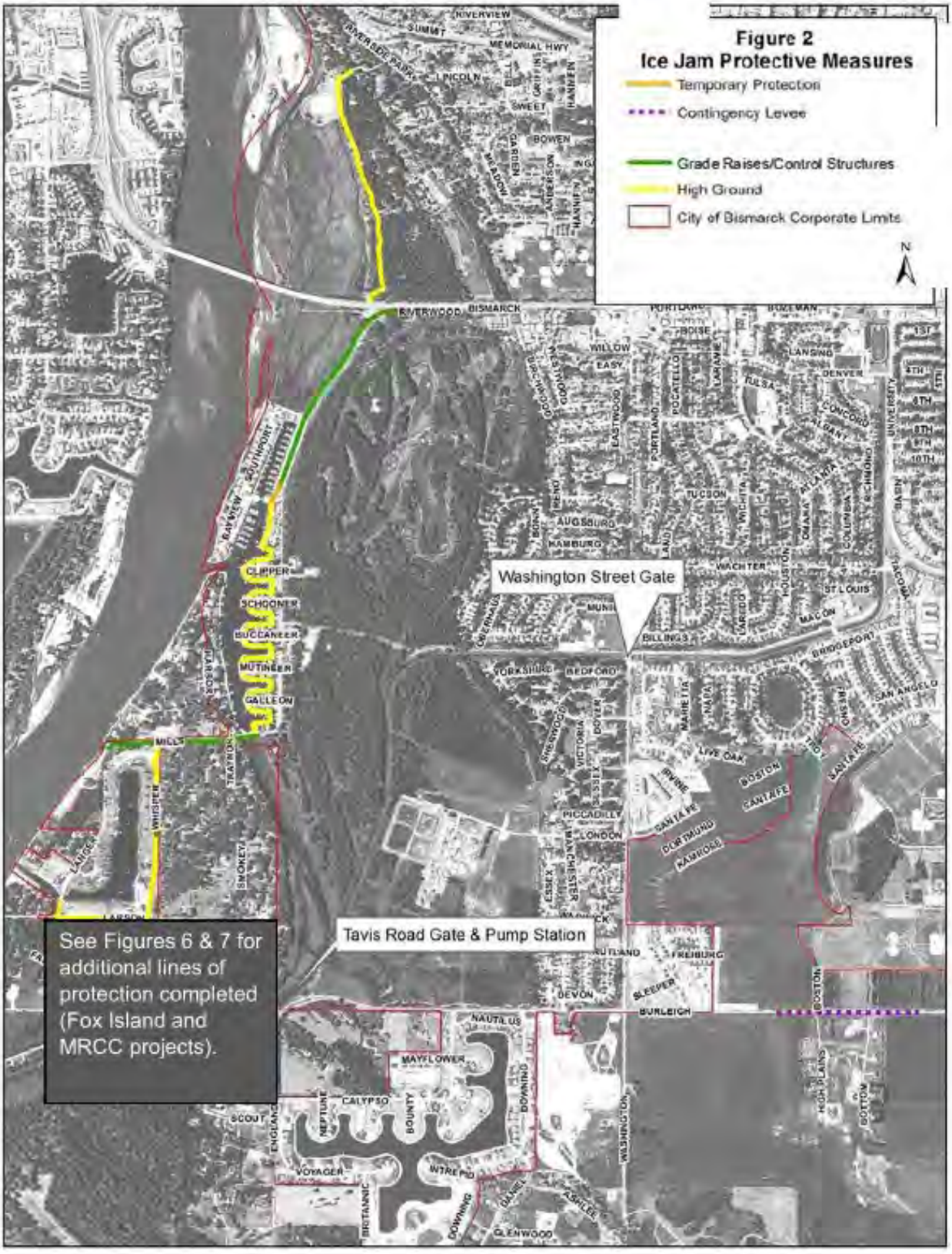


Figure 2
Ice Jam Protective Measures
Temporary Protection
Contingency Levee
Grade Raises/Control Structures
High Ground
City of Bismarck Corporate Limits
N
Washington Street Gate
Tavis Road Gate & Pump Station
See Figures 6 & 7 for additional lines of protection completed (Fox Island and MRCC projects).

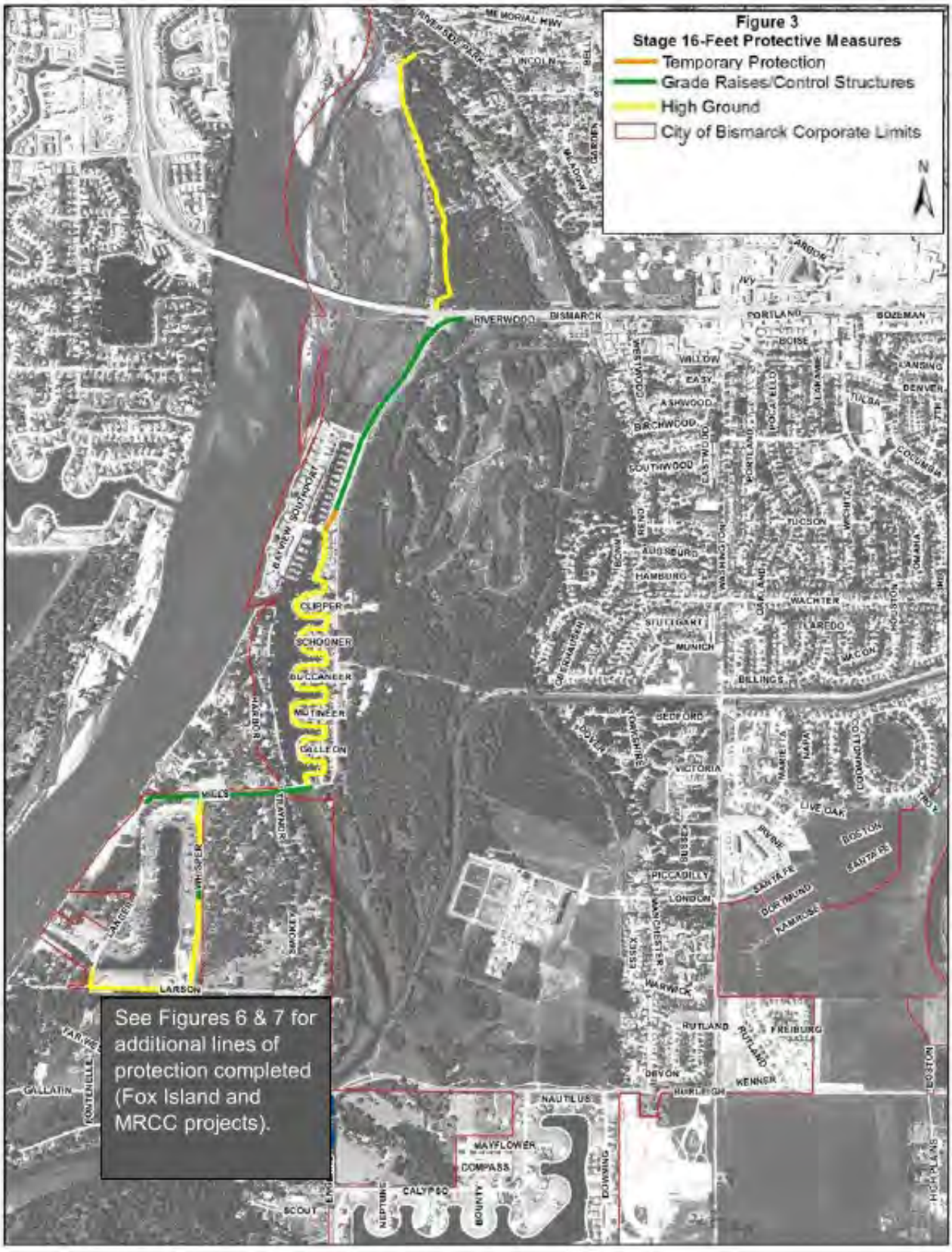


Figure 3
Stage 16-Feet Protective Measures
Temporary Protection
Grade Raises/Control Structures
High Ground
City of Bismarck Corporate Limits
N
See Figures 6 & 7 for additional lines of protection completed (Fox Island and MRCC projects).

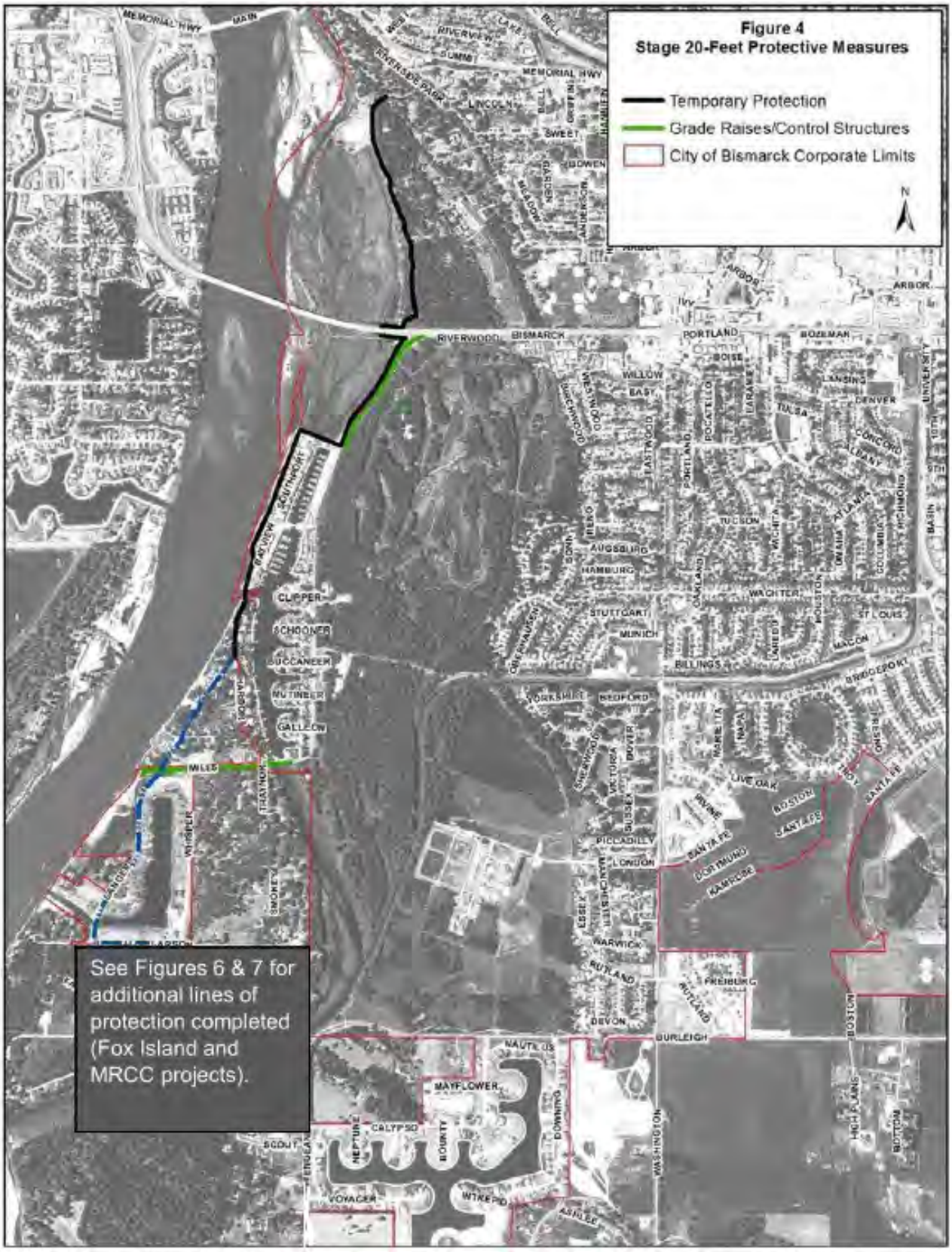


Figure 4
Stage 20-Feet Protective Measures
Temporary Protection
Grade Raises/Control Structures
City of Bismarck Corporate Limits
N
See Figures 6 & 7 for additional lines of protection completed (Fox Island and MRCC projects).

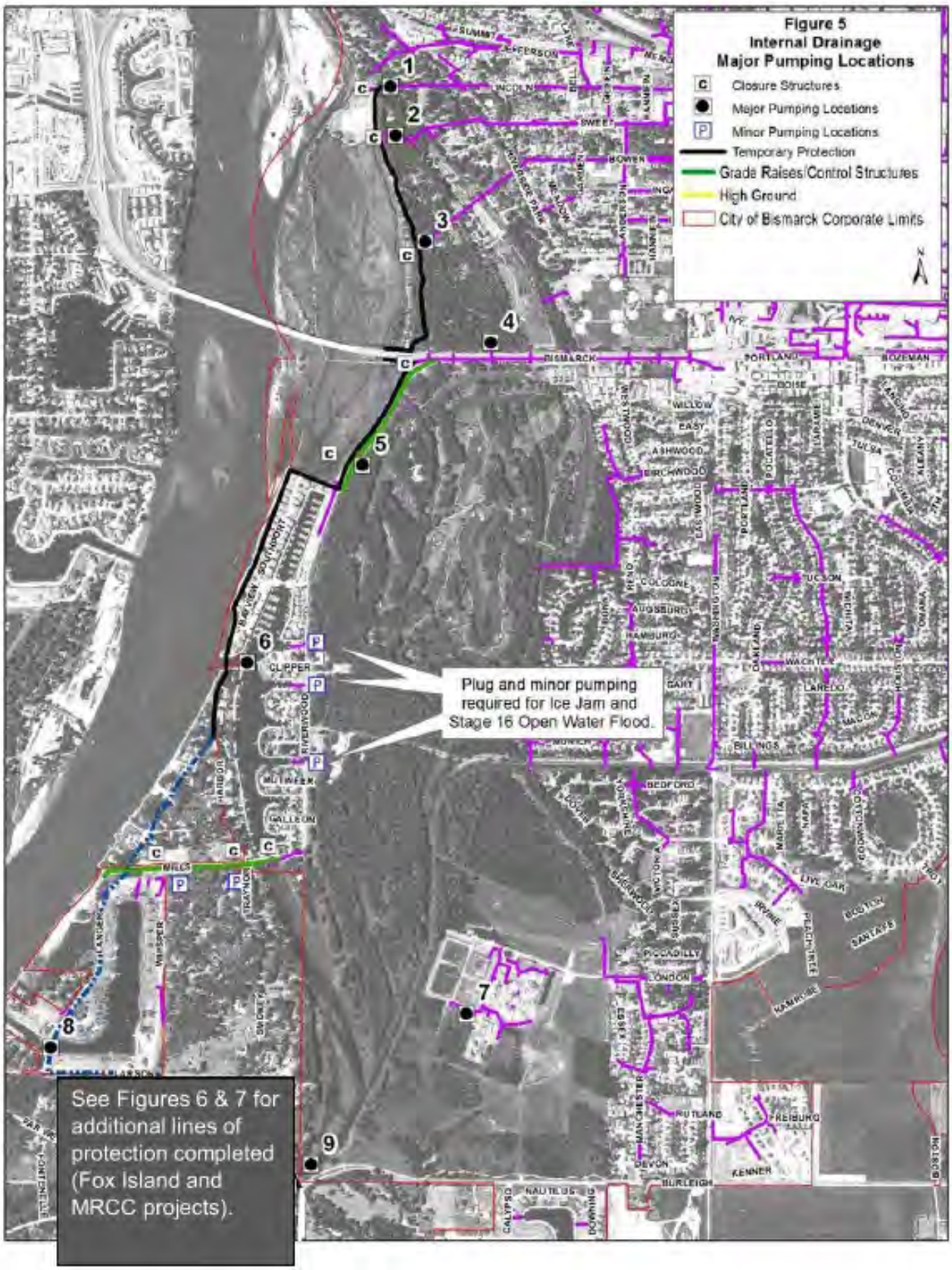


Figure 5
Internal Drainage
Major Pumping Locations
C Closure Structures
Major Pumping Locations
P Minor Pumping Locations
Temporary Protection
Grade Raises/Control Structures
High Ground
City of Bismarck Corporate Limits
N
1
2
3
4
5
6
7
8
9
Plug and minor pumping required for Ice Jam and Stage 16 Open Water Flood.
See Figures 6 & 7 for additional lines of protection completed (Fox Island and MRCC projects).

Figure 6

Stage 20 feet Flood Protective Measures

Fox Island Project Location

https://www.bcwrd.org/image/cache/6_-_Fox_Island_Flood_Control_BCWRD_-_O_M_FINAL_4-14-2021.pdf

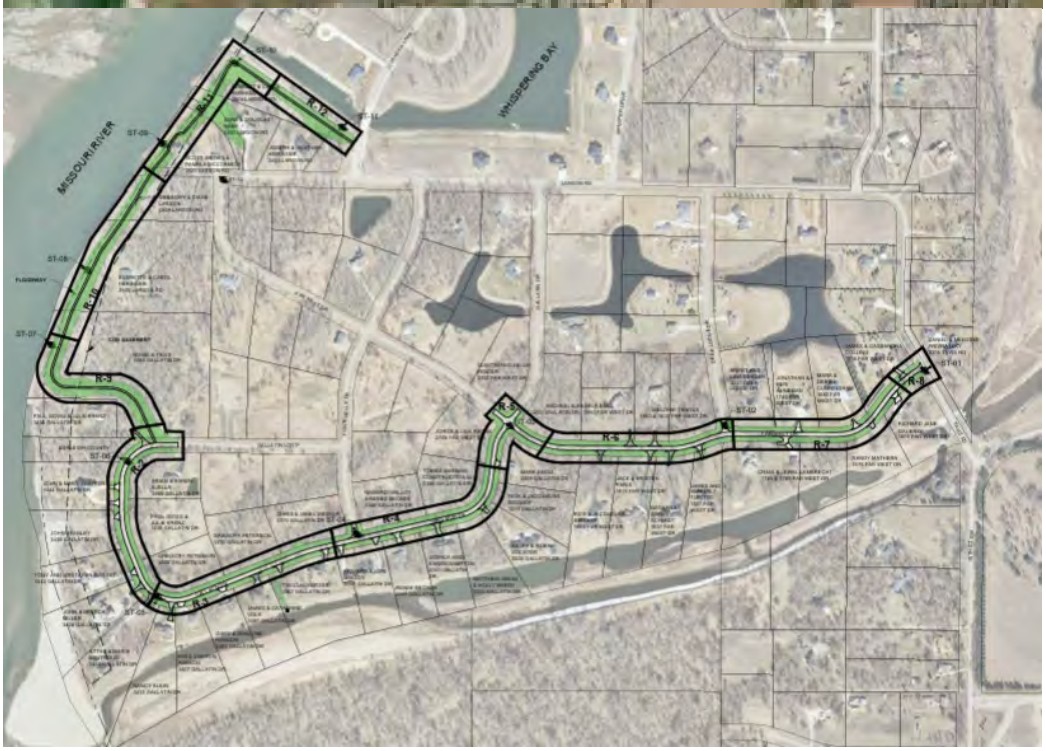


Figure 7

Stage 20 feet Flood Protective Measures

MRCC Project Location

https://www.bcwrd.org/image/cache/5_-_MRCC_Flood_Control_Project_-_O_M_Manual_2-19-18.pdf

Capabilities, continued

11. Flood Insurance Study: The special flood hazard areas are identified by the Federal Emergency Management Agency (FEMA) in a scientific and engineering report titled "The Flood Insurance Study for Burleigh County, North Dakota and Incorporated Areas", Revised August June 6, 2024. Flood Insurance Study and Flood Insurance Rate Maps are available via FEMA: https://msc.fema.gov/portal/home
12. The Bismarck 100-Year (Special Flood Hazard Area) Flood Insurance Rate Maps is updated as of June 6, 2024.
13. Bismarck is a participating community in the National Flood Insurance Program. (CID#380149). Participation in the NFIP requires communities to adopt floodplain regulations that meet NFIP objectives, which are: New buildings must be protected from flooding damages that occur as a result of the 100-year flood, and new development must not cause an increase in flood damages to other property.
14. Bismarck became a Community Rating System (CRS) community in 2017, entering the program with a Class 8 rating and upgraded to a Class 7 in 2022. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions that meet the goals of the CRS program.
15. **Floodplain Ordinance:** The floodplain ordinance is contained with the Bismarck Zoning Ordinance – Title 14. The purpose of the regulations set forth by the floodplain ordinance (14-04-19) is to promote public health, safety, and general welfare, and to minimize public and private losses due to flood conditions. A "Floodplain Administrator" is designated by the City of Bismarck to administer the City's floodplain regulations. More information: http://nd-bismarck.civicplus.com/DocumentCenter/Home/View/1962
16. Floodplain management is addressed through our Floodplain Administrator and Community Development via regular planning meetings where storm water management and floodplain issues are addressed.
17. Bismarck's Comprehensive Plan entitled "Together 2045" identifies goals and objectives relating to stormwater management as well as goals and objectives to build community resilience to prepare for, respond to, withstand, and recover from natural disasters.
18. Stormwater Management Program – Mitigation Capabilities: Bismarck has a Stormwater Management Program implemented jointly by Community Development, Engineering, and Public Works and a Stormwater Program Coordinator within the Public Works Department. Mitigation capabilities of the Stormwater Management program are identified through Community Development via City Ordinance Title 14.1 (Zoning Ordinance). The city has authority to regulate and enforce stormwater management requirements to promote health, safety, and welfare of the people and property within Bismarck and its extraterritorial jurisdiction. The requirements, permitting and detailed review process are in place to mitigate the impacts of development and land disturbance, protect natural resources, maintain water quality, and minimize stormwater runoff, erosion, and urban flooding issues. More Information: https://www.bismarcknd.gov/190/Stormwater
19. The National Weather Service issues warnings, watches, and advisories for flooding.

Additional completed and on-going flood mitigation (existing mitigation capabilities).

20. Apex Engineering completed a study to identify solutions to reduce urban ponding in south Bismarck in the Expressway and South 12th Street area. Identified actions have been completed.

21. The 7th Street underpasses has permanent pumping capability to address urban flooding events. The pump was replaced in 2019. The 9th Street location relies on gravity flow.

22. Commitment to Stormwater Management:

Throughout its existence Bismarck has devoted considerable resources to ensuring the safe and adequate discharge of stormwater within the community.

A number of diversified watersheds within and adjacent to our city, such as the Apple Creek watershed, the Hay Creek watershed, the Jackman Coulee watershed, and the Tyler Coulee watershed, has resulted in the need for a proper stormwater management planning to minimize the potential for damages to already developed downstream properties as development and growth continued. Early solutions to stormwater issues tended to deal mainly with accommodating runoff volume and provided little else as far as erosion control or water quality. Stream channelization was viewed as an acceptable solution. For a more complete listing of the stormwater projects completed in Bismarck over the years, please consult the City of Bismarck Stormwater Management Plan, dated April 1, 1997.

Since the passage and adoption of the City of Bismarck Stormwater Management Ordinance in 1997 with an implementation date of January 1, 1998 (updated and effective January 1, 2018), increased emphasis has been placed on requiring developers to properly control stormwater runoff from their property so that post development runoff is equal to, or less than, predevelopment runoff. This has typically been accomplished through an extensive network of detention ponds, some of a local nature meaning the pond detains runoff from a limited area, and some of a regional nature where the pond collects runoff from a larger area involving multiple property owners and neighborhoods.

Working collectively with developers and grant monies obtained from federal, state, and local sources, recent projects have resulted in stormwater systems that more closely resemble natural stream streambeds and ponds. Recreational trails have been constructed adjacent to and within some stormwater areas. For example, the restoration of the Hay Creek Greenway, complete with a shared use path, now serves as an asset to our community and has generated appreciative comments from our citizens.

Stormwater management, both nationwide and in Bismarck, is a much more complex matter than it was even a half century ago. Through continued proper planning, design, construction, operation and maintenance, our stormwater resources can provide safe, reliable protection for our community and residents for years to come.

National Flood Insurance Program Compliance
(NFIP Compliance)

Bismarck is a participating community in the National Flood Insurance Program. (CID#380149). Participation in the NFIP requires communities to adopt floodplain regulations that meet NFIP objectives, which are: New buildings must be protected from flooding damages that occur as a result of the 100-year flood, and new development must not cause an increase in flood damages to other property.

Bismarck has procedures implemented to address and maintain NFIP compliance.

1. A floodplain ordinance has been adopted and remains in effect. The floodplain ordinance is contained with the Bismarck Zoning Ordinance – Title 14. The purpose of the regulations set forth by the floodplain ordinance (14-04-19) is to promote public health, safety, and general welfare, and to minimize public and private losses due to flood conditions. A "Floodplain Administrator" is designated by the City of Bismarck to administer the City's floodplain regulations.
   More information: http://nd-bismarck.civicplus.com/DocumentCenter/Home/View/1962
   See ordinance – next page.
2. Residents are provided information on flood hazards, floodplain map data, and availability of flood insurance.
3. An interactive floodplain map is available on the city's website: https://arcg.is/1zqDTH0
4. Floodplain management is addressed through our Floodplain Administrator and Community Development via regular planning meetings where storm water management and floodplain issues are addressed.
5. Mitigation Actions highlighted below illustrate commitment to maintain NFIP compliance. These mitigation actions are also identified in Section 4: Mitigation Implementation Action Plan.
   - Apply to participate in the National Flood Insurance Program (NFIP) Community Rating System (CRS).
   - Coordinate and/or support NFIP flood insurance promotional efforts including the availability of flood insurance for community residents and businesses.
   - Conduct Flood Mitigation and Preparedness Public Education efforts for local citizens and businesses.
6. Additional actions supporting NFIP compliance are noted in within this plan section (ie: Flood Hazard mitigation actions and pre-existing mitigation)

National Flood Insurance Program (NFIP)

The Federal Disaster Protection Act of 1973 requires state and local governments to participate in the NFIP as a condition to the receipt of any federal loan or grant for construction projects in flood prone areas. Participation in the NFIP requires communities to adopt floodplain regulations that meet NFIP objectives. The first objective is that new buildings must be protected at a 100-year flood level. The second objective is that new development must not cause an increase in flood damage to other property. In 2012, the Biggert-Waters Reform Act was signed and contains many reforms that will impact the NFIP moving forward. These changes include the phasing out of subsidies, new insurance policies to be issued at full-risk rates, and grandfathered rates being phased out over five years.

Communities have been provided assistance through the North Dakota Floodplain Management Act of 1981 which directs the state engineer to aid local governments in reducing flood damages through sound floodplain management. The state legislature provided the state engineer with an appropriation to be used in assisting communities to obtain base flood (100-year) elevation data.

Floodplain Ordinance

NFIP Compliance Continued

Floodplain Ordinance: http://nd-bismarck.civicplus.com/DocumentCenter/Home/View/1962

14-04-19. FP Floodplain District. In any FP floodplain district, the following regulations shall apply:

1. Statement of purpose. It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:
    a. To protect human life and health;
    b. To minimize expenditure of public money for costly flood control projects;
    c. To minimize the need for rescue and relief efforts associated with flooding, generally undertaken at the expense of the general public;
    d. To minimize prolonged business interruptions;
    e. To minimize damage to public facilities and utilities located in special flood hazard areas such as water and gas mains, electric, telephone, and sewer lines, streets, and bridges;
    f. To help maintain a stable tax base by providing for the use and development of special flood hazard areas so as to minimize future flood blight areas;
    g. To ensure that potential buyers are notified that property is located in a special flood hazard area;
    h. To ensure that those who occupy the special flood hazard areas assume responsibility for their actions; and
    i. To provide an increased level of protection in anticipation of future increases in the base flood elevation (BFE).
2. Methods of reducing flood losses. In order to accomplish its purposes, this section includes methods and provisions for:
    a. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion, flood water elevations or flow velocities;
    b. Requiring that uses vulnerable to flooding, including attendant utilities and facilities which serve such uses, be protected against flood damage at the time of initial construction;
    c. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or convey flood waters;
    d. Controlling filling, grading, dredging, and other development which may increase flood damage; and
    e. Preventing or regulating the construction of flood barriers or obstructions which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Geologic Hazard

Mitigation Actions

1. Continue to include recommendations regarding development control lines in geological sensitive areas as future planning is done.

Public Education topics:

2. Identify opportunities to inform or remind property owners of property related information regarding potential geologic conditions that may impact them or their property.
3. Do Not stockpile snow or other material within any geological sensitive areas.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. The properties along Burnt Boat Drive are built on backfill. Backfill is more prone to failure or settling if not compacted properly. Numerous properties in northwest Bismarck were constructed on extensive backfill along steep topography.
2. The DMVW railroad tracks run adjacent to Hay Creek through much of Bismarck. Hay Creek crosses under the tracks at five locations between 57th Street and Divide Avenue. The DMVW tracks run adjacent to Hay Creek for a distance of approximately 25,000 feet (4.7 miles) through Bismarck. The vulnerability of concern is the potential washout of the track bed and stability of the slope adjacent to the tracks.
3. Burnt Boat Drive is vulnerable (potential loss of street) based on adjacent slopes. Burnt Boat Drive provides critical access to residential properties and to River Road in north Bismarck.
4. Land disturbance control lines were established for the Promontory Point developments and other areas surrounding the Tyler Coulee. Promontory Points I, II and III had no land disturbance control lines when they were developed. The platting of Promontory Point IV established a 50 ft development control line for those lots adjacent to the bluff, but there wasn't a geotechnical determination to support this requirement.
5. The platting of the bluffs adjacent to Hay Creek, such as the Pebble Creek Developments and the Edgewood Developments, did not establish any land disturbance control lines.
6. River Road from Highway 1804 to Fraine Barracks is vulnerable due to the adjacent bluffs / slopes.
7. Property owners may not be aware of easements and setback requirements or other property geologic issues. Lack of awareness may potentially cause problems as a result of over-watering or overloading unstable areas.
8. As the community grows, new areas of development run the risk of increased property vulnerability to the geologic hazard of expansive soils.
9. Underground infrastructure (water, wastewater, pipeline) is vulnerable to both landslide and the expansive soil geological hazards.
10. The transportation infrastructure (ie: streets, sidewalks, and bridges) is vulnerable to the impacts of expansive soils.

Capabilities

Existing Mitigation Capabilities Specific to the Geologic Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Remediation activity to buttress the active geologic slide along River Road north of I-94 Grant Marsh Bridge has been completed.
2. The city has updated the Ash and Ward Coulee Storm Water Master Plan in 2025.
3. Tyler Coulee Storm Water Master Plan prepared in 2002 and updated in 2007 established setback lines to limit development in areas with steep slopes.
4. Completed Tyler Coulee Storm Water project, consisting of new regional stormwater detention facilities, road embankments and storm crossings, and improvements to the existing channel conveyance within the Tyler Coulee drainageway.
5. A report entitled “Geologic and Hydrogeologic Conditions Affecting Land Use in the Bismarck-Mandan Area” via Department of Mineral Resources ND Geologic Survey includes maps intended to provide geologic and hydrogeologic technical input as an aid to future planning. https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/RISeries/RI-70.pdf
6. Bismarck’s “2014 Growth Management Plan as Amended” includes a Future Land Use Plan (FLUP) which illustrates the anticipated and desirable land uses in the potential growth areas of the city. One of the assumptions in developing the concept is that “Streams, slopes, and other significant constraining factors are left as open space, although they may be incorporated as open space owned by public entities or within private development.”
7. Future capability: The ND Geologic Survey Department is planning to integrate a new technology into its program that has potential for local applications such as routine monitoring of slope stability, land surface subsidence, flood tracking, or even delineating areas affected by fires and tornadoes. The recently launched NISAR Mission is a collaborative effort of the National Aeronautics and Space Administration (NASA) and the Indian Space Research Organization (ISRO). NISAR is equipped with synthetic aperture radar (SAR) instrumentation, a type of active remote sensing that functions by emitting radar pulses and recording the reflected signal.

Hazardous Materials Release

See Also "Train Derailment"

Mitigation Actions

1. Develop preplans specific to hazardous materials fixed facilities.

Public Education topics:

2. Continue Public Education efforts regarding Shelter In Place and Evacuation procedures.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Hospital locations: Both are in close proximity to truck routes (hazmat trucks). Both hospitals could potentially be impacted as a result of an incident because of hospital proximity to each other.
2. Critical facilities in close proximity (< ¼ mile) to pipeline, truck route, or fixed facilities include Public Works, Police Department, South Fire Station, Sanford Health, CHI St. Alexius Health, Fraine Barracks, Metro Area Ambulance South, State Penitentiary, Burleigh Morton Detention Center, and Public Health.
3. The Water Treatment plant and Wastewater treatment plant are critical facilities which must utilize hazardous materials (ie: chlorine). The WTP is near the ND Department of Emergency Services and National Guard facilities within Fraine Barracks (critical facilities).
4. There are eighteen schools and daycares in close proximity (< ¼ mile) to truck (hazmat) routes. Impact to more than one school based on any transportation incident is not likely.
5. A low income extended stay motel is located across the street from Ferrelgas (Bismarck Motor Motel).
6. Vulnerable Populations in close proximity to the WBI natural gas pipeline in NW Bismarck include Bismarck State College, Centennial Elementary, Horizon Middle School, Pinehurst Shopping Center, Touchmark Assisted Living, Horizon Care Home, and Primrose Assisted Living.
7. Vulnerable populations adjacent to truck (hazmat) routes include Primrose Assisted Living, Maple View and Kirkwood Mall. Numerous churches are adjacent to designated truck routes as well.
8. Montessori Daycare is adjacent to I-94. This may be perhaps the most vulnerable special population along I-94 should an incident occur near that location or directly impact that location. The daycare is approximately 200 feet from the interstate. The slope from the interstate to Montessori school is relatively steep. One factor reducing the likelihood of an incident at this location is the fact there is no curvature to I-94 at this location or in the general approach of this location.
9. Especially within the winter months due to the prevailing winds, portions of Bismarck are downwind from the Marathon Refinery.
10. Individuals, including the homeless population, without immediate access to transportation resources (inability to evacuate).
11. Homeless population with limited or no building access to shelter in place.

Capabilities

Existing Mitigation Capabilities Specific to the Hazards Materials Release Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Inspections of all Fixed Facilities are conducted by the Bismarck Fire Department.
2. Zoning: Title 14 (14-03-08) identifies permitted zoning areas (industrial and agricultural) for special use bulk storage plants with the purpose of storage and distribution of flammable, combustible, or hazardous materials and identifies installation requirements to limit impact to waterways, drainage ways, and residential areas.
3. International Fire Code is adopted by Bismarck. Mitigation examples of the code include:
    - Regulations regarding quantity and type of materials stored.
    - Separation of incompatible materials is required.
    - Multiple control areas must be established in some cases based on quantity and type of material.
    - Suppression systems must be in place.
4. The City of Bismarck (ie: Fire Department) is aware of hazardous materials used and stored within Bismarck:
    - Tier II Reports are submitted to Bismarck Fire by local facilities (requirement).
    - Railroad hazmat shipments are shared by the railroad industry
    - 2012 Burleigh County Hazmat Flow Study identifies hazardous materials transported through the community. The flow study was conducted to assist in emergency planning. This study may be updated as needed via the Local Emergency Planning Committee (LEPC).
    - Crews document hazardous materials within RMS (including non-reportable quantities) Data within RMS includes documenting the location or storage area within the facility
    - Hazardous Materials facilities are mapped via Bismarck GIS division for planning and response purposes.
5. Bismarck has a year-round household hazardous waste and electronics recycling program via the Public Works Department.
6. The Bismarck Water and Wastewater Treatment Plants have both developed and implemented Risk Management Plans as required by Federal Regulations (Chemical Accident Prevention Rule under the Clean Air Act). These plans cover risk assessment, chemical handling and operating procedures, training, equipment inspection and maintenance, and emergency response procedures. The Plans also include periodic audits.
7. Bismarck Fire Department firefighters are trained to the hazmat technical level.
8. The Bismarck Fire Department and the National Weather Service both have plume modeling capability.
9. Bismarck Fire Department has strong working relationships with ND National Guard Civil Support Team, ND regional response partners, and mutual aid with neighboring jurisdictions.
10. Bismarck Fire and Emergency Management conduct on-going public education to promote “shelter-in place” and evacuation planning.
11. Shelter-In-Place public education remains on the city’s emergency management website.

Infectious Disease

Mitigation Actions

1. Continue Existing Mitigation Efforts (See Mitigation Capabilities listed on next page).
2. Community education campaigns are elevated during increased risk of disease. (influenza season)
3. Engage Community partners during disease outbreaks.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. If other areas of the North Dakota (or neighboring states) are impacted, our medical facilities could be overwhelmed due to demands placed on our facilities. *The same facilities would be overwhelmed by a locally affected population as well.*
2. Although all people are vulnerable, the elderly population and the population with underlying medical conditions or suppressed immune systems are more vulnerable.
3. North Dakota allows for opting out of vaccines for religious, moral, or philosophical reasons.
4. Common social practices such as community cup or exchange of peace at area churches (and regionally) enhance the vulnerability to Infectious diseases.
5. Bismarck has many facilities and other venues that are primarily an asset to the community, but also create vulnerability to the spread of Infectious disease within our community:
    a. Bismarck Airport
    b. Bismarck Civic Center
    c. MDU Community Bowl at BSC
    d. Schools
    e. Shopping Centers
    f. Churches
    g. Long term care centers
    h. Hospitals
6. Jurisdictions with the higher populations are at greatest risk from Infectious diseases. Bismarck is the 2nd most populated community in ND.
7. Universities located in Bismarck are particularly vulnerable as their student populations often live and study in close quarters, thus heightening the probability of transmission.
8. Almost any highly contagious, incapacitating disease that enters the North Dakota population would quickly overwhelm local and state health resources. Similarly, any rapidly spreading bioterrorism event for which little vaccination or containment capability exists is a high magnitude event.
9. Infectious diseases are most likely to spread quickly in institutional settings such as dormitories, long-term care facilities, day care facilities, schools, correctional institutions, etc.
10. Those in who live or work in close proximity – within institutional settings are at higher risk.
    a. Our cold winter season promotes vulnerability as people spend more time indoors. In some cases, heating systems may promote the circulation of contaminants.
11. Not all parents choose to vaccinate their children. Consequently, parents who don't vaccinate their children are in essence depending on the vaccination of other children to protect their child from getting vaccine preventable diseases.
12. The uninsured population is more vulnerable to diseases due to potential lack of healthcare.
13. Bismarck, including the Bismarck Airport, does not have authority to quarantine without sufficient supporting information.
14. Foodborne illnesses have the greatest impact on the young, elderly and people who may be immune-compromised or have other existing health conditions.

15. Anyone who swims in man-made or natural bodies of water is susceptible to recreational water illness.
16. Anyone living in an area where West Nile virus is present in mosquitoes can get infected. West Nile virus has been detected in all lower 48 states (not in Hawaii or Alaska). The risk of infection is highest for people who work outside or participate in outdoor activities because of greater exposure to mosquitoes. People with certain medical conditions, such as cancer, diabetes, hypertension and kidney disease are also at greater risk for serious illness.

Capabilities

Existing Mitigation Capabilities Specific to the Infectious Disease Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Drive-thru vaccination and/or dispensing capability is established at the new Public Health facility (heated area).
2. Sterilization of foot care equipment with an autoclave to decrease spread of Infectious disease.
3. Identify appropriate locations for isolation or quarantine.
4. Increase Immunizations rates through grants opportunities and QI projects.
   Provide breastfeeding education to increase breastfeeding in the community for higher rates of baby immunity.
5. Provide Narcan training opportunities to the community to help with the emerging substance abuse threat.
6. Ongoing education of staff for better response to an outbreak.
7. Provide website and social media means to educate the public during an event.
8. Engage and support local healthcare providers in an active preparedness coalition.
9. Provide education when conducting food service inspections.
10. Provide mosquito control & surveillance services.
11. Hand-sanitizers and masks are available to clients to prevent spread of disease.
12. Medical assets exist to appropriately respond. NDHHS and its medical partners have most of the anticipated materials needed for biological response. These materials are stored in a warehouse supported by an internal transportation which can be supplemented by contract or by assistance request to DES. Some materials are pre-deployed around the state and additionally local public health units have medical assets stored in their health units.
13. Annual flu clinics are held at the BBPH Office.
14. Immunization clinics are held at BBPH Office.
15. N95 fit-testing is completed for nursing staff at local public health units, as well as for long-term care facilities.
16. Bismarck/Burleigh Public Health maintains emergency preparedness plans and conducts training and exercising of those plans.
17. The USPS has a bio-detection system in place at the sorting facility to detect anthrax.
18. It is required to inform the ND Health and Human Services regarding incidence of reportable diseases per statutory authority NDCC 23-07-01. Reportable disease are listed at https://www.hhs.nd.gov/health/diseases-conditions-and-immunization/STI/report
19. Bismarck Environmental Health conducts risk-based inspections on all food establishments annually (one inspection minimum) to verify compliance with the food code.
20. The ND Health and Human Services (NDHHS), Division of Disease Control monitors and investigates Foodborne illnesses.
21. Diagnosed foodborne illness is mandatory reporting to the NDHHS.
22. Food employees who are symptomatic with vomiting or diarrhea must be excluded from work until they are asymptomatic for 24 hours.
23. All public and semi-public pools are inspected annually by Bismarck's Environmental Health

Division.
24. All public and semi-public pools are tested once a month for bacteriological analysis.
25. All public and semi-public pools are required to have a pool operator that is certified by the National Swimming Pool Foundation.
26. The North Dakota Department of Health (NDHHS), Division of Disease Control monitors and investigates all Recreational Water Illnesses.
27. Bismarck currently has a vector control program that performs mosquito surveillance, educates residents on how to avoid getting bitten by mosquitoes, fogs public parks and walking paths and treats standing water with larvacide.
28. Environmental Health enforces environmental health codes and conducts public education to prevent or mitigate health impacts related to sanitation, food safety, and vector control.
29. The North Dakota Department of Health monitors West Nile surveillance throughout the state.

Pest Infestation

(Urban Forest Damaging Pests)

Mitigation Actions

1. Continue programs to monitor existing and future forest-damaging pests.
2. Continue existing mitigation efforts including the systematic approach to removing ash trees in decline and replant with a different species to increase the diversity of our urban forest. See Capabilities below.
3. Maintain the "City of Bismarck Emerald Ash Borer Response Plan" developed and approved by the Forestry Advisory Board and the City Commission.

Public Education:

4. Continue public education efforts to diversify tree plantings and reduce potential for transporting pests (Pest infestations) from other areas of the country.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Currently, Dutch Elm Disease is the most prevalent disease impacting trees in Bismarck on an annual basis. Approximately fifty Elm trees are removed in Bismarck each year due to Dutch Elm Disease.
2. Elm trees were hit with a severe infestation of European Elm Scale in 2021 and 2022. All Elm in City boulevards were injected for this pest. The scale has weakened some of our Elm making them more susceptible to other diseases and pests.
3. The most significant risk and vulnerability to our city urban forest is the potential for Emerald Ash Borer.
4. When Emerald Ash Borer impacts Bismarck's urban forest, extensive resources will be required to combat the spread of the disease, compromising capabilities to address Dutch Elm Disease. These diseases/pests combined have potential to reduce our tree population by 36%.
5. Infested firewood may be transported by campers/travelers.

Capabilities

Existing Mitigation Capabilities Specific to the Pest Infestation Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The City of Bismarck has developed an Emerald Ash Borer Response Plan:
   Plan Purpose: By implementing this plan, the City is attempting to lessen the impact and disruption to its urban forestry program caused when Emerald Ash Borer (EAB) is introduced to Bismarck and the surrounding area. Taking a proactive approach to this threat enables the City to address public and private needs in an efficient and effective manner.
2. Bismarck has a Dutch Elm Disease control program consisting of firewood inspections in March to identify properties that have Elm firewood. Bismarck has forestry staff that monitors the city looking for symptoms of DED. Elms on private property that test positive for DED are abated. Public trees are promptly removed if tested positive for DED.
3. The City has ordinances and policies that affect the City's urban forest. The City Forester does have the authority to abate "nuisance" trees on private property:
   13-01-01 (16). Definitions. "Public nuisance" means any dangerous or unsafe trees or portions thereof; any trees encroaching on public sidewalks or impeding vehicular travel on the streets in violation of standards set by the City Forester

pursuant to Section 13-02-01(3); any trees located in the sight triangle in violation of Section 14-03-05(3); and any tree harboring insect or disease organisms of a contagious and fatal nature which pose a serious threat to surrounding trees if not immediately removed and disposed of, or treated with proper arboricultural procedure.

13-02-08 (4). Removal, Planting and Replacement. "If any part or the whole of any tree on private premises is found after proper investigation to be dangerous or unsafe, or otherwise constitute a public nuisance, the city forester shall declare the tree or portion thereof a public nuisance and cause the nuisance to be abated pursuant to Section 13-02-14."

The Forestry Advisory Board (FAB) made a motion and approved to include EAB into this "nuisance" tree category at the February 2010 meeting. The Forestry Advisory Board also approved a "Structured Removal Plan". This will address removal of ash trees that are in the "poor and severe decline" condition class, ash trees impacted by water service construction projects, or needing cabling and bracing before EAB arrives. The intent is to slow the spread of EAB by reducing host trees, and gaining time in future removals.

4. Bismarck has a Forestry Advisory Board to provide direction and recommendations to the City Forester regarding the health of the urban forest.
   http://www.bismarcknd.gov/index.aspx?nid=929
5. Bismarck participated in a USDA Forest Service/APHIS EAB EOC response exercise.
6. Bismarck has participated in the EAB Awareness week for the last 10 years to 15 years.
7. The ND Dept of Agriculture has an EAB trapping program. Traps are hung throughout the City and Parks in Bismarck each year to monitor for the pest.
8. Public Education is provided via City Forestry web pages regarding Pest infestations.
   http://www.bismarcknd.gov/index.aspx?NID=1399
   http://www.bismarcknd.gov/DocumentCenter/Home/View/2697
9. Several organizations and agencies are currently involved in various preparation activities, they are: NDSU Extension, ND Department of Agriculture and ND Forest Service. https://www.ndda.nd.gov/eab

Severe Summer Weather

See Also "Tornado"

Mitigation Actions

See also Tornado Hazard within this plan section for a summary of applicable mitigation actions, vulnerabilities, and capabilities specific to the tornado hazard (and applicable to Severe Summer Weather Hazard).

Public Education topics:

1. Continue participating in the Severe Summer Weather Awareness campaign.
2. Extreme Heat: Do not leave children or pets in the unattended vehicle. *Extreme heat and humidity is one of the leading weather-related killers in the United States, resulting in hundreds of fatalities each year.* *Source: NWS https://www.weather.gov/mkx/heatwaves*
3. Promote the NOAA all-hazards weather radio as a viable option to receive weather alerts/warnings to ensure awareness of risk and provide for recommended actions for personal safety.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Those caught outdoors during a severe thunderstorm are at higher risk.
    a. High wind related injuries/deaths are caused by flying debris.
    b. Those taking shelter under or near tall trees are vulnerable to lightning strikes.
    c. Potential injury from large hail stones
2. Mobile homes are impacted (damaged) at lower winds speeds compared to typical "stick construction" homes and other building types.
3. Those who do not have access to warning or alert systems are at risk. Lack of access or availability to hear or monitor warnings/alerts would compromise the individual's ability to take appropriate actions.
    a. A low percentage of the population own NOAA All Hazards Weather Radios:
        i. NOAA Weather Radio is one of the best indoor warning systems available. Unfortunately, studies have show that only 5-10 percent of the population owns a weather radio (Wolf, 2009). 2015 Source: http://www.crh.noaa.gov/dmx/?n=preparesvrwarning
4. Many residents mistakenly expect to hear "outdoor" warning sirens indoors.
5. As Bismarck expands, the existing outdoor warning system (sirens) may not provide adequate coverage for outdoor recreational areas, residential areas, etc.
6. Overhead power lines, especially those near trees, are vulnerable to high wind events.
    a. Children and others who may first come across downed power lines are vulnerable.
7. Overhead lines impacted create some fire risk (ie: nearby trees, homes, etc).
8. Those who are most vulnerable to extreme heat include elderly persons, small children, those with disabilities, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions. Others vulnerable to extreme heat are those who must work outdoors, including first responders (ie: Fire, Law, EMS).
    a. Those who do not have access to air-conditioned rooms.
    b. Short term power loss is more likely to occur during heat waves as a result of high energy demands.

Capabilities

Existing Mitigation Capabilities

Specific to the Severe Summer Weather Hazard

Also see Section 6 for additional listings of mitigation capabilities as well as Tornado Hazard for more capabilities.

1. MDU manages tree trimming services (via local tree services contractor) to avoid power pole and power line damages.
2. The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety.
3. Bismarck has 23 outdoor warning sirens within city limits. Four additional sirens, which are part of the same system (and activate simultaneously) provide outdoor warning siren coverage within the city of Lincoln, Apple Valley Subdivision, and the University of Mary.
4. NWS provides alerts/warnings and activates both EAS and NOAA All Hazards Weather Radio.
5. Schools and City Government buildings utilize the NOAA All Hazards Weather Radio.
6. Bismarck is recognized as a “Storm Ready” community by the National Weather Service.
7. Bismarck Parks and Recreation has lightning detection siren notification capability at their outdoor recreational locations (such as golf courses).
8. Public education: Severe Weather Awareness Campaign
9. Bismarck has adopted the International Building Code. Chapter 16 is applicable, however, mobile homes are governed by HUD are not required to comply with the International Building Code.

International Building Code - Chapter 16 Structural Design - Section 1609 Wind Loads:
1609.1 Applications states “Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures.”

- 105 MPH (3 second gust) 33 feet above ground for Risk Category I Buildings and other Structures
- 115 MPH (3 second gust) 33 feet above ground for Risk Category II Buildings and other Structures
- 120 MPH (3 second gust) 33 feet above ground for Risk Category III and IV Buildings and other Structures

2015 Source: http://publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_16_par090.htm
Information regarding wind speeds is derived from the link above.

Space Weather Hazard

Mitigation Actions

1. Consider EMP shielding devices to protect generators.
2. Develop a communication plan strategy.
   - Communicate the possibility of such an unavoidable event and ensure there are effective communication strategies in place for before, during and after an event. Identify the appropriate scale (trigger point) to use for purposes of informing the public of potential impacts. Coordinate with NWS and Space Weather Prediction Center personnel.

Public Education topics:

3. Enhance the Emergency Management Website to include Space Weather to enhance awareness of potential impact, including communications challenges.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Most space weather poses a threat primarily to users of specialized GPS technology, HF radio communications, or upper-latitude avionics over a brief period and limited geography, though stronger events generally produce impacts over expanded areas Note: Chance of a G5 event impacting Earth is 0.4% annually. Chance of a G4 and/or G5 event is 5.8% annually.
2. A severe G4 or G5 geomagnetic storm event could do significant damage to the electrical infrastructure, hinder communications, and cause massive blackouts across the state.
3. Power outages from transformer damage may be long-lasting, and if occurring in connection with extreme heat or cold, may lead to increased human suffering and possible loss of life. The elderly, patients, and infants are highly vulnerable populations.
4. Communication systems are vulnerable due to power outages and due to sensitivity of the electronics. This may compromise communications capabilities normally used to inform the public.
5. Hospitals working without power or on generators, would be working at a reduced capacity. Simultaneously, there are likely to be spikes in the need for medical care due to the lack of electricity for home medical aid devices and the lack of modern conveniences and sanitation facilities, all of which may overwhelm healthcare facilities.
6. Space weather has been linked to pipeline corrosion. Pipelines are natural conduits of currents generated in geomagnetic storms. Pipeline corrosion can cause a hazardous materials incident by weakening the pipe and leading to leaks or catastrophic failure. This can release hazardous substances, which can result in fires, explosions, and severe environmental damage. Corrosion is a significant cause of pipeline incidents, especially for hazardous liquid and gas transmission pipelines.
7. The Bismarck Community is reliant on mitigation stakeholders to deter, prevent, and mitigate the impacts of an electro-magnetic pulse (EMP) event caused by space weather or intentional attack.

Capabilities

Existing Mitigation Capabilities Specific to the Space Weather Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The Space Weather Prediction Center (SWPC) issues watches and warnings when the planet is experiencing elevated geomagnetic events. This occurs during G1 or higher events.
2. There are also mandatory calls to NASA, FEMA, and the North American Electric Reliability Corporation (NERC) when agency's operations may be impacted by space weather. The SWPC reaches out with a call to the NERC regional reliability coordinators whenever the forecast is at Kp7 (G3) or higher to let electric grid operators know that the geomagnetic level is high enough that they should make sure their system is balanced and accounts for surge build up on lines (SWPC, 2023). Calls continue every three hours if the forecast remains at Kp7 or higher.
3. Space weather events are viewed by telescopes, spacecraft, and satellites prior to their arrival on Earth, giving forecasters a 1 to 3-day warning, depending on angle, magnetic fields, and space conditions.
4. The SWPC works with regional council coordinators when geomagnetic levels reach G4 levels to assure that levels are being monitored to avoid overloading and serious damage and outages.
5. The North American Electric Reliability Corporation (NERC) is the organization of grid operators who work together to assure reliable and secure bulk electric production and distribution throughout Canada and the United States. During normal operations, the interconnections operate as if controlled by a single nervous system of electricity transmission, separate from the other interconnection areas.
6. North Dakota is in the Southwest Power Corporation that manages 72,000 miles of transmission lines from North Dakota to Texas and New Mexico. The SWPC and NERC Reliability Coordinators host a quarterly test call to assure reliability for when an event occurs.
7. The State of ND is a net exporter of energy and does not, at this time, utilize its transformer capacity to the point of becoming overloaded. This helps protect the state's grid from serious damage and prolonged outages. *According to the National Research Council (2008), North Dakota ranks amongst the lowest states at using its capacity at seven percent, limiting the likelihood of transformer overloads from a significant geomagnetic event.*

Private Utility Capabilities include:

1. Montana Dakota Utilities (MDU) receives alerts regarding potential GMD (solar flare events with a K7 or higher rating).
2. MDU conducts six drills per year to switch controls from Bismarck/Mandan and vice versa.
3. Bismarck/MDU has three system inputs (redundancies): Garrison, Heskett and WAPA.
4. Bismarck is strategically located for power restoration based on logistics/proximity to power generation and distribution.
5. MDU has mutual aid assistance agreements with other utility companies.
6. MDU has pre-determined priority considerations including hospitals, police station, etc.
7. MDU Electric System Compliance Manager serves as a liaison between MDU and the North American Electric Reliability Corporation (NERC).
8. Materials needed by MDU are readily available per MDU plans/agreements with their vendors.

9. Central Power Electric Cooperative (CPEC), formerly Capital Electric Cooperative, has assistance agreements with other utility companies (mutual aid).
10. CPEC utilizes multiple contractors for restoration which provides for a force multiplier and quicker response.
11. CPEC has two system inputs: Heskett and WAPA.
12. CPEC has capability to monitor individual meters to determine if a facility or home is receiving power.
13. CPEC has generator power to sustain operations at its facility.
14. CPEC has the ability to redirect existing power through its distribution system.

Terrorist, or Nation-State Attack

Note: For purposes of safety and security, specific vulnerabilities and mitigation projects will not be presented in this plan for this hazard. General mitigation recommendations and existing mitigation are identified. A hazard profile for this hazard is included in Section 9 of this plan.

Mitigation Actions

1. Continue those mitigation activities already in place as summarized in the table below (Capabilities).
2. Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options. *See "pre-existing mitigation" table below.*

Public Education topics:

3. Share Mitigation Strategies as recommended by the ND State and Local Intelligence Center as a resource for the city, local businesses and citizens. *See "Capabilities" table below.*

Capabilities

Existing Mitigation Capabilities

Specific to the Terrorist, or Nation-State Attack Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. The Bismarck Police Department (BPD), along with law enforcement agencies across the state share, analyze, and disseminate intelligence via the ND State and Local Intelligence Center (ND SLIC) network. Law Enforcement connected to the information sharing network established by SLIC are able to access intelligence regarding potential threats such as individual offenders, on-line activity, planned protests, criminal organizations, etc.
2. The BPD actively tracks on-line activity and intelligence via the BPD Intelligence Led Policing Program which is staffed by two full-time officers. The intelligence officers hold weekly intelligence briefings at the BPD (and on-line) and share information with numerous surrounding agencies. This has been a highly successful program and allows us to track on-line activity/intelligence that may impact our local community. SLIC Officers also attend this briefing and are able to share our department level intelligence via their network.
3. The North Dakota State Local and Intelligence Center (NDSLIC) is the primary state agency for terrorism and has a system to report suspicious activities to the state for further investigation. Online reports are made at https://apps.attorneygeneral.nd.gov/tip
4. The Bismarck Airport displays the national "If you See Something, Say Something" campaign, visible to travelers: https://www.dhs.gov/see-something-say-something

5. The ND State and Local Intelligence Center provides guidance regarding mitigation and prevention measures, including the following resources:

Mitigation and Prevention Resource	Embedded Link
State Assistance Visit - NDSLIC	https://www.ndslic.nd.gov/critical-infrastructure-ci/site-assistance-visits-savs
Submit a Suspicious Activity Report – NDSLIC	https://www.ndslic.nd.gov/
Mass Gatherings: Security Awareness for Soft Targets and Crowded Places - CISA	https://www.cisa.gov/sites/default/files/publications/Mass%20Gatherings%20-%20Security%20Awareness%20for%20ST-CP.PDF
Active Assailant Security Resources	https://www.cisa.gov/topics/physical-security/active-shooter-preparedness/active-assailant-security-resources
Unattended vs Suspicious Bag - CISA	https://www.cisa.gov/sites/default/files/publications/Unattended-vs-Suspicious-Postcard.pdf
Hate Crime Threat Guide	https://www.justice.gov/hatecrimes/media/1135921/dl?inline=

Also, see "Active Threat" and "Civil Disturbance" summaries within this plan section for additional mitigation efforts in place and applicable to this hazard.

Tornado

Mitigation Actions

1. Include a Tornado Safe Room to EF4 standards within any new construction of city-owned critical facilities where applicable, based on occupancy.
2. Outdoor Warning Sirens - identify need and install additional sirens as the city expands.
3. Update the Land Development Code to ensure space for sirens is reserved during the planning phase of development.
4. Ensure NOAA All Hazards Weather Radios are located in all city owned buildings.
5. Promote the NOAA All Hazards Weather Radio – for all homes and businesses to consider as a primary indoor or portable system for receiving alerts/warnings.
6. Encourage Wind-Resistant Building Techniques

Public Education:

7. Coordinate public education efforts with local schools and local entities (non-profit organizations) serving as liaisons to newcomers and other vulnerable population groups.
8. Promote shelter pre-planning at the individual and worksite levels to include recommendations to take shelter during a tornado watch and avoid tendencies to relocate during a tornado warning.

Public Education topics include:

- Safe Room construction and protecting property from high winds
- Encourage mobile homeowners and park owners to conduct joint shelter planning
- Encourage mobile homeowners to explore potential sheltering options (agreements) with area facilities (such as place of employment, membership, etc).
- Promote NOAA All Hazard Weather Radios
- Promote NWS Severe Weather Spotter Training as events are scheduled
- Communicate the purpose of Outdoor Warning Sirens (as “Outdoor” warning siren system)

Vulnerability Summary

Refer to the “Vulnerability Assessment” table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Most tornado injuries/deaths are caused by flying debris. Those caught outdoors during a tornado event are at higher risk.
    a. Loose debris
    b. Outdoor items not anchored
    c. Construction sites may contain unsecured construction materials (ex:plywood) and debris
    d. Trees are impacted at lower wind speeds (small branches – flying debris).
2. Mobile homes are impacted (damaged) at lower winds speeds compared to typical “stick construction” homes and other building types. Occupants of mobile homes during a tornado event are at higher risk. Bismarck has several mobile home park neighborhoods. The vast majority of mobile home parks within Bismarck do not have designated storm shelters on site.
3. Bismarck does not restrict future development of mobile home parks. This allows for more affordable housing, however, future construction of mobile home parks would create additional vulnerability.
4. Those who do not have access to warning or alert systems are at risk. Lack of access or availability to hear or monitor warnings/alerts would compromise the individual’s ability to take appropriate actions.
5. Many citizens are NOT aware of and/or utilize NOAA All Hazards Weather Radios.

6. Some residents expect to hear "outdoor" warning sirens indoors, which is not the purpose of the outdoor warning sirens.
7. As Bismarck expands, the existing outdoor warning system (sirens) may not provide adequate coverage for outdoor recreational areas, residential areas, etc., increasing community vulnerability.
8. Not all tornadoes are able to be detected by Doppler radar – especially if the tornado forms over the top of the radar and over the city itself.
9. The two hospitals are in close proximity. Depending on the event, if one hospital is impacted, both could potentially be within the same tornado path.
10. There are no community (public or private) tornado shelters identified.

Who's Most at Risk:

- People in mobile homes
- The elderly, very young, and the physically or mentally impaired
- People who may not understand the warning due to a language barrier
- People in an unfamiliar place such as tourists
- People that are outdoors
- Those in automobiles

Capabilities

Existing Mitigation Capabilities Specific to the Tornado Hazard

Also see Section 6 for additional listings of mitigation capabilities as well as the Severe Summer Weather Hazard for applicable capabilities.

1. Bismarck has 23 outdoor warning sirens within city limits. Four additional sirens provide outdoor warning coverage in the areas of Lincoln, Apple Valley Subdivision, and the University of Mary.
2. NWS provides alerts/warnings and activates both EAS and NOAA All Hazards Weather Radio.
3. Schools and City Government buildings utilize the NOAA All Hazards Weather Radio.
4. Bismarck is recognized as a "Storm Ready" community by the National Weather Service.
5. Many traditional construction homes within Bismarck have basements.
6. Public education: Severe Summer Weather Awareness Campaign
7. Bismarck Forestry provides for public education and promotes the benefits of trees to include shade (extreme heat, urban heat island effect, and wind protection).
8. Bismarck has adopted the International Building Code. Chapter 16 is applicable, however, mobile homes are governed by HUD are not required to comply with the International Building Code.

International Building Code - Chapter 16 Structural Design - Section 1609 Wind Loads:
1609.1 Applications states "Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures."

- 105 MPH (3 second gust) 33 feet above ground for Risk Category I Buildings and other Structures
- 115 MPH (3 second gust) 33 feet above ground for Risk Category II Buildings and other Structures
- 120 MPH (3 second gust) 33 feet above ground for Risk Category III and IV Buildings and other Structures

2015 Source: http://publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_16_par090.htm

9. Public Education:
    - Severe Weather Spotter Training
    - Promote NOAA All Hazards WX Radio
    - Staff conduct interviews with local media to promote awareness
    - Severe Summer Weather Awareness Campaign

10. Public Information and Warnings: To protect people and property, the **National Weather Service** issues informational products alerting the public to varying degrees of hazardous weather. The following may be issued for severe thunderstorm events:
    - Hazardous Weather Outlook: Hazardous weather outlooks alert the public to the possibility for severe weather in the area from one to seven days in advance.
    - Severe Thunderstorm Watch: Severe thunderstorm watches are issued by the Storm Prediction Center when conditions for severe thunderstorms appear favorable for an area over the next several hours. Watches are typically in effect for 4-6 hours.
    - Severe Thunderstorm Warning: Severe thunderstorm warnings are issued when Doppler radar indicates or the public reports a thunderstorm with wind gusts of 58 mph or greater and/or hail 1 inch or larger in diameter. The warning is usually valid for 30-60 minutes.
    - Tornado Watch: Tornado watches are issued by the Storm Prediction Center when conditions for tornadoes and severe thunderstorms appear especially favorable for an area over the next several hours. Watches are typically in effect for 4-6 hours.
    - Tornado Warning: Tornado warnings are issued when Doppler radar indicates or the public reports a tornado. The warning is usually valid for 15-45 minutes.

Train Derailment

Mitigation Actions

1. Locate new critical facilities at least ¼ mile away from railroad lines: a. When building new or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options at least ¼ mile from either railroad line. Assuming there are viable location options at least ¼ mile from the railroad lines of equal value and functionality, locating critical facilities at least ¼ mile away would reduce the loss potential.
2. Public Education: Evacuation and Shelter-In-Place Emergency Preparedness
   - Special Populations Considerations: Bismarck State College and occupancies within ½ mile of railroad lines.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.
Note: The vulnerability statements below do NOT imply likelihood or high probability of a significant train derailment incident involving fire, hazardous materials, and/or explosion.

1. Hospital locations: Both major hospitals are in close proximity to the BNSF railroad. A significant incident (ie: fire, hazmat, explosion) could potentially affect both hospitals depending on the location of incident occurrence.
2. Continuity of Government Operations: City owned critical facilities in very close proximity to either railroad line include the Water Treatment Plant, Public Health, and Public Works. City facilities, if impacted as a result of a significant incident (ie: fire, hazmat, explosion), would create challenges to sustain continuity of operations. The City/County Building is also within close proximity. There are several additional critical facilities within ½ mile of railroad lines including city, county, state (ie: State Emergency Operations Center), federal, and emergency service facilities. Of note: Public Works is in close proximity to Praxair, which could expand the magnitude of a significant train derailment incident near that location.
3. County, State, and Federal facilities may also be impacted, such as the State EOC at Fraine Barracks. An incident impacting county, state, or federal government facilities may impact the ability to provide assistance while re-establishing continuity of operations.
4. There are 22 schools and daycares within ½ mile proximity to the railroad as of October 2025. Schools and daycares are widely dispersed along the rail lines, therefore, at least one school is likely to be involved following a significant derailment incident (ie: fire, hazmat, explosion). Depending on time of day of a potential incident, elementary school population may be outdoors.
5. Vulnerable populations within ½ mile of the railroad lines and vulnerable properties based on topography include various assisted living and nursing homes, the Elks Pool, Bismarck Community Bowl, Front Street Plaza (based on proximity and topography), and the ND State Penitentiary.
6. Due to evacuation challenges, the ND State Penitentiary is a very vulnerable special population.
7. Based on a relatively even distribution of various facilities and populations, a significant train derailment incident (ie: fire, hazmat, explosion) would likely include impact to several properties and populations including the following categories: critical facilities, critical infrastructure, waterways (Missouri River, Hay Creek, or storm water drainage system), schools, hazmat fixed facilities, and/or special populations. This would overwhelm local response capabilities. Additional resources would be requested including mutual aid, private, state and federal assistance. However, response times of support agencies may not support the immediate incident needs of evacuation and rescue efforts.
8. Based on potential impact to local communications critical infrastructure, emergency messaging capability via radio and television may be diminished, creating a higher vulnerability for those citizens who primarily get their emergency messages from local radio and television.

9. Vehicles, vehicle occupants, and pedestrians are vulnerable at railroad crossings, if/when making inappropriate attempts to cross, such as by-passing barriers in place.

Capabilities

Existing Mitigation Capabilities Specific to the Train Derailment Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Maximum Speed Limits:
    a. 35 MPH – BNSF Line
    b. 10 MPH – DMVW
2. Maximum speed and inspection requirements are regulated by the Federal Railroad Administration.
3. Railroad Crossings and improvement projects per Quiet Rail Zone approved at 3rd, 5th, and 12th Street railroad crossing locations are completed (2017).
4. Bismarck Fire is aware of the hazardous materials transported by rail through Bismarck via reports shared by railroad industry.
5. Bismarck Fire Department continues to enhance training efforts as it relates to the various types of train cars, hazardous materials response, and also participates in training and exercise activities with mutual aid partners and stakeholders including the railway industry.
6. 7th and 9th Street locations are railroad overpasses are BNSF ownership. DOT in concert with the FRA inspects the structures on a three-year rotation .
7. On August 2, 2013 the FRA issued an Emergency Order and Safety Advisory regarding the movements of flammable liquids, which includes crude oil and ethanol.
    a. The FRA Emergency Order contained requirements for unattended trains carrying hazardous material such as chlorine that is classified as Toxic by Inhalation (TIH) or 20 or more loads of certain flammable liquids like crude oil and ethanol.
    b. Trains may not be left unattended per BNSF communications.
8. New tank cars (DOT-117) constructed after 10/1/2015 must feature a 9/16-inch shell, 11-gauge jacket, one-half-inch, full-height head shield, thermal protection, and improved pressure-relief valves and bottom outlet valves. Existing tank cars must be retrofitted with the same key components based on a "prescriptive, risk-based" retrofit schedule, according to the USDOT. The final rule required replacing DOT-111 tank cars for Packing Group I, which covers most crude shipped by rail, within three years (2018 timeframe).

BNSF mitigation and safety measures summary (source: BNSF representative):

9. BNSF inspects tracks in Bismarck four times per week. The FRA requirement is twice per week. Inspections of all BNSF bridge structures are performed at least once annually. BNSF has a staff of trained bridge inspectors, as well as structural engineers, consultants and specialized contractors. Ownership: 7th and 9th Street locations railroad overpasses are BNSF ownership. DOT in concert with the FRA inspects the structures on a three-year rotation.
10. Rail Industry (BNSF) voluntarily adopted stronger tank car standards in October 2011 and November 2013. The “new” car has ½” or 7/16” jacketed shell (versus 7/16 only), a ½” protective head shield, roll over protection (top fitting protection), larger pressure release valve, and approximately 47-77% better crashworthiness. BNSF makes available the “System Emergency Response Plan” via BNSFHazmat.com as well as other training, preparedness/planning materials.

11. Additional BNSF Prevention Measures include:			
Human Factor • Training • Remote Monitoring • Positive Train Control • Self-reporting protocol	Equipment/Mechanical • Ultrasonic inspection • Detector Network, such as Dragging Equipment • Technology including force-based/strain gage systems • Thermal/infrared scanning for warm bearing detection	Track/Signal • Enhanced track inspection training • Continued elimination of jointed rail • Strong capital program for tie renewal • Technology including ground penetrating radar and enhanced geometry testing	Miscellaneous Operating Practices/Alerts: • High Wind: staging and/or speed requirements • Tornado: requirements to stop, inspect trains • Flood: speed restrictions, additional inspections • Cold weather: speed restrictions

Wildland Fire
(Wildland Urban Interface)

Mitigation Actions

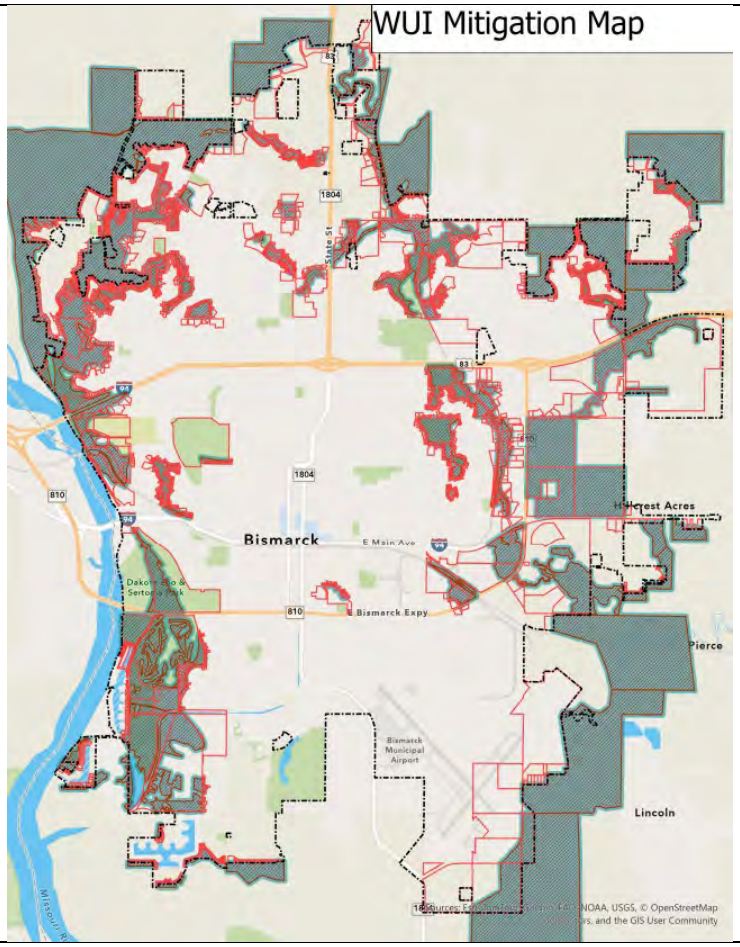
1. Maintain Wildland Fire-Break Trail in Southwest Bismarck.
2. Update the Wildland Fire Urban Interface risk map annually or as needed based on city annexations.
3. Continue to provide for public education efforts, including media releases, interviews, website updates, and public outreach. Public outreach shall include specific mailings to property owners within the wildland fire risk areas every three years or as applicable based on drought conditions. Public education efforts utilize Firewise program guidance.
4. Share Firewise landscaping concepts with developers and the Planning Department.
5. Share Air Quality Information alerts when disseminated by the ND Department of Environmental Quality, along with applicable Shelter In Place recommendations. https://deq.nd.gov/AQ/monitoring/
6. Provide "AirNow" air quality information via the city's website within Emergency Management web pages. Interactive Map of Air Quality

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Homes and other structures located in wildland risk areas as mapped are vulnerable to wildland fire due to the proximity to wildland vegetation and relatively steep slopes which can increase the rate of spread of fire. The likelihood of a wildland fire being a high magnitude event is low.
2. Areas within Bismarck that may have more exposure potential compared to other areas include the northwest portion of the city that is adjacent to undeveloped property and the southwest portion of the city that is adjacent to more heavily forested areas.

The map at right illustrates the wildland urban interface areas as well as the parcels adjacent to the WUI areas.



Capabilities

Existing Mitigation Capabilities Specific to the Wildland Fire Hazard

Wildland Urban Interface (WUI)

Also see Section 6 for additional listings of mitigation capabilities.

1. Fire Trail – Fuel Mitigation Project – completed 2002. A Fire break was created to reduce vulnerability to homes in southwest Bismarck as illustrated by the map on right. This fire trail/ fire break proved to be beneficial during a fire fight event in April 2005.

2. The bike/walking path west of Solheim to Riverwood Drive serves as a fire break. See map below.

3. Public Education: Public Education materials are available to inform property owners adjacent to the wildland risk areas (wildland urban interface) of recommendations as described by the Firewise Program, especially during times of drought and higher fire risk. www.firewise.com
4. Bismarck Fire completes the following on-going activities.
5. Perform Fire Safety Inspections of all local businesses
6. Firefighters train in the latest methods of fighting all types of fire.
7. Bismarck Fire continues public education efforts including:
    a. Presentation to grade schools
    b. Demonstrations in a smoke trailer that gives kids skills to get out of a home on fire
    c. Tours of fire stations to civic groups
    d. Safety tips to the public through local media
8. Response Capabilities: The City of Bismarck is protected by a full-time fire department including 5 fire stations. We have 2 fully equipped wild-land firefighting apparatus able to access remote areas within the city limits. Many of our Wild-land Urban Interface (WUI) areas border Bismarck City and Burleigh County properties. We have mutual aid agreements with the Bismarck Rural Fire Department, Mandan Fire Department, and ND Forest Service. Not only does this aid in fighting fires in the WUI but we can also call on them to assist firefighting efforts within the city limits.
9. ND Department of Environmental Quality provides Alerts to the public when air quality is affected by wildfires (regardless of Wildfire location) or other incidents. ND DEQ air monitoring: https://deq.nd.gov/AQ/monitoring/
10. Bismarck Public Schools has policies/procedures relating to postponing or canceling outdoor events as a result of poor outdoor air quality. Bismarck Parks and Recreation follows those same policies.

Winter Storm

Severe Winter Weather

Mitigation Actions

1. Identify and implement coordinated, community-driven solutions to effectively support individuals experiencing homelessness, behavioral health crises, or substance use disorders.
2. Evaluate need and opportunity for snow fences.
3. Identify critical facilities and infrastructure having or needing back-up generators or upgrades (ie: critical facilities and shelter locations).
4. Ensure back-up generators are in place at all city-owned Critical Facilities. Ensure the back-up generators allow for continued operations of critical and essential functions.
5. Develop an Emergency Agreement with private vendors for delivery of fuel for generators.
6. Coordinate school/city/business closure communications/decisions.
7. Downed Power Line Safety Training (Forestry Staff)

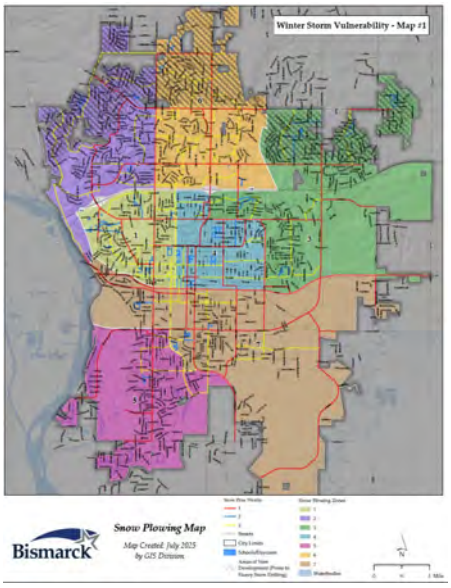
Public Education:

8. Public Education - emphasis on dangers of downed power lines and utilizing alternate work start/stop times to minimize rush hour traffic.
9. Public Education: Participate in the Severe Winter Weather Awareness Campaign (on-going).
10. Coordinate public education efforts with local schools and local entities (non-profit organizations) serving as liaisons to newcomers who may not be familiar with ND winters.

Vulnerability Summary

Refer to the "Vulnerability Assessment" table within Section 9 of this document for a more complete listing of vulnerabilities relating to this hazard.

1. Areas of new development are prone to experience heavy snow drifting due to the limited number of mature trees or other vegetation. The hatched areas within the snow emergency route map illustrate the new development areas currently prone to heavy snow drifting. This vulnerability will continue to migrate north and east as the city grows. See hatched area, map on right. A full size map is included in Section 9.
2. As noted on the snow emergency route map, residential areas are the last priority in terms of clearing streets during and after a winter storm event. During a winter storm event, crews focus on keeping the high priority emergency routes and major arterials clear. Therefore, residential areas are more vulnerable (ie: lack of ingress/egress) during, and for several hours following a major snowfall event. However, existing response plans are in place to re-route snow plows for emergency situations. See map on right or web link: http://www.bismarcknd.gov/index.aspx?NID=249

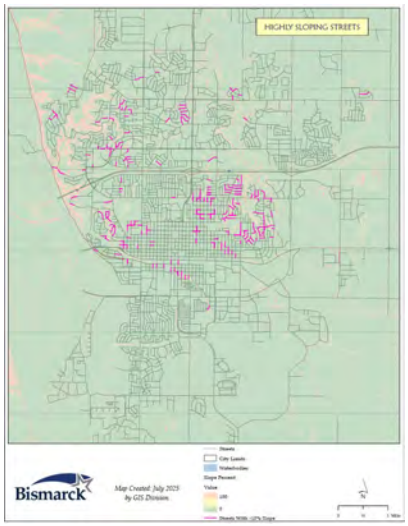


3. Some areas of Bismarck more vulnerable as a result of icy conditions due to a relatively significant slope. These areas are mapped (see right). A full size map is included in Section 9.

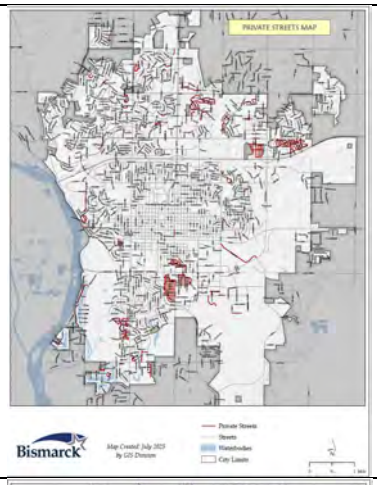
   Streets with greater than a 14% slope:

   - 500 Block of S 11TH ST – up to 19.9%
   - 1500-1600 Block of Northview Ln – up to about 16.5%
   - 2300 Block of Pointe Lp – up to 14.8%
   - 800-900 Block of N Mandan St – up to 14.8%
   - 1600 Block of N 35TH ST – up to 14.5%
   - 2900 Block of E C Ave – up to 14.5%
   - 700-800 Block of N 27TH ST – up to 14.5%
   - 2400 Block of Laforest Ave – up to 14.4%
   - 2900 Block of E B Ave – up to 14.3%
   - 1200-1300 Block of Crestview Ln – up to 14%

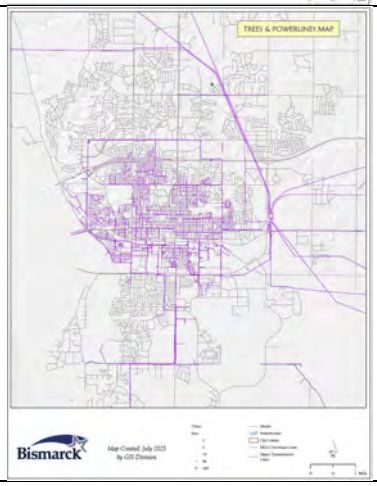
   Burnt Boat Drive has 10% slope, but is curvy, narrow, and has steep slopes adjacent.



4. Private streets within Bismarck are not cleared by Bismarck Public Works. These areas may or may not be more vulnerable (ie: ingress/egress) depending on the quality and timeliness of private snow clearing services. See map at right. A full-size map is located in Section 9.



5. Many of the older developed areas within Bismarck have overhead power lines. These areas are more vulnerable during an ice storm to experience power loss and/or a downed power-lines. See map on right. A full-size map is included in Section 9.
6. Overhead power-lines intersecting trees create a vulnerability. However, local utility companies proactively trim the trees to mitigate the hazard. See map on right. A full-size map is included in Section 9.



7. Snow plows in operation are likely to be hit by other vehicles during conditions of low visibility. The snow plow operator is at risk, however, the operator of the vehicle is at higher risk for injury/death.
8. Traffic accidents, which may involve hazardous materials in some cases, are more likely to occur as a result of slippery street conditions and/or poor visibility. First responders are more vulnerable during response efforts because of the weather elements.
9. Emergency response times may be delayed as a result of snow and/or ice conditions.

10. Downed power lines as a result of ice storms and/or heavy snow pose a serious life safety risk, especially for children who may come across a downed power line.
11. Power lines near trees (ie: evergreen trees or other trees not trimmed) are vulnerable following an ice storm or heavy snow event. Homeowners are responsible for trimming trees from the transmission line to the home itself.
12. Among the most vulnerable population during winter storm events are the elderly and those with medical conditions (ie: heart). A heavy snow event may delay emergency response to 911 calls.
13. Those who require medications may not be able to fill prescriptions during a winter storm event.
14. Loss of power for a few hours (or longer) poses additional risk to those who require power for life support. Back-up battery or generator power may be needed.
    - The vast majority of local citizens do not have back-up power (generator) capability in the event of an extended power outage. Since power outages in Bismarck are repaired quickly (typically within 2 to 3 hours or less), local citizens are likely not prepared for extended power outages (ie: several days or weeks).
15. The use of portable generators pose risks for those using them as well as for utility line workers if not used or connected correctly. Risks include electrocution, fire, and carbon monoxide poisoning.
16. Food and medical supplies may be delayed due to highway and interstate conditions and road closures.
17. Those required to work outdoors or student population walking to and from school are highly vulnerable to frost bite or hypothermia as a result of extreme cold temperatures and wind chill.
18. Populations of higher vulnerability include tourists, homeless, and those who've recently moved to North Dakota with no previous experience with the more harsh winter season.
19. Those travelling during winter storm events may become stranded or become involved in a traffic accident due to visibility and/or road conditions. There is also a higher vulnerability for those traveling within the city during any power outages affecting traffic signal lights.
20. Potential roof collapse as a result of heavy snow load, especially on wide span flat roofs such as gymnasiums or auditoriums.
21. Sewer vents may freeze up, creating vulnerability to the occupants (ie: illness).
22. Occupants of homes / facilities without carbon monoxide detectors are vulnerable if venting is blocked or if the occupants are using improper alternative heating sources or using them improperly.
23. Traffic accidents may occur as a result of power loss to traffic signal lights (ie: ice storm impacting power lines)

Capabilities

Existing Mitigation Capabilities Specific to the Winter Storm Hazard

Also see Section 6 for additional listings of mitigation capabilities.

1. Snow Emergency Routes are designated, signed, and communicated to the public via the city's website. Snow Emergency Routes are designated in City Ordinances 10-02-01 and 10-02-02.
2. City Ordinance 10-02-03 provides for capability to issue a "snow emergency declaration" which allows for prohibition of parking on designated (or all) snow emergency routes.
3. Although Bismarck utilizes snow gates on the plows, City Ordinance 10-02-05 allows for snow plow operations to discontinue the use of the snow gates when a snow emergency is declared. The same city ordinance also allows for taking certain actions when necessary including posting no parking signs to aid in snow removal and hiring of temporary personnel for snow removal. Ordinance 10-05-05 addresses placement of mail boxes to avoid the mailboxes becoming snow removal obstacles.
4. Ordinance 12-13-23 provides officers with authority to remove illegally stopped or parked vehicles when the vehicle is parked on a posted "snow emergency" route during a declared snow emergency.
5. City sanding operations may start before, during, after, or independently of other plowing operations, as appropriate. Public works strives to obtain an 8% salt content within this sand to prevent the sand from freezing/clumping. Public Works also has liquid brine applicators. Applying liquid brine prevents ice from sticking to the streets. This is applied sparingly to minimize environmental impacts.
6. Local utility companies trim trees around their power poles and power lines to minimize risk of utility infrastructure damage following events that may severely impact trees and/or limbs. The current pruning area for MDU is from the East and West Avenue A up to Boulevard and from Washington to 3rd. This pruning is does not include the house connections (main transmission line to the house), this falls on the responsibility of the home owner.
7. Public Works has back-up power capabilities to maintain traffic signals (partial).
8. Back-up generators are in place within city-owned critical facilities and infrastructure.
9. Bismarck has adopted the International Building Code which identifies construction requirements relating to heavy snow loads.
10. Public Education is conducted in concert or partnership with the National Weather Service as well as many other departments at the local, state, and federal government level as well as volunteer agencies promoting emergency preparedness, such as the American Red Cross.
    a. Severe Winter Weather Awareness Campaign – annual
    b. Installation of carbon-monoxide detectors
11. Public Information and Warnings are issued via the National Weather Service (see next page).
12. Emergency Alert System in place
    a. Public Information and Warnings via the National Weather Service
13. NOAA Weather Radio in all Bismarck Public Schools – in place

National Weather Service - "Storm Ready" recognition – Recertified / approved in 2012

14. A Living Snow Fence was put in place (1990s) to prevent the drifting of snow across Yegan Road to the south and east. Due to the airport chain-link perimeter fence creating a drifting problem, the three rows of shrubs were installed to help drop the snow blowing from across the airport property, potentially blocking Yegan Road. The shrubs planted do NOT attract birds to reduce the possibility of bird strikes on airplanes. 15. The National Weather Service (Bismarck Office) provides for decision support services, providing valuable situational awareness for planning prior to anticipated storm events.	

Response Phase Mitigation – Winter Storm:

1. Public Works maintains its Snow and Ice Control Plan. The plan identifies snow removal priorities which are publicized on the city's website.
2. The Bismarck Emergency Operations Plan outlines task force operations for Winter Storm Emergency Response.
3. The Roughrider Snowmobile Club serves as a resource for critical (life-saving) transportation.
4. Public Works has emergency generators and connectivity to maintain the functioning of traffic signals following power outages.
5. Existing shelter sites (with generators) may be used as warming sites.

National Weather Service Provides Forecast and Warning Services		
Product Type	**Description**	**When Issued**
Hazardous Weather Outlook	Designed to outline anticipated weather hazards for the next seven days and provide the first heads up to any possible severe winter weather.	At least once per day
Watch	Issued when the confidence level for severe winter weather is at least 50% (uncertainty remains in exact timing and location of the storm).	Normally issued 36-48 hours prior to the event
Warning	Issued when there is a direct threat to life and property from severe winter weather that has a high probability of occurrence (80% or higher), or is imminent or occurring.	Normally issued 12-24 hours prior to the event
Advisory	Issued for winter weather conditions that have a high probability of occurrence, are imminent or already occurring, that may cause an inconvenience. If precautions are NOT taken, a situation may develop that may threaten life.	Normally issued 12-24 hours prior to the event

Product Type	Description
Blizzard Warning	When sustained or frequent wind gusts of 35 mph or greater with visibilities of less than one quarter mile for at least three hours are expected.
Winter Storm Warning	When six inches of snow in 12 hours or 8 inches in 24 hours are expected and/or 1/2 inch of sleet accumulation (mixed precipitation and blowing snow may also be possible).
Ice Storm Warning	When 0.25 inches or more of ice accumulation is expected.
Wind Chill Warning	When wind chill values of -40 F or less are expected.

https://www.weather.gov/bis/winter_weather_awareness_1

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Mitigation Implementation Action Plan

1. Mitigation Action items will be monitored and evaluated for progress by the applicable city department or division as assigned.
2. Mitigation action items will be incorporated by the applicable department/division into existing annual strategic or work-plans at the department level. Bismarck Emergency Management will also review the status of mitigation action items with the applicable city departments/divisions.
3. City Administration will coordinate with the applicable city department to integrate the requirements of the mitigation plan into other plans and funding mechanisms (ie: annual budgeting process, capital improvement program, growth management plan, future land use plan, plat review process, site plan review process) when appropriate.

Administration

Hazard	Mitigation Action	Support Agencies	Potential Funding Source / Est. Cost	Timeline Initiate	Timeline Complete	On-going	Status as of 2025
Dam Failure	Locate new critical facilities outside inundation area when possible: When building, remodeling, or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options outside of the dam failure inundation area. Because the probability of a catastrophic dam failure is very low, locating critical facilities outside the inundation area is NOT a requirement. However, assuming there are viable location options outside of the inundation area of equal value and functionality, locating outside the inundation area would reduce the loss potential.		Planning Function No cost	2015		Yes	**Complete** and On-going See status update below.
	The future location for the Bismarck Police Department will be in northeast Bismarck, outside of the dam failure zone. Other recent facilities constructed and located outside of the dam failure zone include Fire Station #4 as well as CenCom and the Emergency Operations Center.						
Train Derailment	Locate new critical facilities at least ¼ mile away from railroad lines: a. When building new or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options at least		Planning Function No cost	2015		Yes	**Complete** and On-going See comment below.

Administration							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
	¼ mile from either railroad line. Assuming there are viable location options at least ¼ mile from the railroad lines of equal value and functionality, locating critical facilities at least ¼ mile away would reduce the loss potential.						
	Both the CenCom/EOC facility and Fire Station #4 met the mitigation recommendation above. The future Police Department location will also meet this mitigation recommendation.						
Winter Storm	Implement City Office closure policy based on imminent or current conditions.		Staff Time	2025			**Complete** and On-going
Winter Storm	Coordinate school/city/business closure communications/decisions.	Bismarck Public Schools	Staff Time	2015		Yes	**Complete** and On-going
Public Education							
Winter Storm	Coordinate public education efforts with internal and local entities (non-profit organizations) serving as liaisons to newcomers who may not be familiar with ND winters.		Staff Time	2025		Yes	**New**

Airport							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Aircraft Accident	Maintain the current airport hazard mitigation and emergency response plans and planning efforts identified as existing mitigation Capabilities within Section 3 of this plan document.		Staff time	2025		Yes	**Complete** and on-going
Aircraft Accident	Recommend Burleigh County and City of Lincoln adopt City of Bismarck aeronautical zoning where applicable based on the City of Lincoln growing nearer to the Airport.	Burleigh County City of Lincoln	NA	2025	2027	Yes	**Complete** See comment below.
	Recommended changes provided to the Bismarck Planning Department for ordinance changes. (2026)						
Aircraft Accident	Update the Wildlife Hazard Assessment.		Local Funding	2026	2027	Yes	**New Update** See comment below.
	Airport Administration will begin the assessment in 2026, to be completed in 2027.						

Building Inspections							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Flood	Bismarck is currently rated at Class 7 within the Community Rating System. Continue annual re-certifications to sustain the CRS program.	Emergency Management GIS Others		2025		Yes	**Complete** and On-going
Public Education							
Flood	Coordinate and/or support NFIP flood insurance promotional efforts including the availability of flood insurance for community residents and businesses.	Emergency Management	Staff Time	2015		Yes	**Complete** and On-going
Tornado	Encourage Wind-Resistant Building Techniques.	Building Inspections	Staff Time	2015		Yes	**Complete** and On-going

Emergency Management							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Space Weather	Develop a communication plan strategy. *Communicate the possibility of such an unavoidable event and ensure there are effective communication strategies in place for before, during and after an event. Identify the appropriate scale (trigger point) to use for purposes of informing the public of potential impacts. Coordinate with NWS and Space Weather Prediction Center personnel.*	Comms within Administration	Staff Time	2025	2030		**New**
Tornado	Outdoor Warning Sirens - identify need and install additional sirens as the city expands.	Administration, Finance, Planning	$30,000 Each City Funds	2015		Yes	**Complete** and On-going
	Installed three additional sirens in 2023.						
Tornado All	Replace outdoor warning siren activation controller system.		180,000 City Funds	2020	2021	No	**Completed**
Public Education							
All Hazards	Promote the NOAA all-hazards weather radio as a viable option to receive weather alerts/warnings to ensure awareness of risk and provide for recommended actions for personal safety.	NWS	Staff Time	2015		Yes	**Complete** and On-going
All Hazards	Promote mitigation and emergency preparedness for all hazards.		Staff Time	2015		Yes	**Complete** and On-going
All Hazards	Automatic Notification System (CodeRED) – promote opt-in based on new platform.	CenCom	Staff Time	2025		Yes	**New**
All Hazards	Coordinate public education efforts with local schools and local entities (non-profit organizations) serving as liaisons to newcomers and other vulnerable population groups.	Public Health Comms via Administration	Staff Time	2025		Yes	**New**

Emergency Management							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Dam Failure	Establish Awareness (public education) of the potential impact of Heart Butte Dam.		Staff Time	2025	2027	Yes	**New**
Dam Failure	Support public awareness efforts relating to planned maintenance and repair projects relating to the Garrison Dam as well as the Heart Butte Dam.		Staff Time	2025	2027	Yes	**New**
Dam Failure	Participate in Heart Butte Dam emergency action plan reviews.		Staff Time	2025		Yes	**New**
Flood	Provide for Flood Mitigation and Preparedness Public Education efforts for local citizens and businesses. (via website content and public presentations upon request).	Building Inspections	Staff Time EM Budget	2015		Yes	**Complete** and On-going
Flood & Dam Failure	Promote the purchase of flood insurance (National Flood Insurance Program) – community wide.			2025		Yes	**Complete** and On-going
Hazmat & Train Derailment	Continue Public Education regarding Shelter In Place and Evacuation procedures	Fire		2015		Yes	**Complete** and On-going
	Special Populations Considerations: Bismarck State College and occupancies within ½ mile of railroad lines.						
Severe Summer Weather	Continue participating in the Severe Summer Weather Awareness campaign.		Staff Time EM Budget	2015		Yes	**Complete** and On-going
Severe Summer Weather	Extreme Heat: Do not leave children or pets in the unattended vehicle.	NWS	Staff Time	2015		Yes	**Complete** and On-going
Space Weather	Enhance the Emergency Management Website to include Space Weather to enhance awareness of potential impact, including communications challenges.		Staff Time	2025		Yes	**New**
Tornado	Promote shelter pre-planning at the individual and worksite levels to include recommendations to take shelter during a tornado watch and avoid tendencies to relocate during a tornado warning.	NWS	Staff Time	2025		Yes	**Complete** and On-going
Tornado	Continue participating in the Severe Summer Weather		Staff Time	2015		Yes	**Complete** and On-going

Emergency Management							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
	Awareness campaign.						
Tornado	Protect property from high winds (FEMA website) http://www.fema.gov/media-library/assets/documents/13270?id=3263		Staff Time	2015		Yes	**Complete** and On-going
Tornado	Public Information - NWS Warnings (existing mitigation capability)	NWS	Staff Time	2020			**New**
Tornado	Safe Room Construction Design for property owners (public education) http://www.fema.gov/media-library/assets/documents/2009?fromSearch=fromsearch&id=1536		Staff Time	2015		Yes	**Complete** and On-going
Tornado	Promote the NOAA All Hazards Weather Radio – for all homes and businesses to consider as a primary indoor or portable system for receiving alerts/warnings.		Staff Time	2025		Yes	**New**
Wildland Fire (WUI)	Share Air Quality Information alerts when disseminated by the ND Department of Environmental Quality, along with applicable Shelter In Place recommendations. https://deq.nd.gov/AQ/monitoring/		Staff Time	2025		Yes	**New**
Wildland Fire (WUI)	Provide "AirNow" air quality information via the city's website within Emergency Management web pages. Interactive Map of Air Quality		Staff Time	2025	2026	Yes	**New**
Winter Storm	Recommended minimum of 3-day emergency supplies – recommend enhancing preparedness to 1 or 2 weeks of power loss.		Staff Time	2015		Yes	**Complete** and On-going
Winter Storm	Public Education (on-going) - emphasis on dangers of downed power lines and utilizing alternate work start/stop times to minimize rush hour traffic.	Public Works	Staff Time	2025		Yes	**New**
Winter Storm	Participate in the Severe Winter Weather Awareness Campaign (on-going).		Staff Time	2015		Yes	**Complete** and On-going
Winter Storm	Public Information and Warnings (via NWS).	NWS	Staff Time	2020		Yes	**Complete** and On-going

Engineering							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Flood	South Bismarck Flood Control Study	Public Works	Received Grant Award $407,384	May 2021	Dec 2023	No	**Completed**
Flood	South Bismarck Flood Control Mitigation Project: Reconstruct the South Washington Street Closure Structure (gate) and add a pump station at this location. And modify (widen) the drainage ditch in south Bismarck to enhance flood control and to assist in meeting FEMA requirements for flood protection certification.	FEMA DWR City of Bismarck	FEMA ND (DWR) City	2025	2027	No	**New**
Geologic	Develop a remediation to buttress the active geological slide occurring on River Road north of I94 Grant March Bridge.		Already Funded	2020	2021	No	**Completed**
Geologic	Finalize and approve the Ash and Ward Coulee Stormwater Master Plan.		Already Funded	2014	2015		**Complete**
Geologic	Continue to include recommendations regarding development control lines in geological sensitive areas as future planning is done.		NA Planning Function	2015		Yes	**Complete** and On-going
Public Education							
Geologic	Identify opportunities to inform or remind property owners of property related information regarding potential geologic conditions that may impact them or their property.		TBD based on method of public education	2015		Yes	**On-Going** See comment below
	Additional geologic hazards potentially affecting private property have not been identified which would promote the need for communicating the hazard to respective landowners.						

Environmental Health							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Infectious Disease	Provide education when conducting food service inspections.		Staff Time	2015		Yes	**Complete** and On-going
Infectious Disease	Implement risk-based inspection frequency for food establishments.	NDHHS	Staff Time	2015		Yes	**Completed.** See comment below.
	Risk-based food inspections have been implemented. Continuing to perform risk-based inspections.						
Infectious Disease	Require bi-monthly water analysis for pools and recommend superchlorination if chlorine levels are observed to be low when collecting water samples.		Staff Time	2015		Yes	**Complete** See comment below.
	Pools are now required to submit monthly water sampling.						
Infectious Disease	Provide mosquito control & surveillance services.		$70,000 annual budget estimate	2015		Yes	**Complete** and On-going

Fire Department

Hazard	Mitigation Action	Support Agencies	Potential Funding Source / Est. Cost	Timeline Initiate	Timeline Complete	On-going	Status as of 2025
Fire	Continue to update and enforce zoning, building and fire code regulations.		Staff Time Fire Dept Budget	2015		Yes	**Complete** and On-going
Fire	Promote (not require) residential fire sprinkler systems to minimize fire risk and vulnerability.		Staff Time	2015		Yes	**Complete** and On-going
	This has not been well received by local developers due to added cost of construction of spec homes. Home builders could share this option with those designing/contracting construction of a custom home.						
Hazmat	Develop preplans specific to hazardous materials fixed facilities.		Staff Time	2015		Yes	**Complete** and On-going
Wildland Fire	Maintain Wildland Fire-Break Trail in Southwest Bismarck.	Forestry Public Works	Staff Time	2015		Yes	**Complete** and On-going
Wildland Fire	Update the Wildland Fire Urban Interface risk map annually or as needed based on city annexations.	GIS	Staff Time	2025		Yes	**New**
Wildland Fire	Share Firewise landscaping concepts with developers and the Planning Department.	Planning	Staff Time	2025		Yes	**New**
Public Education							
Fire	Provide Fire Safety public education to the community at large.		Staff Time Fire Dept Budget	2015		Yes	**Complete** and On-going
Hazmat & Train Derailment	Continue Public Education efforts regarding Shelter In Place and Evacuation procedures.	Emergency Management	Dept Budgets Staff Time	2015		Yes	**Complete** and On-going
	Special Populations Considerations: Bismarck State College and occupancies within ½ mile of railroad lines.						
Wildland Fire	Continue to provide for public education efforts, including media releases, interviews, website updates, and public outreach. Public outreach shall include specific mailings to property owners within		Staff Time Fire Dept Budget	2015		Yes	**Complete** and On-going

Fire Department							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
	the wildland fire risk areas every three years or as applicable based on drought conditions. Public education efforts utilize Firewise program guidance.						
	Bismarck Fire is prepared to provide for public education during future drought conditions.						
Wildland Fire	Share Firewise landscaping concepts with developers and the Planning Department.		Staff Time Fire Dept Budget	2015		Yes	**Complete** and On-going

Forestry							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Pest Infestation	Continue programs to monitor existing and future forest damaging pests.		Staff Time	2015		Yes	**Complete** and On-going See comment below
	Ongoing annual monitoring by seasonal Dutch Elm Disease crew and forestry staff.						
Pest Infestation	Continue existing mitigation efforts including the systematic approach to removing ash trees in decline and replant with a different species to increase the diversity of our urban forest.		Staff Time Public Works / Forestry Budget	2015		Yes	**Complete** and On-going See comment below
	The Forestry Division performs risk assessments annually to aid in identifying declining ash trees. See existing mitigation capabilities within Section 3 of this plan document.						
Pest Infestation	Maintain the "City of Bismarck Emerald Ash Borer Response Plan" developed and approved by the Forestry Advisory Board and the City Commission.		Staff Time Public Works / Forestry Budget	2025	2026	Yes	**Complete** and On-going
Winter Storm	Downed Power Line Safety Training (Forestry Staff - Internal)		Staff Time Public Works / Forestry Budget	2025		Yes	**Complete** and On-going
Public Education							
Drought	Provide for community-wide public education relating to landscaping and watering strategies including availability of water analytics, smart irrigation controllers, drought tolerant landscaping, and irrigation rates.	Public Works		2025		Yes	**New**
Pest Infestation	Continue public education efforts to diversify tree plantings and reduce potential for transporting pests (Pest Infestations) from other areas of the country.		Staff Time	2015		Yes	**Complete** and On-going See comment below
	Ongoing public education efforts through Partners in Planting Program and public outreach.						

Information Technology							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Cyber-Attack	Review Cybersecurity policies and procedures annually.			2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)
Cyber-Attack	Engage third parties to perform cybersecurity review and establish security goals.			2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)
Cyber-Attack	Conduct cybersecurity training and tabletop exercises with staff.	All City Depts		2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)
Cyber-Attack	Maintain internal documentation regarding mitigation goals and action items recommended. Communicate mitigation goals and priority action items internally with appropriate city staff.	City Administration Finance	Varies by project	2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)
Cyber-Attack	Continue existing mitigation capabilities as listed within Section 3 of this plan document.			2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)
Cyber-Attack	Promote (internally) the recommended mitigation actions as listed within the Cyberattack hazard profile within Section 9 of this plan document	All City Depts		2025	2030	Yes	***New** (Cyberattack hazard added to plan in 2025)

*Mitigation efforts were in place prior to adding Cyberattack as a hazard to this mitigation plan. The status of “new” in this case is based on the mitigation action items not being included in the previous 2020 plan.

Planning							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Tornado	Update the Land Development Code to ensure space for sirens is reserved during the planning phase of development.	Emergency Management		2025	2026	No	**New**
Winter Storm and All Hazards	Advocate for and support the development of safe, stable, and affordable housing options for individuals and families.	Public Health & Community Partners		2025	2030		**New**

Police							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Active Threat	Invest in a real-time crime center and deploy advanced analytics technologies in high-traffic and high-risk areas to support rapid response, crime prevention, and data-driven decision-making.		TBD	2025	2030		**New**
Active Threat	Continue existing mitigation capabilities as listed in Section 3 of this plan.		Department Budget	2025	2030	Yes	**Complete** and On-going
Active Threat	Provide for training opportunities in how to plan, prepare, and mitigate potential Active Threat / Active Attack incidents. Promote opportunities internally (city departments) and externally (community). (CRASE: Civilian Response to Active Shooter Events).		Department Budget	2025	2030	Yes	**Complete** and On-going
Active Threat	Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the Bismarck Police Department or the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options. State Assistance Visit - NDSLIC		Staff Time	2025	2030	Yes	**Complete** and On-going
Civil Disturbance	Continue preparedness, training, and mitigation activities (mitigation capabilities) as summarized in Section 3 of this plan.		Department Budget	2025	2030	Yes	**Complete** and On-going
Civil Disturbance	Encourage the state of ND to fund support for civil disturbance teams to facilitate training as well as equipment needs in order to support mitigation, prevention, and response capability.		Staff Time	2025	2030	Yes	**Complete** and On-going

Police							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Terrorist, or Nation-State Attack	Continue the existing mitigation capabilities as summarized within Section 3 of this plan document.		Department Budget	2025	2030	Yes	**New**
Terrorist, or Nation-State Attack	Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options.		Staff Time	2025	2030	Yes	**New**
Terrorist, or Nation-State Attack	Share Mitigation Strategies as recommended by the ND State and Local Intelligence Center as a resource for the city, local businesses and citizens. *See "Capabilities" within Section 3 of this plan document.*		Staff Time	2025	2030	Yes	**New**

Public Health							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Infectious Disease	Continue Mitigation Capabilities (on-going or routine mitigation activities) as listed in Section 3 of this plan.						**Complete and On-going** See note below.
	Mitigation Action Items as identified in the 2020 plan have been moved to existing mitigation capabilities within Section 3 of this plan document. See "infectious Disease" within Section 3. Status of all previous mitigation action items is completed and on-going.						
Infectious Disease	Elevate community education campaigns during increased risk of disease. (influenza season).			2025		Yes	**New** **Complete and On-going**
Infectious Disease	Engage community partners during disease outbreaks (response action).	Per Public Health EPR response plans		2025		Yes	**New** **Complete and On-going**
Winter Storm and All Hazards	Identify and implement coordinated, community-driven solutions to effectively support individuals experiencing homelessness, behavioral health crises, or substance use disorders. *Lead facilitation of the Community Triage Center planning, development, and coordination.*	Community		2025	2030		**New**
Winter Storm and All Hazards	Advocate for and support the development of safe, stable, and affordable housing options for individuals and families.	Planning Dept & Community		2025	2030		**New**

Public Works

Hazard	Mitigation Action	Support Agencies	Potential Funding Source / Est. Cost	Timeline Initiate	Timeline Complete	On-going	Status as of 2025
Dam Failure	Conduct maintenance activities at Jackman Coulee Dam #2 (Tom O'Leary Golf Course) as recommended by the State Water Commission and/or annual inspections conducted by Bismarck Public Works.	PW Utilities	PW Utilities Funding	2015		Yes	**Complete** and On-going See comment below
	Public Works completes inspections and maintenance annually.						
Flood	Provide protection to the wastewater treatment plant outfall: Place control structures along the wastewater treatment plant outfall near the Tavis structure and the river to protect the wastewater treatment plant from inundation when river levels at Bismarck gage station rise to 13'.		State Water Commission & City of Bismarck 1M	2020	2021		**Completed**
Flood	Maintain existing flood protective measures to minimize vulnerability as a result of ice jams as well as 100-year and 500-year flood events. Note: Refers to maps Figures 1 through 7) within Section 3 (Mitigation Capabilities).		PW Utility Funding and Staff Time	2012		Yes	**Complete** and On-going See comment below
	All gates are inspected and operated biannually.						
Flood	Continue Watershed master planning and updating as an on-going mitigation activity conducted jointly by Engineering, Public Works, Planning, and Building Inspections.	Engineering, Planning	Staff Time	2015		Yes	**Complete** and On-going
Space Weather	Consider EMP shielding devices to protect generators.		Various Mitigation Grants	2025		Yes	**New**

Public Works							
Hazard	**Mitigation Action**	**Support Agencies**	**Potential Funding Source / Est. Cost**	**Timeline Initiate**	**Timeline Complete**	**On-going**	**Status as of 2025**
Tornado	Include a Tornado Safe Room to EF4 standards within any new construction of city owned critical facilities where applicable based on occupancy.	Public Works Facility Mgmnt	Project Specific	2015		Yes	**Complete** and On-going
	Recent Facilities: CenCom/Emergency Operations Center Facility and Fire Station #4 included Tornado Safe Rooms construction.						
Tornado	Ensure NOAA All Hazards Weather Radios are located in all city owned buildings.	Facilities Mgmt. Emergency Mgmnt	Individual City Departments $50 per radio	2015	2030	Yes	**Progressing**
Winter Storm	Identify critical facilities and infrastructure having or needing back-up generators or upgrades.		Staff Time	2015	2030	Yes	**Complete** and On-going
Winter Storm	Ensure back-up generators are in place at all city-owned Critical Facilities. Ensure the back-up generators allow for continued operations of critical and essential functions.		TBD based on generator needs	2015	2030	Yes	**Complete** and On-going
	Recent facilities: CenCom/Emergency Operations Center Facility, Fire Station #4, and Public Health facilities have established generator capability.						
Winter Storm	Evaluate need and opportunity for snow fences.		Staff Time	2015		Yes	**Complete** and On-going
Public Education							
Drought	Provide for community-wide public education relating to landscaping and watering strategies including availability of water analytics, smart irrigation controllers, drought tolerant landscaping, and irrigation rates.	Forestry		2025		Yes	**New**
Winter Storm & Geologic Hazard	Do NOT stockpile snow (or other material) within any geological sensitive areas.	Engineering	Staff Time Dept Budget	2015		Yes	**Complete** and On-going

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Mitigation Actions – Prioritizing

New and existing mitigation action items are scored using the "STAPLEE" criteria as outlined below and prioritized based on several considerations listed within the table on the next page. Scoring and prioritizing is initiated by Bismarck Emergency Management and reviewed by those identified as Lead Planners per hazard. During the final stages of planning, Mitigation Plan Update Steering Committee members are provided opportunity to review and comment.

It's important to note that completion of mitigation action items is not sequential based on priority level, but depends on various factors including available resources, seasonal priorities and limitations, funding, and potential coordination requirements with community partners, etc.

Public Education mitigation actions are integrated into position job descriptions within various departments and are generally on-going or routine activities. These mitigation actions are grouped as "Public Education" rather than ranked as high, moderate, or low. However, they are listed based on the hazard ranking.

STAPLEE Criteria	
Criteria	**Considerations**
Social	Community Acceptance Effects on Segment of Population
Technical	Technical Feasibility Long-Term Solution Secondary Impacts
Administrative	Staffing Funding Allocated Maintenance/Operations
Political	Political Support Local Champion or Proponent Public Support
Legal	Local Authority Subjectivity to Legal Challenges
Economic	Benefit of Action Cost of Action Contribution to Economic Goals Outside Funding Requirement
Environmental	Effects on Land/Water Bodies Effects on Endangered Species Effects on Hazardous Material and Waste Sites Consistency with Community Environmental Goals Consistency with Federal Laws
Source (STAPLEE): Federal Emergency Management Agency	
STAPLEE Scoring Criteria: 1= highly effective, feasible 0= Neutral -1 = Ineffective or not feasible	

Mitigation Action Item Prioritizing			
The STAPLEE score in conjunction with additional considerations below were applied to determine the ranking for each mitigation action item.			
High	**Moderate**	**Low**	**Deny**
• Needs attention or participation from department heads, authorities, officials • Requires Funding support (ie: grants) • Required to address significant vulnerability • Needs urgent attention (not necessarily short term completion) • Higher hazard rank	• Other entities have lead role – Bismarck is supporting role in mitigation • Not fully within city authority – but city voice may be effective	• Routine or part of city position job description • Can be completed by one individual – minimal coordination • Minimal funding challenges • On-going / routine mitigation	• Not effective (ie: not likely to meet cost/benefit ratio of 1:1) • Not feasible, or practical – or may have other more effective solutions

Note: All Mitigation Action items are important, regardless of ranking of high, moderate or low. “Low” priority mitigation action items are important mitigation action items. Also, the rank does not imply a sequence or priority order for initiating or completing mitigation action items.

Mitigation Action "STAPLEE" Evaluation and Priority Level

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Winter Storm	High	Coordinate school/city/business closure communications/decisions. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 0 / 1 / 9	Administration	High
Winter Storm	High	Downed Power Line Safety Training (Forestry Staff – Internal) 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Forestry	High
Winter Storm	High	Ensure back-up generators are in place at all city-owned Critical Facilities. Ensure the back-up generators allow for continued operations of critical and essential functions. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Public Works	High
Winter Storm	High	Evaluate need and opportunity for snow fences. 1 / 0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9	Public Works	High
Winter Storm	High	Implement City Office closure policy based on imminent or current conditions. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Administration	High
Winter Storm	High	Identify critical facilities and infrastructure having or needing back-up generators or upgrades. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Public Works Facilities Mgmnt	High
Winter Storm & All Hazards	High	Identify and implement coordinated, community-driven solutions to effectively support individuals experiencing homelessness, behavioral health crises, or substance use disorders. *Lead facilitation of the Community Triage Center planning, development, and coordination.* 1 / 0 / 1 / 1 / 0 / 0 / 1 / 1 / 1 / 1 / 7	Public Health	High
Winter Storm & All Hazards	High	Advocate for and support the development of safe, stable, and affordable housing options for individuals and families. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Planning & Public Health	High

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Tornado	High	Include a Tornado Safe Room to EF4 standards within any new construction of city-owned critical facilities where applicable based on occupancy.	Public Works Facility Mgmnt	High
		1 / 1 / 0 / 1 / 1 / 1 / 1 / 1 / 0 / 1 / 8		
Tornado	High	Update the Land Development Code to ensure space for sirens is reserved during the planning phase of development.	Planning	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Review Cybersecurity policies and procedures annually.	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Engage third parties to perform cybersecurity review and establish security goals.	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Conduct cybersecurity training and tabletop exercises with staff.	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Maintain internal documentation regarding mitigation goals and action items recommended. Communicate mitigation goals and priority action items internally with appropriate city staff.	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Continue existing mitigation capabilities as listed within Section 3 of this plan document.	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Cyber-attack	High	Promote (internally) the recommended mitigation actions as listed within the Cyberattack hazard profile within Section 9 of this plan document	Information Technology	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Flood	Moderate	Maintain existing flood protective measures to minimize vulnerability as a result of ice jams as well as 100-year and 500-year flood events. Note: Refers to maps (Figures 1 thru 5) within “existing mitigation”	Public Works	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Flood	Moderate	South Bismarck Flood Control Mitigation Project: Reconstruct the South Washington Street Closure Structure (gate) and add a pump station at this location. And modify (widen) the drainage ditch in south Bismarck to enhance flood control and to assist in meeting FEMA requirements for flood protection certification.	Engineering	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Train Derailment	Moderate	Locate new critical facilities at least ¼ mile away from railroad lines: a. When building new or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options at least ¼ mile from either railroad line. Assuming there are viable location options at least ¼ mile from the railroad lines of equal value and functionality, locating critical facilities at least ¼ mile away would reduce the loss potential.	Administration	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / **10**		
Infectious Disease	Moderate	Require bi-monthly water analysis for pools and recommend superchlorination if chlorine levels are observed to be low when collecting water samples.	Environmental Health	High
		1 / 0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9		
Infectious Disease	Moderate	Provide education when conducting food service inspections.	Environmental Health	High
		1 / 0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9		
Infectious Disease	Moderate	Provide mosquito control & surveillance services.	Environmental Health	High
		1 / 0 / 1 / 1 / 1 / 0 / 1 / 1 / 0 / 0 / 6		
Fire	Low	Promote (not require) residential fire sprinkler systems to minimize fire risk and vulnerability.	Fire	High
		1 / 1 / 1 / 0 / 1 / 1 / 0 / 1 / 1 / 1 / 8		
Geologic	Low	Continue to include recommendations regarding development control lines in geological sensitive areas as future planning is done.	Engineering	High
		0 / 1 / 1 / 1 / 1 / 1 / 0 / 1 / 1 / 1 / 8		
Tornado	High	Ensure NOAA All Hazards Weather Radios are located in all city owned buildings.	Public Works Facilities Mgmnt	Moderate
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 0 / **9**		

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Flood	Moderate	Continue Watershed master planning and updating as an on-going mitigation activity conducted jointly by Engineering, Public Works, Planning, and Building Inspections.	Public Works	Moderate
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Flood	Moderate	Conduct maintenance activities at Jackman Coulee Dam #2 (Tom O'Leary Golf Course) as recommended by the State Water Commission and/or annual inspections conducted by Bismarck Public Works.	Public Works	Moderate
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Flood	Moderate	Bismarck is currently rated at Class 7 within the Community Rating System. Continue annual re-certifications to sustain the CRS program.	Emergency Management & Building Inspections	Moderate
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Fire	Low	Continue to update and enforce zoning, building and fire code regulations.	Fire	Moderate
		1 / 1 / 1 / 1 / 1 / 1 / 0 / 1 / 1 / 1 / **9**		
Winter Storm	High	Public Information and Warnings (via NWS)	Emergency Management	Low
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Hazmat	Moderate	Develop preplans specific to hazardous materials fixed facilities.	Fire	Low
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Active Threat	Moderate	Invest in a real-time crime center and deploy advanced analytics technologies in high-traffic and high-risk areas to support rapid response, crime prevention, and data-driven decision-making.	Police	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Active Threat	Moderate	Continue existing mitigation capabilities as listed in Section 3 of this plan.	Police	Low
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		

Hazard	Hazard Ranking	Mitigation Action											Lead	Priority
		Life Safety	Property Protection	Benefit vs. Cost	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Score		
Active Threat	Moderate	Provide for training opportunities in how to plan, prepare, and mitigate potential Active Threat / Active Attack incidents. Promote opportunities internally (city departments) and externally (community). (CRASE: Civilian Response to Active Shooter Events).											Police	Moderate
		1	1	1	1	1	1	1	1	1	1	10		
Active Threat	Moderate	Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the Bismarck Police Department or the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options.											Police	High
		1	1	1	1	1	1	1	1	1	1	10		
Civil Disturbance	Moderate	Continue preparedness, training, and mitigation activities (mitigation capabilities) as summarized in Section 3 of this plan.											Police	Low
		1	1	1	1	1	1	1	1	1	1	**10**		
Civil Disturbance	Moderate	Encourage the state of ND to fund support for civil disturbance teams to facilitate training as well as equipment needs in order to support mitigation, prevention, and response capability.											Police	High
		1	1	1	1	1	1	1	1	1	1	10		
Terrorist, or Nation-State Attack	Low	Continue the existing mitigation capabilities as summarized within Section 3 of this plan document.											Police	Low
		1	1	1	1	1	1	1	1	1	1	10		
Terrorist, or Nation-State Attack	Low	Recommendation for city facilities and public/private critical infrastructure entities: Request a site assistance visit from the ND State and Local Intelligence Center to facilitate identification of vulnerabilities and identify mitigation options.											Police	High
		1	1	1	1	1	1	1	1	1	1	**10**		
Terrorist, or Nation-State Attack	Low	Share Mitigation Strategies as recommended by the ND State and Local Intelligence Center as a resource for the city, local businesses and citizens. *See "Capabilities" within Section 3 of this plan document.*											Police	High
		1	1	1	1	1	1	1	1	1	1	10		

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Infectious Disease	Moderate	Continue Mitigation Capabilities (on-going or routine mitigation activities) as listed in Section 3 of this plan.	Public Health	Low
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Infectious Disease	Moderate	Elevate community education campaigns during increased risk of disease. (influenza season).	Public Health	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Infectious Disease	Moderate	Engage community partners during disease outbreaks (response action).	Public Health	High
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10		
Pest Infestation	Low	Continue programs to monitor existing and future forest damaging pests.	Forestry	Low
		0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9		
Pest Infestation	Low	Continue existing mitigation efforts including the systematic approach to removing ash trees in decline and replant with a different species to increase the diversity of our urban forest.	Forestry	Low
		0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9		
Pest Infestation	Low	Maintain the “City of Bismarck Emerald Ash Borer Response Plan” developed and approved by the Forestry Advisory Board and the City Commission.	Forestry	Low
		0 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 9		
Dam Failure	Low	Locate new critical facilities outside inundation area when possible: When building, remodeling, or relocating critical facilities, the City of Bismarck should provide additional consideration or preference for location options outside of the dam failure inundation area. Because the probability of a catastrophic dam failure is very low, locating critical facilities outside the inundation area is NOT a requirement. However, assuming there are viable location options outside of the inundation area of equal value and functionality, locating outside the inundation area would reduce the loss potential.	Administration	Low
		1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / **10**		

Hazard	Hazard Ranking	Mitigation Action	Lead	Priority
		Life Safety / Property Protection / Benefit vs. Cost / Social / Technical / Administrative / Political / Legal / Economic / Environmental / Score		
Aircraft Accident	Low	Maintain the current airport hazard mitigation and emergency response plans and planning efforts identified as existing mitigation Capabilities within Section 3 of this plan document. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Airport	Low
Aircraft Accident	Low	Recommend Burleigh County and city of Lincoln adopt city of Bismarck aeronautical zoning where applicable based on the city of Lincoln growing nearer to the Airport. 1 / 1 / 1 / 1 / 1 / 0 / 0 / 1 / 1 / 1 / 8	Airport	Moderate
Aircraft Accident	Low	Update the Wildlife Hazard Assessment. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Airport	Low
Wildland Fire	Low	Update the Wildland Fire Urban Interface risk map annually or as needed based on city annexations. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Fire	Low
Wildland Fire	Low	Share Firewise landscaping concepts with developers and the Planning Department. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Fire	Low
Wildland Fire	Low	Maintain Wildland Fire-Break Trail in Southwest Bismarck. 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Fire	Low
Space Weather	Low	Develop a communication plan strategy. *Communicate the possibility of such an unavoidable event and ensure there are effective communication strategies in place for before, during and after an event. Identify the appropriate scale (trigger point) to use for purposes of informing the public of potential impacts. Coordinate with NWS and Space Weather Prediction Center personnel.* 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 10	Emergency Management	Low
Space Weather	Low	Consider EMP shielding devices to protect generators. 1 / 1 / 0 / 1 / 0 / 1 / 1 / 1 / 0 / 0 / **6**	Public Works Facility Management	Low

Public Education Mitigation Activities

Hazard	Hazard Ranking	Mitigation Action	Life Safety	Property Protection	Benefit vs. Cost	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Score	Lead	Priority (See Page 1 of this Section)
All Hazards	High	Automatic Notification System (CodeRED) – promote opt-in based on new platform.	1	1	1	1	1	1	1	1	1	1	10	CenCom & Emergency Management	Public Education
Winter Storm & All Hazards	High	Coordinate public education efforts with local schools and local entities (non-profit organizations) serving as liaisons to newcomers and other vulnerable population groups.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Winter Storm	High	Public Education (on-going) - emphasis on dangers of downed power lines and utilizing alternate work start/stop times to minimize rush hour traffic.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Winter Storm	High	Participate in the Severe Winter Weather Awareness Campaign (on-going).	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Winter Storm	High	Coordinate public education efforts with internal and local entities (non-profit organizations) serving as liaisons to newcomers who may not be familiar with ND winters.	1	1	1	1	1	0	1	1	1	1	9	Administration	Public Education
Tornado	High	Promote shelter pre-planning at the individual and worksite levels to include recommendations to take shelter during a tornado watch and avoid tendencies to relocate during a tornado warning.												Emergency Management	Public Education
Tornado	High	Public Information - NWS Warnings (existing mitigation capability)	1	0	1	1	1	1	1	1	1	1	9	National Weather Service	Public Education
Tornado	High	Encourage Wind-Resistant Building Techniques	1	1	1	1	1	1	1	1	1	1	10	Building Inspections	Public Education

Hazard	Hazard Ranking	**Mitigation Action**	Life Safety	Property Protection	Benefit vs. Cost	Social	Technical	Administrative	Political	Legal	Economic	Environmental	**Score**	Lead	**Priority** *See Page 1 of this Section*
Tornado & All Hazards	High	Promote the NOAA All Hazards Weather Radio – for all homes and businesses to consider as a primary indoor or portable system for receiving alerts/warnings.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Tornado	High	Protect property from high winds (FEMA website) http://www.fema.gov/media-library/assets/documents/13270?id=3263	1	1	1	1	1	1	1	1	1	1	**10**	Emergency Management	Public Education
Tornado	High	Safe Room Construction Design for property owners (public education) http://www.fema.gov/media-library/assets/documents/2009?fromSearch=fromsearch&id=1536	1	0	1	1	1	1	0	1	0	0	6	Emergency Management	Public Education
Tornado	High	Continue participating in the Severe Summer Weather Awareness campaign.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Winter Storm	High	Recommended minimum of 3-day emergency supplies – recommend enhancing preparedness to 1 or 2 weeks of power loss.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Severe Summer Weather	Moderate	Extreme Heat: Do not leave children or pets in the unattended vehicle.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Severe Summer Weather	Moderate	Continue participating in the Severe Summer Weather Awareness campaign.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Flood	Moderate	Coordinate and/or support NFIP flood insurance promotional efforts including the availability of flood insurance for community residents and businesses.	1	1	1	1	1	1	1	1	1	1	10	Building Inspections	Public Education
Flood	Moderate	Provide for Flood Mitigation and Preparedness Public Education efforts for local citizens and businesses. (via website content and public presentations upon request).	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Flood & Dam Failure	Moderate	Promote the purchase of flood insurance (National Flood Insurance Program) – community wide.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education

Hazard	Hazard Ranking	**Mitigation Action**											Lead	**Priority** *See Page 1 of this Section*
		Life Safety	Property Protection	Benefit vs. Cost	Social	Technical	Administrative	Political	Legal	Economic	Environmental	**Score**		
Hazmat	Moderate	Continue Public Education regarding Shelter In Place and Evacuation procedures											Fire & Emergency Management	Public Education
		1	1	1	1	1	1	1	1	1	1	10		
Train Derailment	Moderate	Evacuation and Shelter-In-Place Emergency Preparedness.											Fire & Emergency Management	Public Education
		1	0	1	1	1	1	1	1	1	1	**9**		
Fire	Low	Provide Fire Safety public education to the community at large.											Fire	Public Education
		1	1	1	1	1	1	1	1	1	1	10		
Geologic	Low	Identify opportunities to inform or remind property owners of property related information regarding potential geologic conditions that may impact them or their property.											Engineering	Public Education
		0	1	1	1	1	1	1	1	1	1	9		
Wildland Fire	Low	Share Air Quality Information alerts when disseminated by the ND Department of Environmental Quality, along with applicable Shelter In Place recommendations. https://deq.nd.gov/AQ/monitoring/											Emergency Management	Public Education
		1	1	1	1	1	1	1	1	1	1	10		
Wildland Fire	Low	Provide “AirNow” air quality information via the city’s website within Emergency Management web pages. Interactive Map of Air Quality											Emergency Management	Public Education
		1	1	1	1	1	1	1	1	1	1	10		
Wildland Fire	Low	Continue to provide for public education efforts, including media releases, interviews, website updates, and public outreach. Public outreach shall include specific mailings to property owners within the wildland fire risk areas every three years or as applicable based on drought conditions. Public education efforts utilize Firewise program guidance.											Fire	Public Education
		1	1	1	1	1	1	1	1	1	1	10		
Wildland Fire	Low	Share Firewise landscaping concepts with developers and the Planning Department.											Fire	Public Education
		1	1	1	1	1	1	1	1	1	1	10		

Hazard	Hazard Ranking	**Mitigation Action**											Lead	**Priority** *See Page 1 of this Section*
			Life Safety	Property Protection	Benefit vs. Cost	Social	Technical	Administrative	Political	Legal	Economic	Environmental	**Score**	
Drought	Low	Provide for community-wide public education relating to landscaping and watering strategies including availability of water analytics, smart irrigation controllers, drought tolerant landscaping, and irrigation rates.	1	1	1	1	1	1	1	1	1	1	10	Public Works & Forestry	Public Education
Pest Infestation	Low	Continue public education efforts to diversify tree plantings and reduce potential for transporting pests (Pest Infestations) from other areas of the country.	0	1	1	1	1	1	1	1	1	1	9	Forestry	Public Education
Geologic and Winter Storm	Low High	Do Not stockpile snow (or other material) within any geological sensitive areas.	0	1	1	1	1	1	1	1	1	1	9	Public Works	Public Education
Dam Failure	Low	Establish Awareness (public education) of the potential impact of Heart Butte Dam.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Dam Failure	Low	Support public awareness efforts relating to planned maintenance and repair projects relating to the Garrison Dam as well as the Heart Butte Dam.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Dam Failure	Low	Participate in Heart Butte Dam emergency action plan reviews.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
Space Weather	Low	Enhance the Emergency Management Website to include Space Weather to enhance awareness of potential impact, including communications challenges.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education
All Hazards	High	Promote mitigation and emergency preparedness for all hazards.	1	1	1	1	1	1	1	1	1	1	10	Emergency Management	Public Education

The following Mitigation Action Items from the 2020 Multi-Hazard Mitigation Plan have been removed from the listed Mitigation Action items for the 2025 plan update. The column on the right provides the reason.

Hazard	**2020 Mitigation Action Items Removed**	Lead Agency	**Reason**
Tornado	Replace outdoor warning siren activation controller system.	Emergency Management	**Completed**
Tornado	Explore potential for developing a city ordinance to require tornado shelter construction at any newly developed mobile home parks and encourage construction absent city ordinance. Note: If a new manufactured home is anchored to a frost-protected foundation system in accordance with the manufacturers installation requirements it would likely be as resilient to wind damage as a conventionally framed home that has been constructed in accordance with the International Residential Code (IRC). Also, new mobile home parks have not been established in Bismarck within the last 20 years.	Emergency Management	Removed See note at left below the mitigation item.
Flood	Provide protection to the wastewater treatment plant outfall: Place control structures along the wastewater treatment plant outfall near the Tavis structure and the river to protect the wastewater treatment plant from inundation when river levels at Bismarck gage station rise to 13'.	Public Works	**Completed** and listed as a Mitigation Capability in Section 3
Shortage or Outage of Critical Materials	Identify critical facilities and infrastructure having or needing back-up generators or upgrades (ie: critical facilities and shelter locations). Gap Analysis Note: Shortage or Outage of Critical Materials is not included as a separate hazard within this plan update.	Public Works	Transferred to Winter Storm Hazard. Continue.
Shortage or Outage of Critical Materials	Ensure back-up generators are in place at all city-owned Critical Facilities. Ensure the back-up generators allow for continued operations of critical and essential functions. Note: Shortage or Outage of Critical Materials is not included as a separate hazard within this plan update.	Public Works	Transferred to Winter Storm Hazard. Continue.
Train Derailment	Clarify bridge ownership and responsibilities for maintenance and inspections. 7th and 9th Street locations railroad overpasses are BNSF ownership.DOT in concert with the FRA inspects the structures on a three-year rotation.		**Completed** See comment at left.
Geologic	Develop a remediation to buttress the active geological slide occurring on River Road north of I94 Grant Marsh Bridge.	Engineering	**Completed** and listed as a Mitigation Capability in Section 3

Hazard	**2020 Mitigation Action Items Removed**	Lead Agency	**Reason**
Civil Disturbance	Bismarck Police Department staff meet with event organizers (primary points of contact) prior to events to learn of event size (expected total participants), event location, time and date and other event specifics. A permitting process is established and permits are encouraged to be completed, but cannot be mandated based on United States case law.	Police	Listed as an existing Mitigation Capability in Section 3. (routine)
Infectious Disease	Identify appropriate locations for isolation or quarantine.	Public Health	All are completed and are listed within Section 3 as existing Mitigation Capabilities.
Infectious Disease	Increase Immunizations rates through grants opportunities and QI projects.	Public Health	
Infectious Disease	Increased opportunities to receive Hepatitis B vaccine to high risk individuals.	Public Health	
Infectious Disease	Engage and support local healthcare providers in an active preparedness coalition.	Public Health	
Infectious Disease	Sterilization of foot care equipment with an autoclave to decrease spread of Infectious Disease.	Public Health	
Infectious Disease	Continue Existing Mitigation Efforts (BBPH)	Public Health	
Infectious Disease	Assess willingness among local health care providers to work collaboratively to address bacterial resistance and anti-biotic stewardship.	Public ealth	
Infectious Disease	Ongoing education of staff for better response to an outbreak.	Public Health	
Infectious Disease	Provide website and social media means to educate the public during an event.	Public Health	
Infectious Disease	Provide breastfeeding education to increase breastfeeding in the community for higher rates of baby immunity.	Public Health	
Infectious Disease	Provide Narcan training opportunities to the community to help with the emerging substance abuse threat.	Public Health	

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Integration of Plans and Programs & Mitigation Capabilities Inventory

This section provides a summary of community mitigation capabilities and identifies the plans, programs, and other capabilities integrated throughout the development of this mitigation plan. Additional capabilities specific to each hazard are identified within Section 3 of the Multi-Hazard Mitigation Plan.

City Administration will coordinate with the applicable city department to integrate the mitigation plan goals into other plans and funding mechanisms (ie: annual budgeting process, capital improvement program, growth management plan, future land use plan, plat review process, site plan review process) where appropriate.

Plans and Programs Plans and programs reviewed and incorporated into the mitigation plan or mitigation planning process are noted below. This updated 2025 Multi-Hazard Mitigation Plan will be used to inform these mechanisms.	
Bismarck Strategic Plan	The City of Bismarck developed a Strategic Plan identifies the community's Vision, Mission, and Values as well as numerous goals and objectives relating to seven focus areas: Infrastructure and Development, Economic Vitality, Safey and Healthy Community, Emerging Issues, Engaged and Informed Community, Desirable Lifestyle, and Organizational Excellence. The City of Bismarck is available via the city's website, allowing the public to monitor goals and goal status.
Together 2045 – Bismarck's Comprehensive Plan	The Bismarck Comprehensive Plan (Together 2045) was completed in 2022 and is revised periodically . Goal #16 within the plan states "Build community resilience to prepare for, respond to, withstand, and recover from natural disasters." Several objectives are identified under goal #16, relating to floods, drought, winter storms, and general hazard mitigation. The Future Land Use Plan in the Comprehensive Plan utilizes areas of potential hazard, including floodplains and steep slope, to assign suitable future growth areas and zoning. The Major Street Plan displays future major streets to facility orderly development of outward growth and internal connections necessary for street connectivity. The Active Mobility Plan shows future shared use paths. https://www.bismarcknd.gov/DocumentCenter/View/41634/Together-2045-Comprehensive-Plan?bidId=

Plans and Programs Plans and programs reviewed and incorporated into the mitigation plan or mitigation planning process are noted below. This updated 2025 Multi-Hazard Mitigation Plan will be used to inform these mechanisms.	
Bismarck Emergency Operations Plan	The hazard profiles (ie: risk and vulnerability assessment components) contained with this mitigation plan may be referenced to enhance the Emergency Operations Plan and department specific standard operating guides/procedures. The Emergency Operations Plan informs the mitigation planning development through reviews of the Emergency Operations Plan which may identify response capability gaps and opportunities for mitigation.
Bismarck Continuity of Operations Plan	Plan update in progress.
Stormwater Management Program	Bismarck has a Stormwater Management Program implemented jointly by Planning, Engineering, and Public Works and includes a Stormwater Program Coordinator within the Public Works Department. Mitigation capabilities of the Stormwater Management program are identified through Planning via City Ordinance Title 14.1 (Zoning Ordinance). The city has authority to regulate and enforce stormwater management requirements to promote health, safety, and welfare of the people and property within Bismarck and its extraterritorial jurisdiction. The requirements, permitting and detailed review process are in place to mitigate the impacts of development and land disturbance, protect natural resources, maintain water quality, and minimize stormwater runoff, erosion, and urban flooding issues. More Information: http://www.bismarcknd.gov/index.aspx?nid=190
Bismarck Airport Master Plan **and** **Airport Mitigation and Response Plans**	The Bismarck Airport through its various plans and manuals has specific guidelines and procedures for mitigating hazards. The plans include but are not limited to: Airport Certification Manual, Airport Emergency Plan, Airport Security Program, Spill Prevention Control and Countermeasure Plan (SPCC), Wildlife Hazard Management Plan, Wetland Mitigation and Environmental Assessments. The airport in on-going operations strives to ensure safety and security and mitigate any hazards that could arise. By following procedures set forth, continuous retraining and improvements the airport mitigates hazards.
Public Health Programs	Public Health programs include Emergency Preparedness and Response, Home Health Services, Disease Prevention and Control, Women's Way, Environmental Health and other health services. Bismarck also provides public health services to Burleigh County (via contract).
Board of Health	The board of city commissioners constitutes the City Board of Health. *Reference: N.D.C.C. 23-35-03. (Ord. 5660, 05-13-08)*
Emergency Operations Center (EOC) Facility	The City of Bismarck and Burleigh County, in partnership with Dakota Carrier Network (DCN) built the public safety communications center and emergency operations center connected to the DCN facility. The

Plans and Programs Plans and programs reviewed and incorporated into the mitigation plan or mitigation planning process are noted below. This updated 2025 Multi-Hazard Mitigation Plan will be used to inform these mechanisms.	
	DCN addition (CenCom and EOC) is hardened, built to withstand natural and manmade disasters and to ensure maximum uptime in the most adverse conditions. The facility construction was completed in the fall of 2020.
Central Dakota Communications Center (CenCom)	In 2016, the City of Mandan joined with the City of Bismarck and Burleigh County and reorganized into the Central Dakota Communications Center, serving Bismarck, Mandan, Burleigh County and the SE portion of McLean County to include the City of Wilton. This has enabled better information sharing and coordination amongst agencies. It has reduced the necessity of transferring calls, resulting in a more efficient response in the served communities.
Statewide Interoperable Radio Network (SIRN)	SIRN has begun implementation in 2019 with the CenCom coverage area included in the early adopter buildout for 2020. This provides for better coverage, interoperability and in-building communications within a system built to leverage new technology over the next 20-25 years.
Transportation Improvement Program (TIP)	The annually developed Transportation Improvement Program (TIP), produced by the Bismarck-Mandan Metropolitan Planning Organization (MPO), identifies federally funded transportation improvements in the area over a four year time frame. The TIP is developed on an annual basis in cooperation with the MPO area member jurisdictions, transit provider, and the North Dakota Department of Transportation. The MPO utilizes its Public Participation Plan and coordinates the TIP with its Long Range Transportation Plan (LRTP). https://www.bismarcknd.gov/1109/Transportation-Improvement-Program
Metropolitan Transportation Plan (MTP)	The 2025-2050 Metropolitan Transportation Plan (MTP) is the long range transportation plan for the MPO area. It is a guide for the development of the area's transportation system over the next 20+ years. The MTP is required by federal regulations to be updated once every five years in order for the Bismarck-Mandan area to be eligible for federal transportation dollars for transportation improvements. The updates allow the MPO jurisdictions an opportunity to re-examine their values related to transportation, as well as provide an opportunity for the area to consider how their transportation system should look and function in the future. The MTP addresses transportation system needs and provides a set of methods, strategies, and actions for developing an integrated multi-modal transportation system that supports the efficient movement of people and goods. The MTP considers all relevant modes of transportation in the area including

Plans and Programs Plans and programs reviewed and incorporated into the mitigation plan or mitigation planning process are noted below. This updated 2025 Multi-Hazard Mitigation Plan will be used to inform these mechanisms.	
	pedestrians, bicyclists, automobile drivers, transit users, and freight shippers. https://www.bismarcknd.gov/1226/Metropolitan-Transportation-Plan-MTP
Consolidated Plan	The 2025-2030 Consolidated Plan identifies the city's housing and community development needs, priorities, goals, and strategies – and strategizes how federal funds, especially the Community Development Block Grant, will be allocated to meet these needs. A section (MA-65) of the Consolidated Plan addresses hazard mitigation activities, especially for vulnerable populations and low-to-moderate income households. The Consolidated Plan is developed by the Bismarck's Planning Department.
Capital Improvement Program	The Capital Improvement Program is managed by the Finance Department. A department may place capital improvement projects over $50,000 (for non-special assessment district projects) on the Capital Improvement Plan which are evaluated by the Budget Committee. The Budget Committee makes recommendations to the City Commission regarding approvals/adjustments to the Capital Improvement 5-year and annual plans. The City Commission adopts the 5 year plan and approves the annual plan. Projects under $50,000.00 follow the purchasing ordinance. The Engineering Department may submit a request to the City Commission to create a special assessment district to assess benefiting properties. The city commission calls for a public hearing regarding those projects.
State and County Mitigation Plans	The 2024-2029 State of North Dakota Enhanced Mitigation Plan and the Burleigh and Morton County Multi-Hazard Mitigation Plans were reviewed by Bismarck Emergency Management and integrated into this plan and planning process.
Missouri River 2024 Flood Response and Action Plan	The Missouri River 2024 Flood Response and Action Plan is integrated into the Bismarck Multi-Hazard Mitigation Plan. The plan addresses both Ice Jam and Flood protection.
Cyber Response Plan	Bismarck IT, via support from the Paragon Policy Program, completed the city's cyber response plan (September 2025).

Codes, Permitting and Inspections The following mitigation capabilities are reviewed and incorporated into the mitigation plan and planning process.	
Building Ordinance and Codes	The Building Inspections Department enforces various building codes per Title-4 Building Ordinance. The building codes ensure construction standards to address life safety and quality construction issues. The ordinance establishes processes for permitting and inspections managed by the Building Inspections Department. The jurisdiction of the division includes Bismarck and Burleigh ETA mapped : https://bismarck.maps.arcgis.com/home/webmap/viewer.html?webmap=d714ee6df3254526902e66baa926c42e More information: https://www.bismarcknd.gov/DocumentCenter/View/151/Title-04---Building-Regulations?bidId= It is anticipated that building codes will be updated in 2026.
Fire Codes	The Bismarck Fire Department enforces Fire Codes per Title-4 Building Ordinance in cooperation with the Building Inspections and Planning Departments. The Fire Department issues permits for licensed daycare facilities, exhaust hood system installations, sprinkler systems, fire alarm systems, and professional firework displays. Bismarck Fire conducts annual inspections of all commercial and public facilities to ensure sustained compliance with fire codes and to promote safety and mitigation practices. Within the incorporated limits of the City of Bismarck, the ISO Public Protection Classification is 1. More information: https://bismarcknd.gov/479/Permits-Code-Compliance

Land Use Planning and Ordinances The following land use planning capabilities and ordinances are incorporated into the mitigation plan or planning process.	
Zoning	Zoning authorities are established by Bismarck City Ordinance Title 14. The zoning ordinance provides for the concept of a “Master Plan” which is a compilation of adopted street, road, land use, water, sanitary sewer and drainage plans. The Planning Division administers land use regulations and coordinates the development application process for City Planning & Zoning Commission, the County Planning Commission: https://www.burleighco.com/board/planning/ and the Board of Adjustment. 14-02-01. Intent. It is the intent of the board of city commissioners to promote the health, safety and general welfare by guiding the development of the city by means of a comprehensive land use plan which is in part carried out by the provisions of this ordinance. It is the intent of this ordinance to provide regulations, standards and guides for the city's development which will: a) Lessen congestion in the streets; b) Secure safety from fire, panic and other dangers; c) Promote the health and general welfare; d) Prevent the overcrowding of land; e) Provide adequate light and air; f) Avoid undue concentration of population; g) Facilitate adequate provision for transportation, water, sewerage, schools, parks and other requirements. More Information: http://www.bismarcknd.gov/index.aspx?nid=138
Floodplain Ordinance	The floodplain ordinance is contained with the Bismarck Zoning Ordinance – Title 14. The purpose of the regulations set forth by the floodplain ordinance (14-04-19) is to promote public health, safety, and general welfare, and to minimize public and private losses due to flood conditions. A “Floodplain Administrator” is designated by the City of Bismarck to administer the City’s floodplain regulations. More information: http://nd-bismarck.civicplus.com/DocumentCenter/Home/View/1962
Flood Insurance Study and Flood Insurance Rate Maps	Flood Insurance Study and Flood Insurance Rate Maps: https://www.bismarcknd.gov/1466/Flood-Resources
Snow Emergency Ordinance	City Ordinance Title 10 established snow emergency routes and outlines the process to issue a snow emergency declaration. A snow emergency declaration allows for the public works director to take specific actions such as allow for the discontinued use of snow plow “snow gates” to more efficiently remove snow. Title 12 (traffic code) and Title 14 (Zoning) also support snow emergency preparedness, mitigation, and response efforts. Title 12 authorizes the removal of parked vehicles located on a posted snow emergency routes during a declared snow emergency or otherwise impeding efficient snow removal or obstructing normal traffic flow. Title 14 requires available snow storage via islands, medians, and adjacent parking areas.

Land Use Planning and Ordinances The following land use planning capabilities and ordinances are incorporated into the mitigation plan or planning process.	
	More information (title 10): https://www.bismarcknd.gov/DocumentCenter/View/157/Title-10---Public-Places-and-Property-Franchises?bidId=
Drought – City Ordinance	Title 2 (Chapter 2-08) of the Bismarck City Ordinance provides authority to restrict the use of water and other utilities during a drought or other emergency following a declaration of emergency. More information: https://www.bismarcknd.gov/DocumentCenter/View/149/Title-02--Administration-and-Governmental-Organiz?bidId=
Neighborhood Parks and Open Space	The Neighborhood Parks and Open Space ordinance and policy were both adopted by the City Commission in October 2013. More Information: http://www.bismarcknd.gov/index.aspx?nid=1474

Administration Administration capabilities integrated within mitigation planning are noted below.	
Planning and Zoning Commission	The Bismarck Planning and Zoning Commission hears requests for major and minor subdivision plats, zoning changes, zoning ordinance text amendments, annexations, special use permits and rural lot splits. The City of Bismarck has zoning and subdivision authority within the corporate limits and the extraterritorial area. The Planning and Zoning Commission meets monthly. More information: https://www.bismarcknd.gov/1037/Planning-Zoning-Commission
Metropolitan Planning Organization	The Metropolitan Planning Organization (MPO) provides a forum for public officials, citizens, and other interested groups to establish policies and plans for effectively addressing various metropolitan transportation issues. The MPO is comprised of five jurisdictions including: Bismarck, Lincoln, Mandan, and portions of Burleigh and Morton counties. More information: http://www.bismarcknd.gov/index.aspx?nid=133

Departments, Staff and Committees: Mitigation Capabilities The following department/staff mitigation capabilities are integrated into the mitigation planning process.	
Building Inspections Department, Building Official	Also see "Building Ordinance and Codes." Bismarck has a full-time Building Official and additional full-time Building Inspections staff to enforce ordinances and building codes including building regulations, floodplain administration, addressing, and zoning administration and enforcement. : https://www.bismarcknd.gov/111/Building-Inspections
Environmental Health	Bismarck has a Environmental Health Division within the Public Health Department. The Environmental Health Division is comprised of an Environmental Health Administrator and three Environmental Health Specialist. The Environmental Health Division enforces ordinances governing health and sanitation. The Environmental Health Division license and inspects the following business types in Bismarck: food service, lodging, body art, public and semi-public swimming pools, tanning. Other Environmental Health activities include: investigation of public health nuisances, special pet licensing, issuing noise permits and mold consultation.
Floodplain Administrator	The Building Official for Bismarck is designated as the Floodplain Administrator. The Floodplain Administrator (Building Official) administers the city's floodplain regulations. The duties and responsibilities of the Floodplain Administrator are outlined in Title 14 Zoning (14-04-19). More information: http://nd-bismarck.civicplus.com/DocumentCenter/Home/View/1962
Planning Department	The Planning Department is responsible for: • Administering land use regulations for the City of Bismarck and portions of Burleigh County. • Coordinating the development application process for zoning changes, major and minor subdivision plats, annexations, special use permits, variances, lot modifications, plat modifications (right-of-way vacations, easement releases, street name changes), site plan review and downtown design review • Administering HUD Grant Programs (CDBG and HOME) for the City • Administering Downtown Programs (Renaissance Zone and CORE) for the City • Providing staff support to the City Planning & Zoning Commission, the Burleigh County Planning and Zoning Commission (https://www.burleighco.com/board/planning/), , the Board of Adjustment and the Renaissance Zone Authority. • Plat Reviews More Information: https://www.bismarcknd.gov/138/Planning

Departments, Staff and Committees: Mitigation Capabilities The following department/staff mitigation capabilities are integrated into the mitigation planning process.	
Historic Preservation Commission	The Historic Preservation Commission advises on matters related to nominations to the National Register of Historic Places, promotes and educates about the City's history and heritage and serves as a local historic resources for citizens and other City boards.
Engineering Department	The Engineering Department monitors contracted construction projects and permits by private contractors in the City of Bismarck streets, rights of way, and public easements. The Engineering Department also provides guidance and information relating to land development, stormwater and floodplain management, traffic matters (including parking, street signs, road closures and pavement markings), property boundaries, water distribution, sanitary sewer collection, transportation network master planning, records of public infrastructure (including water, sewer, road, lighting, and service lines to private buildings). The Engineering Department works in conjunction with the Public Works Department which is responsible for operations and maintenance of water utility services, streets/lights, waste and recycling, and city forestry. More Information: https://www.bismarcknd.gov/17/Engineering
Geographic Information Systems	The GIS Division is capable of producing maps, graphs, tables, images, and applications using geographic data to support operational and planning functions, including support to mitigation planning efforts.
Information Technology	Bismarck's IT team provides for technology solutions and support to enhance the efficiency and productivity of the City of Bismarck, managing and maintaining the city's IT infrastructure, ensuring seamless connectivity and robust security for all departments. Bismarck IT develops and maintains the city's cyber response plan and supports continuity of operations planning for city departments.
Forestry	Bismarck has a Forestry Division (within Public Works Department). Mitigation capabilities of the Forestry Division are identified in City Ordinance Title 13 providing the City Forester with authority to regulate/enforce forestry standards which govern planting, maintenance, removal, fertilization, pruning, and bracing of trees to minimize interference with utility lines and support public safety (ie: maintain visibility, public safety access, wildland/urban interface). Through promotion of the urban forestry program, stormwater run-off reduction is achieved as well with an estimated annual benefit of $500,000.00. More information: http://www.bismarcknd.gov/index.aspx?nid=163
Forestry Advisory Board	The Forestry Advisory Board advises and assists the City Forester in tree management on streets, in parks and other public property in the city, as well as advises and assists in the enforcement of the Forestry Ordinance.
Southwest Central Emergency	The Southwest EPR Coordinator develops plans and capabilities to address public health (and all hazard) emergencies. Public Health

Departments, Staff and Committees: Mitigation Capabilities The following department/staff mitigation capabilities are integrated into the mitigation planning process.	
Preparedness Regional Coordinator	Emergency Operations Plans address Points of Distribution, Mass Vaccination, Strategic National Stockpile, Mass Fatality, Mental Health, Family Reunification, and Pandemic Influenza.
Public Health Community Integration Facilitator	The Community Integration Facilitator bridges relationships between local and state government, communication resources, the local population, and newcomers; and expands access to local resources (such as housing authorities) and services for newcomers.
Human Relations Committee	The Bismarck Human Relations Committee creates an atmosphere of inclusion, equality and accessibility through education and outreach to recognize the value of a diverse community.
Committee for People with Disabilities	The Bismarck-Mandan Mayors' Committee for People with Disabilities works to educate the public and initiate projects. The goal of their work is to establish a receptive climate for the involvement of people with disabilities in all aspects of life within the communities of Bismarck-Mandan.
Emergency Manager	Bismarck established an emergency management program at the city level in 2003 and employs a full-time city emergency manager partially funded by the Emergency Management Performance Grant. Alternate Emergency Managers are identified in the Continuity of Operations Plan. More information: https://www.bismarcknd.gov/495/Emergency-Management

Technical Mitigation Capabilities	
Warning Systems & Services	There are 27 outdoor warning sirens in Bismarck and surrounding area. Twenty-three of them are within city of Bismarck. The sirens are activated via the Central Dakota Communications Center (CenCom). CenCom also has emergency notification system technology to activate personnel and to notify a select area of the community of an impending or current situation. Notification/alerts may be sent out via land-line phone, cell phone, text, etc.
Grant Writing	All Departments have grant writing capability. Bismarck also has a Grants Coordinator position to assist with grants management including grant compliance.

Financial Mitigation Capabilities	
Financial capabilities - various	-Capital Improvement project funding is approved annually via the city commission. See *Capital Improvement Program* under *Plans and Programs* above. -Bismarck City Commission has the authority to levy taxes. -Bismarck City Commission approves and may amend the city's budget. -Bismarck may incur debt through general obligation bonds. However, funds are more typically raised via taxes such as hotel/motel, liquor, sales tax, and car rental taxes. -Community Development Block Grant funds are utilized by Bismarck annually.

Education and Outreach Mitigation Capabilities and Plan Integration	
Public Education: Mitigation and Emergency Preparedness	Various departments have capability and do conduct safety, mitigation, and emergency preparedness public education and outreach activities. City departments include Public Works, Public Health, Fire, Police, as well as Emergency Management. Other community partners also have this capability and conduct public education activities for the benefit of local citizenry including the business community. Other community partners include the American Red Cross, National Weather Service, Burleigh County, North Dakota Health and Human Services and ND Department of Emergency Services.

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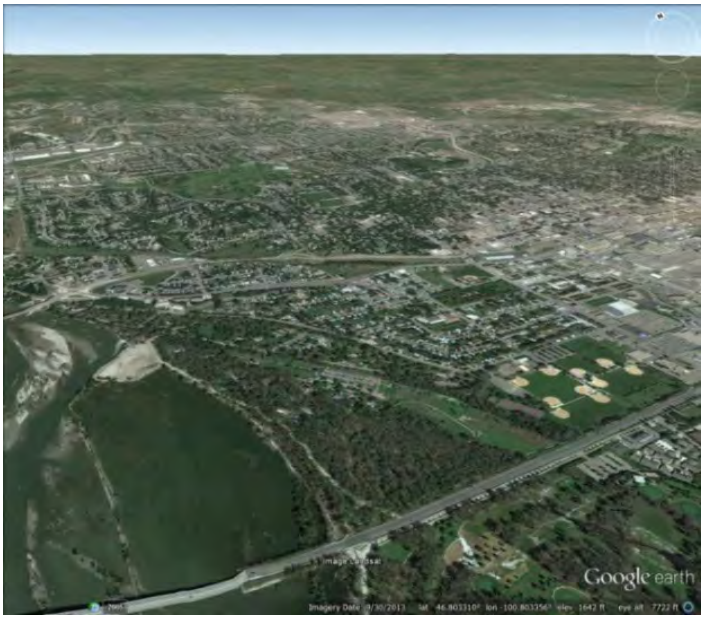
Community Profile

Geography

Bismarck, the county seat and State capital, is in the southwestern part of Burleigh County. Bismarck measures 36.31 square miles (April 2025), about 2% of the 1,668 square miles of Burleigh County. Within the past 5 years, the city expanded by 1.48 square miles. The Missouri River, flowing in a southerly to southeasterly direction, forms the western boundary of Bismarck. Bismarck lies within the eastern margin of the Great Plains, which is defined by gently rolling hills and wide expanses of prairie.

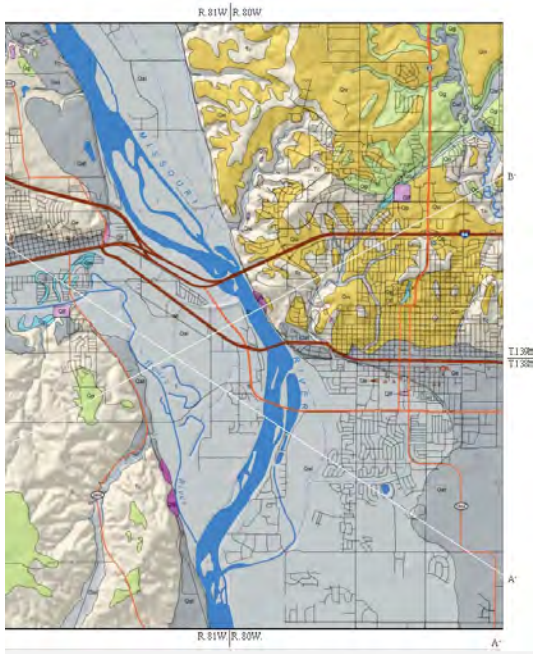


The north side of Bismarck is of higher elevation with a gently rolling terrain. The highest elevation in Bismarck is 1,973 near the Ash Coulee Drive water tower. There are relatively steep slopes adjacent to the Missouri River on the east side of River Road. The south side of Bismarck is of lower elevation and generally flat. The “gage 0” datum level is 1618.28 at the river gage near the water treatment in west Bismarck. 1630 is the typical lower elevation in southwest Bismarck.

Interstate 94 and US 83 are major transportation routes, and both bisect the city of Bismarck.

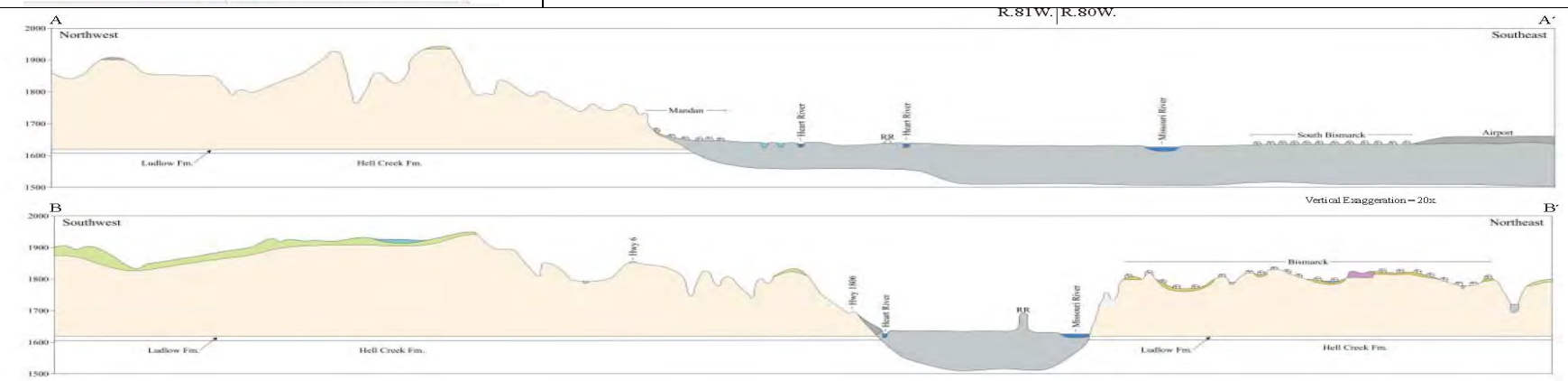
At Bismarck-Mandan the Missouri River Valley is only about two miles wide where Interstate Highway 94 crosses the river. On the south side of Bismarck the valley broadens to about six miles wide. The reason for this widening is that, prior to glaciation, the Heart and Little Heart rivers, which today flow into the Missouri River (the Heart River enters the Missouri River at Mandan; the Little Heart enters about ten miles south of Mandan), joined a few miles east of Bismarck. The old, combined valley of the Heart-Little Heart rivers still exists as the broad lowland south of Bismarck - a wide spot in the Missouri River valley.

The latitude of Bismarck is 46.808N. The longitude is -100.783W. Elevation varies from 1,600 to 1,973. Population of Bismarck in 2023 was 75,092, which is latest estimate by the U.S. Census Bureau. The City of Bismarck’s form of government is a five-member city commission, elected at-large, of which the president is also the Mayor of the city.



The Missouri River forms the western boundary of Bismarck. The elevation of the majority of south Bismarck (shown below at right top) is not significantly higher than the normal or typical river elevations throughout the year. Much of south Bismarck could not be developed until after the completion of the Garrison Dam in 1953. The lower right of the bottom diagram shows a cross section of north Bismarck. The location of each cross section below is based on the geology map at left. Mandan is shown on the west (left) side of the map and diagram.

Source of map and diagram: ND Geologic Survey, Department of Mineral Resources
https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/geoinv/GI_3.pdf



Community Changes Overview

Since January 1, 2020 Bismarck has gained 946 acres added to the city limits through numerous annexations. The location of the annexations since 2020 are shown on page 5.

Since January 1,2020, to April 17, 2025 the City of Bismarck issued a total of 1,977 new building permits (each with a unique address).

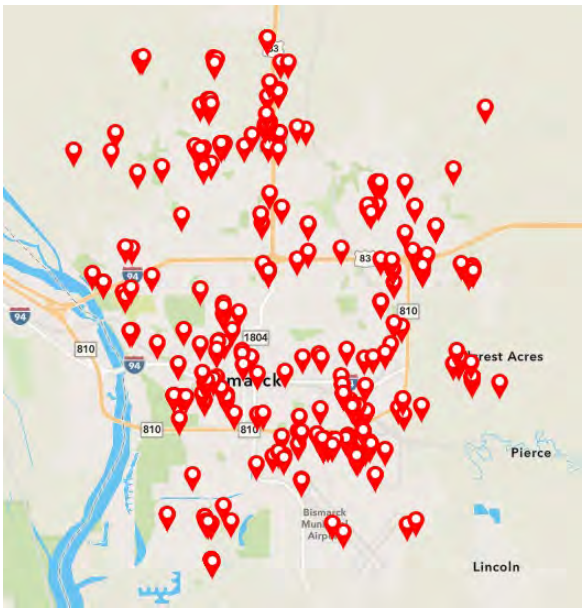
FEMA completed a study and update to the Burleigh County Flood Insurance Study and Flood Insurance Rate Map (FIRM) for the Missouri River and select tributaries. The study and update FIRM became effective on June 6, 2024. This effort also resulted in the update of Bismarck's floodplain zoning ordinance, which was adopted June 6, 2024.

Changes in building counts within the Special Flood Hazard Area (SFHA) within Bismarck and the 4-mile ETA:

Year End	Total buildings within the SHFA. Includes Bismarck and the 4-mile ETA.
2020	2420
2021	2520
2022	2550
2023	2563
*2024	3,876

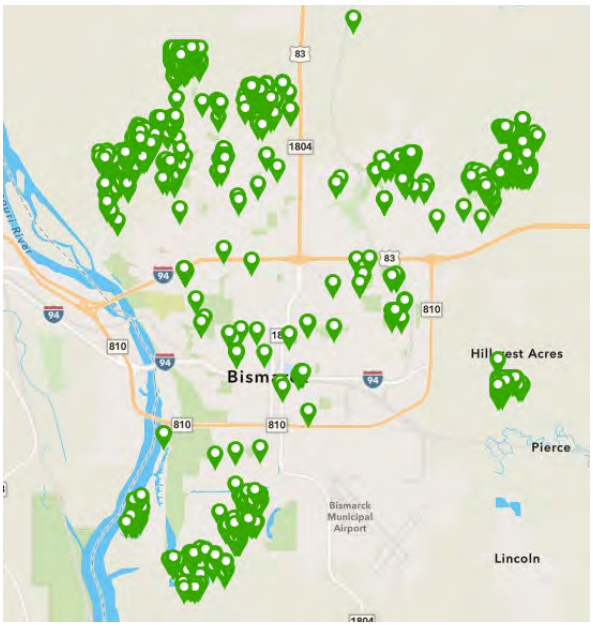
*As a result of the FIRM update effective June 6, 2024, there were 1,742 buildings added to the floodplain and 413 were removed. Additional structures were built within the floodplain (61) as well as 18 affected by map revisions in the year 2024. The current total buildings within the SFHA as of January 9, 2025 is 3,876.

Three hundred thirty-eight (338) building permits for commercial, new construction, were issued from January 1, 2020 through May 1, 2025. The general locations of the new construction commercial building permits are illustrated below.



Of these new commercial permits issued, there is a limited number of structures located within the 100-year floodplain:

- Bismarck Riverfront Festival Grounds Building
- Burleigh County Housing (South Washington Street) – 3 structures
- 3 Restaurants located at Kirkwood Mall (South 3rd Street)
- 1 shop condo – Hagen Drive
- Cell Tower (South 12th Street)
- Lift Station (Boston Drive)



1,443 building permits for new residential construction were issued from January 1, 2020 through May 1, 2025. None of the new structures are within the 100-year floodplain. However, due to the updated Flood Insurance Rate Map that became effective as of June 6, 2024, many structures were added to the floodplain. See page 3 for a summary count of structures within the 100-year floodplain (Special Flood Hazard Area).

A recent change to the ETA boundary, based on agreement with Burleigh County, will have impact as it relates to floodplain management and other regulatory authority for this area outside of city limits. Approximately 95% of the ETA, and associated responsibility, is transferred to Burleigh County.

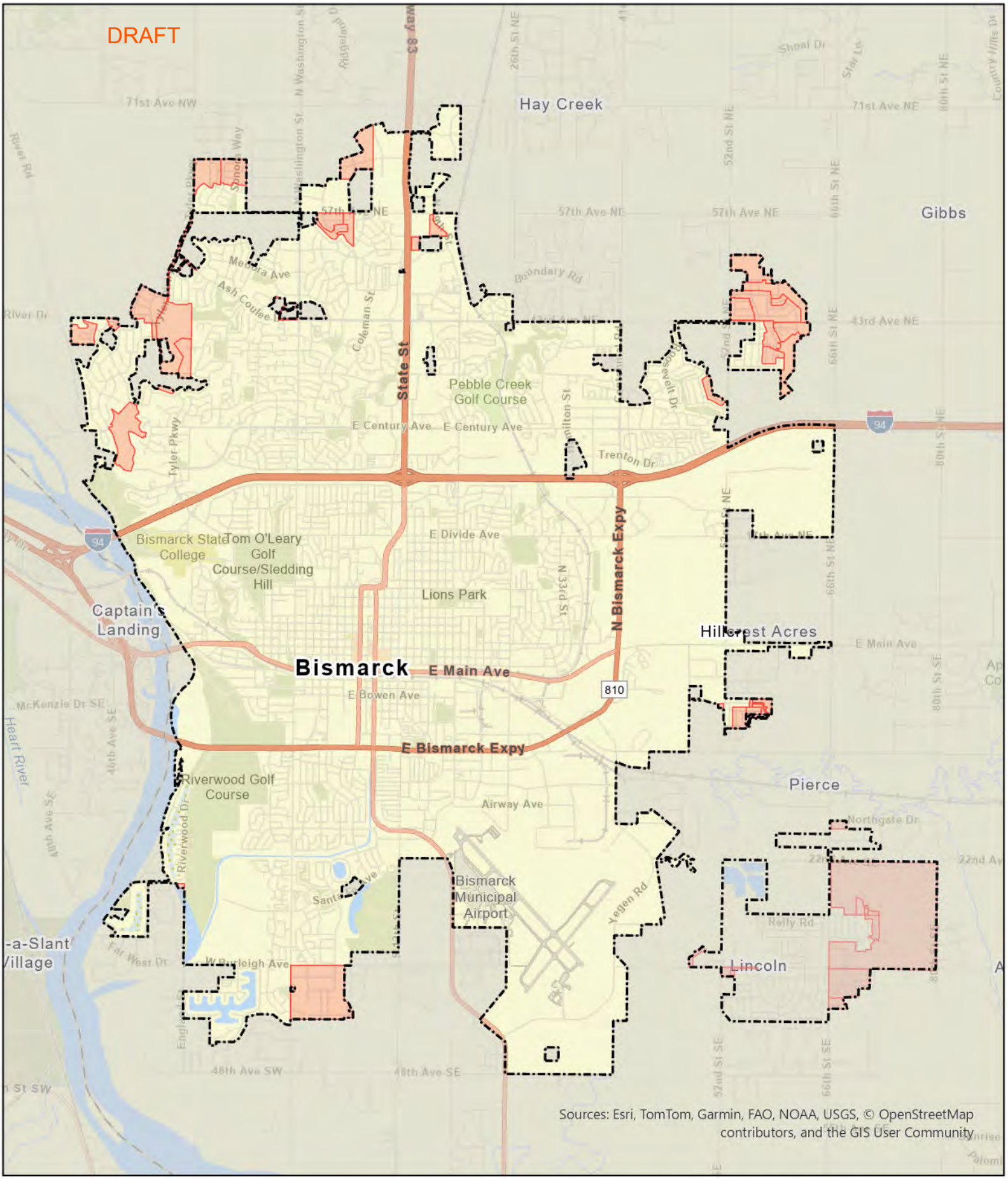
Two new elementary schools were built to accommodate growth in north Bismarck. Silver Ranch elementary in NE Bismarck and Elk Ridge Elementary in NW Bismarck. Both are located in areas annexed within the last 5 years. A building permit has also been issued for a new Bismarck Public Schools Career and Technical Education Facility in NE Bismarck (Silver Ranch).

Three new outdoor warning sirens were added in 2023. The new sirens are located in north Bismarck; one in the northwest, north central, and northeast part of Bismarck due to community growth.

Since 1990, Bismarck has shown steady growth in population. The approximate percentage increase per decade since 1990 is 12%, 10% and 20% based on the decennial censuses. The population of the public school system has been seeing steady growth. The median household incomes have increased since 2018 ($75,846 in 2023 vs. $65,567 in 2018), and persons below the poverty level remains consistent (9.6% in 2023 vs. 9.5% in 2018).

Community Changes Impact Summary

As a result of community changes, the vulnerability to hazards and potential for impact may be considered to be somewhat elevated compared to previous years. Therefore, the importance of mitigation, public education, and communication becomes elevated as well. Within Section 9, Hazard Profiles, there is a summary of increase and/or decrease of vulnerability specific to each hazard as it relates to community changes or other factors.



Bismarck

Annexation Change Since 2020

Map Created: April 2025
by GIS Division

CityLimits
Annexation History

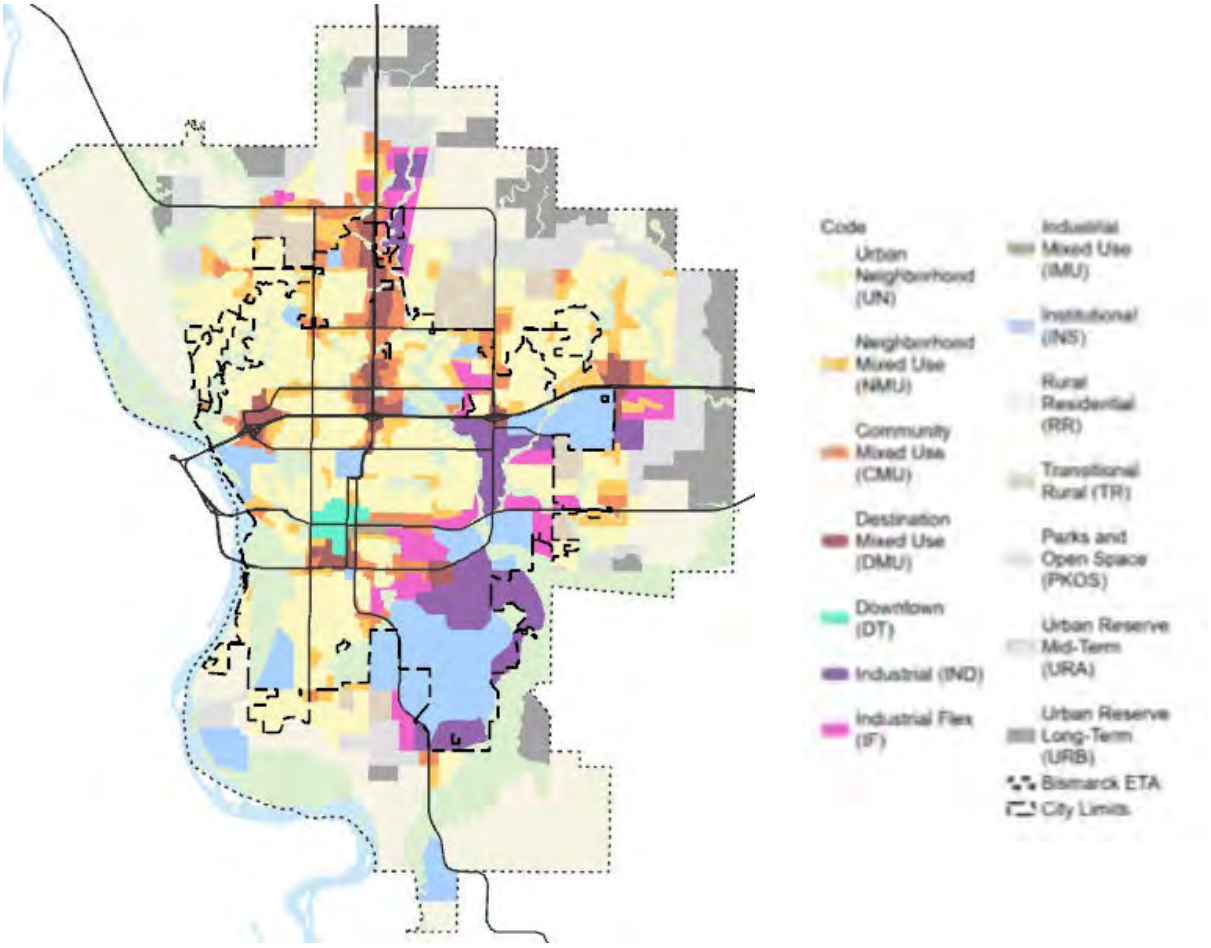
N

0 ½ 1 Mile

Future Land Use Plan

The Future Land Use Plan is a map that shows various districts in the City of Bismarck and its extraterritorial area that are planned to take shape by the year 2045. This plan is intended to guide:

- Decisions on rezonings, subdivisions, special use permits and other activities managed by the Planning and Zoning Commission
- Investment decisions made by the private sector and general public, by providing reasonable expectations for future growth of the city
- Capital improvements and infrastructure development by the City and other entities.



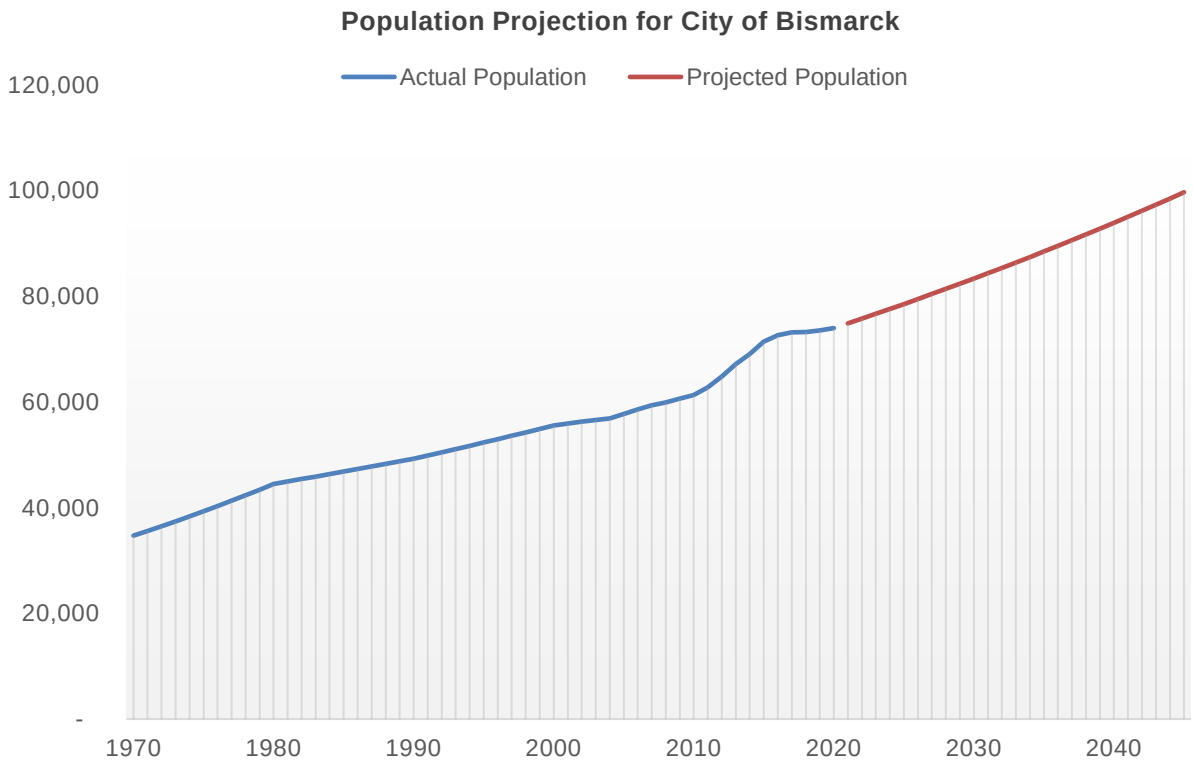
Source: City of Bismarck, Together 2045 Comprehensive Plan
https://www.bismarcknd.gov/DocumentCenter/View/41634/Together-2045-Comprehensive-Plan?bidId=

Growth Rate and Population Projection

A projected population growth rate of 1.2% per year is proposed for the following reasons: This reasonably aligns with the long-term population trends for Bismarck, accounting for both boom and bust cycles.

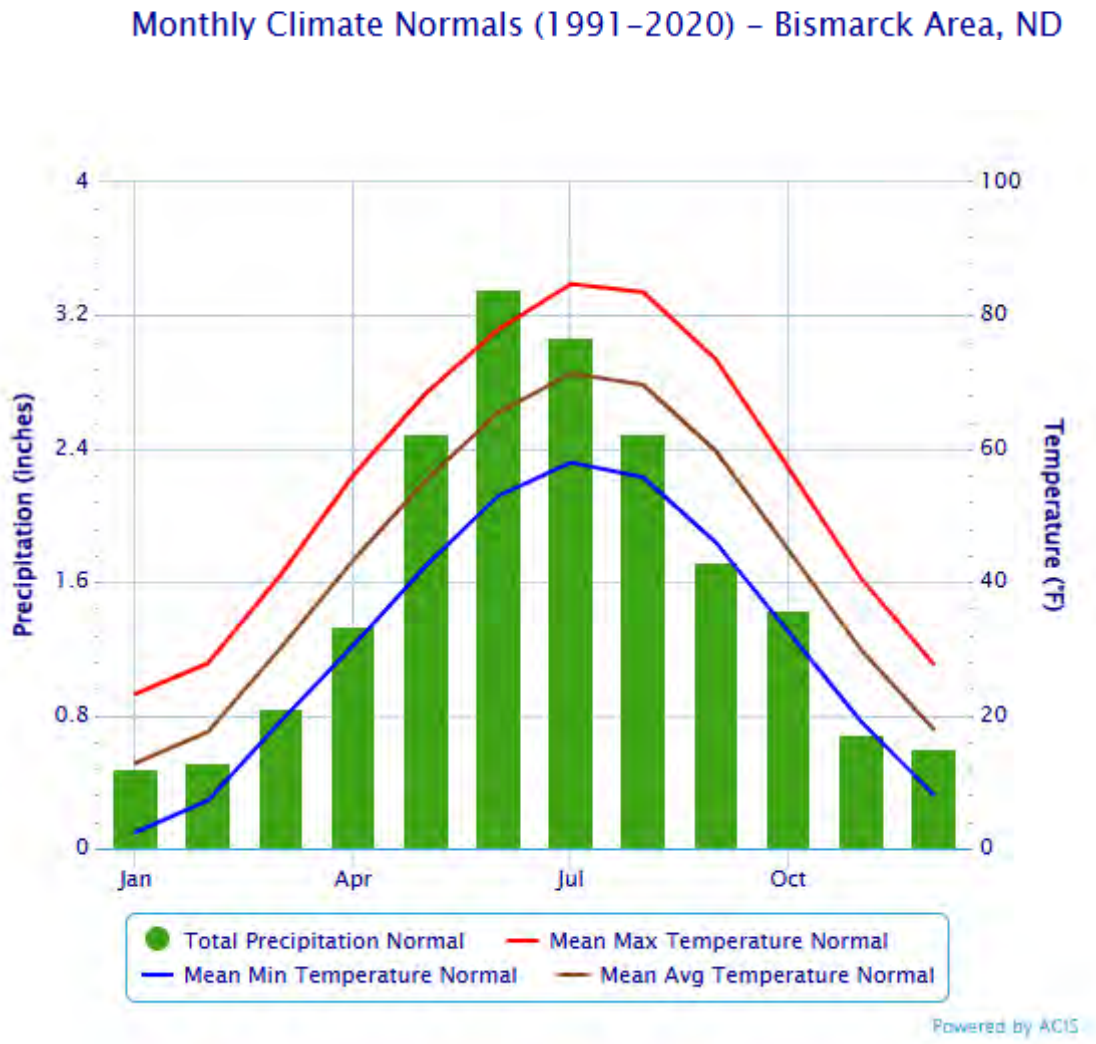
- This represents an exponential pattern of growth, which fits the historic curve better than a linear regression.
- A fixed annual rate of growth is simple to use and apply to any future year.
- This is the population growth rate used for the Arrive 2045 Metropolitan Transportation Plan, and the travel demand model used to project future transportation needs used this projection. Both plans would be aligned.

Based on this projection, the City of Bismarck will grow by approximately a thousand people per year and have a population of 99,647 by 2045.

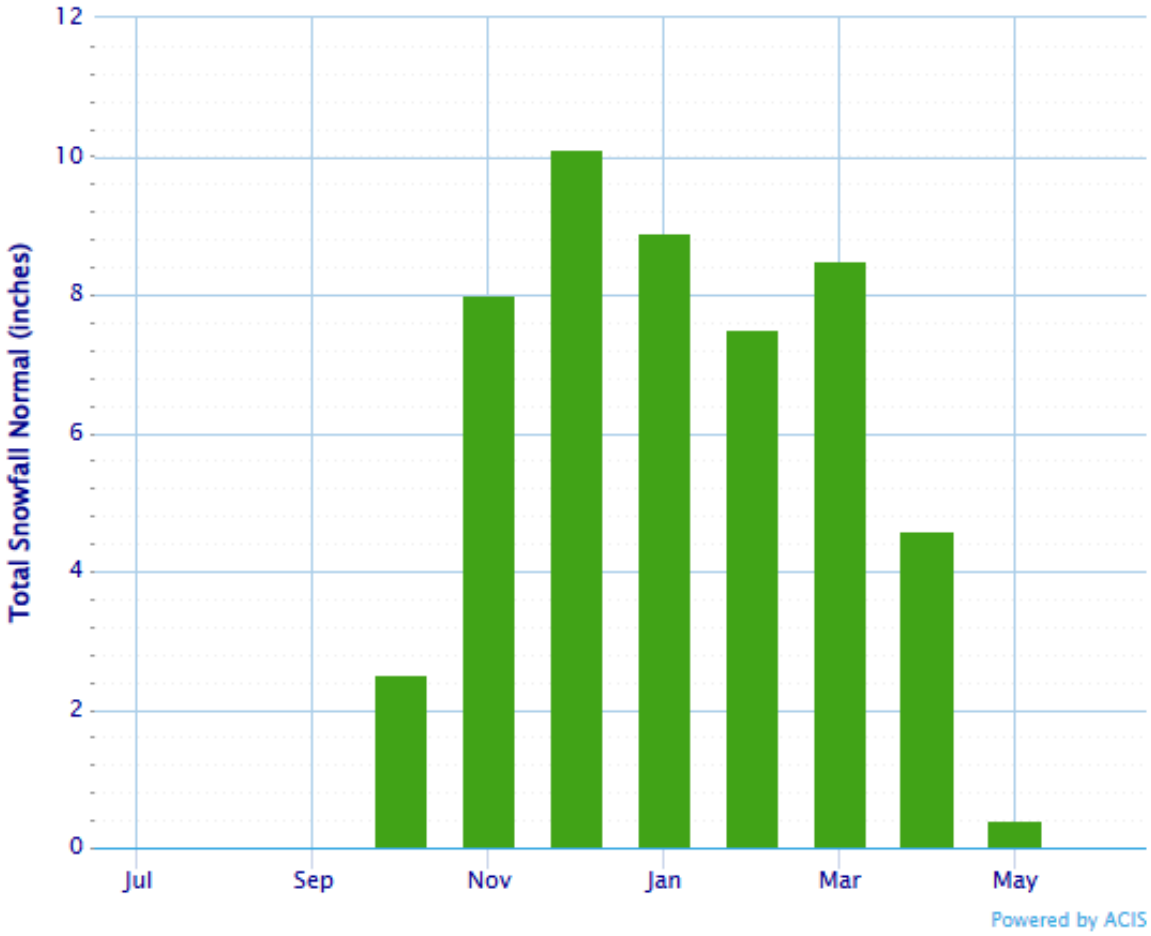


Climate Summary

Source: https://www.weather.gov/bis/climate_bis



Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	0.48	23.2	2.4	12.8
February	0.52	27.8	7.2	17.5
March	0.84	41.0	19.1	30.1
April	1.34	56.0	30.4	43.2
May	2.50	68.3	42.4	55.3
June	3.36	77.9	52.9	65.4
July	3.07	84.7	57.9	71.3
August	2.50	83.5	55.7	69.6
September	1.72	73.4	45.9	59.7
October	1.43	57.1	32.6	44.8
November	0.69	40.6	19.1	29.9
December	0.60	27.7	8.1	17.9
Annual	19.05	55.1	31.1	43.1



Month	Total Snowfall Normal (inches)
July	0.0
August	0.0
September	0.0
October	2.5
November	8.0
December	10.1
January	8.9
February	7.5
March	8.5
April	4.6
May	0.4
June	0.0
Annual	50.5

Bismarck Climate Data - Daily Extremes
Years 1874-2024

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Highest Daily Temperature (degree F)											
63	73	81	93	102	111	114	109	105	95	79	66
Lowest Daily Temperature											
-45	-45	-36	-12	17	30	32	32	10	-10	-30	-43
Highest Daily Precipitation											
0.67	1.02	1.80	2.35	2.65	3.19	4.32	4.63	4.31	1.68	1.13	1.16
Highest Daily Snowfall											
13.2	10.3	15.5	17.3	8.5	0.00	0.00	0.00	4.1	8.6	10.8	10.5

Bismarck Climate Data - Monthly Extremes
Years 1874-2025

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Precipitation (amount/year)											
1.64	1.74	3.27	5.71	7.37	9.9	13.75	9.29	6.93	4.73	3.10	2.06
1877	2000	1876 1916	1878	2013	1914	1993	1998	1977	2013	1896	2016
Minimum Precipitation (amount/year)											
0.00	0.03	0.00	0.00	0.04	0.00	0.10	"T"	0.02	0.00	0.00	0.00
1878 1901 1924 1935	1894 1913 1915 1985	1930 2021 2025	1888 1926 1956	1901 1917 1936	1918 1919	1894 1936 1959 1967	1921 1922 1970	1883 1899 1948 2012	1889 1935 1968 1993	1990 1902 1912 1963	1896 1944 1954 1986
Record Snowfall											
25.0	25.6	31.1	21.9	10.3	0.00	0.00	0.00	5.00	23.7	31.0	33.3
1982	1979	1975	2022	1950	-	-	-	1984	1991	1896	2008

Bismarck Climate Data - Extremes Top 10 Extremes from years 1874-2025

Rank	Value	Date	Rank	Value	Date
Highest Daily Maximum Temperature (degree F)					
1	114	7/6/1936	6-7	109	7/11/1973
2	112	7/30/2006	6-7	109	8/5/1941
3	111	6/29/2002	8-9	108	7/20/1960
4-5	110	7/16/1936	8-9	108	7/9/1921
4-5	110	7/10/1936	10	107	June and July various dates
Lowest Daily Minimum Temperature (degree F)					
1	-45	2/16/1936	6-9	-43	2/9/1994
2	-45	1/13/1916	6-9	-43	12/31/1967
3-5	-44	1/15/2009	6-9	-43	2/19/1929
3-5	-44	1/18/1950	6-9	-43	2/1/1887
3-5	-44	1/2/1887	10	-42	1/12/1974 1/12/1887 2/15/1936 12/20/1916
Highest Daily Precipitation (inches)					
1	4.63	8/21/1998	6	3.36	6/26/1914
2	4.48	8/12/1999	7	3.25	6/3/1947
3	4.32	7/15/1993	8	3.19	6/15/2009
4	4.31	9/15/1994	9	3.12	8/9/1909
5	3.67	9/7/1894	10	2.92	8/1/1915
Highest Daily Snowfall (inches)					
1	17.3	4/14/2013	6	11.9	3/26/1950
2	15.5	3/3/1966	7	11.9	4/3/1937
3	15.2	4/5/1997	8	11.8	3/30/2009
4	13.2	1/17/1996	9	11.6	3/19/1982
5	11.9	4/27/1984	10	11.0	3/21/1894

Source: NOAA - National Weather Service Weather Forecast Office https://www.weather.gov/bis/climate_bis

Annual Temperature Averages and Extremes – Bismarck ND 1874-2024				
Annual Average	Highest Annual Average	Year	Lowest Annual Average	Year
43.1 F	47.2 F	2021	35.4 F	1875

Of the top twenty rankings for highest annual average temperature, 16 of 20 records occurred since 1980. Five of the top ten warmest years occurred since year 2000. The 1930's hold two records of the top tweny.

Annual Temperature Rankings
Bismarck, ND
Period of Record Beginning 1874

Warm	Cold	YEAR	Temperature
1	150	2021	47.2°F
2	149	2016	46.5°F
3	148	1931	46.3°F
4	147	2006	46.2°F
5	146	1987	46.1°F
6	145	2024	46.0°F
7	144	1934	45.7°F
8	143	2020	45.6°F
9	142	2012	45.5°F
10	141	2015	45.3°F
11	139	1998	45.2°F
11	139	1878	45.2°F
13	136	2005	44.8°F
13	136	1999	44.8°F
13	136	1981	44.8°F
16	135	2017	44.7°F
17	134	1991	44.6°F
18	133	1921	44.4°F
19	132	2001	44.3°F
20	130	1990	44.2°F

Annual Precipitation Averages and Extremes – Bismarck ND 1875-2024				
Annual Average	Highest Annual Average	Year	Lowest Annual Average	Year
19.05"	30.92"	1876	5.97"	1936
	29.58"	2019	7.74"	1934

Eight of the top 20 wettest years have occurred since year 2000.

Annual Precipitation Rankings
Bismarck, ND
Period of Record Beginning 1875

Wet	Dry	YEAR	Precipitation
1	145	1876	30.92"
2	144	2019	29.58"
3	143	1875	27.53"
4	142	1993	26.99"
5	141	2013	26.75"
6	140	1999	26.45"
7	139	1986	24.24"
8	138	1998	23.70"
9	137	2016	23.48"
10	136	1884	23.36"
11	135	1915	23.25"
12	134	2011	23.22"
13	133	2010	23.18"
14	132	2009	23.12"
15	131	2000	23.00"
16	130	1914	22.98"
17	129	1879	22.61"
18	128	1965	21.53"
19	127	1975	21.50"
20	126	2001	21.34"

Seasonal Snowfall Averages and Extremes – Bismarck ND 1886-2024				
Annual Average	Highest Annual Average	Year	Lowest Annual Average	Year
50.5"	101.6"	1996-97	13.3"	1914-15
	101.3"	2022-23	13.6"	2011-12

Twenty-four of the top 25 season snowfall records occurred since 1970.

Seasonal Snow Rankings
Bismarck, ND
Period of Record Beginning 1886

Wet	Dry	YEAR	Snow
1	140	1996-1997	101.6"
2	139	2022-2023	101.2"
3	138	2008-2009	100.3"
4	137	1993-1994	91.8"
5	136	1949-1950	86.8"
6	135	2010-2011	85.4"
7	134	1978-1979	83.0"
8	133	1981-1982	80.3"
9	132	1995-1996	80.1"
10	131	2016-2017	71.5"
11	130	1986-1987	67.9"
12	129	1994-1995	67.1"
13	128	1983-1984	66.5"
14	127	1896-1897	64.7"
15	126	1998-1999	64.5"
16	125	1977-1978	63.7"
17	124	1966-1967	61.7"
18	123	1985-1986	61.2"
19	122	2018-2019	60.3"
20	121	1974-1975	58.7"
21	120	1991-1992	57.5"
22	119	2012-2013	57.3"
23	118	2019-2020	55.6"
24	117	2009-2010	55.4"
25	116	2021-2022	55.1"

Community Characteristics

The Metropolitan Planning Organization develops the MPO Monitoring Report, as a living document which provides for an overview of People & Housing, Employment, and Travel. Future trends and projections are also provided as applicable. The report is a snapshot of the Bismarck-Mandan Community: https://www.bismarcknd.gov/1457/Monitoring-Report

Population

PEOPLE	**Bismarck**	**North Dakota**
Population, estimates July 1, 2024 (V2024)	NA	796,568
Population, estimates July 1, 2023 (V2023)	75,092	783,926
Population, estimates base, April 1, 2020, (V2023)	73,626	779,079
Population, percent change, April 1, 2020 to July 1, 2024	NA	2.2%
Population, percent change, April 1, 2020 to July 1, 2023	2.0%	0.6%
Population, Census, April 1, 2020	73,622	779,094
Persons under 5 years, percent, 2023	5.6%	6.3%
Persons under 18 years, percent, 2023	21.9%	23.6%
Persons 65 years and over, percent, 2023	18.7%	17.0%
Female persons, percent, 2023	50.3%	48.7%

Sources: ND Department of Commerce and US Census Bureau – QuickFacts

Population by Age Group

Age	2000		2010		Change 00-10	2020		Change 00-20	2023 Estimate		Change 00-23
	Number	% of total	Number	% of total		Number	% of total		Number	% of total	
Under 5	3,356	6.0%	3,896	6.4%	540	4,595	6.2%	1,239	3,744	5.0%	388
5 to 9	3,431	6.2%	3,431	5.6%	0	4,626	6.3%	1,195	3,733	5.0%	302
10 to 14	3,790	6.8%	3,350	5.5%	-440	4,362	5.9%	572	4,813	6.4%	1,023
15 to 19	4,308	7.8%	3,765	6.1%	-543	4,323	5.9%	15	3,980	5.3%	-328
20 to 24	4,380	7.9%	5,035	8.2%	655	4,865	6.6%	485	5,684	7.6%	1,304
25 to 34	7,339	13.2%	9,110	14.9%	1,771	10,920	14.8%	3,581	10,973	14.6%	3,634
35 to 44	8,842	15.9%	6,886	11.2%	-1,956	9,637	13.1%	795	9,453	12.6%	611
45 to 54	7,815	14.1%	8,879	14.5%	1,064	7,553	10.3%	-262	7,533	10.0%	-282
55 to 59	2,545	4.6%	4,218	6.9%	1,673	4,354	5.9%	1,809	3,819	5.1%	1,274
60 to 64	2,084	3.8%	3,291	5.4%	1,207	4,786	6.5%	2,702	5,587	7.4%	3,503
65 to 74	3,888	7.0%	4,435	7.2%	547	7,273	9.9%	3,385	8,787	11.7%	4,899
75 to 84	2,631	4.7%	3,379	5.5%	748	4,076	5.5%	1,445	5,042	6.7%	2,411
85 and over	1,123	2.0%	1,597	2.6%	474	2,252	3.1%	1,129	1,954	2.6%	831
Total	**55,532**	**100.0%**	**61,272**	**100.0%**	**5,740**	**73,622**	**100.0%**	**18,090**	**75,102**	**100.0%**	**19,570**

Sources: U.S. Census Bureau - 2000 Decennial Census, Table DP1; 2010 Decennial Census, Table P12; 2020 Decennial Census, Table DP1; 2023 American Community Survey, 5-year Estimates, Table DP05

Demographics

PEOPLE	Bismarck	North Dakota
White alone, percent, 2023	84.8%	86.4%
Black or African American alone, percent, 2023 (a)	2.5%	3.8%
American Indian and Alaska Native alone, percent, 2023 (a)	5.0%	5.3%
Asian alone, percent, 2023 (a)	1.0%	1.7%
Native Hawaiian and Other Pacific Islander alone, percent, 2023 (a)	0.3%	0.2%
Two or More Races, percent, 2023	5.4%	2.6%
Hispanic or Latino, percent, 2023 (b)	3.2%	4.9%
White alone, not Hispanic or Latino, percent, 2023	84.0%	82.6%
Living in same house 1 year & over, percent, 2019-2023	85.5%	83.6%
Foreign born persons, percent, 2019-2023	3.6%	4.5%
Language other than English spoken at home, pct age 5+, 2019-2023	4.5%	6.4%
High school graduate or higher, percent of persons age 25+, 2019-2023	95.0%	93.8%
Bachelor's degree or higher, percent of persons age 25+, 2019-2023	38.7%	32.3%
Veterans, 2019-2023	4,118	43,237
Mean travel time to work (minutes), workers age 16+, 2019-2023	15.5	18.0
Housing units, July 1, 2023	34,852*	380,841
Owner-occupied housing unit rate, 2019-2023	65.8%	63.4%
Housing units in multi-unit structures, percent, 2019-2023*	30.8%	28.0%
Median value of owner-occupied housing units, 2019-2023	$291,400	$241,100
Households, 2019-2023	32,208	325,079
Persons per household, 2019-2023	2.23	2.31
Per capita money income in past 12 months (2023 dollars), 2019-2023	$44,475	$42,474
Median household income, 2019-2023	$77,698	$75,949
Persons in poverty, percent, 2023	9.7%	9.8%

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
Z: Value greater than zero but less than half unit of measure shown
Source: US Census Bureau – QuickFacts; *American Community Survey, 5-year Estimates, Table DP04: Selected Housing Characteristics

Income

	North Dakota				Bismarck			
INCOME (IN 2023 INFLATION-ADJUSTED DOLLARS)	Estimate	Margin of Error	Percent	Percent Margin of Error	Estimate	Margin of Error	Percent	Percent Margin of Error
Total households	325,079	±1,663	325,079	(X)	32,208	±482	32,208	(X)
Less than $10,000	14,303	975	4.4%	±0.3	1,449	322	4.5%	±1.0
$10,000 to $14,999	11,378	975	3.5%	±0.3	1,127	258	3.5%	±0.8
$15,000 to $24,999	21,780	1300	6.7%	±0.4	2,287	419	7.1%	±1.3
$25,000 to $34,999	23,406	1300	7.2%	±0.4	1,868	354	5.8%	±1.1
$35,000 to $49,999	35,434	1300	10.9%	±0.4	3,253	419	10.1%	±1.3
$50,000 to $74,999	54,288	1625	16.7%	±0.5	5,604	580	17.4%	±1.8
$75,000 to $99,999	45,186	1300	13.9%	±0.4	4,187	419	13.0%	±1.3
$100,000 to $149,999	59,815	1950	18.4%	±0.6	6,281	612	19.5%	±1.9
$150,000 to $199,999	29,582	1300	9.1%	±0.4	3,060	419	9.5%	±1.3
$200,000 or more	29,907	1300	9.2%	±0.4	3,124	483	9.7%	±1.5
Median household income (dollars)	75,949	±1,002	(X)	(X)	77,608	±4,245	(X)	(X)
Mean household income (dollars)	100,487	±1,248	(X)	(X)	99,685	±4,078	(X)	(X)

An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
An '(X)' means that the estimate is not applicable or not available
Source: US Census Bureau – 2023 American Community Survey, 5-year Estimates, Table S1901: Income in the Past 12 Months (in 2023 Inflation-Adjusted Dollars)

Poverty Statistics

PEOPLE	**Bismarck**	**North Dakota**
Households, 2019-2023	32,208	325,079
Persons per household, 2019-2023	2.23	2.31
Per capita money income in past 12 months (2023 dollars), 2019-2023	$44,475	$42,474
Median household income (in 2023 dollars), 2019-2023	$77,608	$75,949
Persons in poverty, percent, 2023	9.7%	9.8%

Source: US Census Bureau - QuickFacts

Employment Status

EMPLOYMENT STATUS	North Dakota				Bismarck			
	Estimate	Margin of Error	Percent	Percent Margin of Error	Estimate	Margin of Error	Percent	Percent Margin of Error
Population 16 years and over	622,500	±2,487	622,500	(X)	62,277	±1,112	62,277	(X)
In labor force	432,302	±5,756	69.4%	±0.9	40,825	±2,042	65.6%	±3.0

Source: US Census Bureau – American Community Survey, Table DP03 – Selected Economic Characteristics

Business Quick Facts

	Bismarck	North Dakota
Total number of firms, 2022	2,067	18,251
Minority-owned firms, percent, 2022	4.4%	5.0%
Women-owned firms, percent, 2022	18.2%	17.9%

F: Fewer than 100 firms
S: Suppressed; does not meet publication standards
Sources: City of Bismarck and US Census Bureau - QuickFacts

Leading Industries:

Health Care and Education
Retail Trade
Arts, Entertainment, Hospitality
Construction
Public Administration

Five Largest Employers:

https://www.bismarckmandanedc.com/workforce/major-employers

- State of North Dakota (4,456 employees)
- Sanford Health (4,204 employees)
- Bismarck Public Schools (2,580 employees)
- CHI St. Alexius Health (1,290 employees)
- Doosan Bobcat (1,280 employees)

Housing Statistics

PEOPLE	Bismarck	North Dakota
Living in same house 1 year & over, percent2019-2023	85.5%	83.6%
Foreign born persons, percent, 2019-2023	3.6%	4.5%
Language other than English spoken at home, pct age 5+, 2019-2023	4.5%	6.4%
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Persons per household, 2019-2023	2.23	2.31
Per capita money income in past 12 months (2023 dollars), 2019-2023	$44,475	$42,474
Median household income, (in 2023 dollars) 2019-2023	$77,608	$75,949
Persons in poverty, percent, 2023	9.7%	9.8%

Source: US Census Bureau – QuickFacts; *2023 American Community Survey, 5-year Estimates, Table DP04: Selected Housing Characteristics

	North Dakota				Bismarck			
HOUSE HEATING FUEL	Estimate	Margin of Error	Percent	Percent Margin of Error	Estimate	Margin of Error	Percent	Percent Margin of Error
Occupied housing units	325,079	±1,663	325,079	(X)	32,208	±482	32,208	(X)
Utility gas	134,835	±2,416	41.5%	±0.7	21,749	±666	67.5%	±1.8
Bottled, tank, or LP gas	44,535	±1,168	13.7%	±0.4	511	±182	1.6%	±0.6
Electricity	129,646	±2,169	39.9%	±0.7	9,294	±610	28.9%	±1.9
Fuel oil, kerosene, etc.	5,942	±388	1.8%	±0.1	82	±86	0.3%	±0.3
Coal or coke	434	±129	0.1%	±0.1	6	±11	0.0%	±0.1
Wood	1,196	±195	0.4%	±0.1	13	±20	0.0%	±0.1
Solar energy	44	±30	0.0%	±0.1	0	±24	0.0%	±0.1
Other fuel	4,945	±491	1.5%	±0.2	162	±78	0.5%	±0.2
No fuel used	3,502	±467	1.1%	±0.1	391	±164	1.2%	±0.5
SELECTED CHARACTERISTICS								
Occupied housing units	325,079	±1,663	325,079	(X)	32,208	±482	32,208	(X)
Lacking complete plumbing facilities	1,307	±278	0.4%	±0.1	90	±81	0.3%	±0.3
Lacking complete kitchen facilities	1,908	±316	0.6%	±0.1	83	±53	0.3%	±0.2
No telephone service available	2,901	±438	0.9%	±0.1	218	±126	0.7%	±0.4

An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
An '(X)' means that the estimate is not applicable or not available
Source: U.S. Census Bureau - 2023 American Community Survey, 5-year Estimates, Table DP04: Selected Housing Characteristics

Additional Resources

The Metropolitan Planning Organization (MPO) mains a community “Monitoring Report” on the City of Bismarck Website at https://www.bismarcknd.gov/1457/Monitoring-Report

- *Although the focus of the MPO is transportation related, the information contained within the MPO’s Monitoring Report provides for detail regarding People, Housing, Employment, and Travel within the MPO area (Bismarck/Mandan).*

Current City of Bismarck City Construction Projects Story Map:
https://bismarck.maps.arcgis.com/apps/MapSeries/index.html?appid=e8d06816c8114f18a07019c34d31b04a

- The story map link above shows the major construction projects in the city within six different areas:

1. Street Rehab and Repair
2. Street Lighting
3. Watermain
4. Signal Upgrades
5. Sewer Upgrades
6. New Developments.

Community Assets

Community Assets are inventories for planning purposes, to assist in the identification of potential impacts and vulnerabilities within the various hazard profiles. Specific community assets are also identified within the various hazard profiles where applicable. This section provides an overview of the type of community assets identified to aid in hazard profile development and updating.

Community asset categories and category descriptions:

Critical Facilities
A facility that provides a critical service or product that is vital to the community for continuity of emergency services, critical government services, medical services, and critical supplies.

Critical Infrastructure
Transportation infrastructure and utility infrastructure including gas, electricity, communications, sewer and water.

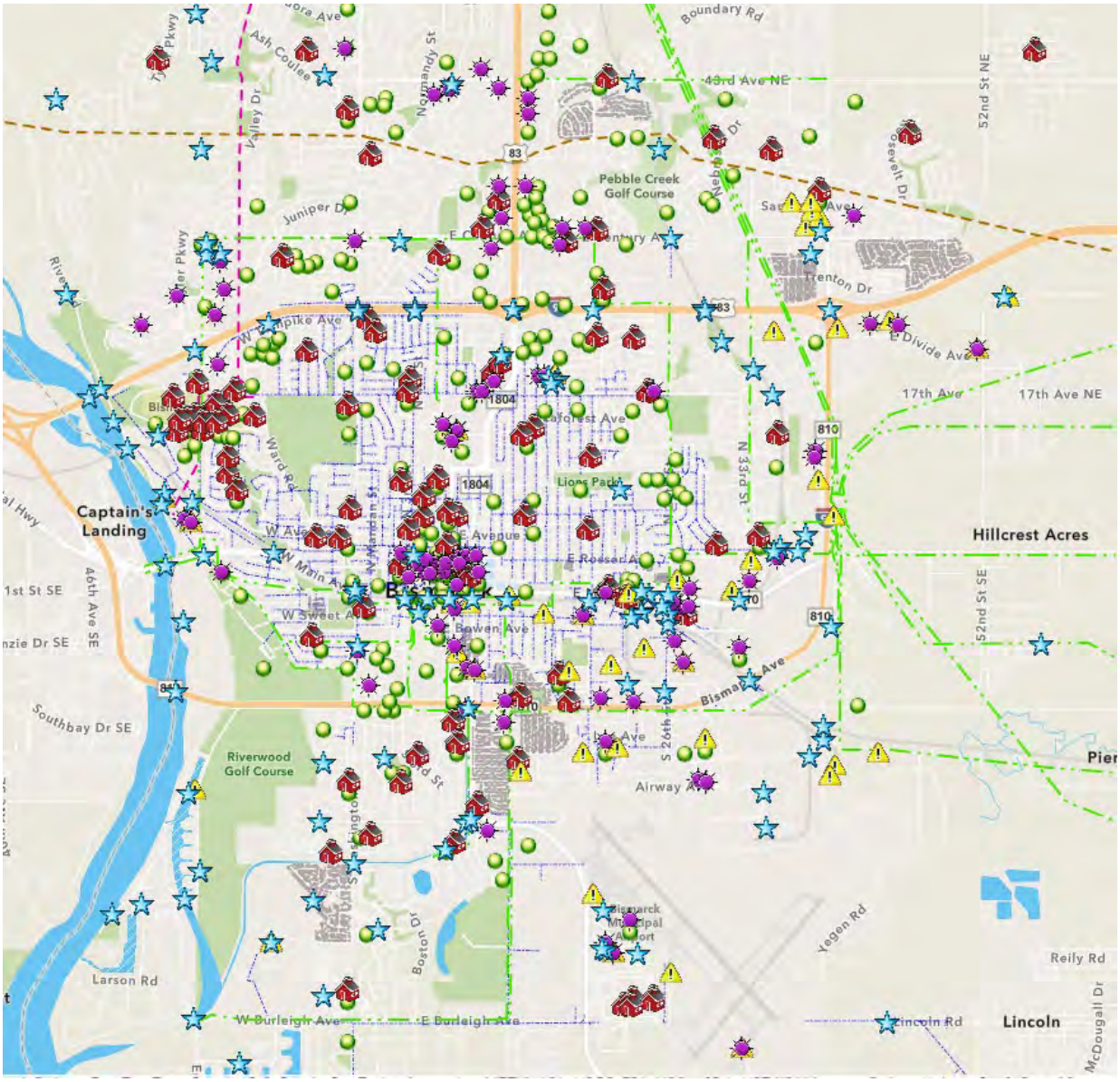
Schools
All schools including licensed daycare to college and private schools.

Hazardous Materials Sites
Hazards Materials Sites contain chemical, biological, or other substances. If a hazardous materials facility is impacted, there may be an additional threat to the community because of the potential for a release.

Vulnerable / Special Populations
Includes areas of “assembly” where a facility or site is likely to have a “high density” population within a relatively small area. Schools are not included, as they are a separate category. Includes populations that may require special assistance during response and recovery efforts. Examples are jail/prison populations, nursing homes, assisted living, etc.

The map on the following page identifies the various community assets as noted above. The map is maintained by Bismarck Emergency Management and Bismarck GIS.

The visual below illustrates various community assets as described on page 1 of this section. Assets identified and reviewed for purposes of this mitigation plan include critical facilities (purple), Critical Infrastructure (blue), schools, hazardous materials sites required to report (yellow), and vulnerable populations (green).



Hazard Profiles

Table of Contents

Ten of the hazards are addressed primarily as **Natural Hazards**: Drought, Flood, Geologic Hazards, Infectious Disease, Pest Infestation, Severe Summer Weather, Space Weather, Tornado, Wildland Fire, and Winter Storm.

Nine of the Hazards are addressed primarily as **Technological or Human-Caused Hazards**: Active Threat, Aircraft Accident, Cyberattack, Dam Failure, Fire, Hazardous Materials Release, Terrorism or Nation State Attack, and Train Derailment. In some cases, hazards may be the result of natural, technological, and/or human caused. Each hazard is categorized based on the more likely cause of significant impact.

Methodology
Each hazard or group of related hazards has its own profile. A stand-alone hazard profile allows for the comprehensive analysis of each hazard from many different aspects. The tornado hazard was addressed separately from Severe Summer Weather because of the significant differences in terms of probability, magnitude and extent of potential impact compared to other summer-related hazards. Each hazard contains a hazard description as well as an analysis of risk (including historical occurrences) and a vulnerability assessment as well as descriptions relating to magnitude, extent, and potential impact of the hazard. The hazard profiles (for natural hazards) contain a vulnerability assessment table, which is used as a tool to identify vulnerabilities from different perspectives. Vulnerability summary statements included in Section 3 are based on the more detailed hazard profile and vulnerability assessments included within this plan section. The Risk Assessments for each hazard are summarized in Section 10.

Active Threat – Hazard Profile

Description

Vulnerabilities and specific mitigation actions will not be included in this plan for the Active Threat Hazard to avoid compromising safety and security of specific facilities and populations. Regarding the active threat hazard, the mitigation plan content is limited to profiling the hazard, identifying existing mitigation or prevention measures, and identifying general risk mitigation recommendations.

Active Threat
The Bismarck Police Department has developed an “Active Threat Response Plan” to provide uniform guidelines and provisions for use in responding and resolving situations involving crimes of violence in progress involving an Active Threat situation with the potential for more victims. Active Threat crimes include but are not limited to situations such as Active assailants in schools, businesses, public places, gatherings as well as any other type of ongoing crime of violence where innocent victims are in in continuous imminent danger due to the ongoing act of an Active Threat.

Active Threat definition (within Bismarck PD Active Threat Response Plan): Subject or subjects that are utilizing deadly force and without intervention would continue to do so while, having unrestricted access to additional victims. The means of deadly force by the subject does not necessarily need to be that of a firearm.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Active Threat
Probability	Possible
Speed of Onset	Limited or No Notice
Duration	Minutes to Hours
Geographic Area	Small targeted area (ex: facility or property level) – usually targeting a specific population or individual/s
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Active Attack. (use of various weapons: guns, knives, explosives, etc) A. Targeted groups such as government entities/employees, religions, and LGBTQIA population. B. Densely populated areas (buildings or events) C. First Responders (ie: law enforcement personnel)
Mass Casualty Incident	Possible
Property Losses (points of vulnerability – high priority)	Property Damage may be extensive depending on weapons used such as explosives. May be limited to targeted property and adjacent properties.
Environmental (points of vulnerability – high priority)	
COG/COOP (points of vulnerability – high priority)	All City Departments may be the target of active threats.
Critical Facilities (points of vulnerability – high priority)	Those with limited or no security measures.
Critical Infrastructure (points of vulnerability – high priority)	Typically, the target would be individuals associated with the critical infrastructure, not the infrastructure itself.
Schools (points of vulnerability – high priority)	Probability is considered equal for all schools. Vulnerability will vary based on security measures and procedures in place.
High Risk Facilities (chemical) (points of vulnerability – high priority)	Typically, the target would be individuals associated with the high risk facility, not the facility itself.
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	Businesses (more frequent than school events nationwide) Government Buildings & Staff Places of Worship Schools Groups or individuals targeted by hate crimes.
Economy (community-wide)	Usually limited to the impacted facility
OTHER: (points of vulnerability – high priority)	

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
New facilities including schools and businesses are equally vulnerable to locations (facilities) existing prior to this plan update.	No changes. See Active Threat Hazard Mitigation Capabilities listed in Section 3.

Risk
See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Active Threat and Civil Disturbance are closely related. One hazard may initiate the other. The occurrence of other hazards may contribute to the likelihood of an active threat or active attack due to compounding stress and frustrations.

Future Conditions

- **Location**: The locations of active threat hazards will remain the same, with the exception of additional businesses, schools, etc that may become a targeted location.
- **Extent/Intensity:** No change.
- **Frequency:** No expected change.
- **Duration:** No change.

Anticipated Future Climate Impact – Active Threat Hazard
Climate conditions are not expected to be the direct cause of the unrest or active attacks, but may exacerbate underlying instabilities. Like civil disturbance, most crime results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR, 2005). Future climate projections through the end of the century indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018) including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil unrest (Powys-White, 2016; Levin, 2016; EELP, 2023). *Source: 2024-29 ND Enhanced Mitigation Plan.*

Previous Occurrences

Previous Threats (not carried out)

August 19, 2025: Bomb Threat at local bank in Bismarck. Bismarck PD issued a shelter in place recommendation for locations within the vicinity via CodeRED and cordoned off the area. A male wearing the backpack walked into the bank on North Fourth Street about 11:20 a.m. and made a veiled threat regarding an explosive device. The backpack the suspect was wearing was later deemed safe.

May 2, 2023: Numerous schools in North Dakota including Bismarck High School were the target of hoax calls reporting an active shooter . The call that came to Bismarck had recorded gunfire in the background. Police responded to BHS at about 9:45 am and concluded a room-by-room search at about 12:30 pm.

Bismarck Police also responded to Bomb Threats at north Walmart on November 15, 2021 and south Walmart on May 21, 2019.

A bomb threat at the Bismarck Event Center delayed high school graduation ceremonies on May 27, 2007. The threat made resulted in the evacuation of Century High School graduating seniors and the rest of the crowd at the beginning of the 5 pm Friday graduation ceremony. The even resumed at about 6 pm after the bomb squad did a sweep of the building.

The list above is NOT all-inclusive of previous threats.

Building Security Risk Mitigation Recommendations

Procedures:

- Conduct a realistic security assessment to determine the facility's vulnerability to an active assailant attack.
- Identify multiple evacuation routes and practice evacuations under varying conditions; post evacuation routes in conspicuous locations throughout the facility; ensure that evacuation routes account for individuals with special needs and disabilities.
- Designate shelter locations with thick walls, solid doors with locks, minimal interior windows, first-aid emergency kits, communication devices, and duress alarms.
- Designate a point-of-contact with knowledge of the facility's security procedures and floor plan to liaise with police and other emergency agencies in the event of an attack.
- Incorporate an active assailant/threat drill into the organization's emergency preparedness procedures.
- Vary security guards' patrols and patterns of operation.
- Limit access to blueprints, floor plans, and other documents containing sensitive security information, but make sure these documents are available to law enforcement responding to an incident.
- Establish a central command station for building security.

Systems:

- Put in place credential-based access control systems that provide accurate attendance reporting, limit unauthorized entry, and do not impede emergency egress.
- Put in place closed-circuit television systems that provide domain awareness of the entire facility and its perimeter; ensure that video feeds are viewable from a central command station.
- Put in place communications infrastructure that allows for facility-wide, real-time messaging.
- Put in place elevator systems that may be controlled or locked down from a central command station.

Training:

- Train building occupants (city-owned buildings and broader community) on response options outlined by ALERRT. http://alerrt.org/

  Avoid, Deny, Defend These core concepts incorporate the response options of "Run, Hide, Fight," while providing for a more thorough explanation of additional response options within "Avoid, Deny, Defend."

Aircraft Accident – Hazard Profile

Description

The property of Bismarck Airport, located in south Bismarck, consists of 2,400 acres which includes two runways, a control tower, and a 70,000 square foot terminal building completed in 2005.

In part because of the economic growth in Bismarck and in the state, as well as being a destination location for hunters and other tourists, the airport continues to expand its commercial flight options and is actively used by those using or owning privately owned smaller aircraft. Throughout much of the airports history, there have typically been two commercial airlines providing service. As of 2025, there are four commercial airlines and 75 general aviation based airplanes. The airport now has more flights, more destinations, and more use of the airport by the local, regional, and wider community.

Total annual passenger boardings continue to increase:

Total Annual Passenger Boardings				
2010	**2011**	**2012**	**2013**	**2014**
194,043	196,414	236,172	237,683	245,205
2015	**2016**	**2017**	**2018**	**2019**
259,734	271,022	272,739	282,363	309,337
2020	**2021**	**2022**	**2023**	**2024**
150,161	213,668	241,927	256,761	294,580

Additional information regarding the Bismarck Airport: www.bismarckairport.com

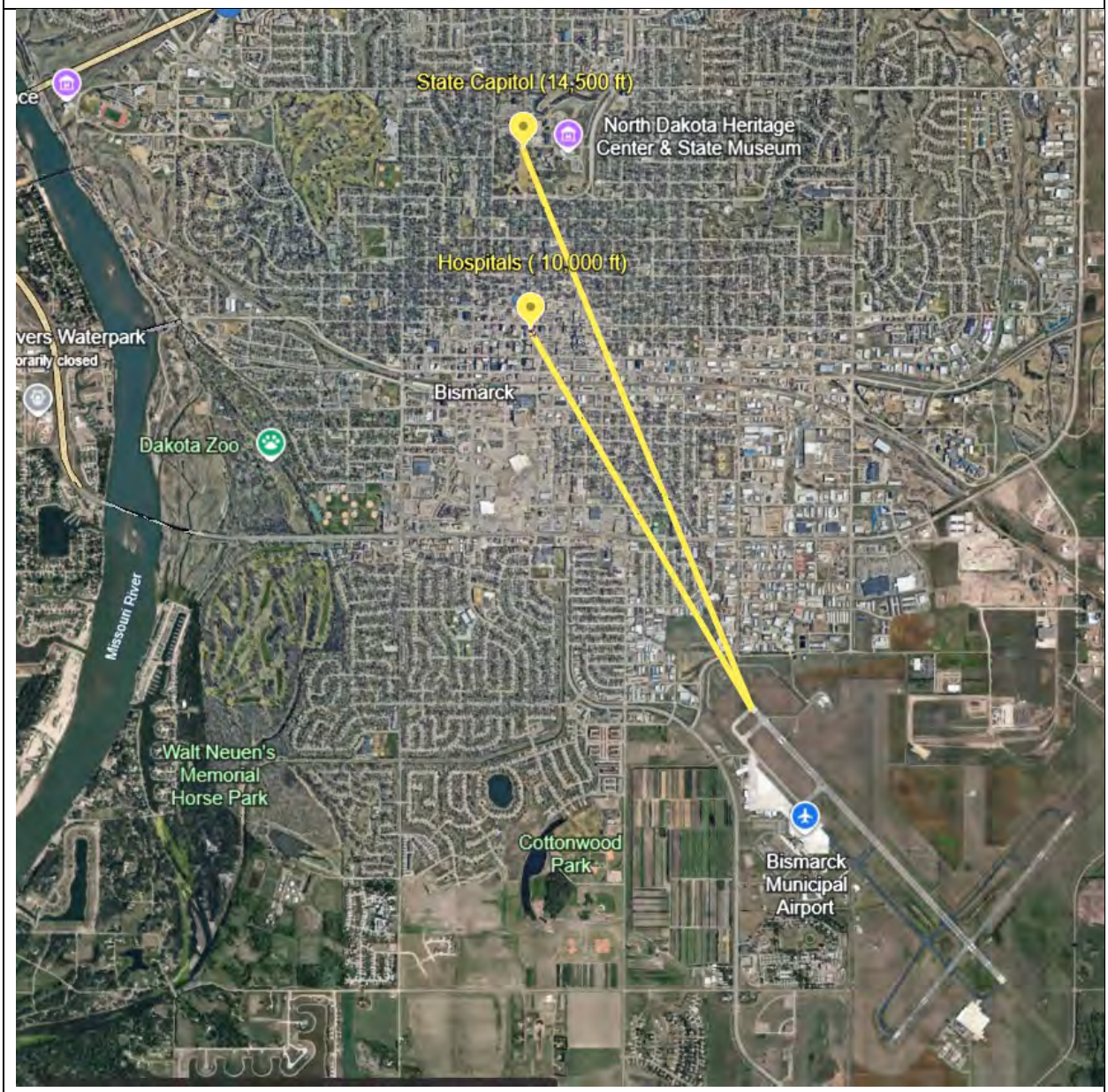
In most disasters, death and injury represent one of the effects of the hazard, while in aircraft accidents (ie: incidents involving major airlines), mass casualties are often the primary impact and focus of the event. An aircraft accident may be intentional as well. Terrorists have used transportation, particularly mass transportation, as a method of delivering their attacks throughout the world.

A mass casualty event from an airline crashing on or near the airport would stress the city's hospitals, clinics and emergency response capabilities. Mass casualties can be defined as an incident resulting in a large number of deaths and/or injuries that reaches a magnitude that overwhelms local resources. In this case, mutual aid as well as state, federal, and private resource assistance would be requested.

The **Accident Potential Zone (APZ)** is an area beyond the ends of a runway where aircraft accidents are statistically more likely, particularly during takeoff and landing. It typically includes a Clear Zone extending 3,000 feet from the runway end, followed by APZ I (5,000 feet) and APZ II (7,000 feet), aligned with the flight path. While the provided map outlines key population hazards in yellow—including the North Dakota State Capitol and nearby hospitals—it does not represent the full extent of the APZ."

Reference: Aircraft Rescue and Fire Fighting IFSTA Manual 6th Addition.

Approximate distance from the end of the runway to the State Capitol is 14,500 feet (noted by red line). Approximate distance to the two major hospitals is 9,000 to 10,000 feet.



The highest population and number of properties within 15,000 feet (within the APZ) of the Bismarck Airport are northwest of the airport based on the alignment of the runway running NW/SE. Properties and populations within that distance include CHI St. Alexius Health, Sanford Health, the State Capitol, five mobile home parks, twelve schools, and Bismarck critical facilities including Bismarck Police Department, the City/County Building and Bismarck Burleigh Public Health.

The most vulnerable populations are the crew members and frequent travelers based on extensive use of aircraft (higher use equals higher risk or probability).

The city of Lincoln, as it continues to grow, will be within the air traffic pattern of the Bismarck Airport (within the Accident Potential Zone).

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Aircraft Accident– Commercial Airline
Probability	Possible
Speed of Onset	No notice event or may have some notice based on identified issues creating risk (prior to landing)
Geographic Area	Not specific, however, areas of concern include the geographic area within the Accident Potential Zone (APZ)
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Crash impact and/or Fire A. Crew and Passengers B. Those within the APZ (higher risk)
Mass Casualty Incident	1. Yes. Mass casualty is the primary concern for aircraft accidents.
Property Losses	1. Properties within the Accident Potential Zone.
Environmental	1. An aircraft accident could involve the Missouri River, Hay Creek, or Apple Creek. Environmental impact would be primarily fuel and debris entering the waterways.
COG/COOP	Critical Facilities within the APZ: 1. City County Building 2. Bismarck Police Department 3. Bismarck Burleigh Public Health 4. State Capitol 5. Burleigh County Courthouse 6. United Tribes Technical College, although in close proximity, is NOT within the flight path.
Critical Facilities	1. See COG/COOP above. 2. Bismarck Event Center 3. CHI St. Alexius Health 4. Sanford Health
Critical Infrastructure	1. Railroad (BNSF) is within APZ 2. DMVW Railroad within APZ

	Aircraft Accident– Commercial Airline
Schools	Schools within the APZ: 1. Jeanette Myhre Elementary School 2. Bismarck High School 3. St. Mary's Central Middle School 4. Willmore Elementary 5. BECEP 6. St. Anne's Grade School 7. Pioneer Elementary 8. Saxvik Elementary 9. Simle Middle School 10. South Central Middle School 11. Roosevelt Elementary 12. Cathedral Elementary
High Risk Facilities (chemical)	1. Airport Fuel Farm
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Crescent Manor 2. Mobile Home Parks: Holiday Park, Airport Village, Skyway Park Village, Stardust Terrace, Colonial Estates
Economy (community wide)	Catastrophic (THIRA Rating)
OTHER:	The potential for inappropriate (illegal) use of drones within proximity, either intentionally or unintentionally provides for additional vulnerability (interaction between drones and aircraft).

Changes in Vulnerability

Since the previous plan update in 2020.

Increase in Vulnerability	Decrease in Vulnerability
The potential for inappropriate (illegal) use of drones within proximity, either intentionally or unintentionally, provides for additional vulnerability (interaction between drones and aircraft).	Note: Airport Response Plans have been updated to address the potential for the illegal use of drones within the area.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Extreme weather events may influence the risk and potential impact or severity of an aircraft accident. Aircraft, if used as a weapon, would be considered a Terrorism or Nation-State Attack event. If a significant aircraft accident occurred, the aircraft accident may initiate other hazards such as Fire, Wildland Fire, and may involve Hazardous Materials. Space Weather can impact HF Frequencies used by commercial airline industry.

Future Conditions

- **Location**: No change.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** No change.
- **Duration:** No change.

Anticipated Future Climate Impact – Aircraft Accident Hazard

Impact would be indirect. Projected increases in frequency or intensity of storms may impact likelihood.

Previous Occurrences

As of 2025, there have been no large commercial line aircraft accidents at the Bismarck Airport or within Burleigh County. However, there have been accidents and even fatalities involving smaller aircraft. The largest number of fatalities for any one incident within Burleigh County is one fatality. Most aircraft accidents involve smaller aircraft.
Bismarck Airport may also be the receiver of redirected flights for aircraft requiring emergency landing. In these cases, the aircraft is not landing at its destination location. Airline incidents and incident related information can be found at the National Transportation Safety Board website: http://www.ntsb.gov/

Airplane Accident Statistics

Aircraft accidents predominantly occur during phases of flight where the aircraft is close to the ground. According to the Federal Aviation Administration (2022), over 25% of general aviation fatal accidents take place during the maneuvering phase—typically involving low-altitude turning, climbing, or descending. Similarly, the National Transportation Safety Board (2014) found that the landing phase is the most frequent point of occurrence for personal flying accidents.

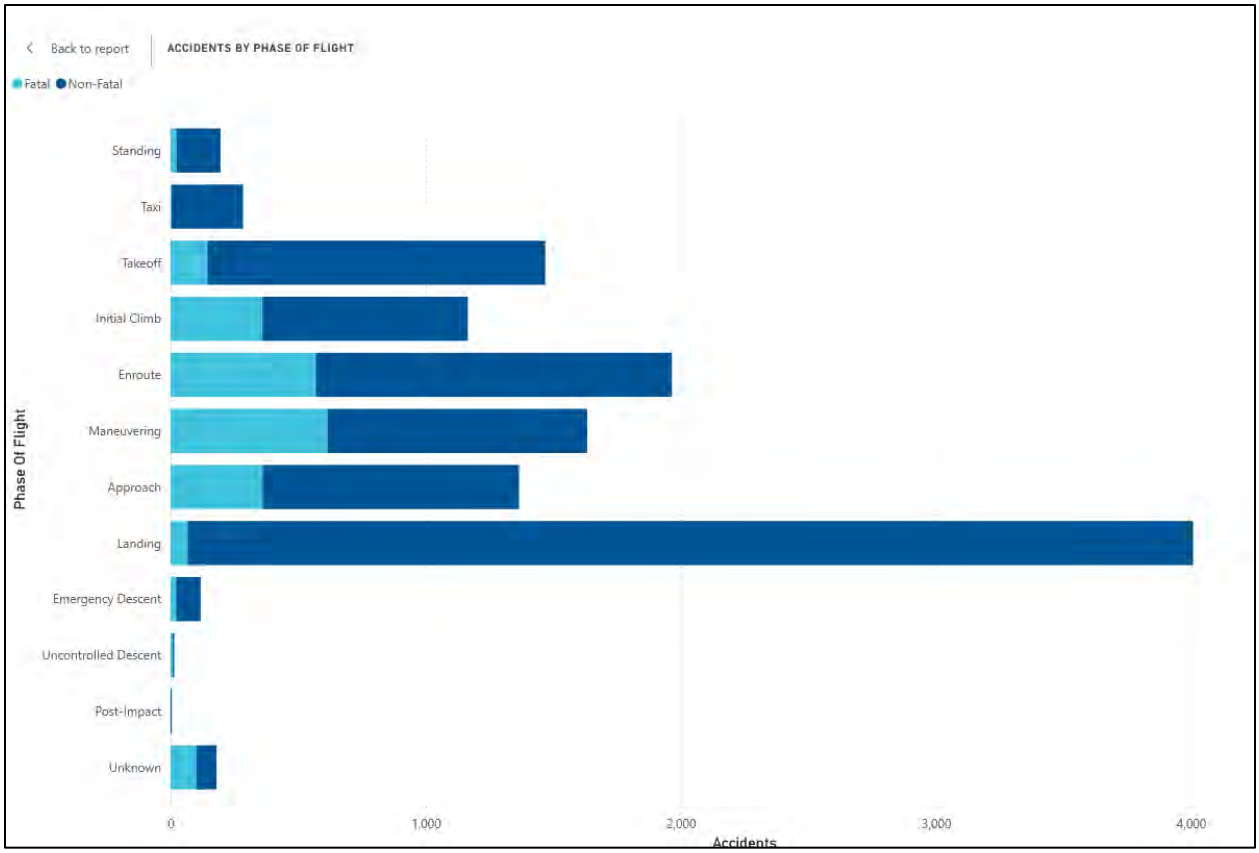
Fatal accidents are more likely during the takeoff and initial climb phases, when aircraft engines are under maximum load and any mechanical issues are more likely to become apparent. In these cases, pilots may attempt an emergency return to the airport—commonly referred to as a "turnback." However, executing a turnback is both technically and operationally challenging, as it typically occurs after a failure has already impaired aircraft performance and often at a low altitude with limited maneuvering options.

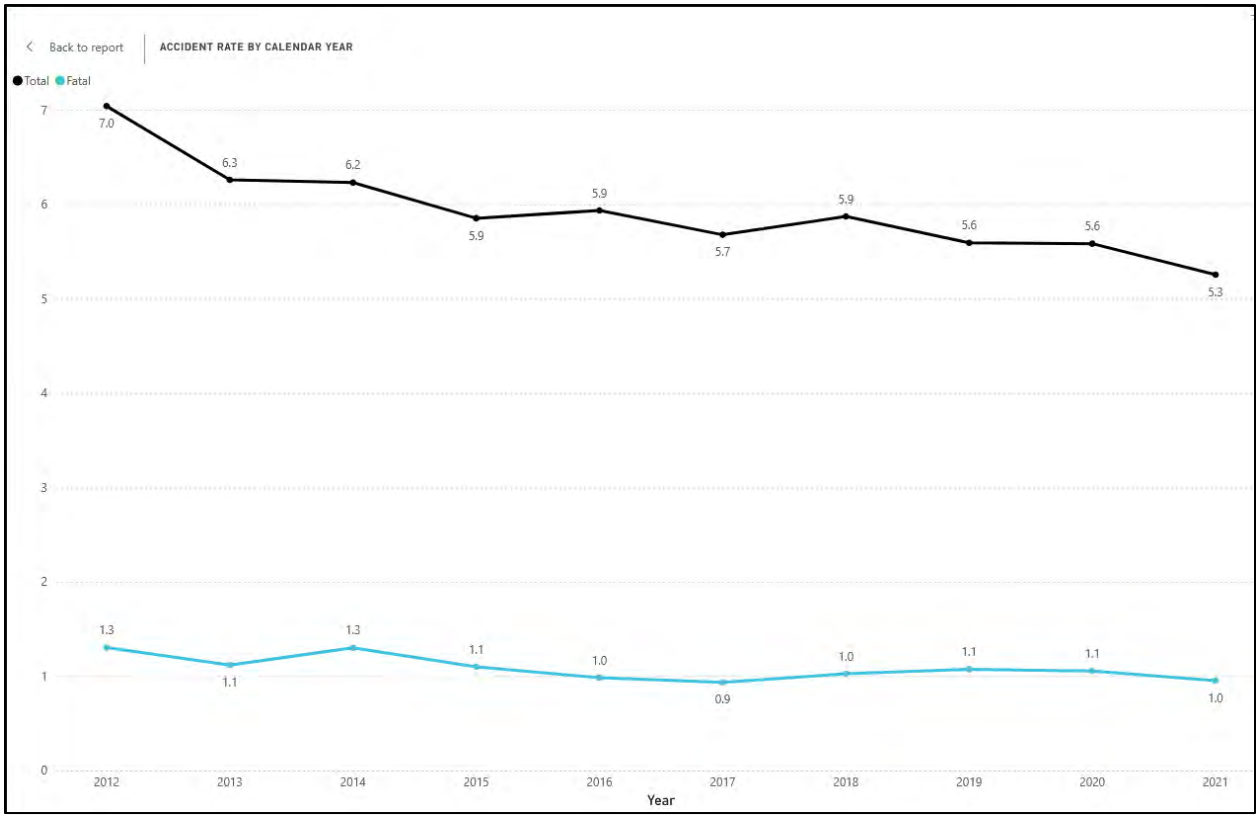
References

Federal Aviation Administration. (2022, February 4). Maneuvering flight. https://www.faa.gov/newsroom/safety-briefing/maneuvering-flight

National Transportation Safety Board. (2014). Review of U.S. civil aviation accidents, calendar year 2011 (NTSB/ARA-14/01). https://www.ntsb.gov/safety/data/Documents/ARA1401.pdf

National Transportation Safety Board. (2024). General Aviation Accident Dashboard. https://www.ntsb.gov/safety/data/Pages/GeneralAviationDashboard.aspx


Back to report
ACCIDENTS BY PHASE OF FLIGHT
Fatal
Non-Fatal
Standing
Taxi
Takeoff
Initial Climb
Enroute
Maneuvering
Approach
Landing
Emergency Descent
Uncontrolled Descent
Post-Impact
Unknown
Phase Of Flight
0
1,000
2,000
3,000
4,000
Accidents


Back to report
ACCIDENT RATE BY CALENDAR YEAR
Total
Fatal
7
6
5
4
3
2
1
0
7.0
6.3
6.2
5.9
5.9
5.7
5.9
5.6
5.6
5.3
1.3
1.1
1.3
1.1
1.0
0.9
1.0
1.1
1.1
1.0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year

Civil Disturbance – Hazard Profile

Description

Civil disturbance is a term that is typically used by law enforcement to describe forms of disturbance caused by groups of people. Civil disturbance is typically a symptom of socio-political problems in the form of a protest or riot. The severity of these actions typically coincide with the level of public outrage.

Civil disturbances can also arise out of labors disputes, correction center uprisings, or a public gathering or event that becomes disorderly. Civil disturbance can range from a group of people impeding access to a building, blocking a street, or disrupting normal activity through noise or intimidation. Civil disturbance can manifest in many different levels of disruption. These vary from a peaceful demonstration, such as a sit-in to a mob that burns or destroys property and terrorizes and assaults citizens. Even in its more passive forms, a group that blocks roadways, sidewalks, or buildings interferes with public order. Often protests intended to be a peaceful demonstration to the public and the government can escalate into general chaos. There are two types of large gatherings typically associated with civil disturbances: a crowd and a mob. A crowd may be defined as a casual, temporary collection of people without a strong, cohesive relationship. Crowds can be classified in to the following four categories (Blumer 1946):

- Casual Crowd: A casual crowd is a group of people who happen to be in the same place at the same time. Violent conduct does not occur.
- Cohesive Crowd: A cohesive crowd consists of members who are involved in some type of unified behavior. Members of this group are involved in some type of common activity, such as worshipping, dancing, or watching a sporting event. Members of these crowds may have intense internal discipline, and require substantial provocation to arouse to action.
- Expressive Crowd: An expressive crowd is one held together by a common commitment or purpose. They may not be formally organized, and are assembled as an expression of common sentiment or frustration. Members wish to be seen as a formidable influence. One of the best examples of this type is a group assembled to protest.
- Aggressive Crowd: An aggressive crowd is composed of individuals who have assembled for a specific purpose. This crowd often has leaders who attempt to arouse the members or motivate them to action. Members are noisy and threatening and will taunt authorities. They may be more impulsive and emotional and require only minimal stimulation to arouse violence. Examples of this type of civil unrest crowd could include demonstrators and strikers, though not all demonstrators and strikers are aggressive.

Civil unrest and disturbances affect the following factions of society:

- The Public: The general population could serve as participants or targets in actions of civil unrest. Widespread unrest could cause fear amongst the populace and cause them to be absent from school or work activities. During an event, bystanders may be harmed because of the activities of participants.
- Responders: Responses to civil unrest events are generally handled at the local level. In a large event, the resources of a local jurisdiction may be exceeded. In this instance, State resources would be activated to fill the need. During an event, responders may become targets, which could hamper their effectiveness.
- Continuity of Operations: The outbreak of widespread rioting or looting could have potential impact on the City's ability to provide services and conduct its normal operations. Protesters could occupy government buildings and interrupt the normal functions of government, or targeted attacks on government facilities could interrupt operations entirely.
- Property: Private property often serves as a target in instances of civil unrest. Businesses can be targeted for looting or vandalism. If an event is particularly large, damage could reach millions of dollars and recovery could take years.
- Facilities: Often in acts of civil unrest government facilities become the focal point of protests or targets for vandalism. Damage suffered during an event or the inability of a worker to enter a facility may greatly reduce a facility's effective capacity or close it completely.
- Infrastructure: Similar to government facilities, public and private infrastructure can become targets of civil unrest. Damage to transportation, communications, or utilities infrastructure could further exacerbate the situation.
- Environment: Normally, instance of civil unrest will have a minimal impact on the environment. However, if petroleum or other chemical facilities were a target for vandalism or large-scale fires occurred, the impact on the environment could be significant.

Various media and social media platforms make the distribution of misinformation, disinformation, or mal-information potentially more effective in promoting lack of trust in government and officials who are traditionally considered subject matter experts, and civil disturbance incidents may occur, partially as a result of inaccurate information or propaganda.

Definitions from the Princeton Library https://princetonlibrary.org/guides/misinformation-disinformation-malinformation-a-guide/

- **Misinformation** is defined as false, incomplete, inaccurate/misleading information or content which is generally shared by people who do not realize that it is false or misleading. This term is often used as a catch-all for all types of false or inaccurate information, regardless of whether referring to or sharing it was intentionally misleading.
- **Disinformation** is false or inaccurate information that is intentionally spread to mislead and manipulate people, often to make money, cause trouble or gain influence.
- **Malinformation** refers to information that is based on truth (though it may be exaggerated or presented out of context) but is shared with the intent to attack an idea, individual, organization, group, country or other entity.Mediadefence.org

Mitigation

The City of Bismarck bears the first and primary responsibility to control the disturbance within the city limit of Bismarck. Civil unrest that remains uncontrolled warrants local mutual aid from neighboring municipalities and/or county resources. If the civil unrest remains beyond the capabilities of local law enforcement agencies alone, the North Dakota Highway Patrol assistance may be requested. If the restoration of law and order is beyond local, county and state abilities, the Governor may declare a State of Emergency calling on federal support such as the North Dakota National Guard to assist in restoring order.

It is a continuing goal of the Bismarck Police Department to train officers to respond to civil disturbance situations in a professional and tactical manner. Officers are trained in Field Force Operations and Field Force Extrication Tactics from the Center of Domestic Preparedness in Anniston, Al.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Civil Disturbance
Probability	Low
Speed of Onset	Limited or No Notice
Geographic Area	City-Wide, Statewide, Regional, or Nationwide
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Active Attack. (see Active Threat Hazard Profile) A. Targeted groups such as government entities/employees, religions, and LGBTQIA population. B. First Responders (ie: law enforcement personnel) C. Densely populated areas (buildings or events)
Mass Casualty Incident	Possible
Property Losses (points of vulnerability – high priority)	Government Buildings Property owned by or catering to groups targeted for hate crimes. Nearly all the past civil disturbances in North Dakota have resulted in property damage in the form of vandalism and trash.
Environmental (points of vulnerability – high priority)	Clean-up after a civil disturbance is often costly, and for events occurring in natural areas, like the Dakota Access Pipeline project, there may be environmental impacts from trash, human waste, and from humans degrading the land. For environmental protests, the primary grievance may be about the importance of the natural or cultural resource at risk
COG/COOP (points of vulnerability – high priority)	Law Enforcement All Government Entities
Critical Facilities (points of vulnerability – high priority)	Airport Hospitals/Clinics
Critical Infrastructure (points of vulnerability – high priority)	Damage to transportation, communications, or utilities infrastructure could further exacerbate the situation.
Schools (points of vulnerability – high priority)	Events may cause absenteeism from work/school based on concerns for safety
High Risk Facilities (chemical) (points of vulnerability – high priority)	Specific facilities, pipelines, or methods of transporting chemicals may be a target of protest or civil disturbance actions.
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	Places of Worship Government Buildings & Staff Protest sites
Economy (community-wide)	Events may cause absenteeism from work/school based on concerns for safety During civil disturbances, businesses near the location of the disturbance usually cannot operate as they would in normal conditions, leading to loss of business locally. These businesses may face damages that require insurance claims and can alter business for short periods as they recover from the damage.
OTHER: (points of vulnerability – high priority)	

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No changes.	No changes. See Civil Disturbance Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Active Threat and Civil Disturbance are closely related. One hazard may initiate the other. The occurrence of other hazards may contribute to the likelihood of Civil Disturbance event due to compounding stress and frustrations.

Future Conditions

- **Location**: The locations of potential Civil Disturbance events will remain the same, with the exception of additional location possibilities based on annexations into the city.
- **Extent/Intensity:** No change.
- **Frequency:** No expected change.
- **Duration:** No change.

Anticipated Future Climate Impact – Active Threat Hazard
Any number of things may cause a civil disturbance, whether it is a single cause or a combination of causes; however, most result from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR, 2005). Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil disturbance (Powys-Whyte, 2016; Levin, 2016; EELP, 2023). In most such cases, climate conditions are not the direct cause of disturbance but may exacerbate underlying instabilities. *Source: 2024-29 ND Enhanced Mitigation Plan.*

Previous Occurrences

Although Bismarck has not had significant Civil Disturbance incidents, protest events are common (as a protected first amendment right) and there is always some potential that actions of individuals or groups on either side of an issue can cause a protest event to escalate, resulting in civil disturbance.

Civil Disturbance Incidents within North Dakota illustrate the potential for Civil Disturbance events to occur in Bismarck. The following event descriptions are derived from the 2024-29 ND Enhanced Mitigation Plan.

- In 2016, North Dakota's most nationally recognized civil disturbance event involved controversy over the Dakota Access Pipeline (DAPL) (Johnson, 2016). While the pipeline was intended to connect the Bakken Oil Fields to Gulf Coast refineries (Hersher, 2017), protesters sought to protect sacred burial grounds and the Standing Rock Reservation's water supply.

- On May 30, 2020, peaceful demonstrations in Fargo in response to the George Floyd case in Minnesota turned violent with sunset. Individuals began to taunt police by throwing water bottles, smashing windows of local businesses, damaging vehicles, and setting a bonfire downtown. In response to the criminal actions, police deployed tear gas, and the mayor and governor declared emergencies (Associated Press, 2020). The City of Fargo estimated that the civil disturbance resulted in about $842,000 in damages (Olson, 2020). At this time there were also protests and marches on the NDSU campus that impacted the university and students at the time.

Building Security Risk Mitigation Recommendations

Procedures:

- Conduct a realistic security assessment to determine the facility's vulnerability to an active assailant attack.
- Identify multiple evacuation routes and practice evacuations under varying conditions; post evacuation routes in conspicuous locations throughout the facility; ensure that evacuation routes account for individuals with special needs and disabilities.
- Designate shelter locations with thick walls, solid doors with locks, minimal interior windows, first-aid emergency kits, communication devices, and duress alarms.
- Designate a point-of-contact with knowledge of the facility's security procedures and floor plan to liaise with police and other emergency agencies in the event of an attack.
- Incorporate an active assailant/threat drill into the organization's emergency preparedness procedures.
- Vary security guards' patrols and patterns of operation.
- Limit access to blueprints, floor plans, and other documents containing sensitive security information, but make sure these documents are available to law enforcement responding to an incident.
- Establish a central command station for building security.

Systems:

- Put in place credential-based access control systems that provide accurate attendance reporting, limit unauthorized entry, and do not impede emergency egress.
- Put in place closed-circuit television systems that provide domain awareness of the entire facility and its perimeter; ensure that video feeds are viewable from a central command station.
- Put in place communications infrastructure that allows for facility-wide, real-time messaging.
- Put in place elevator systems that may be controlled or locked down from a central command station.

Training:

- Train building occupants (city-owned buildings and broader community) on response options outlined by ALERRT. http://alerrt.org/

  Avoid, Deny, Defend These core concepts incorporate the response options of "Run, Hide, Fight," while providing for a more thorough explanation of additional response options within "Avoid, Deny, Defend."

Cyberattack – Hazard Profile

Use of AI Tools Disclosure

This Cyberattack Hazard Profile has been written with the assistance of a Large Language Model (LLM). The resultant content has been reviewed for accuracy and necessary edits made prior to publication.

Description

A cyberattack is any offensive maneuver that targets computer information systems, infrastructures, networks, or personal computer devices, attempting to steal, alter, or destroy data or systems. These attacks can come in various forms, including malware, ransomware, phishing, denial of service (DoS), and advanced persistent threats (APTs). Attacks are often orchestrated by hackers, cybercriminals, or state-sponsored groups, who exploit vulnerabilities in digital systems to achieve their malicious objectives.

General Types of Cyberattacks

- Malware: Malicious software designed to disrupt, damage, or gain unauthorized access to computer systems.
- Ransomware: A type of malware that encrypts a victim's data, demanding a ransom to restore access.
- Unauthorized Access: Fraudulent attempts to obtain sensitive information by disguising as trustworthy entities, stealing credentials, or otherwise accessing a secure system via unapproved or illegal methods.
- Insider Attacks: An individual with authorized access to an organization's systems or data intentionally or unintentionally uses that access to cause harm, such as stealing, altering, or destroying information.
- Denial of Service (DoS): Attacks that aim to make a machine or network resource unavailable to its intended users by temporarily or indefinitely disrupting services.

Effects of Cyberattack on Local Government

Cyberattacks can have profound and far-reaching effects on local governments, disrupting essential services and undermining public trust. The impacts can be categorized into several areas:

Operational Disruption

Cyberattacks can paralyze local government operations, including essential services such as emergency response, public safety, clean water, and waste management. This disruption can lead to delays in service delivery, compromised safety, and significant inconvenience to the community.

The following are some of the more impactful operational disruptions that could occur due to a cyber event:

Loss of clean water and wastewater systems

Many modern water treatment and industrial systems use SCADA (Supervisory Control And Data Acquisition) to manage infrastructure. SCADA is often a target for attackers aiming to disrupt public services.

Examples of significant SCADA cyberattacks include the Stuxnet worm on Iran's nuclear program, the 2024 Russian attack on a water tower in Muleshoe, TX, and the 2021 Colonial Pipeline ransomware incident.

In a city like Bismarck, losing access to potable water could require a rapid government response and bottled water distribution. Similarly, compromised wastewater treatment could result in unsanitary conditions and the potential spread of disease.

Delayed 911 response times

Public safety dispatchers and first responders use Computer Aided Dispatch (CAD) software for efficient and quick responses to 911 calls. The loss of CAD systems can delay emergency responses and create a backlog of administrative tasks, making emergency services less effective and potentially causing avoidable harm.

In July 2024, the ransomware incident in Cleveland, OH, necessitated that 911 dispatchers and field personnel operate using only paper and radio communication for weeks afterward. Although such procedures are routinely practiced in most agencies to prepare for system outages, maintaining this method over an extended period would require additional personnel to manage the same workload, potentially leading to employee burnout.

Administrative backlog

When a cyberattack renders normal systems like asset tracking, documentation, financial processing, and email communications unusable, the resulting administrative backlog can severely hinder local government functions.

Essential tasks that depend on accurate and up-to-date records, such as budgeting, payroll, and resource allocation, become chaotic and error-prone. This breakdown in organization can delay critical decision-making processes, impede the delivery of public services, and magnify the impact of the initial attack.

Unable to rely on automated systems, staff must revert to manual methods, which are time-consuming and prone to mistakes, exacerbating the strain on already stretched resources. The cumulative effect of these disruptions can erode public trust and confidence in the government's ability to manage and respond effectively to crises.

Financial Impact
The financial repercussions of a cyberattack can be substantial. Costs may include ransom payments, system restoration, data recovery, legal fees, identity theft protection, and increased cybersecurity measures. Additionally, there is often a loss of revenue due to interrupted services and diminished economic activity within the affected locality.

Data Breach and Privacy Concerns
Local governments store vast amounts of sensitive data, including personal information of residents and employees, financial records, and official documents. A cyberattack can result in data breaches, exposing this information to unauthorized entities. This breach can lead to identity theft, financial fraud, and erosion of public confidence in the government's ability to protect its constituents' privacy.

Reputational Damage
The reputational damage following a cyberattack can be significant. Public trust in the local government's ability to secure its digital infrastructure and protect citizens' information may decline, leading to long-term damage to the government's reputation and credibility.

Probability of Cyberattack on Local Government

The probability of a cyberattack on local governments has been increasing steadily over the years due to several factors:

Increasing Digitalization
As local governments continue to adopt digital technologies to improve efficiency and service delivery, the attack surface for cyber threats expands. More connected systems, online services, and digital records provide more entry points for cybercriminals.

Resource Constraints
Many local governments operate with limited budgets and resources, often resulting in insufficient investment in cybersecurity. This lack of robust cybersecurity measures makes them attractive targets for attackers looking for easy prey.

Targeted Nature of Attacks
Attackers often specifically target local governments due to the critical nature of the services they provide and the potentially high returns from successful attacks. The use of ransomware, for example, can yield substantial payouts, making local governments appealing targets.

Lack of Awareness and Training
Cybersecurity awareness and training among local government employees are often inadequate. This lack of knowledge and preparedness increases the likelihood of successful phishing attacks and other social engineering tactics used by cybercriminals.

Vulnerability Assessment and Applicable Mitigation Actions for Local Government IT Systems

A vulnerability refers to a flaw or weakness in a system that can be “exploited” to gain unauthorized access or cause harm.

Vulnerabilities are synonymous with “threat vectors”, which more specifically refer to the path in which a bad actor takes to accomplish their goal.

Below is a general list of the types of vulnerabilities/threat vectors that exist in an IT environment like the City of Bismarck. Accompanying each will be general best practices for *mitigating* (“dealing with”) that type of vulnerability.

The focus of the below mitigation actions is twofold:

1. Actions that **lessen the probability** of a successful cyberattack occurring
2. Actions that **reduce the potential impact** of a successful cyberattack

Malware

Malware, short for malicious software, encompasses a variety of harmful programs designed to damage, disrupt, or gain unauthorized access to computer systems. This includes viruses, worms, trojans, ransomware, and spyware, each with its own method of infecting and compromising systems.

Here are some general **mitigation strategies** for malware threats:

- Do not allow users to install their own software (wherever possible).
- Implement a new software procurement/approval/vetting process.
  - Use a “sandbox” environment when testing new software.
  - Analyze online reviews, articles, and malware submission tools.
- Maintain a software inventory and review regularly for unwanted software
- Use reputable antivirus/antimalware software.
- Use intrusion detection (IDS/IPS) software to monitor systems and networks for unusual activity.

Ransomware

Ransomware is a type of malicious software designed to encrypt a victim's files or lock them out of their system, demanding a ransom payment, typically in cryptocurrency, to restore access. Ransomware can cause significant disruption and data loss, as well as financial damage.

In addition to making files inaccessible, many ransomware gangs will “exfiltrate” (transfer outside of the secure environment) sensitive data and threaten to release or sell the data unless a ransomware payment is given. This extra step helps guarantee a payout from organizations that would otherwise just restore from known-good system backups.

The above list for mitigating malware risk is the best starting point for ransomware, but there are a few additional **mitigation actions** to add that are specific to this type of threat:

- Maintain a robust, 3-2-1 backup solution that provides protection against deleting or manipulating backups
  - Keep backup solutions physically and logically separate from production systems wherever possible
  - Regularly test restoring systems from backup
- Establish a working relationship with crucial third parties BEFORE a ransomware incident occurs, including:
  - Managed Security Service Providers (MSSPs)
  - Law enforcement/FBI
  - Cybersecurity insurance
  - Digital forensics professionals (often dictated by cyber insurance)
  - Governing bodies that must be reported to in case of breach (DOH, DOJ, TSA, CISA)

Software Vulnerability

This is where malicious actors take advantage of flaws in software to gain access to a system.

In software, there are known vulnerabilities, often classified using the CVE (Common Vulnerabilities and Exposures) program, and there are unknown vulnerabilities, also referred to as “zero-day” vulnerabilities.

Some strategies for **mitigating *known*** software vulnerabilities include:

- Install software updates regularly as provided by the manufacturer (“patching”)
- Utilize scanning software to find and fix vulnerabilities
- Maintain a software inventory and patch management program
- Proactively plan for software and hardware lifecycles to prevent usage of unsupported or out-of-date software
- Stay up-to-date with the latest cybersecurity news and trends

Zero-day vulnerabilities are not yet known to the manufacturer, so all systems are vulnerable until it is found and reported, and a workaround or fix is deployed.

Some strategies for **mitigating *zero-day*** vulnerabilities are:

- Reduce the variety of software being used
- Reduce the amount of public-internet-facing services
- Only use actively supported software from reputable sources
- Use modern and secure coding practices when developing in-house software
- Adhere to the principal of least privilege wherever possible
- Use antivirus and intrusion detection (IDS/IPS) software to monitor systems and networks for unusual activity

Physical Security

Computing assets must be protected from physical threats, not only human but also environmental, such as natural disasters, fire, or loss of HVAC or electrical power.

While humans can much more easily deploy malware or steal data when they have physical access to the computer, environmental effects most often cause Denial-of-Service (DoS) conditions.

Taking this one step further, bad actors can target dependencies like electricity or HVAC to bring down computer systems for the simple purpose of those services not being available to use.

Here are some **methods of protecting against physical security threats** to computing assets:

- Keep as much hardware and network behind lock-and-key as possible
- Implement a hardware inventory system.
- Establish device controls to track and wipe data on stolen or lost devices.
- Implement physical security systems like cameras, electronic locks, and perimeter fences.
- Provide redundant sources of electricity and HVAC to critical computing resources.
- Establish visitor/vendor escort procedures.

Social Engineering

Social engineering is a manipulation technique that exploits human error to gain private information, access, or valuables. In the context of cybersecurity, it involves tricking individuals into breaking normal security procedures, often through deceptive means such as phishing emails, pretexting, tailgating, or shoulder-surfing.

Phishing

Phishing involves fraudulent attempts to obtain sensitive information such as usernames, passwords, and credit card details by disguising as a trustworthy entity over email. These are made to appear legitimate but trick individuals into providing confidential information, install malware, or other malicious acts.

Similar terms were were coined for *smishing* and *vishing*, which refer to SMS (text) and voice solicitation, respectively.

Spear Phishing

Officials in local government are especially targeted by what is called “spear phishing”. These are phishing attempts that are targeted at specific people and are far more difficult to identify as fraudulent.

Messages are sent as if from a trusted party, and addressed to the recipient, and made to look as legitimate as possible. Common examples are fake requests from employees to re-route paychecks, or fake emails from internal departments instructing the user to perform a malicious action.

Business Email Compromise

Going one step further in more sophisticated Business Email Compromise (BEC) attacks, bad actors take direct control of a user's email account. The bad actor poses as the user and uses existing email conversations as a basis for compromising more accounts.

For example, if the user was expected to send a quote to their customer, the bad actor would hijack the existing email thread and reply with a fake quote, embedded with a malicious website link or malware. If the customer falls for this trick, the bad actor can then "pivot" into the customer's email box, and continue their path from there.

BEC attacks are very difficult to spot and have wide-ranging consequences from malware delivery to unauthorized disclosure of Personally Identifiable Information (PII).

The Role of AI in Phishing

The use of AI LLMs (Large Language Models) to create phishing content has significantly complicated the detection of fraudulent activities. These advanced models can generate highly convincing and contextually appropriate messages that closely mimic legitimate communications from trusted entities. By leveraging vast amounts of data, AI LLMs can tailor spear-phishing attempts to specific individuals, making them appear more personalized and credible.

As a result, traditional methods of identifying phishing, such as spotting spelling errors or unusual language, are no longer as effective. This increased sophistication of phishing attempts necessitates more advanced detection mechanisms and a heightened awareness among individuals to recognize potential threats.

Pre-Texting

Pretexting is a social engineering technique where an attacker fabricates a plausible scenario to manipulate a victim into divulging confidential information or performing specific actions. In the realm of cybersecurity, this often involves the attacker impersonating a trusted individual such as a colleague or IT support staff.

By creating a convincing narrative, the attacker can deceive the victim into revealing sensitive information such as passwords or account numbers. Pretexting is particularly dangerous because it exploits human trust and can bypass technical security measures, making it a highly effective tool for cybercriminals.

Tailgating

Tailgating, in the context of cybersecurity, is a social engineering technique where an unauthorized individual gains physical access to a secure area by following closely behind a legitimate user without the user's knowledge or consent. This often occurs when an attacker takes advantage of common courtesy, such as holding the door open for the next person, to enter restricted spaces.

Once inside, the attacker can access sensitive areas, steal confidential information, or deploy malicious devices. Tailgating is particularly dangerous because it bypasses electronic security controls and relies on the exploitation of human behavior, making it a significant threat to organizational security.

Shoulder Surfing

Shoulder surfing is a form of social engineering in cybersecurity where an attacker observes a victim's private information by peering over their shoulder. This method can occur in any public or semi-public space, such as offices, cafes, or airports, where individuals may access sensitive information on their devices.

By visually capturing passwords, PINs, or other confidential data, the attacker can gain unauthorized access to the victim's accounts or secure systems. Shoulder surfing exploits the human tendency to overlook the physical security of their surroundings, making it a persistent threat in protecting personal and organizational data.

Credential Harvesting

Credential harvesting is a social engineering attack where cybercriminals collect and steal user credentials, such as usernames and passwords, through various deceptive methods. These techniques may include phishing emails, fake websites, or malicious software designed to capture login information. Once obtained, these credentials can be used to gain unauthorized access to systems, leading to data breaches, financial loss, and other security incidents.

Mitigation Actions:

- Implement multi-factor authentication (MFA) to add an extra layer of security beyond just passwords.
- Educate employees on recognizing phishing attempts and credential harvesting methods.
- Use email filtering and web security solutions to block malicious emails and websites.
- Monitor and review login activities for unusual or suspicious behavior to detect potential credential theft early.

Social Engineering Mitigations

Protecting against the human aspect of cybersecurity can be most difficult, since machines are (most often) better at interpreting instructions. It also costs more to educate the human populace than to configure technical computer controls.

A successful defense to Social Engineering attacks involves consistent, engaging training content, and strong policy to forward cyber education initiatives and hold people accountable when needed. Executive buy-in is crucial to continuing the effort over a long time period.

Here is a general list of **strategies to mitigate Social Engineering attacks**:

- Regularly conduct Cybersecurity Awareness Training with all employees, with a newfound emphasis on recognizing AI-generated content.
- Conduct regular phishing simulations and track effectiveness to guide education efforts.
- Implement multi-factor authentication (MFA) to add an extra layer of security beyond just passwords.
- Educate employees on recognizing phishing attempts and credential harvesting methods.
- Use email filtering and web security solutions to block malicious emails and websites.
- Monitor and review login activities for unusual or suspicious behavior to detect potential credential theft early.
- Establish clear organizational policy and procedure pertaining to:
  - Training requirements
  - Vetting of vendors, visitors, and unidentified employees
  - Approval workflows for divulging sensitive information
  - Consequences for not adhering to security policies

Insider Threats

Insider attacks involve individuals within the organization who intentionally or unintentionally compromise security. These insiders can be disgruntled employees, contractors, or partners with access to sensitive information.

Mitigating insider threats requires a multi-faceted approach that focuses on preventive and detective measures.

- Implement strict access controls and monitor user activities.
- Conduct thorough background checks during the hiring process.
- Regularly review and update access permissions based on role changes.
- Establish a whistleblower program to report suspicious behavior confidentially.
- Provide continuous training on recognizing and reporting insider threats.
- Utilize behavior analytics to detect deviations from normal user activities.
- Enforce the principle of least privilege, ensuring employees have access only to the information necessary for their role.

Advanced Persistent Threats (APTs)

Advanced Persistent Threats (APTs) are prolonged and targeted cyberattacks in which an intruder gains access to a network and remains undetected for an extended period. Unlike traditional attacks, APTs are highly sophisticated and often involve significant planning and resources, with the goal of stealing data or surveilling activities over time.

Nation-state APTs are particularly concerning because they are often orchestrated by government-backed groups with substantial resources and expertise. These actors typically target critical infrastructure, government agencies, and large corporations to gather intelligence, disrupt operations, or steal sensitive data for political, economic, or military advantage.

Mitigation Actions:

- Implement advanced intrusion detection systems to monitor for unusual network activity.
- Regularly update and patch software to fix known vulnerabilities.
- Use multi-factor authentication to add an extra layer of security.
- Conduct regular security audits and vulnerability assessments.
- Educate employees about phishing and other common attack vectors.
- Segment networks to limit the spread of an intrusion.
- Develop and test an incident response plan to quickly address breaches.

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
Cyberattack was not included in the previous Multi-Hazard Mitigation Plan.	Cyberattack was not included in the previous Multi-Hazard Mitigation Plan.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Cyberattack is an intentional human-caused hazard, and may relate to other human-caused hazards including Terrorism or Nation-State Attack. Cyberattack also relates to all hazards in that a cyberattack may impede ability to respond effectively, regardless of hazard type.

Future Conditions

- **Location**: No change.
- **Extent/Intensity:** The probability and potential impact of cybercrimes continue to expand as dependencies on technology continue.
- **Frequency:** The probability of a cyberattack in the state is increasing over time. Worldwide, ransomware attacks are launched every 11 seconds as of 2021, and that interval is expected to shorten to every two seconds by 2031. The United States is the preferred target of cybercriminals, receiving 46 percent of all attacks in 2021 (Brooks, 2022). It is highly probable that the state will be impacted by a cyberattack.
  Source: 2024-29 ND Enhanced Mitigation Plan
- **Duration:** No change.

Anticipated Future Climate Impact – Cyberattack Hazard
There is no known direct connection between cyberattacks and future climate conditions, though attackers may take advantage of inclement weather periods and other social, infrastructure, or economic stressors to mask or otherwise facilitate their attacks.

Conclusion

The probability of cyberattacks against local government is ever increasing, as local governments often manage critical infrastructure and sensitive data that are attractive targets. The impacts can be severe, ranging from disrupted public services to stolen confidential information, which can undermine public trust and compromise national security. It is imperative that local governments implement robust cybersecurity measures to mitigate these risks and protect their assets from sophisticated threats.

Dam Failure – Hazard Profile

Description

A dam is any artificial barrier, including appurtenant works, which impounds or diverts water. Dam failure is defined as a sudden, rapid, and uncontrolled release of impounded water that can create a potentially significant downstream hazard.

The storage capacity of Garrison Dam ranges from the 18-24 million acre-feet (Lake Sakakawea). The purpose of this dam includes storage of water for irrigation, hydroelectric power generation, flood control, water supply, recreation, and wildlife habitat. Should the dam fail, the consequences can be devastating.

Most dams are classified based on the potential hazard to life and property should the dam suddenly fail. Note the hazard rating is not an indicator of the condition of the dam or its probability of failure. The following hazard categories have been established for North Dakota according to the North Dakota Design Handbook (North Dakota State Engineer, June 1985:

Low Hazard: These dams are located where there is little possibility of future development such as rural or agricultural areas. Failure of low hazard dams may result in damage to agricultural land, township and county roads, and non-residential farm buildings. No loss of life is expected if failure occurs.
Medium Hazard: These dams are located in predominately rural or agricultural areas where failure may damage isolated homes, main highways, railroads, or cause interruption of minor public utilities. The potential for the loss of a few lives exists if the dam fails.
High Hazard: These are dams located upstream of developed and urban areas where failure may cause serious damage to homes, industrial and commercial buildings, and major public utilities. There is a potential for the loss of more than a few lives if the dam fails.
(North Dakota State Engineer, 1985)

High Hazard Dams affecting Bismarck

Dam Name	River	Location	Owner
Garrison Dam *Maximum storage: 23.8 million acre feet*	Missouri River	McLean County	US Army Corps of Engineers
Jackman Coulee Dam #2	Jackman Coulee	Bismarck	Bismarck
The Jackman Coulee Dam structure is required to pass a 0.5 PMP event without overtopping. PMP= Probable Maximum Precipitation. See page 4 and 5.			
Fort Peck Dam *Maximum storage: 19.1 million acre feet*	Missouri River	McCone County, Montana	USACE
Heart Butte Dam	Heart River to Missouri River	Grant County	Bureau of Reclamation

North Dakota Century Code § 61-03-25 requires and Emergency Action Plan for all high hazard and medium hazard dams. An EAP is developed for the Jackman Coulee Dam #2 , classified as a “high hazard dam.”

There are many potential causes for dam failure including hydrologic inadequacy, seepage related issues, structural problems, mechanical problems, operational errors, earthquakes, and terrorism. The causes behind a dam failure can be interrelated and complex. The most common causes of dam failure are hydrologic inadequacy and seepage related issues.

Hydrologic Failures
Hydrologic failures are typically associated with flood events. A hydrologic failure may occur due to dam overtopping or excessive spillway erosion. A dam can be overtopped during a flood event due to insufficient reservoir storage and insufficient spillway capacity. Earthen dams are particularly susceptible to failure when overtopped since earthen material may erode relatively easily. Some dams have an earthen auxiliary spillway designed to carry excess flows during a flood event. Since these are earthen spillways, some erosion can be expected, but under the right conditions excessive erosion can occur. (North Dakota State Water Commission, 2007)

Seepage Failures
All dams have some seepage occurring through the structure and foundation. Seepage, if uncontrolled, can erode material from the embankment of an earthen dam and lead to complete failure of the dam. Piping is a special seepage problem where erosion starts at the point where seepage is exiting the downstream slope or foundation, then works backwards toward the upstream slope. Internal erosion, another type of seepage failure, occurs when water flowing through the dam causes erosion along a crack in the embankment or foundation, or along some other discontinuity or preferential flow path in the embankment, such as along a spillway conduit. Tree roots and animal burrows can also provide paths for seepage. Seepage failures can occur during the course of normal operations, but can also occur during flood conditions when reservoir levels are abnormally high. (North Dakota State Water Commission, 2007)

Garrison Dam Profile
(Source Data: US Army Corps of Engineers, Omaha District)

Garrison Dam is the fifth largest earthen dam in the world. It was constructed as part of the Pick-Sloan Plan for development of the upper Missouri River Basin. Construction of the $294 million dam project began in 1947 and closure of the embankment occurred in April 1953.

Project Statistics
The main features of Garrison Dam are the embankment power plant, spillway and outlet works. The embankment is 2-1/2 miles long and stands 210 feet high. The dam is 2,050 feet wide at the base and tapers off to 60 feet wide at the top. It contains 66.5 million cubic yards of earth fill and 1.5 million cubic yards of concrete.

Power Plant
The power plant consists of five generating units with a total capacity of 515,000 kilowatts. These generators produce 1.8 to 2.6 billion kilowatt-hours of electricity a year. Electrical power is transmitted from the project through seven transmission lines to various substations and is marketed by Western Area Power Administration at the Watertown Dispatch Office in South Dakota.

Intake
The purpose of the Intake Structure is to house the necessary hoisting equipment, gates and auxiliary equipment for the eight water tunnels. Five of the tunnels are for power generation and three are for regulating water releases.

- Height 249 Feet
- Length 540 Feet
- Width 170 Feet

The structure is 7 feet, 8 inches higher than the 18 story N.D. State Capitol building; its base slab is 540 feet long compared to the Capitol's 402 foot length. This structure regulates and directs water flow into the eight water tunnels. The water in the reservoir covers most of the structure, rising nearly to the top of the service bridge piers.

Spillway
The purpose of the Spillway is to control the water level during an emergency situation. The Spillway has 28 gates. Each gate is 29 feet high by 40 feet wide. The total length of the Spillway is almost 3200 feet and was designed for a maximum discharge capacity of 827,000 cubic feet per second at an elevation of 1858.5 mean sea level (MSL). Water released through the gates can reach a speed of 75 miles per hour en route to the stilling basin. The spillway chute contains 42 acres of concrete 18 inches thick. The stilling basin at the end of the chute contains 20 acres of concrete up to a thickness of 5 feet.

> ***2011 Flooding**: During this flood event, the spillway gates at Garrison Dam were opened for the first time since the dam was built in the 1950s. As of June 1, the Spillway was used to release flood waters. The maximum release was 151,000 CFS on June 25, 2011. While the dam was not in any danger of failure, the record water levels were an historic event. Garrison Dam is a high hazard dam on the Missouri River owned by the US Army Corps of Engineers.*
>
> *Video: Garrison Dam Historic Spillway Gate Opening:*
> *http://www.dvidshub.net/video/153064/garrison-dam-historic-spillway-gate-opening#.VAhr-fMo6Uk*
> *Shortly before 8 a.m. on June 1, 2011, the U.S. Army Corps of Engineers opened the gates to pass flood waters for the first time from the Garrison Dam spillway. Seven gates were opened to the height of one foot each to release some 7,500 cubic feet per second of floodwaters. By Kevin Wingert, U.S. Army Corps of Engineers, Omaha District.*

The Lake
Lake Sakakawea, formed behind Garrison Dam, is one of the largest man-made lakes in the United States, extending 178 miles from the dam northwest to Williston, N.D.

The lake averages between two and three miles in width and is six miles wide at its widest point. The maximum depth of the lake is 180 feet at the face of the dam. At normal operating pool (1850 feet mean sea level), the lake covers 368,000 acres, has 1,300 miles of shoreline, and can store nearly 23 million acre-feet of water. That amount of water would cover the entire state of North Dakota with about six inches of water. The drainage area of the lake is about 181,400 square miles.

Garrison Project Statistics:
http://www.nwo.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/2034/Article/487634/garrison-project-statistics.aspx

Heart Butte Dam Hazard Profile

Source Data: https://www.usbr.gov/projects/index.php?id=465

The Heart Butte Unit of the Pick-Sloan Missouri Basin Program lies in scattered tracts along the Heart River from Heart Butte Dam to the Missouri River.

Heart Butte Dam dam is a homogeneous earthfill type, with a structural height of 142 feet and a crest length of 1,850 feet. It contains 1,140,000 cubic yards of earth materials. The dam is on the Heart River in Grant County approximately 18 miles south of Glen Ullin, North Dakota. The spillway is a morning-glory type, leading to a 14- foot tube with a capacity of 5,700 cubic feet per second. The outlet works consist of a gated tube with a capacity of 700 cubic feet per second. The reservoir has a total capacity of 223,646 acre-feet, of which 147,861 acre-feet are for flood control storage and 206,365 acre-feet are for surcharge. The lake has a surface area of 3,397 acres.

Heart Butte Dam and Reservoir are operated by the Bureau of Reclamation. The Western Heart River Irrigation Project is operated and maintained by the Western Heart River Irrigation District.

To assist in identifying potential impact, the Bureau of Reclamation has developed and mapped two scenarios: 1) Static Internal Erosion Failure and 2) Hydrologic Internal Erosion Failure.

The Static scenario is a “sunny day” failure (unexpected) with a normal reservoir elevation at 2064.5 feet which is the bottom sill elevation of the morning glory inlet. The Hydrologic scenario would be a dam failure during a major flood with the reservoir level at 2096 feet. The record high reservoir is 2086.2 feet set in 1952. More recently, the reservoir reached 2082.7 feet in April 2011 and 2076 feet in 2023.

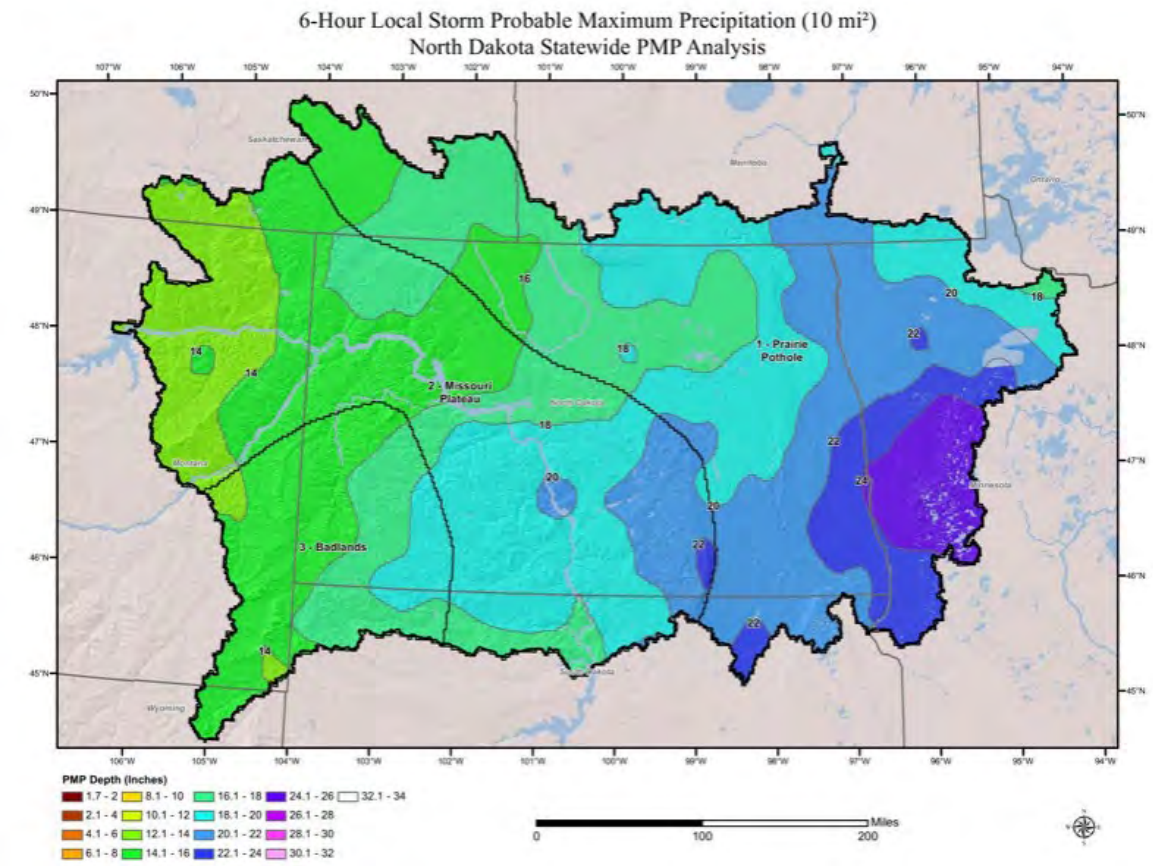
Potential Impact & Vulnerability: Based on the Hydrologic Internal Erosion Failure scenario (worst case), the WasteWater Treatment plant would have concerns for access, but is not likely to experience flood impact to the critical facilities. Other areas impacted within Bismarck would include Pioneer Park, Dakota Zoo, Riverwood Golf Course, Atkinson Park, the drainage ditch up to Washington Street, and access to the Whispering Bay development.

Probable Maximum Precipitation (PMP) is defined by the Federal Emergency Management Agency as theoretically, *“the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location during a certain time of year.”* The 50% PMP for Bismarck is as illustrated on the following page would fall within a range of 9 to 10 inches of rainfall within 6 hours. The 50% PMP is used as a requirement for design standards for dam construction (ex: Jackman Coulee Dam within Bismarck).

In June 2021, the ND Department of Water Resources completed an update of the statewide Probable Maximum Precipitation (PMP) data through a two-year PMP study.

The 2021 study supersedes Hydrometeorological Reports (HMRs) HMR-48, HMR-51, and HMR-52, which were derived in the 1970s and 1980s by the National Ocean and Atmospheric Administration, as best available PMP data in North Dakota. Results of the 2021 PMP study reflect the current standard of practice.

The new standards update the 1985 Dam Design Handbook with state-of-the-practice requirements and processes. They incorporate and replace DWR's 2016 Emergency Action Plan Guidelines and 2022 Probable Maximum Precipitation Guidance. Further, the standards integrate the 2023 Hazard Classification Review process from DWR's Hazard Classification and Legacy Dam Policy. Alongside this effort, the Hazard Classification and Legacy Dam Policy has been updated to remove the previous hazard classification review process and now focuses solely on the legacy dam process. To access the Probable Maximum Precipitation Study, see https://www.swc.nd.gov/reg_approp/dam_safety/



Source: Applied Weather Associates, 2021

Based on Table E.1 from the updated study as referenced, the anticipated probable maximum precipitation for the Bismarck area is reduced by approximately 19.8% compared to the previous data presented by the previous reports.

Table E.1: Percent difference from HMR 51 PMP at 10-square miles. PMP depths are averaged over each transposition zone and represent the largest of all storm types.

Mean 10 mi² PMP (max of all types) Percent Change from HMR 51 by Transposition Zone									
Transposition Zone	HMR 51 6hr	PMP 6hr	% Change 6hr	HMR 51 12hr	PMP 12hr	% Change 12hr	HMR 51 24hr	PMP 24hr	% Change 24hr
1	21.7	19.9	-8.5%	25.9	24.1	-6.8%	27.6	24.2	-12.3%
2	20.8	16.7	-19.8%	24.7	20.3	-17.7%	26.5	20.3	-23.2%
3	20.8	15.9	-23.2%	24.6	19.4	-21.2%	26.5	19.4	-26.6%

Table Source: Applied Weather Associates, 2021 The PMP depths are used in the computation of the Probable Maximum Flood (PMF), generally for the design of high-hazard structures.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Note: For vulnerability analysis relating to partial failure, see Flood Hazard – refer to 100 and 500 Year flood information.

Scenario	Garrison Dam Catastrophic Failure
Probability	Unlikely (THIRA rating)
Speed of Onset	10-23 Hours See page 13
Duration	7 days. Water may recede within about a week. Many years to recover.
Geographic Area	See maps: pages 14 - 16
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Drowning or "stranded" for a long period of time without necessary supplies and ability to communicate the need for help. A. Those who choose not to evacuate – or do not have the means to evacuate – and do not receive assistance. B. Those who do not receive warnings and other emergency public information in a timely manner. C. Prison Population – ND State Penitentiary
Mass Casualty Incident	Yes, potentially Catastrophic due to special populations requiring evacuation
Property Losses (points of vulnerability – high priority)	1. All Structures within affected area. See Dam Failure maps pages 13-15. See pages 6 -7 for loss estimates.
Environmental	1. All Structures within affected area – all contents and building materials contribute to environmental hazards 2. Debris / hazardous materials, contaminated flood waters

Scenario	Garrison Dam Catastrophic Failure
	3. Septic systems 4. Hazmat facilities 5. Household hazardous materials released
COG/COOP	1. Bismarck PD 2. Waste Water Treatment Plant 3. Water Treatment Plant 4. Public Works 5. Public Health 6. South Fire Station 7. Employee / Family impact – availability of personnel
Critical Facilities	1. See COG/COOP above. 2. See pages 8-9 for list of critical facilities.
Critical Infrastructure	1. All Critical Infrastructure within the inundated areas would be destroyed or inaccessible. See pages 10-11 for list of critical infrastructure within dam failure impact area.
Schools	1. All Schools south of Rosser. See page 9 for list of schools within dam failure impact area. 2. Schools, if open, may be overwhelmed with additional student population. Many families, however, may have evacuated Bismarck and relocated to other communities.
High Risk Facilities (chemical)	1. There are approximately 145 facilities storing hazardous materials within the dam failure impact area. The majority are NOT Tier II facilities.
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Dakota Zoo – not likely to be able to relocate. 2. Non-ambulatory population requiring evacuation assistance. 3. State Penitentiary population. 4. Bismarck Transition Center 5. Crescent Manor 6. Hospital (patient) population
Economy (community wide)	Catastrophic – years/decades to recover
OTHER:	Estimated Population Displaced as a result of catastrophic dam failure: 25,000

Vulnerability for the Heart Butte Dam is discussed on page 4. Vulnerability relating to the Jackman Coulee Dam #2 is discussed on pages 17-20.

Garrison Dam Failure - Inundation Map

Current mapping is now made available via the National Inventory of Dams.

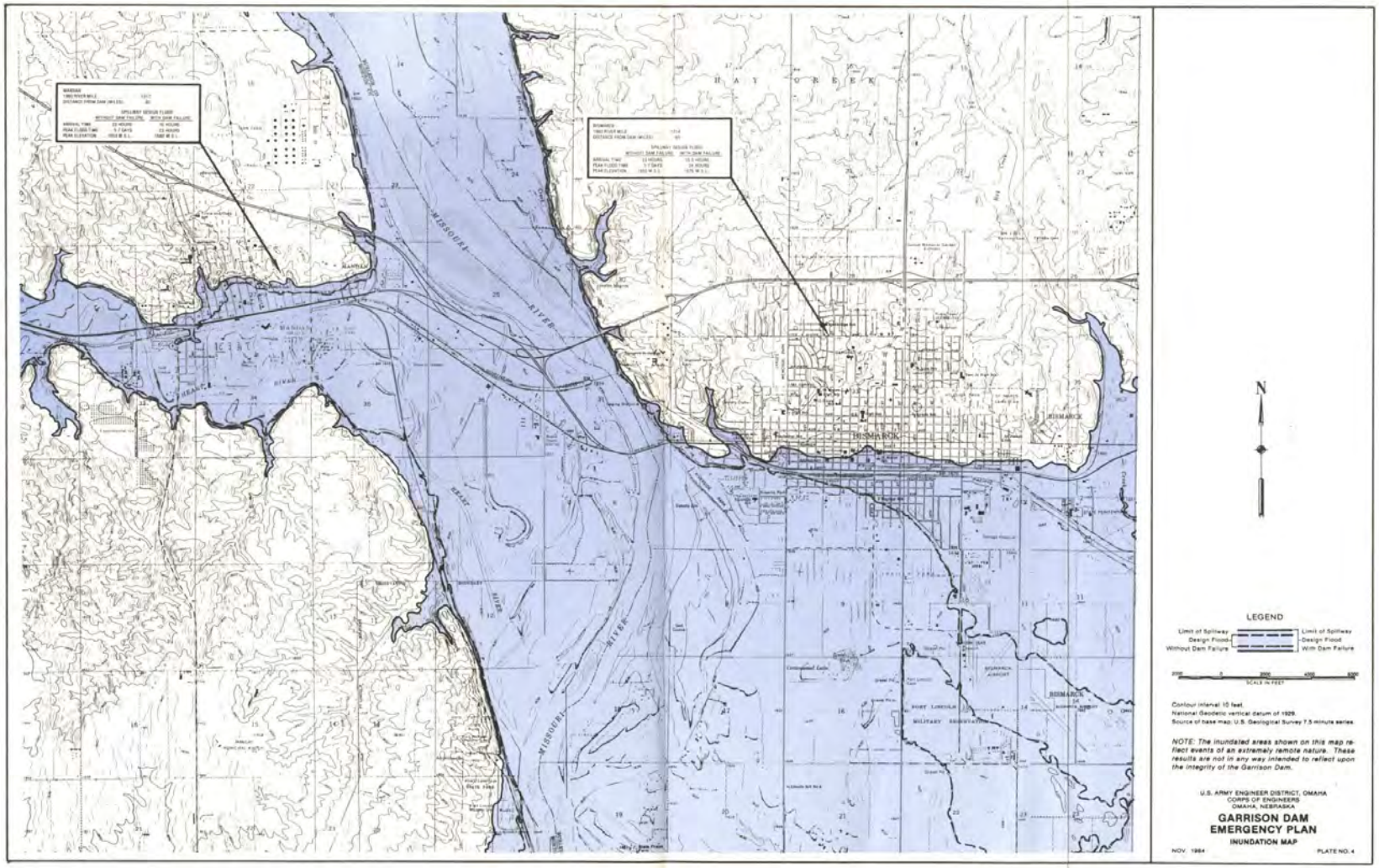
https://nid.sec.usace.army.mil/#/dams/system/ND00145/risk

Note: The information below regarding the Garrison Dam Spillway and inundation maps on the following pages are intended to be used as a general guideline. The information and mapping regarding the Garrison Dam Spillway contained in this plan was developed by the US Army Corp of Engineers, Omaha District. The information and related maps were published in November of 1984. Changes in topography, new construction, and other various factors may influence or alter the data and inundation maps.

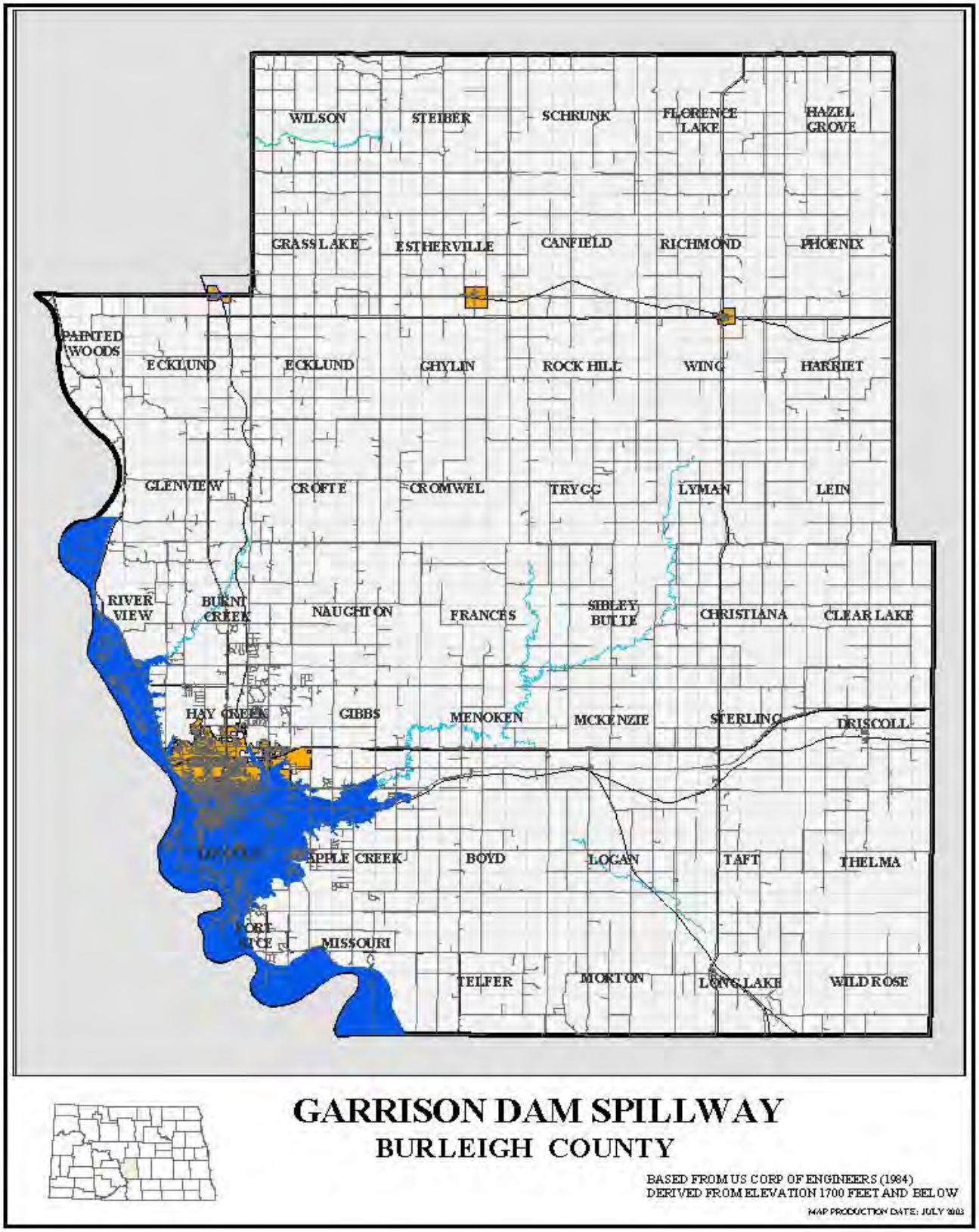
Bismarck
1960 River Mile: 1314
Distance From Dam: 65

Spillway Design Flood

	Without Dam Failure	With Dam Failure
Arrival Time	23 hours	10.3 hours
Peak Flood Time	5.7 days	24 hours
Peak Elevation	1650 MSL	1675 MSL


HAY CREEK
MISSOURI RIVER
HEART RIVER
BISMARCK
N
LEGEND
Limit of Spillway Design Flood Without Dam Failure
Limit of Spillway Design Flood With Dam Failure
SCALE IN FEET
Contour interval 10 feet.
National Geodetic vertical datum of 1929.
Source of base map: U.S. Geological Survey 7.5 minute series.
NOTE: The inundated areas shown on this map reflect events of an extremely remote nature. These results are not in any way intended to reflect upon the integrity of the Garrison Dam.
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS
OMAHA, NEBRASKA
GARRISON DAM
EMERGENCY PLAN
INUNDATION MAP
NOV. 1984
PLATE NO. 4


Bismarck
Garrison Dam
Inundation Map
Garrison Dam Spillway
Source: US COE - Omaha District - November 1984
Map Production Date: June 5, 2006
ADOBE DR
64TH AV NW
OAKFIELD DR
57TH AV NW
RIVER RD
FERNWOOD DR
MEDORA AV
ASH COULEE DR
SLATE DR
HALIFAX ST
SOURIS ST
RIDGEDALE ST
83 HY NE
VALHALLA DR
26TH ST NE
57TH AV NE
62ND ST
BOUNDARY RD
43RD AV NE
CENTENNIAL RD
52ND ST NE
15TH ST N
26TH ST N
VALLEY DR
BUCKSKIN AV
MONTREAL ST
STATE ST
GLENDALE DR
CHISHOLM TR
VALLEY DR
CODY DR
ASPEN AV
CLAIRMONT RD
TYLER PY
CENTURY AV W
CENTURY AV E
NEBRASKA DR
YORKTOWN DR
ROOSEVELT DR
INTERSTATE 94 HY
INTERSTATE AV E
I-94
WASHINGTON ST N
CAPITOL AV E
19TH ST N
DIVIDE AV E
DIVIDE AV W
CANARY AV
EDWARDS AV
WARD RD
3RD ST N
4TH ST N
15TH ST N
23RD ST N
LILAC LN
33RD ST N
BISMARCK EX N
20TH AV NE
17TH AV NE
66TH ST NE
52ND ST N
66TH ST N
BOULEVARD AV E
F AV E
E AV E
D AV E
26TH ST N
35TH ST N
A AV W
B AV W
1ST ST N
9TH ST N
ROSSER AV E
A AV E
MAIN HY E
MAIN ST E
MEMORIAL HY
MAIN AV E
BROADWAY AV E
SOUTH VIEW LN
BOWEN AV W
7TH ST S
10TH ST S
15TH ST S
22ND ST S
26TH ST S
66TH ST S
3RD ST S
BISMARCK EX W
BISMARCK EX E
APPLE CREEK RD
BURLINGTON DR
PARK AV
LEE AV
FULLER AV
YEGEN RD
UNIVERSITY DR
AIRWAY AV
SYKES ST
AIRPORT RD
SABER DR
MUNICH DR
RENO DR S
BULLNOS DR
NAPA LP
12TH ST S
HARBOR DR
RIVERWOOD DR
WASHINGTON ST S
LARSON RD
FAR WEST DR
ENGLAND ST
LANCASHIRE ST
ASHLEE AV
HIGH PLAINS RD
BURLEIGH AV E
12TH ST SE
AIRWAY AV
LINCOLN RD
SANTEE RD
ECKLESON RD
CUSTER DR
PRESTON LP
66TH ST SE
CENTURION DR
HUBER DR
48TH AV SW
GLENWOOD DR
48TH AV SE
S WASHINGTON ST
S 12TH ST
SIBLEY DR
APPLE CREEK DR
52ND ST SE
62ND AV SE
MCDONALD DR
N RILLING RD
SOUTHRIDGE LN
SCENIC DR


WILSON
STEIBER
SCHRUNK
FLORENCE LAKE
HAZEL GROVE
GRASS LAKE
ESTHERVILLE
CANFIELD
RICHMOND
PHOENIX
PAINTED WOODS
ECKLUND
ECKLUND
GHYLIN
ROCK HILL
WING
HARRIET
GLENVIEW
CROFTE
CROMWEL
TRYGG
LYMAN
LEIN
RIVER VIEW
BURNT CREEK
NAUGHTON
FRANCES
SIBLEY BUTTE
CHRISTIANA
CLEAR LAKE
HAY CREEK
GIBBS
MENOKEN
MCKENZIE
STERLING
DRISCOLL
APPLE CREEK
BOYD
LOGAN
TAFT
THELMA
MISSOURI
TELFER
MORTON
LONG LAKE
WILD ROSE
GARRISON DAM SPILLWAY
BURLEIGH COUNTY
BASED FROM US CORP OF ENGINEERS (1984)
DERIVED FROM ELEVATION 1700 FEET AND BELOW
MAP PRODUCTION DATE: JULY 2003

CRITICAL FACILITIES Within the Garrison Dam Failure Impact Area	
City of Bismarck	
Facility	**Location**
Bismarck Airport	2301 UNIVERSITY DR UNIT 17
Bismarck Event Center	315 S 5TH ST
Bismarck Police Department	700 S 9TH ST
City / County Office Building	221 N 5TH ST
Fire Station 2 - South	835 E BISMARCK
Public Health - Bismarck/Burleigh	407 South 26th Street
Public Works	601 South 26th Street
Burleigh County	
Burleigh County Courthouse	514 E THAYER AV
Burleigh County Social Services	316 N 5TH ST
Regional Jail (future development)	
State and Federal Government	
Air Guard	3410 AIRWAY AV
Federal Aviation Agency	2000 UNIVERSITY DR
Federal Building (old)	304 E BROADWAY AV
National Guard - Fraine Barracks	432 FRAINE BARRACKS RD
National Weather Service	2301 UNIVERSITY DR
ND Health and DEQ Lab	2635 E MAIN AV
ND Department Of Transportation	218 AIRPORT RD
ND Dept of Health Warehouse	1200 INDUSTRIAL DR, 2
ND DES	35 FRAINE BARRACKS RD
ND State Forensics	2637 E MAIN AV
ND State Lab	2641 E MAIN AV
Post Office	220 E ROSSER AV
State Penitentiary	3303 E MAIN AV
US Postal Processing & Distribution	2220 E BISMARCK EX
Medical and Emergency Services	
Family Practice Center UND	701 E ROSSER AV
Medical Arts Building	810 E ROSSER AV
Metro Area Ambulance South	1139 MEMORIAL HY
Mid Dakota Clinic	401 N 9TH ST
MRI Center	720 E ROSSER AV
Sanford Clinic	222 N 7TH ST
Salvation Army	601 S WASHINGTON ST
Sanford Clinic - South	1040 TACOMA AV
Sanford Health Center	300 N 7TH ST
Sanford Health Powerhouse	310 N 8TH ST
Sanford Health Warehouse	1112 S 12TH ST
CHI Hospital	900 E BROADWAY AV
CHI Purchasing / Warehouse	1300 INDUSTRIAL DR
Communications and Utility Facilities	
Century Link	220 N 5TH ST
MDU	909 AIRPORT RD
Public/Private Critical Facilities	
Bismarck Lumber	2200 E MAIN AV
Bismarck Public School Facilities & Transportation	705 S 9TH ST
Bismarck Transition Center	2001 LEE AV
Bismarck Tribune	707 E FRONT AV
Cash Wise Foods	1144 E BISMARCK
Community Access TV	307 N 4TH ST
Dan's Supermarket - South	835 S WASHINGTON ST
United Way (Shelter location) formerly Open Door	1140 South 12th Street
Vitalent (formerly United Blood Services)	517 S 7th St

CRITICAL FACILITIES Within the Garrison Dam Failure Impact Area	
Railroad Transportation Facility	
DMVW RR	3501 E ROSSER AV
Schools	
Victor Solheim Elementary South Central High School Dorothy Moses Elementary Jeanette Myhre Elementary Wachter Middle School St. Mary's Elementary United Tribes – Daycare United Tribes – Elementary School (2 buildings) United Tribes Technical College Prairie Rose Elementary Ascension Church School First Presbyterian Church – Daycare Noah's Ark Daycare Emmanuel Christian School ECLC Sanford College of Nursing Shepherd of the Valley School Super Kids Jr. Academy Shepherd of the Valley Preschool Hair Academy Angel Academy Discovery Daycare Preschool Program - House of Prayer	

CRITICAL INFRASTRUCTURE Within the Garrison Dam Failure Impact Area	
City of Bismarck	
Facility	**Location**
Wastewater Treatment Plant	601 W LONDON AV
Water Treatment Plant	615 RIVER RD
Sanitary Sewer Pump Station	100 E INDIANA AV
Sanitary Sewer Pump Station	2516 RIVER RD
Sanitary Sewer Pump Station	850 E WACHTER AV
Sanitary Sewer Pump Station	810 S 26TH ST
Sanitary Sewer Pump Station	3701 E BISMARCK EX
Sewer Lift Station	511 South Washington
Sewer Lift Station	1203 Memorial Highway
Sewer Lift Station	2200 South Washington
Sewer Lift Station	125 East Reno
Sewer Lift Station	525 West Reno
Sewer Lift Station	1740 South Reno
Sewer Lift Station	3108 Manchester Street
Sewer Lift Station	1700 River Road
Sewer Lift Station	3701 Morrison Avenue
Sewer Lift Station	300 Santa Fe
Sewer Lift Station	4053 Downing Street
Sewer Lift Station	3200 Rutland Drive
Lift Station	Boston Drive – South Bismarck
Transportation	
Bis-Man Transit	3750 E ROSSER AV
Communications	
Clear Channel Radio - KFYR/Y93	3500 E ROSSER AV
CellularTower	2301 UNIVERSITY DR
CellularTower	WEST OF 2301 UNIVERSITY DR
Cell Tower	South 12th Street
Utility	
MDU Operations	400 N 4TH ST
Montana-Dakota Utilities Bismarck Service Center	909 Airport Rd
Western Area Power Administration - Bismarck Substation	
Substation – South Washington Street	South of Burleigh Ave, North of Glenwood Dr.
4th and Front Substation	Front Avenue
Kirkwood Substation	South 7th Street and Arbor Avenue
Sweet Avenue Junction Substation	402 East Sweet Avenue
26th & Expressway Substation	26th Street and Expressway
Pipeline at Missouri River	WEST OF 4051 SANDY RIVER RD
Power Line at Missouri River	WEST OF 6948 BURNT CREEK LP
Power Line at Missouri River	WEST OF 5716 MISTY WATERS DR
Boat Ramps	
Fox Island Boat Ramp	NORTH OF 2650 MILLS AV
Grant Marsh Bridge Boat Ramp	NORTH OF 1103 RIVER RD
Bridge Locations	
Bridge: 3rd St over drainage ditch	SOUTHEAST OF 1922 S 3RD ST
Bridge: Bismarck Ex over Missouri River	BISMARCK EXPRESSWAY BRIDGE OVER MISSOURI RIVER
Bridge: Bismarck Ex over Railroad	WEST OF 3310 E BISMARCK EX
Bridge: east bound I-94 over Railroad	I-94 OVER RAILROAD
Bridge: Lincoln Rd over Apple Creek	WEST OF 5151 LINCOLN RD
Bridge: Main Av over Missouri River	WEST OF 100 RIVERSIDE PARK RD

CRITICAL INFRASTRUCTURE Within the Garrison Dam Failure Impact Area	
Bridge: Main Av over Washington St	WEST OF 311 W MAIN AV
Bridge: Railroad over 7th St	SOUTHWEST OF 705 E MAIN AV
Bridge: Railroad over 9th St	SOUTHWEST OF 901 E MAIN AV
Bridge: Railroad over Apple Creek	SOUTH OF 7301 APPLE CREEK RD
Bridge: Railroad over Main Av	SOUTH OF 906 MISSOURI AV
Bridge: Railroad over River Rd and Missouri River	NORTH OF 1103 RIVER RD
Bridge: Railroad over Washington St	NORTHWEST OF 260 W FRONT AV
Bridge: Riverwood Dr	2300 RIVERWOOD DR
Bridge: Rosser Av Over Hay Creek	NORTH OF 3605 E ROSSER AV
Bridge: Southport Lp	1500 SOUTHPORT LP
Bridge: Tavis Rd	3300 TAVIS RD
Bridge: University Dr Apple Creek	WEST OF 5701 APPLE CREEK DR
Bridge: Wachter over Drainage Ditch	800 WACHTER AV E
Bridge: Washington over Drainage Ditch	2201 WASHINGTON ST
Bridge: West Bound I-94 over Railroad	I-94 OVER RAILROAD
Railroad / Railroad Crossing Locations	
Railroad Crossing at 12th St	SOUTHEAST OF 1131 E MAIN AV
Railroad Crossing at 24th St	WEST OF 2407 RAILROAD AV
Railroad Crossing at 24th St	NW OF 2400 E FRONT AV
Railroad Crossing at 24th St N	SE OF 2321 E BROADWAY AV
Railroad Crossing at 26th St	SOUTHWEST OF 207 S 26TH ST
Railroad Crossing at 26th St	SE OF 210 S 26TH ST
Railroad Crossing at 26th St	EAST OF 114 N 26TH ST
Railroad Crossing at 3rd St	SOUTHWEST OF 1003 S 3RD ST
Railroad Crossing at 5th St	SOUTHWEST OF 113 S 5TH ST
Railroad Crossing at 66th St	NORTHEAST OF 1580 66TH ST SE
Railroad Crossing at 93rd St	NORTH OF 1800 93RD ST SE
Railroad Crossing at Airport Rd	SOUTHEAST OF 1833 E MAIN AV
Railroad Crossing at Divide Av	SE OF 3500 DIVIDE AV E
Railroad Crossing at Eastdale Dr	SW OF 109 EASTDALE DR
Railroad Crossing at Fraine Barracks	EAST OF 600 RIVER RD
Railroad Crossing at Front Av	EAST OF 2201 E FRONT AV
Railroad Crossing at Main Av	NORTH OF 2409 E MAIN AV
Railroad Crossing at Morrison Av	3810 MORRISON AV
Railroad Crossing at Railroad Av	SE OF 2516 RAILROAD AV
Railroad Crossing at Rosser Av	EAST OF 3422 E ROSSER AV
Railroad Crossing at Vermont Av	NW OF 2220 VERMONT AV
Railroad Crossing at Yegen Rd	EAST OF 1200 YEGEN RD
Railroad Crossing at Yegen Rd	SE OF 910 YEGEN RD
Railroad Over Hay Creek	EAST OF 3120 E CAPITOL AV
Railroad Over Hay Creek	SE OF 2920 E CAPITOL AV

Bismarck Critical Facilities and Infrastructure Values Note: Values identified in the table below are additional impacts beyond those identified within the previous table entitled "Impact Analysis – Catastrophic Dam Failure." Properties within this table are limited to those within the inundation area as mapped.			
Group	**Building Property**	**Personal Property**	**Outdoor Property**
Airport	$31,374,921.00	$1,247,496.00	$70,186.00
Bis-Man Transit	$6,115,317.00	$152,965.00	$0.00
Bismarck Public Health Center	$6,137,221.00	$749,215.00	$0.00
Event Center	$96,225,286.00	$2,651,686.00	$307,961.00
Emergency Management – EOC/CenCom	Relocated in 2020	Relocated in 2020	Relocated in 2020
Fire Department - South	$2,992,131.00	$802,723.00	$0.00
Multi-Tenant Retail Building	$1,657,072.00	$0.00	$0.00
Northern Plains Commerce Centre	$561,762.00	$13,147.00	$0.00
Parking Authority	$23,223,256.00	$17,806.00	$0.00
Police Department	$9,421,669.00	$1,161,392.00	$924,004.00
Public Works	$15,190,932.00	$655,839.00	$23,281.00
Wastewater Treatment Plant	$7,909,929.00	$4,838,887.00	$436,457.00
Water & Sewer	$4,402,943.00	$0.00	$0.00
Water Treatment Plant	$47,112,487.00	$316,050.00	$233,100.00
Totals	**$252,324,926.00**	**$12.607,206.00**	**$1,994,989.00**
GRAND TOTAL			**$254,319,915.00**

Source: 2014-2015 State Fire and Tornado Insurance Data. Values reflect only properties within Dam Failure Spillway.

Impact Analysis – Catastrophic Dam Failure	
Values within this table reflect 6,506 parcels of 7,376. The remaining 870 parcels are tax exempt properties and are not reflected in the totals within this table.	
Land Value	$447,683,000
Building Value Impact	$1,628,219,000
Total Property Impact	**$2,075,902,000**

Source: Bismarck GIS, 2014

Tax Exempt Property Values NOT included in the total above include parcels with the following designations: 5-year remodeling, blind, charitable, county, disabled person, disabled veteran, Federal, fire levy, graveyard, hospital or homes, lodges, municipal, municipal parks, new business, non-profit, paraplegic wheelchair, religious, school district, state assessed, state owned, homestead credit, payment in lieu of taxes, and renaissance zone project.

Vulnerability Assessment
Jackson Coulee Dam #2 (Tom O'Leary Golf Course)

The letter from Houston Engineering regarding Jackman Coulee Storm Water Facility Improvements and Tom O'Leary Storm Water Detention Applications dated September 4, 2002 describes the low probability: "…It seems appropriate to note the breach failures and methods requested are reflective of a catastrophic, or instantaneous, failure of both embankments simultaneously. Such failures would require these embankments to be fully saturated or have significant structural defects. The probability of a multiple breach is extremely remote since embankment saturation during events lasting six hours and a complete erosive failure event associated with spillway flows of three hours is unreasonable, though it is worst case. We understand these embankments are being held to a very high standard and in our opinion the proposed designs now comply with the required criteria. It is important to understand, however, that if all future and/or existing embankments, including roadways, are held to this level of jurisdictional authority or design criteria some may be impractical to construct and the cost to evaluate the potential failure impacts extensive…"

The inserted map on the following page identifies five residential properties at potential risk for flooding on either a 0.5 PMP (probable maximum precipitation) flood event or a 0.5 PMP flood event with a multiple breach. The 6 hour precipitation event for the 0.5 PMP is 10.7 inches.

The first residence is located on the west side of Jackman Coulee just to the west of Ward Road. The potential risks to this residence were determined using a selected channel section and a conveyance capacity rating based on downstream backwater conditions.
This rating indicates the maximum elevation on a 0.5 PMP event, using a peak flow of 3,400 cfs, is approximately 1698.5 msl. The upstream elevation at Ward Road on this event is 1706.6 and would transition from the overflow back into the channel at this location. Using the City of Bismarck's 2-foot aerial topography was determined the ground level at this residence is at or above elevation 1704. While a finished floor elevation could not be determined this is a slab on grade structure. Based on a projected multiple breach peak flow of 5,355 cfs the water surface elevation in the channel increases to 1700.5 with the elevation over Ward Road at 1707.4. Again the projected water surface elevation in the channel at the residence is below the estimated floor elevation. The unknown, however, is the actual boundary of the transition from overflows on Ward Road into the channel. Reviewing the topography it appears there is a moderate risk for shallow water flooding to reach the north side of this residence on a multiple breach 0.5 PMP event.

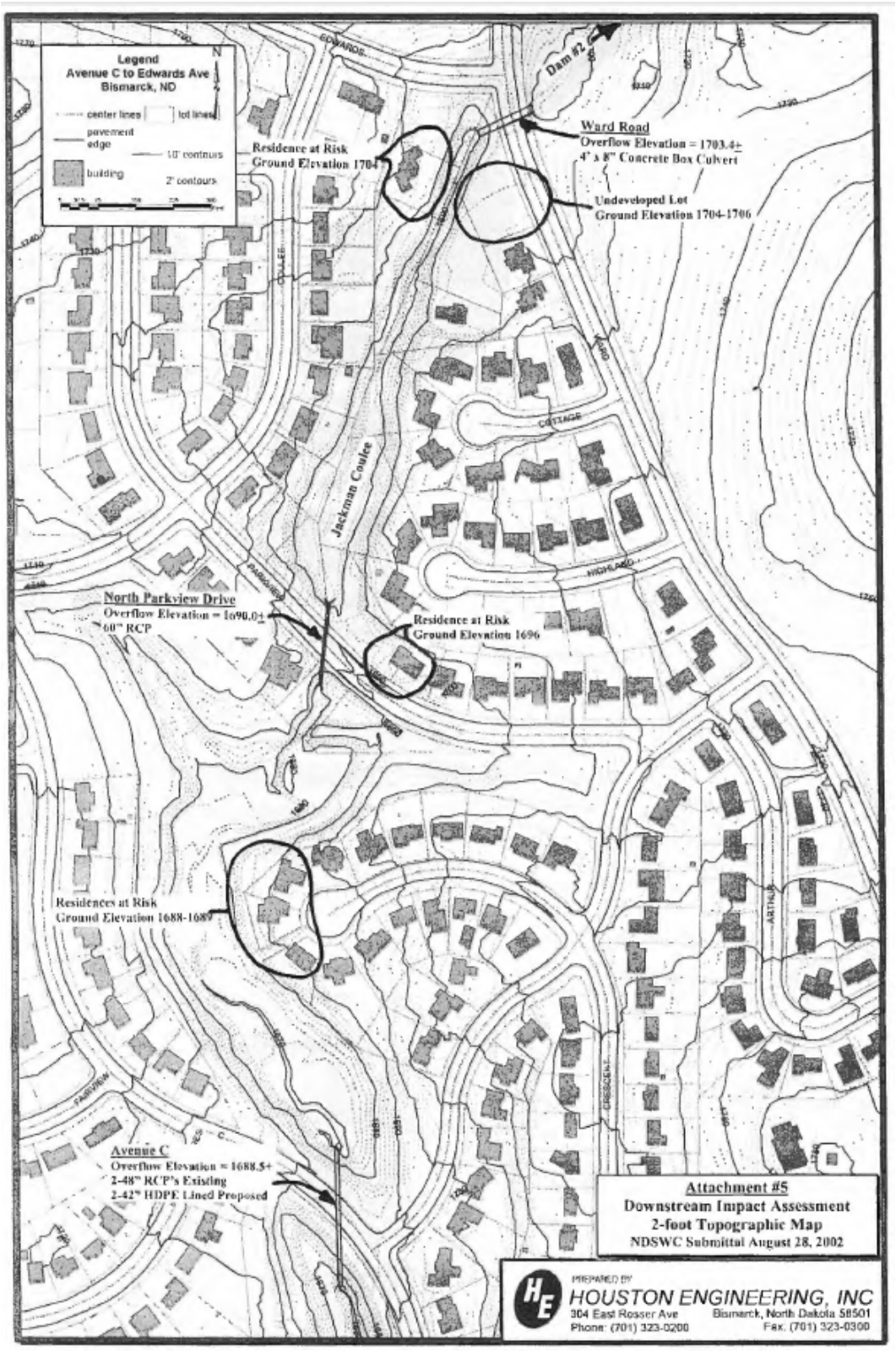
The second impact site is an undeveloped lot located on the west side of Ward Road south of the channel. This lot is not at risk for flooding on a 100-year event and has been removed from the current FIRM. This lot and any future residence are, however, at potential risk for flooding on events greater than the 100-year event, especially a 0.5 PMP or multiple breach event. While this lot and any future residence could be raised this action would restrict the overflows on Ward Road and flows around the structure into the channel would not be desirable. The City has been informed about this situation and will need to carefully consider the associated risks when reviewing any building permit request for this lot. The option to purchase this lot is should also be reviewed.

The third impact site is a residence located on the east side of Jackman Coulee just north of North Parkview Drive. The 0.5 PMP flood event and 0.5 PMP multiple breach flood event yielded elevations of 1693.7 and 1694.I respectively at this crossing. Using the City of Bismarck's 2-foot aerial topography the ground level around this is residence was determined to be at or above elevation 1696. Therefore, this residence is not deemed at risk for flooding on these events.

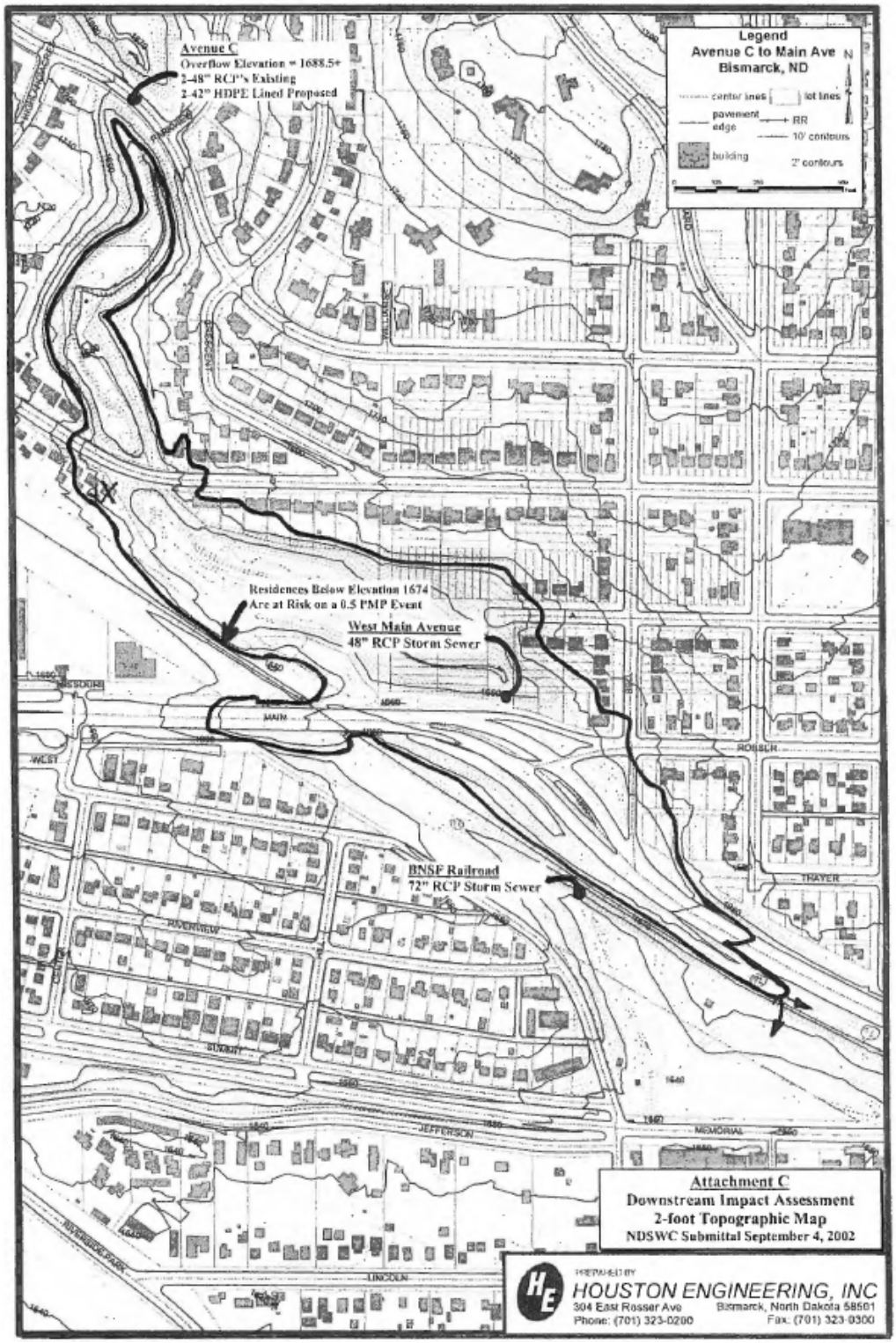
The fourth impact site contains three residences located on the east side of Jackman Coulee at the west end of Crescent Lane. Using the City of Bismarck's 2-foot aerial topography the ground level around these residences was determined to be between elevation 1688 and 1690. This potentially places the finished floor elevations of these walkout basements below the overflow elevation on Avenue C, which are approximately
1688.5. Based on the tables in Attachment #3 these residences are potentially first affected by shallow flooding on about a 500-year event under existing conditions, flood elevation 1688.3. They would however be provided additional protection under projected conditions, which lowers the 500-year flood elevation to 1685.8. In all cases these residences will be affected by floodwaters on events larger than a 500-year event. Since the 0.5 PMP flood event and 0.5 PMP multiple breach event yielded the same flood elevation at Avenue C the incremental impacts are deemed to be minimal. It should be noted that the most likely change would be a slight increase in the potential for shallow water flooding.

The next impact area is between Avenue C and West Main Avenue as illustrated within the inserted map labeled as “Attachment C.” This is a confined storage area with a discharge capability limited to 350-450 cfs. Therefore, no matter when the floodwaters arrive from the 0.5 PMP event, breach overflows or not, the maximum flood elevation will not change appreciably as the total inflow volume is too significant to be discharged in a timely manner. Based on the City of Bismarck's aerial topography, the estimated overflow elevation at the BNSF railroad tracks or east along the south side of West Main Avenue is around 1672.5+. Using an estimated maximum water surface elevation of 1674, approximately twelve residences surrounding this area could be affected, most with shallow flooding with the exception basement impacts. Reviewing the path for overflows from Avenue C no residences will be impacted along the reach from Avenue C and Avenue B. The principal impact of all overflows will be from increased floodwater elevations from Avenue B south to West Main Avenue.

Jackman Coulee – Houston Engineering Attachment #5



Jackman Coulee Map Attachment C.



Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
Both the Garrison Dam and the Heart Butte Dam have significant reconstruction, repair, and maintenance activities planned. Garrison Dam Reconstruction is planned to initiate in 2029 and will take several years to complete. Heart Butte Dam will initiate projects in 2027 and is anticipated to take two or three seasons to complete. Additional residential, commercial, and other properties have been constructed in south Bismarck within the inundation area of a Garrison Dam Failure.	CenCom (911 center) and the Emergency Operations Center have been relocated to north Bismarck, out of the inundation area. Future: The primary location of the Bismarck Police Department will be out of the inundation area prior to the next plan update.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Flood, Terrorism or Nation State Attack, Severe Summer Weather and Winter Weather (heavy precipitation and snowmelt runoff). These hazards can contribute to the cause of a dam failure. Also, a failure of Fort Peck Dam (upstream of Garrison Dam) would have impact on the Garrison Dam.

A catastrophic dam failure would influence the potential for other hazards to occur include: Geologic Hazard, Hazardous Materials Release, Civil Disturbance, and Fire. Power outages are likely to occur even outside of the inundation area. Power normally generated by the dam would likely discontinue for a long period of time. Traffic over each of the bridges (including train bridge) would be discontinued for a lengthy period of time depending on impact, assessments, and repairs.

Future Conditions

- **Location**: The locations of potential impact will likely remain the same. Inundation mapping for both the Garrison Dam and Heart Butte Dam is not likely to change in the next five years.
- **Extent/Intensity:** See anticipated future climate impact below.
- **Frequency:** See anticipated future climate impact below.
- **Duration:** The duration of geologic hazards is not projected to change.

Anticipated Future Climate Impact – Dam Failure Hazard
The expected increase in size, intensity, and frequency of both drought and heavy precipitation episodes, or an increased frequency in change between drought and flood intervals may put more dams at risk of scenarios that exceed the original design criteria of each respective dam. Aging dams are most at risk for this expected impact.

Previous Occurrences – Dam Failure

North Dakota does not have a history of significant dam failures within the state.

Dams that may impact Bismarck have no previous occurrences of failure.

The dam failure probability is somewhat low based on a minimal history of significant events and the regular inspection and upkeep of the high-hazard dams. Should a high or significant hazard dam fail, that event would be considered a high magnitude event. The loss of property, services, and even life could result.

Drought – Hazard Profile

Description

Drought is a condition of climatic dryness severe enough to reduce soil moisture below the minimum necessary for sustaining plant, animal, and human life systems. Drought characteristics usually include precipitation levels well below normal and temperatures higher than normal. Under these conditions, topsoil crumbles and is lost due to wind erosion. Streams, ponds, and wells often dry up and water levels in lakes and rivers drastically fall, creating severe strain on vegetation, wildlife, and livestock. Although the agricultural economy may be more negatively impacted, urban economies are also constrained when the amount of domestic and industrial water is in short supply. Prolonged droughts have caused severe economic hardships in North Dakota.

Scientifically, drought can mean many things to many people, depending on the discipline and perspective of the individual. Operational definitions are used to help quantify the beginning, end, and degree of severity of a drought. The following definitions were provided by the National Drought Mitigation Center.

Meteorological drought is usually an expression of precipitation's departure from normal over some period of time. These definitions are usually region-specific, and presumably based on a thorough understanding of regional climatology.

Agricultural drought occurs when there isn't enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, this shortage will be reflected in declining surface and subsurface water levels.

Socioeconomic drought occurs when physical water shortage starts to affect people, individually and collectively. Or, in more abstract terms, most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

Drought effects regarding agriculture depend on time of year, timing of precipitation, amount of stored soil moisture, type of crop, stage of growth, and meteorological variables such as temperature, humidity, and wind. Precipitation deficits as little as four to six inches can cause severe agricultural drought conditions.

A wide range of possible social and economic consequences normally occurs during a prolonged drought. The effects of drought first strike individual farmers and ranchers, who suffer loss of income, increased indebtedness, possible bankruptcy, and dislocation. Regionally, drought can cause increased unemployment, economic disruption, migration intensity, and regional instability. A nation may be affected by increased government payments to the

agricultural sector, foreign trade losses, rising prices, food shortages, and health problems. Worldwide effects include severe health problems, disruption of world social systems, international conflict, starvation, and famine.

Hydrological droughts affecting tourism/recreation, energy development, food processing, and other industries are usually related to surface water levels in area lakes and rivers that serve as water sources. Reduced water levels can lower production and threaten the ability to produce energy at an acceptable rate, thus, having significant economic ramifications. Water-related recreation can become less desirable or even impossible with the effects of such extending into the economic well-being of tourism and recreation businesses.

A number of secondary hazards are generally associated with drought. Rural grassland fires increase due to dry vegetation. Reduction in vegetation will expose the soil to wind erosion. Reduced flow characteristics adversely affect chemical quality of lakes and rivers. Sediment transport regimes in streams and rivers are altered. Deterioration of water quality results in injury and death to plants and animals. Stagnant pools along rivers provide favorable habitat for insects, particularly mosquitoes. When normal rain patterns develop, the dry, unstable topsoil becomes vulnerable to gullies and flooding.

Effects of drought accumulate slowly but tend to persist over long periods. Determining whether conditions warrant drought status versus an extended dry spell is difficult and experts often disagree. However, a typical drought in North Dakota would most likely begin with limited winter snowfall, deficient spring precipitation accompanied by warmer than normal temperatures and windy conditions. At this point, normal spring greening does not occur causing a shortage of natural livestock feed. Spring planting plans most likely change. Fire danger to grasslands begins to increase. Growth and production of cash crops and feed grains become questionable. Continued drought negatively affects farm income, ultimately affecting agriculture-related businesses. Besides crop loss, recreational opportunities are reduced and hydroelectric power production is affected. Drought causes serious economic problems for the entire State of North Dakota.

Extent (drought indices)

Drought is usually a regional hazard and any part of the state could be impacted in any given year. Mapping of the current drought status is published by the US Drought Monitor each Thursday at https://droughtmonitor.unl.edu/. North Dakota also has an extensive network of ground monitoring wells and surface water gauges. Ground water information, including hydrographs, recent water levels and chemistry conditions, can be found at http://mapservice.swc.state.nd.us/ Daily streamflow conditions are maintained by the US Geological Survey and can be found at http://waterdata.usgs.gov/nd/nwis/rt.

Several drought indices are used to measure a drought's severity and any combination of these indices and others may be used to trigger a wide variety of response activities by governments, individuals, and organizations.

The table below lists the more common indices and their use.

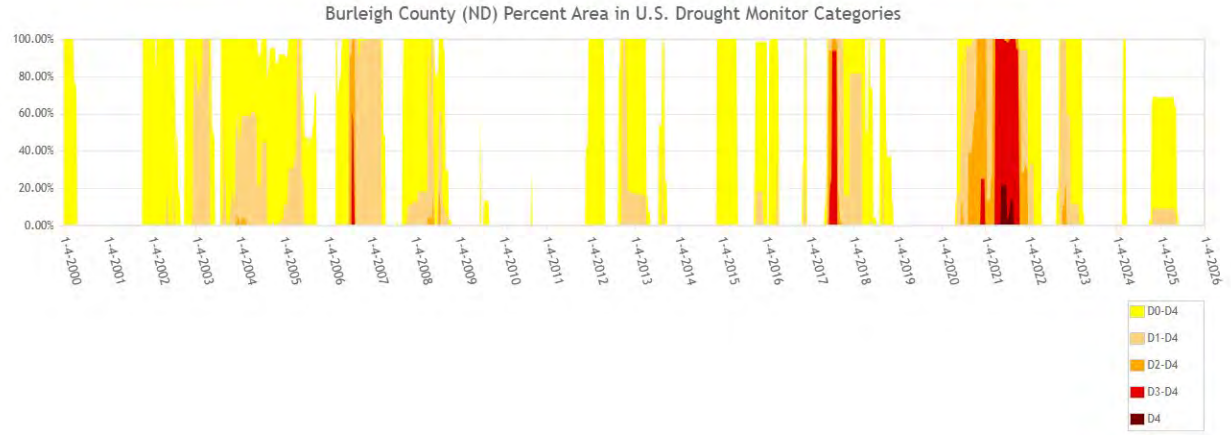
Drought Index	Description
Keetch Byram Drought Index (KBDI)	Used for wildfire risk potential, based on daily water balance including soil moisture
Percent of Normal Precipitation	Simple calculation to describe precipitation anomalies
Standardized Precipitation Index (SPI)	Used by the National Drought Mitigation Center and the Western Regional Climate Center; more complex calculation of a deviation from normal
Weighted Anomaly Standardized Precipitation (WASP)	A NOAA measure best applied to tropical areas
Crop Moisture Index (CMI)	A NOAA measure that measures week-to-week impact on seasonal crop and field activities
Drought Reconnaissance Index (DRI)	A measure common in United Nations data based on monthly comparisons
Palmer Drought Severity Index (PDSI)	Used by NOAA to measure long-term drought conditions in the past.
United States Drought Monitor (USDM)	The most widely referenced NOAA index, measures the persistence as well as severity of drought
Quick Drought Response Index (QDRI)	A NOAA measurement of short-term dryness over a 2-week period to identify the onset or expiration of drought
Soil Moisture Anomaly (SMA)	A NOAA measurement that evaluates total soil moisture conditions
Normalized Difference Vegetation Index (NDVI)/Temperature Condition Index (TCI)/ Vegetation Condition Index (VCI)	NOAA Satellite imagery used to evaluate

Table Source: ND Department of Emergency Services 2024-2029 Enhanced Mitigation Plan

Standard Precipitation Index

Category	Description	Example Percentile Range for Most Indicators	Values for Standard Precipitation Index and Standardized Precipitation-Evapotranspiration Index
None	Normal or wet conditions	30.01 or Above	-0.49 or above
D0	Abnormally Dry	20.01 to 30.00	-0.5 to -0.79
D1	Moderate Drought	10.01 to 20.00	-0.8 to -1.29
D2	Severe Drought	5.01 to 10.00	-1.3 to -1.59
D3	Extreme Drought	2.01 to 5.00	-1.6 to -1.99
D4	Exceptional Drought	0.00 to 2.00	-2.0 or less

The following chart illustrates location (percentage of area within Burleigh County), probability (frequency/likelihood), and magnitude (scale) of drought conditions.



Based on the updated Drought **Impact Reporter Dashboard** (National Drought Mitigation Center, University of Nebraska), there have been no additional drought impacts for Bismarck/Burleigh since the 2020 plan update.
https://unldroughtcenter.maps.arcgis.com/apps/dashboards/46afe627bb60422f85944d70069c09cf

The National Drought Mitigation Center dashboard being phased out provided only one impact from the timeframe of January 2020 to June 2025:

Prayers for rain in Bismarck, North Dakota
Dates of Impact: 2021-04-11 to unknown
Summary:
Leaders at a Bismarck church organized a communitywide prayer effort to pray for rain to end the drought in North Dakota.
The Bismarck Tribune (N.D.), April 17, 2021
Affected Area(s): Bismarck, ND
Categories:
Relief, Response & Restrictions
Society & Public Health
Sources: Media

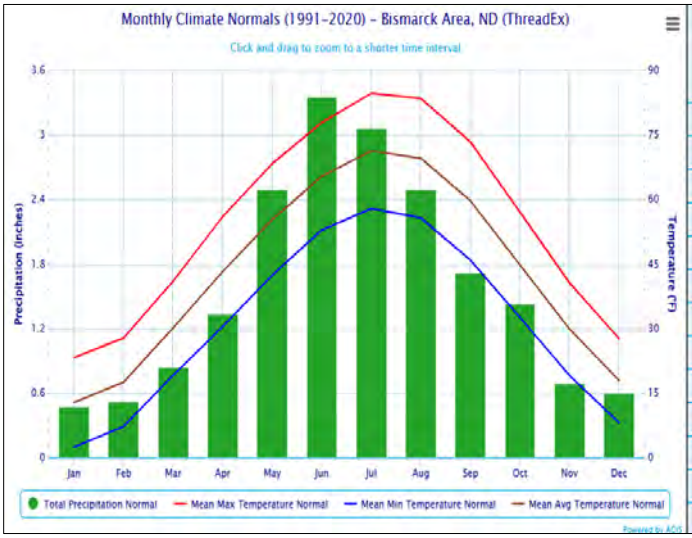
Source: https://droughtreporter.unl.edu/advancedsearch/impacts.aspx

Bismarck Water Supply – Voluntary Water Restrictions Implemented

Bismarck has had voluntary lawn watering restrictions in the last 20 years. These restrictions have been based on reduced capacity due to construction and repair of infrastructure, or higher demands for lawn watering. In the drought conditions of 2019, there were no issues with water supply. Voluntary water restrictions were put in place on the following dates:

- July 26, 2018
- June 5, 2017
- June 18, 2014
- June 1, 2010
- July 22, 2008
- August 7, 2006

The diagram below shows the average monthly precipitation and the range of monthly average high and low temperatures for the Bismarck area during the most recent 30-year climate normal period, 1991-2020 (XM-ACIS, 2025; Climate Toolbox, 2024).



Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	0.48	23.2	2.4	12.8
February	0.52	27.8	7.2	17.5
March	0.84	41.0	19.1	30.1
April	1.34	56.0	30.4	43.2
May	2.50	68.3	42.4	55.3
June	3.36	77.9	52.9	65.4
July	3.07	84.7	57.9	71.3
August	2.50	83.5	55.7	69.6
September	1.72	73.4	45.9	59.7
October	1.43	57.1	32.6	44.8
November	0.69	40.6	19.1	29.9
December	0.60	27.7	8.1	17.9
Annual	19.05	55.1	31.1	43.1

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Drought	Extreme Drought
Probability	Likely	Possible
Drought is a recurring feature of nearly every climate on the planet. In many parts of the world, including North America, we have very little ability to predict exactly when drought will happen next. But if we look at history and climate data, we can be sure that drought will happen again at some point. Source: National Drought Mitigation Center		
Speed of Onset	Slow. Warning time is up to a year	Slow. Warning time is up to a year
Duration	Weeks, Months, Years	Months, Years, Decades
Geographic Area	Multiple counties or States	Multiple counties or states
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Heat Wave A. Elderly and young – based on lack of cooling (HVAC) indoors or excessive outdoor activity	1. Heat Wave 2. Dust 3. Stress / Depression /Suicide/violence 4. Lack of Food / Nutrition A. Elderly and young B. Those with lung / health issues C. Farmers, agricultural workers, others impacted greatly by economic impact D. Economically disadvantaged E. Increased risk to first responders due to heat stress F. Outdoor workers (construction, etc.)
Mass Casualty Incident	Unlikely	Possible, but not likely to require mass casualty response
In the United States, a well-developed economy and agricultural system generally protect citizens from the most critical effects of drought such as shortages of food and water. However, drought still causes extreme hardship for farm and ranch families, and individual wells may run dry. *Source: National Drought Mitigation Center*		
Property Losses (points of vulnerability – high priority)	Not likely	1. Abandoned property due to economic issues faced by individual families 2. Properties at Wildland/Urban Interface (due to increase in fire)
Environmental	1. Soil Erosion 2. Lower Lake & River levels	1. Soil Erosion 2. Lower Lake/river levels 3. Increase in turbidity and salinity levels 4. Air Quality (dust / pollutants increase) – decreased visibility 5. Loss of wetlands 6. Loss of vegetation 7. Loss of fish and game habitat 8. Stressed vegetation and wildlife more vulnerable to disease 9. Insect infestations 10. Plant infestations

	Drought	Extreme Drought
COG/COOP		
Critical Facilities		
Critical Infrastructure	1. Water Restrictions may be necessary	1. Diminished food supply and increase in food prices 2. Strain on financial institutions 3. Commercial Food Service Operations
Schools		
High Risk Facilities (chemical)		
Specific Populations: Public Assembly, Vulnerable / Special Populations		1. Farm Families 2. Elderly/Young 3. Increase in Respiratory Ailments 4. Economically disadvantaged (higher food prices) 5. Agribusiness employees
Economy (community wide)	1. Agricultural businesses Impacted 2. Tourism – loss of revenue 3. Recreational facilities / businesses impacted	1. Agricultural businesses impacted 2. Tourism – loss of revenue 3. Recreational facilities / businesses impacted 4. Industrial Users a. Energy production (i.e.: use of water for cooling or hydro-electric power) b. Those that draw directly from the river 5. Financial Institutions 6. Transportation 7. Unemployment 8. Loss of Property Tax revenues 9. Out-migration of affected residents
OTHER:	1. Increased risk of fire 2. Migration of wildlife animals to urban areas seeking food/water (and potential for disease)	Public Safety Concerns: 1. Conflicts over water / water use / water rights 2. Increased risk of fire 3. Firefighting and issues related to requirements for water (quantity / pressure) 4. Migration of wildlife animals to urban areas seeking food/water (and potential for disease)

Changes in Vulnerability

Since the previous plan update in 2020.

Increase in Vulnerability	Decrease in Vulnerability
New development and increase in population create additional demand for water.	See Drought Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan. The Risk Assessment for this hazard (in Section 10) is based on D4 Exceptional Drought conditions.

D4 Exceptional Drought Exceptional and widespread crop or pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.

- *Palmer Drought Index -5.5 or less*
- *Standard Precipitation Index -2.0 or less*
- *CPC Soil Moisture Model 0-2 percentile*
- *USGS Weekly Streamflow 0-2 percentile*
- *Objective Short and Long-term Drought Indicator Blends 0-2 percentile*

The FEMA **National Risk Index** https://hazards.fema.gov/nri/map places Burleigh County (including Bismarck) as

- Drought Risk Index: Very Low
- Estimated Annual Loss: Very Low
- Social Vulnerability: Relatively Low
- Community Resilience: Very High

Relationship to other Hazards: Drought increases risk for Wildland Fire (Wildland Urban Interface). Drought conditions can impact soil ability to absorb precipitation, ultimately contributing the potential for geologic hazards. Flooding, flash flooding and high wind events *following a drought event* can increase the level of impact of those hazards. Drought can also affect likelihood or impact of Pest Infestation hazard.

Future Conditions

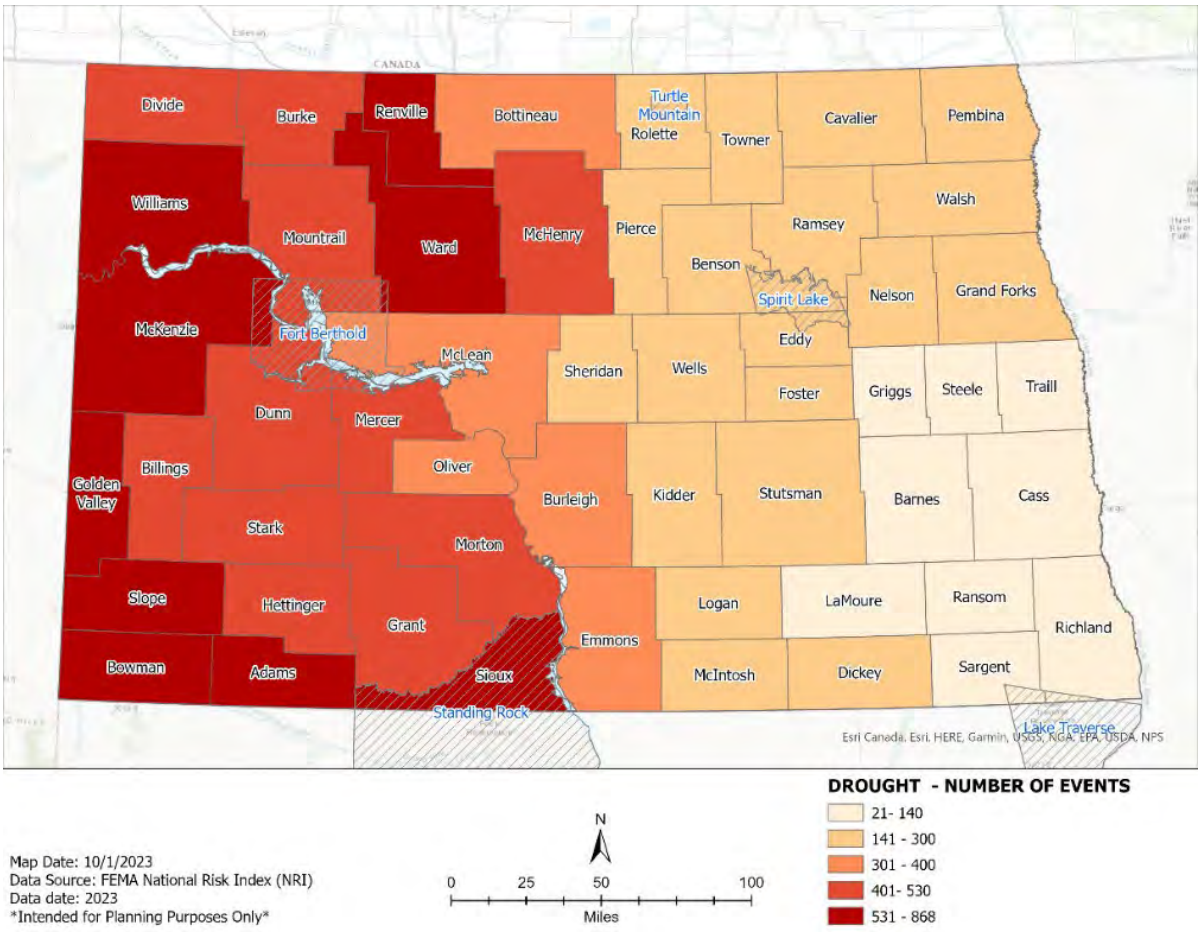
- **Location**: The locations of this hazard will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See Anticipated Future Climate Impact below.
- **Frequency:** See Anticipated Future Climate Impact below.
- **Duration:** See Anticipated Future Climate Impact below.

Anticipated Future Climate Impact – Drought Hazard

Through the end of this century, expect larger and more intense droughts, with increasing frequency and/or longer duration of drought periods in North Dakota. Potential impacts include more episodes of extreme heat/heat index with increased human, animal, and crop stress; more rapid onset of drought conditions or flash drought; more drought related (both wind and rapid rainfall runoff) erosion, riverbank destabilization, etc.; reductions in overall agricultural economy. Drought impacts on vulnerable water users, such as the agriculture industry and municipal systems, will likely be exacerbated.

Previous Occurrences – Drought

The diagram below illustrates the number of drought related events from 2000 through 2022.



Given the lengthy history of frequent, severe, and prolonged drought incidents in the state's history, North Dakotans have a high probability of experiencing drought hazards in varying degrees. Drought is a hazard that should be routinely prepared for and proactively planned for.
Source: ND 2024-202929 Enhanced Mitigation Plan

1930's Dust Bowl: June 1929 was one of the driest on record in North Dakota, followed by continuing drought conditions throughout the 1930s. In 1936, North Dakota recorded its highest temperature of 121°F at Steele, ND on July 6. (State Historical Society of North Dakota, 2007)

The "Dust Bowl", as it is called, resulted in widespread drought conditions, soil erosion, and grasshopper infestations. This drought was exacerbated by poor farming practices, low market prices, and a depressed economy. Lessons learned during the 1930s drought stimulated the creation of governmental agencies to promote conservation, increased irrigation, and education stressing more flexible and diverse operations using improved management practices. The

Federal Crop Insurance Program was established and institutions liberalized credit. The United States Department of Agriculture (USDA), the North Dakota State Agricultural Experiment Station System, and agricultural colleges and universities began an intensified research effort. This resulted in technologies for control of soil erosion, soil moisture conservation, higher yielding grain varieties that could better withstand dry conditions, improved fertilizers, and better farm management techniques.

1950s: The impact of drought in the early 1950s was less severe than the 1930s. The widespread financial distress, interstate migration, and regional disruption characteristic of the Dust Bowl era were largely absent. Strong emphasis was placed on water conservation and augmentation, weather modification research, weather prediction and control, groundwater recharge, irrigation and river basin development, evaporation control, desalination, phreatophyte control, and irrigation canal lining.

1970s and 1980s: 1976 was the driest year in North Dakota since the 1930s. (State Historical Society of In the 1970s and 1980s, response to drought by state and federal governments was characterized by provisions for livestock feed assistance, crop loss financial aid packages (deficiency and disaster payments), commodity stock adjustments, disaster credit and forbearance programs for agriculture producers and related small businesses, and some water-related assistance

1976: Presidential Emergency Declaration (DR 3016 declared July 21, 1976) for North Dakota including Burleigh County. Driest year in North Dakota since 1936.

1988: The North Dakota Governor declared a statewide emergency because of the drought. Damages were not limited to agricultural losses. Public water systems and individual wells also began to dry up. (North Dakota State Water Commission, 1994) Disaster damage in 1988 was estimated to be $3.5 billion, not including the cost of indirect impacts. .

2000-2007: North Dakota soils were under some degree of drought and ruled for 78 consecutive months from December 2000 until mid-June 2007. The most severe drought occurred during

July 2006 when 100 percent of the state experienced at least moderate drought status on the drought monitor scale.

2012: Governor Jack Dalrymple declared an agricultural emergency for the state due to drought conditions on August 14, 2012. The declaration included 49 counties (including Burleigh) and the five reservations. Most locations across western and central North Dakota this year experienced it as one of the top ten warmest years on record, drier than normal conditions, and a snowfall deficit of over 10 inches. Several locations had their warmest March average temperature on record. The average temperatures in March were 12 to 14 degrees Fahrenheit above normal. The drought conditions deteriorated throughout the summer and fall, with below normal precipitation and abnormally dry conditions. In August and September, there were very high and extreme fire dangers in portions of southwest and south central North Dakota. The west to northwest wind gusts were reported between 45 to 51 mph on several days. The drought conditions improved during November and December as the weather pattern transitioned into wetter than normal conditions.

May, 2017: Voluntary water restrictions requested in City of Bismarck and City of Lincoln due to low water reservoirs as a result of a period of increased temperatures.

July, 2017: Burleigh County issued a drought emergency declaration on July 26, 2017. On July 27, 2017 Gov. Doug Burgum declared a drought disaster for nearly all of North Dakota. The U.S. Drought Monitor's weekly report (July 27) rated nearly 46 percent of North Dakota in extreme (D3) or exceptional (D4) drought. About 16 percent of the state was in severe drought (D2) and 18 percent is in moderate drought (D1). More than 300 wildfires had been reported to the North Dakota Department of Emergency Services since April 1.

2021: Governor Burgum issued a statewide drought disaster declaration on April 8, 2021. The drought coverage area surpassed the 2017 record, and a severe deficit of moisture during September 2020 through February 2021 exceeds the driest six-month period on record since 1895.

Data Limitations

The greatest data limitation with drought is the inability to pinpoint the start and end of drought periods and the associated correlation with economic losses.

Fire (Urban Fire) – Hazard Profile

Description

Fire by definition is a rapid, self-sustaining oxidization process accompanied by the evolution of heat and light of varying intensities. (Essentials of Fire Fighting 4 addition) In other words, fire is a form of oxidation. On the slow end of oxidation you have rusting which can take months to occur and on the fast end of oxidation you have an explosion that happens in micro-seconds, with fire at a rate of just seconds. If fire occurs in a structure it can increase in size very rapidly and be out of control within seconds.

Urban fire departments are one of the oldest continuing institutions in the United States. Professional firefighters are well trained in the latest skills for preserving life and applying their abilities to limit property damages. Fire departments conduct regular inspections to identify and help reduce the fire risk that businesses may have. In addition, public education programs have been implemented within the community to educate businesses and the citizens on the importance of fire safety awareness in the prevention and reduction of fires.

The overall picture of fire safety information reveals that, per capita, the United States has one of the highest death rates in the industrialized world. Bismarck, North Dakota averages approximately 124 fires per year. Records show that Bismarck has less than one fire-related death per year and less than 2 fire-related injuries per year on average. Cooking related fires account for approximately 20% of all fires within the community.

Although structure fires are usually individual disasters and not community wide ones, the potential exists for widespread urban fires that can displace several businesses or families and exceed local resources. Urban blocks, commercial structures, and apartment buildings are vulnerable, especially the downtown area which consist of older buildings that have been renovated several times. Fires in the downtown area can have a significant economic impact.

While building and fire code enforcement have contributed to improved fire and life safety in new and existing buildings in recent years, fire prevention and awareness of the owners and occupants of buildings is key. Smoke detectors, automatic fire alarm systems, automatic sprinkler systems, fire doors, and fire extinguishers can all aid in preventing and reducing deaths, injuries, and damage from fire.

Fire Causes – City of Bismarck				
2010	**2011**	**2012**	**2013**	**2014**
101 Total Fires	*96 Total Fires*	*126 Total Fires*	*96 Total Fires*	*111 Total Fires*
Operating equipment 30%	Cooking 29%	Undetermined ignition source 26%	Cooking 28%	Cooking 44%
Cooking 23 %	Operating Equipment 21%	Cooking 21%	Operating Equipment 25%	Operating Equipment 20%
Undetermined ignition source 17%	Undetermined ignition source 20%	Operating Equipment 20%	Undetermined ignition source 15%	Undetermined ignition source 11%
Ember 8%	Open Flame Source 8%	Cigarettes 7%	Open Flame Source 8%	Open Flame Source 7%
Electrical Arcing 7%	Electrical Arcing 7%	Ember 6%	Ember 8%	Ember 7%
Cigarettes 6%	Cigarettes 5%	Electrical Arcing 3%	Electrical Arcing 6%	Chemical Reaction 5%
Open Flame Source 4%	Ember 5%	Chemical Reaction 3%	Cigarettes 6%	
Other Causes 5%	Other Causes 5%	Other Causes 14%	Other Causes 4%	Other Causes 6%

Summary of Changes in Demand for Service: 2015 thru 2019:

Demand For Service

Priority Calls
Change from 2015 to 2019

NWB – 50% 50 to 75

5E – 138% 39 to 93

5D – 58% 24 to 38

3C – 51% 204 to 309

2G 95% 24 to 47

NA – 63% 43 to 70

5F – 89% 44 to 83

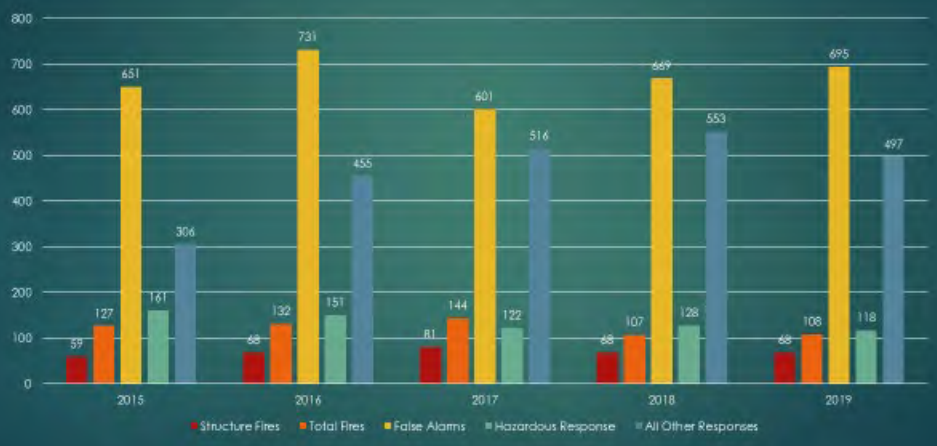
4C – 44% 107 to 155

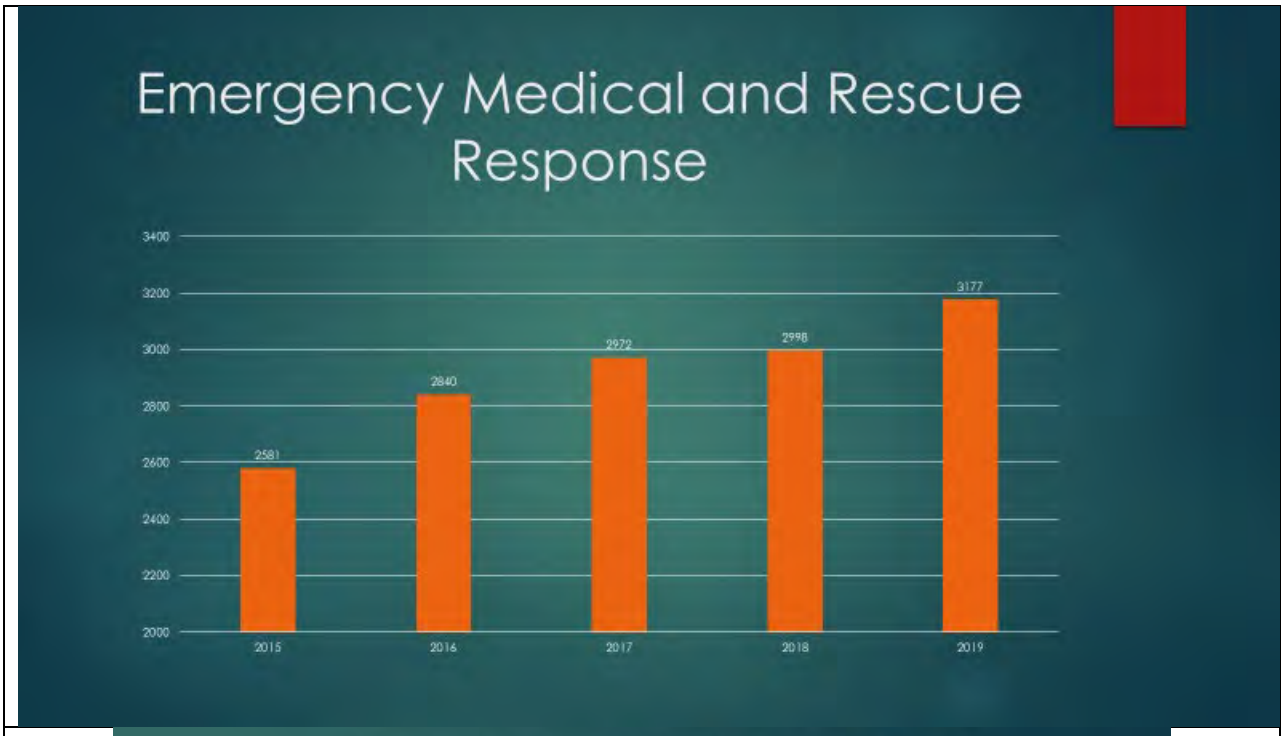
4D – 224 % 25 to 81

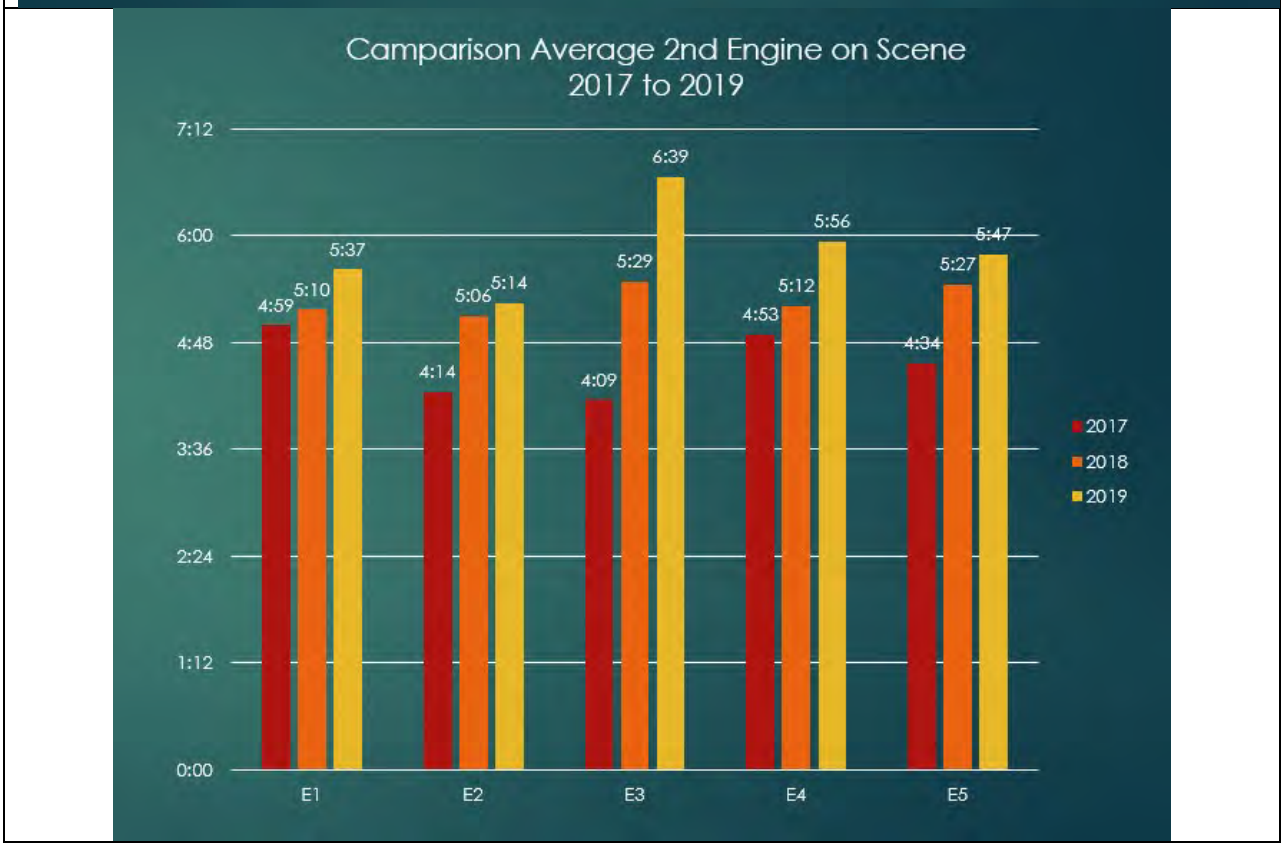
SE2A – 633% 3 to 22

Overall change from 2015 to 2019 = 26%

Fire/Hazardous Response




Emergency Medical and Rescue Response
3400
3200
3000
2800
2600
2400
2200
2000
2581
2840
2972
2998
3177
2015
2016
2017
2018
2019


Camparison Average 2nd Engine on Scene 2017 to 2019
7:12
6:00
4:48
3:36
2:24
1:12
0:00
4:59
5:10
5:37
4:14
5:06
5:14
4:09
5:29
6:39
4:53
5:12
5:56
4:34
5:27
5:47
E1
E2
E3
E4
E5
2017
2018
2019

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Scenario	**Residential Fire**	**Commercial**	**Conflagration**
Probability	Very Likely	Very Likely	Unlikely
Speed of Onset	No Notice Event	No Notice Event	Possible escalation event
Duration	Minutes to Hours	Hours	Hours to beyond 24 hours
Geographic Area	Localized Event – may impact any area	Localized Event – may impact any area	May spread to city blocks
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Smoke inhalation or direct flame contact A. Residents in older apartment bldgs. The elderly and very young.	1. Smoke inhalation or direct flame contact A. The elderly and very young.	1. Smoke inhalation or direct flame contact if evacuation is not completed in a timely manner A. The elderly and very young.
Mass Casualty Incident	Low probability	Low to Moderate probability	Low probability Explosion / collapse may cause mass casualty
Property Losses (points of vulnerability – high priority)	1. Room and contents to the entire structure. 2. Mobile homes	1. Room and contents to the entire structure	1. Multiple Structures
Environmental	1. Toxic smoke and other gases released 2. Water run-off	1. Toxic smoke and other gases released possibly hazardous materials depending on the business. 2. Run-off from water used to suppress fire.	1. Toxic smoke and other gases. 2. Water run-off. 3. Possible hazmat releases. 4. Possible gas main issues.

Scenario	Residential Fire	Commercial	Conflagration
COG/COOP			1. FD personnel – first responders.
Critical Facilities		See Section 8 for listing of Critical Facilities.	See Section 8 for listing of Critical Facilities.
Critical Infrastructure		See Section 8 for listing of Critical Infrastructure.	See Section 8 for listing of Critical Infrastructure.
Schools		1. Unsprinklered schools and portable classrooms.	1. Unsprinklered schools and portable classrooms.
High Risk Facilities (chemical)		See Section 8 for listing of Hazmat Sites as of December 31, 2024.	See Section 8 for listing of Hazmat Sites as of December 31, 2024.
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Nursing homes, Assisted Living, Group Homes, and those living in Mobile Homes	1. Belle Mehus 2. Dakota Stage 3. Churches Bars and Restaurants with occupant loads of less than 300	1. Properties and populations in closer proximity to each other are more vulnerable. 2. Otherwise, all sections of the city are of equal vulnerability.
Economy (community wide)	Minor impact	Moderate impact Downtown Business District	Catastrophic Impact
OTHER:			FD personnel due to response.

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No changes aside from additional property as annexed into the city. See Community Profile Section 7.	See Pest Infestation Hazard Mitigation Capabilities listed in Section 3.

Risk
See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: The Fire hazard is closely associated with Hazardous Materials Release hazard in that fires may involve or create hazardous materials and a release of hazardous materials may result in fire. Also, natural hazards such as lightning (severe summer weather) may cause fires and fires may be intentional as an attack, through Civil Disturbance or as an act of Terrorism. Also see Wildland Fire (wildland urban interface).

Future Conditions

- **Location**: Additional properties within the current jurisdiction as well as new properties and geographic locations as annexed into the city.
- **Extent/Intensity:** No change.
- **Frequency:** No change. Although additional properties and development create a potential for an increase in frequency, mitigation efforts including public education and code requirements are anticipated to minimize changes in frequency. See Section 3 for mitigation capabilities specific to the Fire Hazard.
- **Duration:** The duration of fire hazards is not projected to change.

Flood – Hazard Profile

Description

Floods are naturally occurring hazards that happen frequently throughout the world. The National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA), defines floods in the following way:

- A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from:
    - Overflow of inland or tidal waters; or
    - Unusual and rapid accumulation or runoff of surface waters from any source; or
    - Mudflow; or
- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining, caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

Floods are a natural phenomenon; however, human activities often intensify flood hazards because of the alteration of natural conditions. Floods often occur along rivers and streams, in poor drainage areas, or in oversaturated soils.

Flooding is North Dakota's most costly and repetitive natural hazard. All 53 counties have experienced severe damages and losses to public and private properties due to floods. The floodplain in Bismarck is developed with housing, streets, railroads, businesses, and recreational facilities. Hazardous materials (fixed facilities) in the floodplain leads to the potential for contamination and complicates and increases the extent of damage caused by flooding.

Surface water is that water found on the land surface, and includes overland flow and flow in distinct channels. The three major sources of surface water include streams and rivers flowing into the state, precipitation, and groundwater discharge along streambeds. Surface water leaves the state in out-flowing streams and rivers, by evaporation, and by percolating downward into the subsurface into the groundwater flow system.

Many floods in North Dakota occur because the ground is frozen and/or saturated with moisture and cannot absorb any further moisture. This moisture can come from several different sources and circumstances. One source is a heavy snowpack, which is affected by a rapid warming trend as well as spring rain falling directly on the snow pack.

The spring flood danger period generally occurs during March and April. The magnitude of the flooding varies from year to year depending on such factors as characteristics of the snow cover, soil moisture conditions, frost depth, winter temperatures, temperatures during spring melting, spring precipitation, and the extent of ice jams. A wet fall, early freeze up with saturated ground at the time of freezing, heavy winter precipitation, and warm rains during and after spring thaw add to the seriousness of the spring flooding situation. Smaller streams are more susceptible to flooding in the summer with peak flows resulting from thunderstorms.

Riverine Flooding
Riverine flooding originates from a body of water, typically a river, creek, or stream, as water levels rise onto normally dry land. The riverine hazard areas in Bismarck are mapped as part of the National Flood Insurance Program (NFIP). Under this program, an area is broken into zones to depict the level of flood hazard.

Most commonly, the areas within the 100-year floodplain are considered the greatest risk. The 100-year floodplain has a 1% chance of exceedance in any given year. Locations outside the 100-year floodplain may also experience flood conditions during greater magnitude floods, localized events, or along unmapped creeks, streams, and ditches.

Most riverine floods are slow developing events with a natural, predictable source of water or moisture, such as snowmelt, slow rain, or a controlled dam release. This type of flood can often be forecast based on the amount of moisture or water available. The timing and location of flood conditions can often be calculated to a reasonable degree. If implemented in a timely manner, protective measures can sometimes mitigate the potential damage and loss. Because river levels of the Missouri River at Bismarck are controlled to a large extent by the COE via the Garrison Dam, flood forecast products (NWS) do not exist for the Missouri River near Bismarck.

Ice Jams
Flooding can also result from ice jamming or blockage along streams and rivers. Ice breaking up into pieces, called floes, moves along with the flowing rivers or streams. The ice floes can jam at curves, narrow places in the channel, structures, river/stream confluences, or where there is a sharp decrease in river bed gradient, creating an effective dam that produces water backup and overflow. Ice jams can cause considerable increases in upstream water levels, while at the same time downstream water levels may drop. According to the US Army Corp of Engineers, the types of ice jams include freeze up jams, breakup jams, or combinations of both. When an ice jam releases, the effects downstream can be similar to that of a flash flood or dam failure.

Flash Flood
Another source of flooding, called flash flooding, occurs when heavy rain falls in such a short time that the soil cannot absorb it and/or drainage systems (natural or man-made) cannot carry the volume of water away as quickly as it accumulates. Flash flooding also occurs when heavy rain falls over a prolonged period of time and the ground becomes saturated and cannot absorb the additional moisture fast enough.

A flash flood is usually caused by severe thunderstorms, heavy rains on snowpack, slow moving storms, dam, dike, or levee failures, or ice jam releases. Flash floods can occur anywhere when a large volume of water inundates an area over a short time period. Because of the localized nature of flash floods, clear definitions of hazard areas do not exist. These types of floods often occur rapidly with significant impacts. Rapidly moving water, only a few inches deep, can lift people off their feet, and only a depth of a foot or two, is needed to sweep cars away. Most flood deaths result from flash floods.

Urban flooding is the result of development and the ground's decreased ability to absorb excess water without adequate drainage systems in place. Typically, this type of flooding occurs when land uses change from fields or woodlands to roads and parking lots. According to the National Oceanic and Atmospheric Administration, urbanization increases runoff two to six times more than natural terrain.
The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it. *Note: When property damage does not occur, these events are technically referred to as "urban ponding."*

Groundwater levels fluctuate from season to season and from year to year. Excessive groundwater may flood basements and crawlspaces but never reach the Earth's surface. Often this type of flooding occurs during or following periods of heavy rainfall or snowmelt.

Flooding is one of the most deadly hazards nationwide and in North Dakota. Most injuries and deaths occur when people are swept away by flood currents, and most property damage results from inundation by sediment-laden water. Fast-moving water can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage.

A tremendous amount of soil erosion takes place by water movement and its pressures on land surfaces. Runoff from the eroded areas is swift, thus contributing to flood magnitude. Additionally, when the floodflow slackens, the suspended materials will settle to the bottom of the channel, reducing the space that was previously available to keep the river within its banks. This sedimentation increases flood potential.

Probable Maximum Precipitation (PMP) is defined by the Federal Emergency Management Agency as theoretically, *"the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location during a certain time of year."*

In June 2021, the ND Department of Water Resources completed an update of the statewide Probable Maximum Precipitation (PMP) data through a two-year PMP study. The PMP depths are used in the computation of the Probable Maximum Flood (PMF), generally for the design of high-hazard structures (ie: dams). See the Dam Failure Hazard Profile within section 10 of this plan for more information regarding Probable Maximum Precipitation.

Missouri River Basin

Comprised of seven major sub-basins, the Missouri River Basin, the state‘s largest, drains nearly 48 percent of the state‘s total area. The seven subdivisions included in the Missouri River Basin are the Grand, the Cannonball, the Heart, the Knife, the Little Missouri, the Missouri, and the Yellowstone rivers and direct, minor tributaries. The climate is mostly semiarid. Buttes, hills, and smaller valleys characterize the topography and are most prominent in the Badlands along the Little Missouri River. The area east of the Missouri River is marked with numerous small lakes and wetlands. Annual mean precipitation ranges from 13 inches in the northwest to 17 inches in the east.

Flood control measures in the basin include Fort Peck Dam located in northeast Montana, the Garrison Dam which forms Lake Sakakawea, Oahe Dam in South Dakota which forms Lake Oahe, and the Heart Butte and Dickinson Dams on the Heart River.

Lake Sakakawea was formed by the construction of the Garrison Dam in 1953. Lake Sakakawea covers 368,000 surface acres, can store a maximum of 24.5 million acre-feet, and has 1,600 miles of shoreline in six counties. Lake Oahe Dam in South Dakota covers 40,000 to 80,000 surface acres in North Dakota, with an average storage of 989,605 acre-feet and a maximum storage of 1,626,588 acre-feet, depending upon the management elevation of the lake. The two projects required a total of 550,000 acres of land in North Dakota, including shoreline acres needed for flood conditions.

Flood Insurance Study (FIS)

The revised Flood Insurance Study (FIS), effective June 6, 2024, covers the entire geographic area of Burleigh County, North Dakota. The FIS is available as a FEMA document. The Flood Insurance Study Number is 38015CV000C, Version Number 2.6.3.2.

Purpose of this Flood Insurance Study Report: The Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in the report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

The Basin Characteristics, Principal Flood Problems, and Historic Flooding Elevation Summaries below are copied from the current Flood Insurance Study.

Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Apple Creek	10130103	Apple Creek	Encompasses the majority, including the eastern portion of Burleigh Co. and water flows west	3,633
Painted Woods-Square Butte	10130101	Missouri River	Encompasses the northwestern portion of Burleigh Co. and water flows west and south	2,527
Upper Lake Oahe	10130102	Missouri River	Encompasses the southwest portion of Burleigh Co. and water flows south	3,630

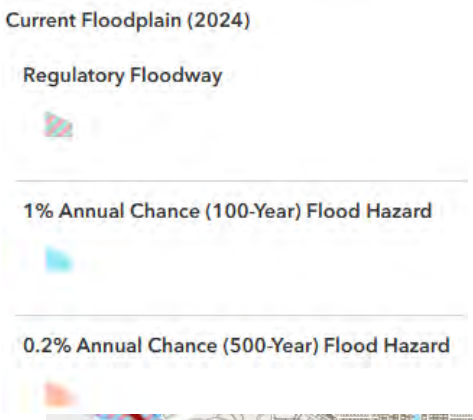
Principal Flood Problems

Flooding Source	Description of Flood Problems
Apple Creek	Short duration, high-intensity spring rainstorms, in combination with snowmelt are the principal cause of flooding. High intensity rainstorms also cause minor flooding.
Burnt Creek	Short duration, high-intensity spring rainstorms, in combination with snowmelt are the principal cause of flooding. High intensity rainstorms also cause minor flooding.
Hay Creek	Short duration, high-intensity spring rainstorms, in combination with snowmelt are the principal cause of flooding. High intensity rainstorms also cause minor flooding. Hay Creek is located in both rural and urban parts of the county. Flooding within the urban communities is particularly impactful because it affects structures.
Missouri River	Significant inflows from the Upper Missorui and Yellowstone Basins into Lake Sakakawea create long duration flood risks. Freeze-up and break-up ice jams have significantly contributed to flooding in the area. While the severity of ice jams has decreased since the construction of Garrison Dam, the potential for severe river blockage still exists.
Random Creek	Random Creek is located in a low-elevation marshy area.

Historic Flooding Elevations

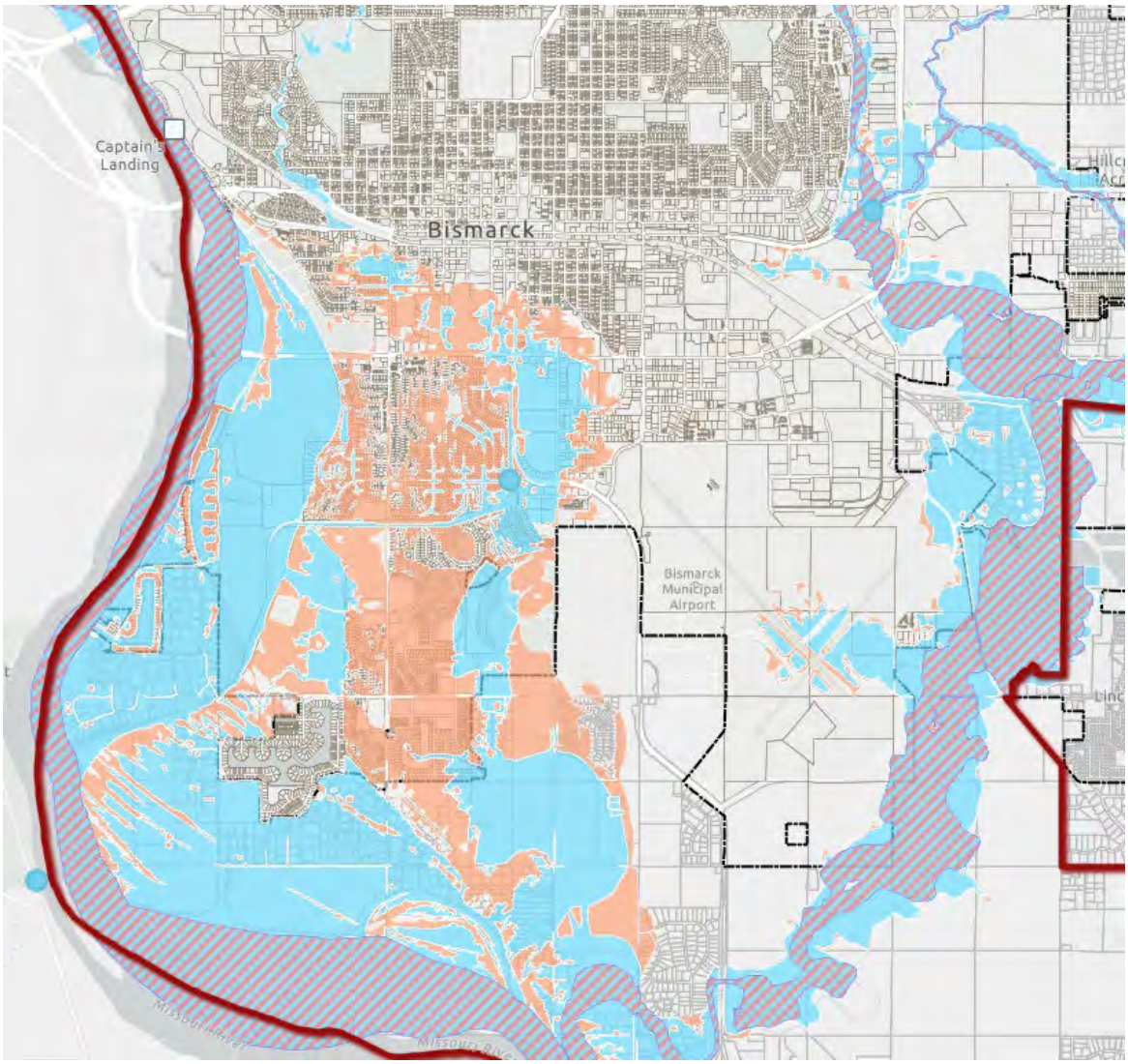
Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Apple Creek	Apple Creek Road – USGS Gage 06349500	1657.46	1979	50	USGS Gage
Burnt Creek	15th Street NW – USGS Gage 06342450	1706.34	1979	150	USGS Gage
Missouri River	Bismarck Water Treatment Plant – USGS Gage 06342500	1638.87	2011	400	USGS Gage

100-Year and 500-Year Floodplain Map – City of Bismarck



The FEMA Flood Map Service Center is the official online location to find all flood hazard mapping products created under the National Flood Insurance Program, including our community's flood map.

https://www.fema.gov/flood-maps



https://www.arcgis.com/apps/mapviewer/index.html?webmap=b6ba0e85b8b84ef48db3b24fb2d2de78

The “Floodplain Changes” map on the following page illustrates the location of structures added and removed from the 100-year floodplain as a result of the updated FIRM.

Structures within the 100-Year floodplain including Bismarck and the 4-mile ETA.

Year End	Total buildings within the SHFA. Includes Bismarck and the 4-mile ETA.
2020	2420
2021	2520
2022	2550
2023	2563
***2024**	**3,876**

***As a result of the FIRM update effective June 6, 2024, there were 1,742 buildings added to the floodplain and 413 were removed.** Additional structures were built within the floodplain (61) as well as 18 affected by map revisions in the year 2024. The current total buildings within the SFHA as of January 9, 2025 is 3,876.

Acronyms Used above:

SFHA: Special Flood Hazard Area (100-year floodplain)
FIRM: Flood Insurance Rate Map
ETA: Extraterrestrial Area (4 mile zone outside Bismarck city limits)

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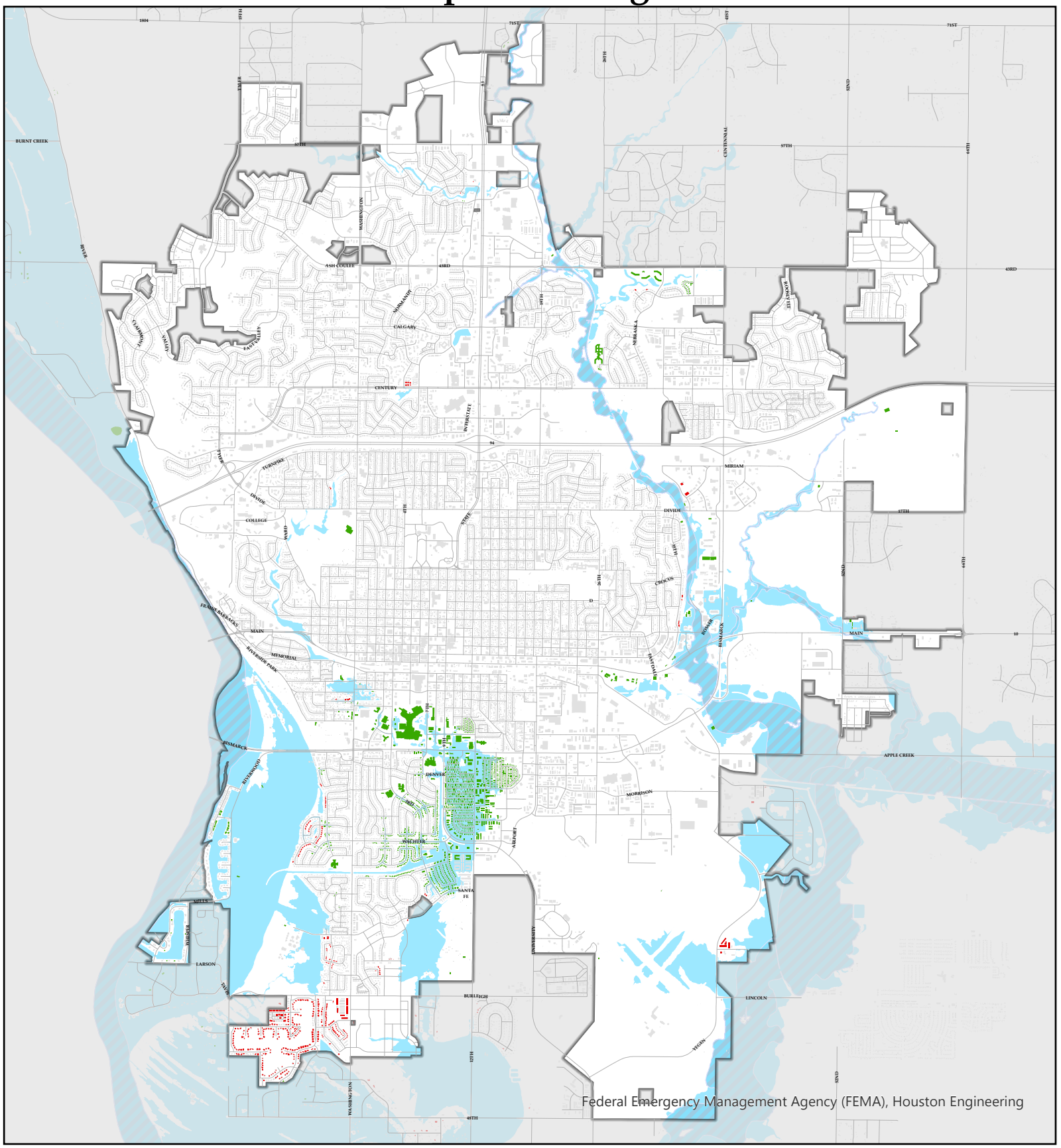
Floodplain Changes



Bismarck

- City Limits
- Buildings Added to Floodplain
- Buildings Removed from Floodplain
- 1% Annual Chance (100-Year) Flood Hazard

N

Date: 5/20/2025

This data is for representation only and does not represent a survey. No liability is assumed as to the accuracy of the data delineated herein.

0 ½ 1 2 Miles

National Flood Insurance Program – Community Statistics as of April 2025

Policy and Claims Data as of 4/24/2025:

State	County Name (Number)	Community Name (Number)	Number of Losses	Total Net Payment	Avg. Net Payment	Active Contracts	Active Policies	Total Premium + Policy Fee (Active Contracts)	Average Premium + Policy Fee (Active Contracts)	Cancelled Contracts	Expired Contracts
Grand Total			435	$7,472,139.66	$17,177.33	503	503	$600,963	$1,195	1,038	2,592
NORTH DAKOTA	BURLEIGH COUNTY (38015)	BISMARCK, CITY OF (380149)	435	$7,472,139.66	$17,177.33	503	503	$600,963	$1,195	1,038	2,592

Policies in Force & Payments as of 4/24/2025:

Community	Policies in Force (PIF)	Contracts in Force (CIF)	Total Coverage	Median Discounted Premium	Median Total Annual Payment	Total Discounted Premium	Total Annual Payment
	503	503	$146,987,000	$831	$1,063	$577,322	$732,979
BISMARCK, CITY OF	503	503	$146,987,000	$831	$1,063	$577,322	$732,979

Company Name (Number)	State	Claim Status	Number of Losses	Net Building Payments	Net Contents Payments	Net ICC Payments	Total Net Payments	LAE Fee	Special Expense Amount
Grand Total			435	$7,128,388	$313,752	$30,000	$7,472,140	$381,369	$62,362

Repetitive Loss Summary:

State/County/Community	State	Repetitive Loss Properties	Total Losses	Total Building Payments	Total Contents Payments
	Grand Total	26	53	$2,189,274.19	$159,322.51
BISMARCK, CITY OF (380149)	NORTH DAKOTA	26	53	$2,189,274.19	$159,322.51

Repetitive Loss Property (defined):
A repetitive loss property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978. The losses must be within 10 years of each other and be at least 10 days apart.

A severe repetitive loss (SRL) property is a residential property that has had at least four NFIP claim payments over $5,000 each with two such claims occurring within any ten-year period or a residential property that has had at least two separate claim payments within any ten-year period that have cumulatively exceeded the value of the property. Bismarck does not have any SRL properties.

Total Number of Closed ICC (Increased Cost of Compliance) Polices Data:

Date of Loss	Claim Close Date	Address	ICC Opened Date	ICC Closed Date	ICC Claim Indicator	ICC Mitigation Indicator	Occupancy Type	Flood Zone	Net ICC Payment
									$30,000
06/03/2011	8/17/2012				S	E	Single-Family (1)	AE	$30,000

NFIP policyholders may receive up to $30,000 under this coverage to comply with state or local floodplain management laws or ordinances. This insurance facilitates an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

Number of Policies by Month – March 2024 through March 2025:

Community	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Growth
NFIP Filtered Total	487	474	471	463	471	497	513	515	519	516	512	510	506	19
BISMARCK, CITY OF	487	474	471	463	471	497	513	515	519	516	512	510	506	19

Note: The updated FIRM (Flood Insurance Rate Map) went into effect on June 6, 2024.

See pages 9-10 to review change in number of structures within the 100-year floodplain as a result of the FIRM update.

Groundwater issues, especially in south Bismarck, may arise when higher river levels are maintained for a long period of time during flooding events or simply during higher releases from the Garrison Dam. Extensive and recurring heavy rainfalls would contribute to higher water tables.

The map on the following page illustrates an example of groundwater conditions that promote the use of sump pumps in south Bismarck. The river stage at that time was 13.25 feet. At that point, the flows through Bismarck/Mandan had been about 60,000 cfs for almost a month; and therefore, had the longest amount of time to affect the surrounding groundwater levels. At the end of July that year, the USACE started decreasing flows. It is not fully understood how long it generally takes for the groundwater levels to respond to changes in river flow.

See **Depth to Water Table map** on the following page. The map serves as an example of the impact that higher river levels (for an extended period of time) have on the groundwater levels in south Bismarck.

The **Storm Watersheds** map on page 15 illustrates the movement of stormwater through the various watersheds that would occur during significant rain events.

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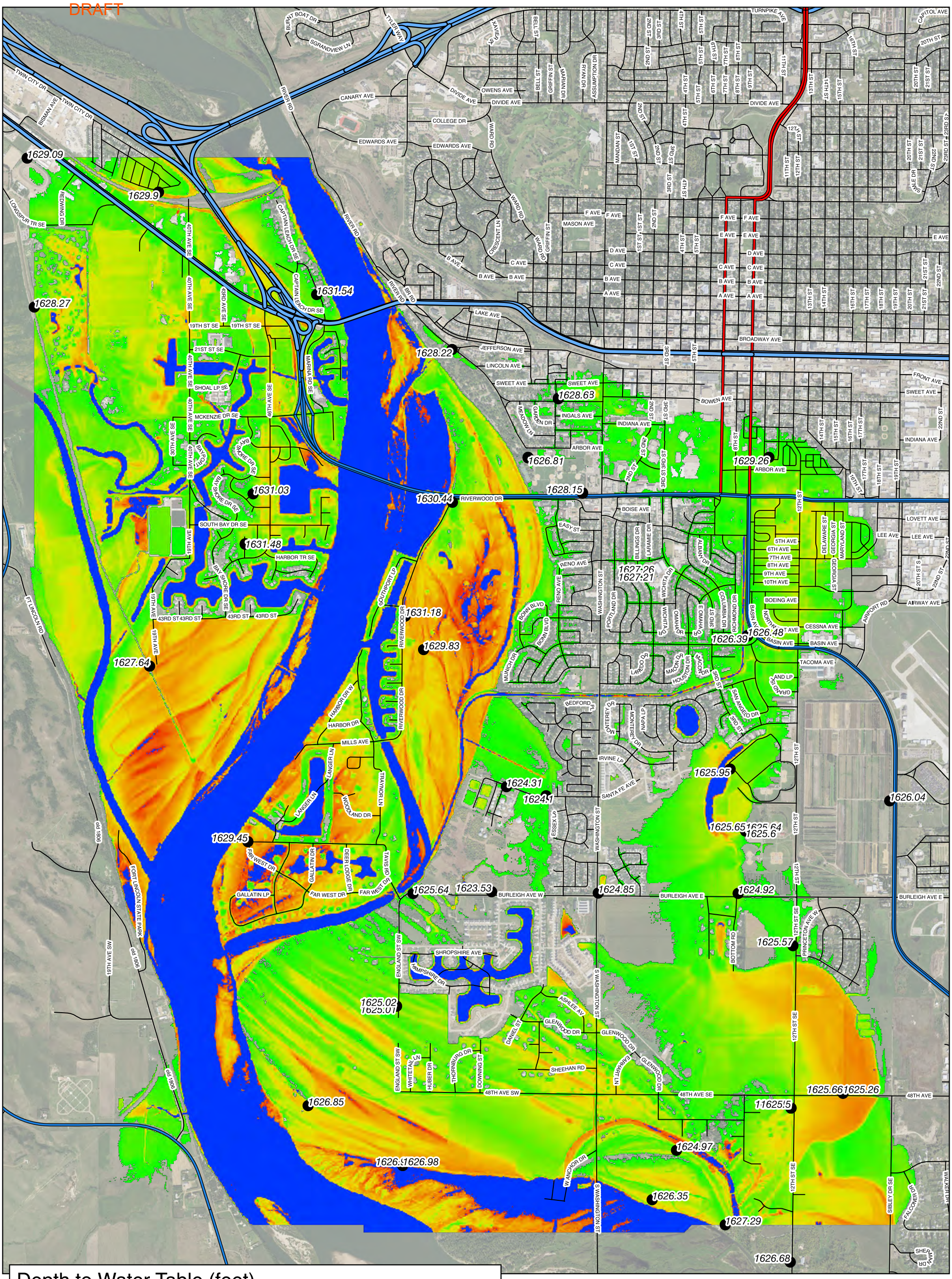


Depth to Water Table (feet)
River Stage at 13.25 feet

- *SWC Well Location/July 19-20, 2018 Elevation (ft NAVD88)*

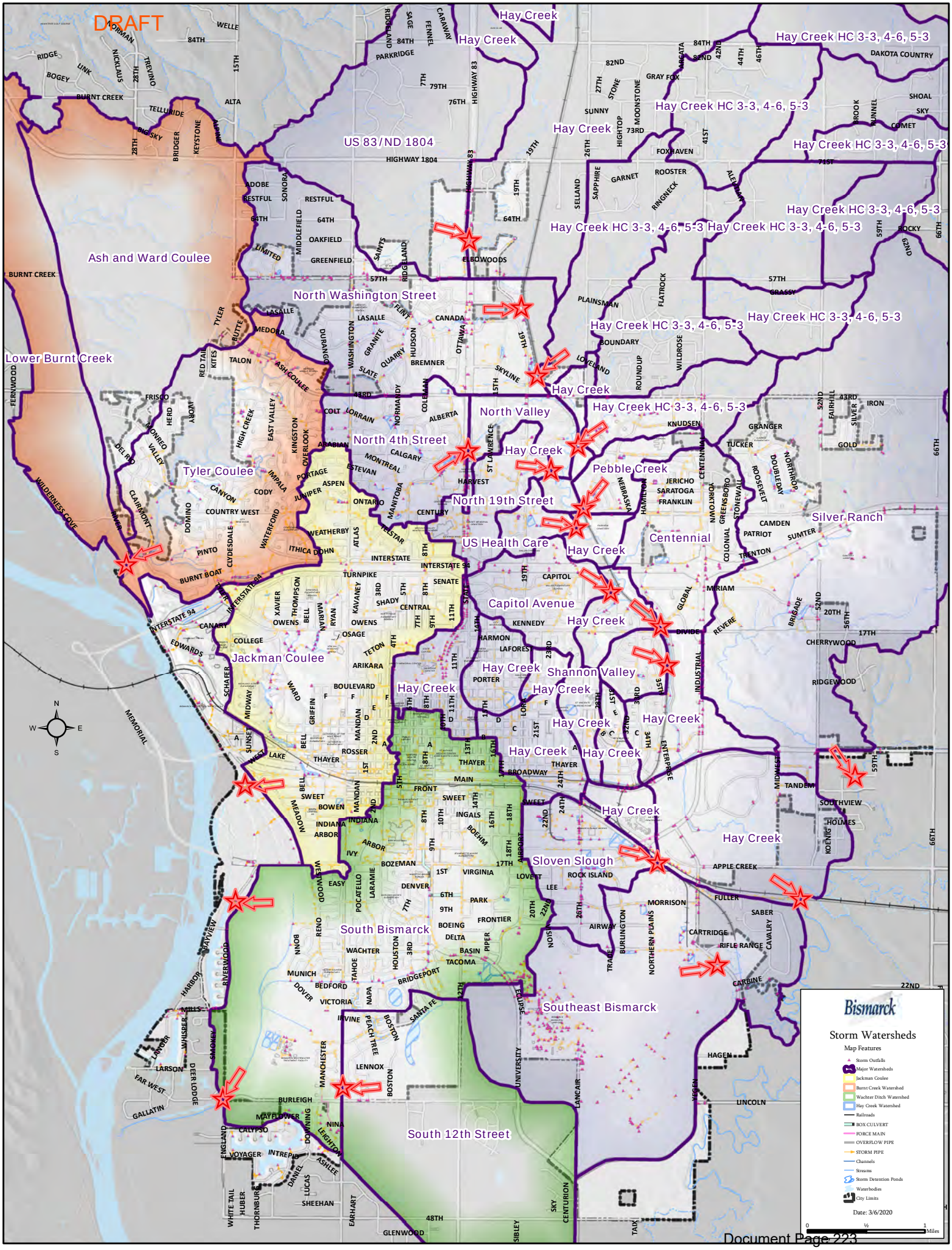
Depth to Water - 7/19/2018 and 7/20/2018

- *0*
- *0.1*
- *0.5*
- *1*
- *2*
- *3*
- *4*
- *5*
- *6*
- *7*
- *8*
- *9*
- *10*

*Legend color scheme revised 7/5/2018

North Dakota
State Water Commission

0.5 0 0.5 1 mile


DRAFT
Hay Creek
Hay Creek HC 3-3, 4-6, 5-3
US 83/ND 1804
Ash and Ward Coulee
North Washington Street
Lower Burnt Creek
Tyler Coulee
North 4th Street
North Valley
Pebble Creek
North 19th Street
US Health Care
Silver Ranch
Centennial
Capitol Avenue
Jackman Coulee
Shannon Valley
Sloven Slough
South Bismarck
Southeast Bismarck
South 12th Street
Bismarck
Storm Watersheds
Map Features
Storm Outfalls
Major Watersheds
Jackman Coulee
Burnt Creek Watershed
Wachter Ditch Watershed
Hay Creek Watershed
Railroads
BOX CULVERT
FORCE MAIN
OVERFLOW PIPE
STORM PIPE
Channels
Streams
Storm Detention Ponds
Waterbodies
City Limits
Date: 3/6/2020
0
½
1
Miles

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

*Items in last column specific to 500 year flood are noted with an asterisk. 100 Year flood impacts are included in 500 year flood.

Flooding type	**Flash Flooding Urban Flooding**	**Ice Jam Debris / Blockage**	**Riverine 100 & *500 Year Flood**
Probability	Very Likely	Possible	Possible (100 Year) Unlikely (500 Year)
Speed of Onset	Limited warning Minutes to Hours	Some warning, Generally at least 24 hours	Controlled River (Garrison Dam / COE)
Duration	Hours	Days	Weeks/Months (2011 flood was over 3 months above flood stage)
Geographic Area	All areas of Bismarck subject to urban flooding	Generally low lying areas along river and in South Bismarck. See 100 Year Flood map.	See 100 Year and 500 Year Flood mapping
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Driving through flood waters A. Driving through water – assuming roadbed is intact and vehicle will remain on street Most flood deaths result from flash flooding. Source: ND DES Mitigation Plan	1. Driving through flood waters A. Driving through water – assuming roadbed is intact and vehicle will remain on street	1. Driving through flood waters A. Driving through water – assuming roadbed is intact and vehicle will remain on street
Mass Casualty Incident	Limited probability	Limited probability	Limited probability

Flooding type	**Flash Flooding Urban Flooding**	**Ice Jam Debris / Blockage**	**Riverine 100 & *500 Year Flood**
Property Losses	1. Basement flooding – basement contents 2. Airport and Skyway Park Village 3. Basin Avenue Area	1. Basement Flooding – basement contents & utilities 2. Fox Island 3. Washington Street Bridge (concrete damages) 4. Riverwood Golf Course	1. Structures within 100 Year or 500 Year Flood Plain. 2. Main floor and contents (below base flood elevation)
Environmental	1. Basement flooding – basement contents	1. Debris / hazardous materials contaminating flood water 2. Septic systems *Flood waters are typically contaminated*	1. Structures in low lying areas (ie: 100 Year Flood plain) 2. Debris / hazardous materials contaminating water 3. Septic systems *Flood waters are typically contaminated*
COG/COOP	1. Employee/ Family Impact – availability of personnel 2. Bismarck PD	1. Employee/ Family Impact – availability of personnel	1. *Bismarck PD 2. Employee / Family impact – availability of personnel
Critical Facilities	1. South Fire Station	1. Wastewater Treatment Plant 2. South Fire Station access	1. Bismarck Airport 2. *Wastewater Treatment Plan
Critical Infrastructure	*Street Access:* 1. 12th Street – from University to Bismarck Expressway 2. Bismarck Expressway from 7th to 12th Street 3. 7th and 9th Street underpasses 4. S 3rd Street – Arbor Avenue to Bismarck Expressway 5. Broadway – 12th to 14th Street		*Railroad Access:* 1. *DMVW North/South Railroad
Schools		1. Prairie Rose Elementary	

Flooding type	**Flash Flooding** **Urban Flooding**	**Ice Jam** **Debris / Blockage**	**Riverine** **100 & *500 Year Flood**
High Risk Facilities (chemical)		1. Southport Marina (2009 ice jam) (The “Pier”)	1. Southport Marina 2. *Wastewater Treatment Plant 3. Little Dukes 4. Pony Express 5. Holiday Gas 6. Exxon Station (Red Carpet)
Specific Populations: Public Assembly, Vulnerable / Special Populations			1. Dakota Zoo 2. *Crescent Manor
Economy (community wide)	Minor (THIRA rating)	Minor (THIRA rating)	Moderate (THIRA rating)
OTHER:	Mobile HazMat (transportation)	Mobile Hazmat (transportation)	Mobile Hazmat (transportation)

Bismarck Facilities and Infrastructure within 100-Year Floodplain	
Critical Infrastructure	
Bridge: Railroad over Hay Creek	East of 3727 Pebbleview Lp
Bridge: Railroad over Main Av	South of 906 Missouri Av
Bridge: Riverwood Dr	2300 Riverwood Dr
Bridge: Rosser Av Over Hay Creek	North of 3605 E Rosser Av
Bridge: Tavis Rd	3300 Tavis Rd
Clear Channel Radio - KFYR/Y93	3500 E Rosser Av
Fox Island Boat Ramp	North of 2650 Mills Av
Grant Marsh Bridge Boat Ramp	North of 1103 River Rd
Pipeline at Missouri River	West of 4051 Sandy River Rd
Power Line at Missouri River	West of 6948 Burnt Creek Lp
Power Line at Missouri River	West of 5716 Misty Waters Dr
Railroad Crossing at Rosser Av	East of 3422 E Rosser Av
Railroad Over Hay Creek	East of 3120 E Capitol Av
Railroad Over Hay Creek	SE of 2920 E Capitol Av
Sanitary Sewer Pump Station	2516 River Rd
Sanitary Sewer Pump Station	3701 E Bismarck Ex
Hazmat Sites (ie: Tier II sites)	
South Port Marina	1120 Riverwood Dr
Western Area Power Administration	719 N Bismarck
Schools	
Prairie Rose Elementary (Bismarck Public Schools)	2200 Oahe Bend
Vulnerable/Special Populations	
Dakota Zoo	600 Riverside Park Rd

See 100-Year Flooplain map on page 7.

Bismarck Facilities and Infrastructure within 500-Year Floodplain	
Critical Facilities	
Bismarck Police Department	700 S 9th St
Bismarck Public School Facilities & Transportation	705 S 9th St
Cash Wise Foods	1144 E Bismarck
Family Fare - South	835 S Washington St
Fire Station 2 - South	835 E Bismarck
Salvation Army	601 S Washington St
Sanford Clinic - South	1040 Tacoma Av
Sanford Health Warehouse	1112 S 12th St
Vitalent (Blood Services)	517 S 7th St
Critical Infrastructure	
Bridge: 3rd St over drainage ditch	Southeast Of 1922 S 3rd St
Bridge: Railroad over Hay Creek	East of 3727 Pebbleview Lp
Bridge: Railroad over Main Av	South of 906 Missouri Av
Bridge: Railroad over River Rd and Missouri River	North of 1103 River Rd
Bridge: Riverwood Dr	2300 Riverwood Dr
Bridge: Rosser Av Over Hay Creek	North of 3605 E Rosser Av
Bridge: Southport Lp	1500 Southport Lp
Bridge: Tavis Rd	3300 Tavis Rd
Bridge: Wachter over Drainage Ditch	800 Wachter Av E
Bridge: Washington over Drainage Ditch	2201 Washington St
Clear Channel Radio - KFYR/Y93	3500 E Rosser Av
Fox Island Boat Ramp	North of 2650 Mills Av
Grant Marsh Bridge Boat Ramp	North of 1103 River Rd
Railroad Crossing at Divide Av	SE of 3500 Divide Av E
Railroad Crossing at Rosser Av	East of 3422 E Rosser Av
Railroad Over Hay Creek	East of 3120 E Capitol Av
Railroad Over Hay Creek	SE of 2920 E Capitol Av
Sanitary Sewer Pump Station	100 E Indiana Av
Sanitary Sewer Pump Station	2516 River Rd
Sanitary Sewer Pump Station	850 E Wachter Av
Sanitary Sewer Pump Station	3701 E Bismarck Ex
Wastewater Treatment Plant	601 W London Av

Bismarck Facilities and Infrastructure within 500 Year Floodplain cont'd	
HazMat Sites (Ie: Tier II Sites)	
Alltel	541 S 7th St
AmeriPride Linen & Apparel	1238 Frontier Dr
Bismarck Public School Facilities & Transportation	705 S 9th St
Exxon Station (aka Red Carpet)	919 S Washington St
Holiday Gas	905 E Bismarck
Little Dukes	1140 E Bismarck
Pony Express	1020 S Washington St
South Port Marina	1120 Riverwood Dr
Wastewater Treatment Plant	601 W London Av
Western Area Power Administration	719 N Bismarck
Schools	
Ascension Church School	1911 S 3rd St
Dorothy Moses Elementary	1312 Columbia Dr
ECLC	1901 Oakland Dr
Jeanette Myhre Elementary	919 S 12th St
Noah's Ark Daycare	1550 Wichita Dr
Open Door Community Center	1140 S 12th St
Perfect Start	1001 Basin Ave
Prairie Rose Elementary	2200 Oahe Bend
Preschool Program - House of Prayer	1470 S Washington St
South Central High School	406 S Anderson St
Shepherd of the Valley Preschool	801 E Denver Av
Super Kids Jr. Academy	1227 Park Av
Victor Solheim Elementary	325 Munich Dr
Wachter Middle School	1107 S 7th St
Vulnerable/Special Populations	
Crescent Manor	107 E Bowen Av
Dakota Zoo	600 Riverside Park Rd
Diane's Hope House	315 W Indiana Av

See 500-Year Floodplain map on page 7.

Changes in Vulnerability

Since the previous plan update in 2020.

Increase in Vulnerability	Decrease in Vulnerability
As a result of the FIRM update effective June 6, 2024, there were 1,742 buildings added to the floodplain and 413 were removed. Additional structures were built within the floodplain (61) as well as 18 affected by map revisions in the year 2024. The current total buildings within the SFHA as of January 9, 2025 is 3,876. Of the new commercial permits issued, there is a limited number of structures located within the 100-year floodplain: • Bismarck Riverfront Festival Grounds Building • Burleigh County Housing (South Washington Street) – 3 structures • 3 Restaurants located at Kirkwood Mall (South 3rd Street) • 1 shop condo – Hagen Drive • Cell Tower (South 12th Street) • Lift Station (Boston Drive)	Bismarck improved it's Community Rating System rating from a class 8 to a class 7. Also, See Flood Hazard Mitigation Capabilities listed in Section 3. *Future Conditions to re-allocate risk and vulnerability:* The regulatory authority for much of the existing ETA (approximately 95%) will be transferred to Burleigh County. As part of this process, the 26 repetitive loss properties will be removed from Bismarck, and added to Burleigh County. These properties will not be included within the Bismarck CRS program in the future.
See "Floodplain Changes" map on page 9 illustrating properties added and removed from the 100-Year floodplain as a result of the 2024 FIRM update.	

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Heavy precipitation (flash floods), snowmelt, and flood events can trigger geologic hazards. Floods and droughts can induce geologic hazards through the expansion and/or shrinkage of clay soils. Flood events may contribute to the potential for dam failures.

Future Conditions

- **Location**: The location of flood hazards per FIRM map is expected to change after a successful completion of a planned South Bismarck Flood Mitigation Project. Approximately 900 properties may be removed from the 100-year floodplain. *These same properties were added to the 100-year floodplain based on the FIRM update completed in 2024.*
- **Extent/Intensity:** See "Anticipated Future Climate Impact" on next page.
- **Frequency:** See "Anticipated Future Climate Impact" on next page.
- **Duration:** The duration of flood hazards is not projected to change.

Anticipated Future Climate Impact – Flood
Future climate conditions are expected to produce increased precipitation across North Dakota, with winter and early spring precipitation expected to see the greatest increase, along with an increased risk of rainfall occurring during the traditional spring snowmelt period. In addition to increased precipitation during the cool/cold season, the number of days with strong thunderstorms and heavy rainfall is expected to increase by mid-century, especially in the eastern half of the state. Increased rainfall rates typically result in increased runoff rates and an increase in flash flooding, overland flooding, and/or riverine flooding in any season. However, rain occurring when the ground is frozen produces even more and faster runoff and is most likely to exacerbate the flood threat.

Previous Occurrences

Flood Related Declarations for Burleigh County Since 1989		
Flood Declaration	**Declaration Date**	**Incident Period**
North Dakota Flooding (DR-1981)	Major Disaster Declaration declared on May 10, 2011	Incident period: February 14, 2011 to July 20, 2011 Burleigh County was added Thursday, June 2, to the federal disaster declaration issued by President Obama on May 10 in response to North Dakota flooding beginning Feb. 14 and continuing.
North Dakota Flooding (EM-3318)	Emergency Declaration declared on April 7, 2011	April 5, 2011 to July 1, 2011
North Dakota Flooding (EM-3309)	Emergency Declaration declared on March 14, 2010	Incident period: February 26, 2010 to April 30, 2010
North Dakota Severe Storms and Flooding (DR-1829)	Major Disaster Declaration declared on March 24, 2009	Incident period: March 13, 2009 to August 10, 2009
North Dakota Severe Storms, Flooding, and Ground Saturation (DR-1597)	Major Disaster Declaration declared on July 22, 2005	Incident period: June 1, 2005 to July 7, 2005
North Dakota Floods (DR-1376)	Major Disaster Declaration declared on May 28, 2001	Incident period: March 1, 2001 to August 9, 2001
North Dakota Severe Storms And Flooding (DR-1334)	Major Disaster Declaration declared on June 27, 2000	April 5, 2000 to August 12, 2000
North Dakota Severe Storms, Tornadoes, Snow and Ice, Flooding, Ground Saturation, Landslides and Mudslides (DR-1279)	Major Disaster Declaration declared on June 8, 1999	March 1, 1999 to July 19, 1999
North Dakota Severe Storms/Flooding (DR-1174)	Major Disaster Declaration declared on April 7, 1997	Incident period: February 28, 1997 to May 24, 1997
North Dakota Flooding (DR-1118)	Major Disaster Declaration declared on June 5, 1996	Incident period: March 12, 1996 to June 21, 1996
North Dakota Severe Storms, Flooding, Ground Saturation (DR-1050)	Major Disaster Declaration declared on May 16, 1995	Incident period: March 1, 1995 to July 5, 1995
North Dakota Flooding, Severe Storms (DR-1001)	Major Disaster Declaration declared on July 26, 1993	Incident period: June 22, 1993 to September 24, 1993

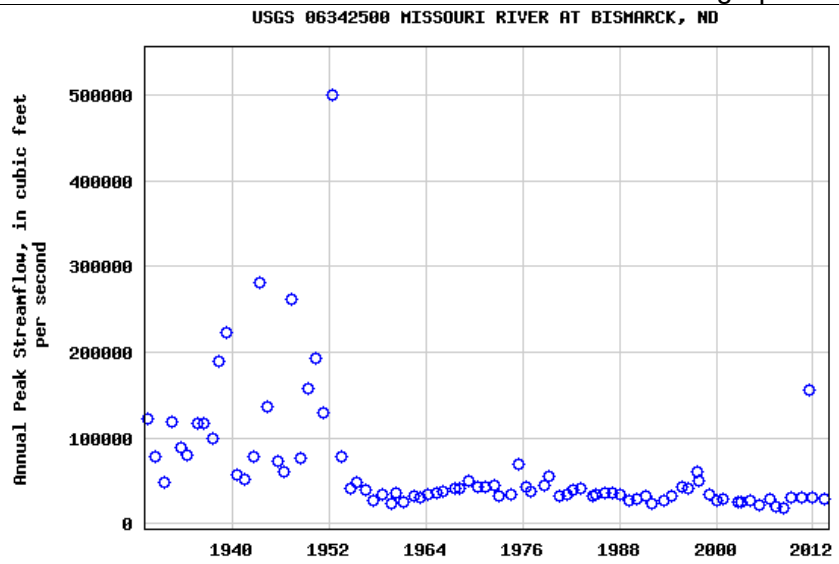
http://www.fema.gov/disasters?field_state_tid=11&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=10&page=3

Riverine Flooding

Missouri River at Bismarck - Flood stages and Historical Crests (via Bismarck NWS website)		
Flood Stages		**Historical Crests**
Major Flood Stage	**18**	(1) 31.60 ft on 03/31/1883
Moderate Flood Stage	**16**	(2) 31.10 ft on 01/01/1887
Flood Stage	**14.5**	(3) 30.40 ft on 03/14/1910
Action Stage	**12.5**	(4) 27.90 ft on 04/06/1952
		(5) 27.70 ft on 04/08/1897
Note: As of 2012, "flood stage" is changed to 14.5 feet. Prior to 2012, 16 feet was defined as flood stage.		
In 1939, the Flood Stage was 19 Feet.		

Annual Peak Streamflow – Missouri River at Bismarck

Riverine Flooding (Missouri River at Bismarck) was a common occurrence prior to the construction of the Garrison Dam in 1953 as shown in the graph below.



Source: http://nwis.waterdata.usgs.gov/nd/nwis/peak/?site_no=06342500&agency_cd=USGS

2011 Flood: The 2011 Flood is the most significant Missouri River riverine flooding event impacting Bismarck since the construction of the Garrison Dam. The peak river elevation reached 19.24 feet on July 1, 2011. The peak releases from the Garrison Dam were 151,000 CFS on June 25, 2011. The river exceeded "action stage" (14 feet) from May 23 through August 31, 2011. Temporary protective measures (levee systems) were put in place to protect critical infrastructure (wastewater treatment plant) and south Bismarck in general (homes, streets, access, etc.). The maximum inflow during this period, according to the USACE was 190,000 CFS.

The largest peak discharge recorded at Bismarck following the closure of Garrison Dam in 1953 was 155,000 cfs on June 25, 2011. Source: http://www.swc.nd.gov/pdfs/south_bismarck_sediment_study_2014.pdf

Impact to homes within Bismarck city limits was limited to damage associated with basement seepage as a result of high groundwater due to the higher river levels for an extended period of time and heavy rains throughout the summer. The Missouri River did not overtop or breech the temporary levee systems. Overland river flooding impact was limited to the Meriwether's facility, Meriwether's parking lot, and Pioneer Park in Bismarck. Extensive heavy rains throughout the summer along with the need to close the gate (flood control structure) on South Washington did exacerbate flash flooding impacts (urban street flooding) on a few occasions. However, the pumping operations were successful and worked as planned. The costs of fighting the flood were extensive, but public infrastructure including the wastewater treatment plant and south Bismarck were protected as a result of combined flood fight efforts in Bismarck.

2011 Flood Event – Bismarck Flood Fight Cost *Total Cost: $17,700,838.73 90% Federal Share: $15,930,473.59 *(based on submitted Project Worksheets via the FEMA Public Assistance Program)*	Category A – Emergency Work Debris Removal: $5,941,821.36 Category B – Emergency Protective Measures: $11,323,273.13 Category C – Road and Bridges: $633,709.26 Category D – Water Control Facilities: $0.00 Category E – Buildings and Equipment: $8,273.01 Category F – Utilities: $95,440.35 Category G – Parks, Recreational Facilities, Other: $148,321.62

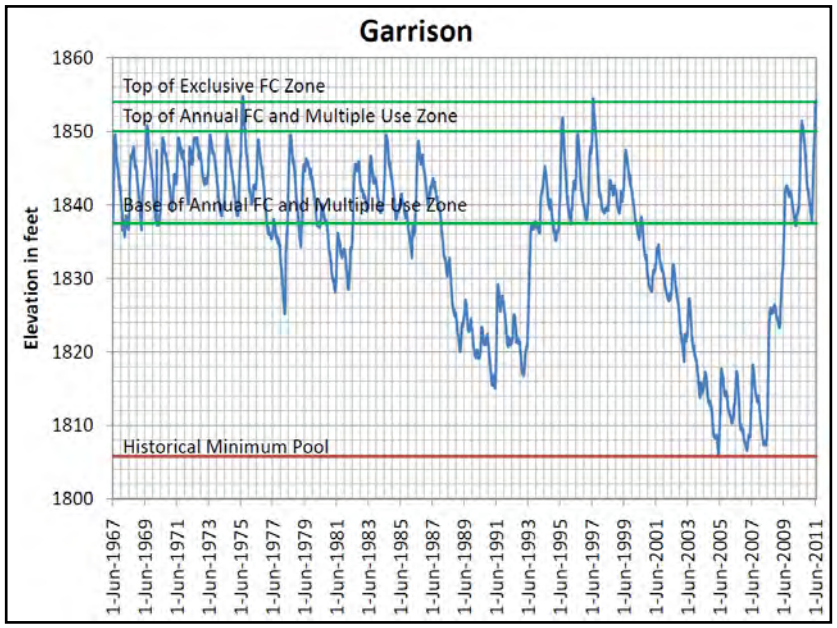
The following description came from the USACE website regarding the 2011 Flood:

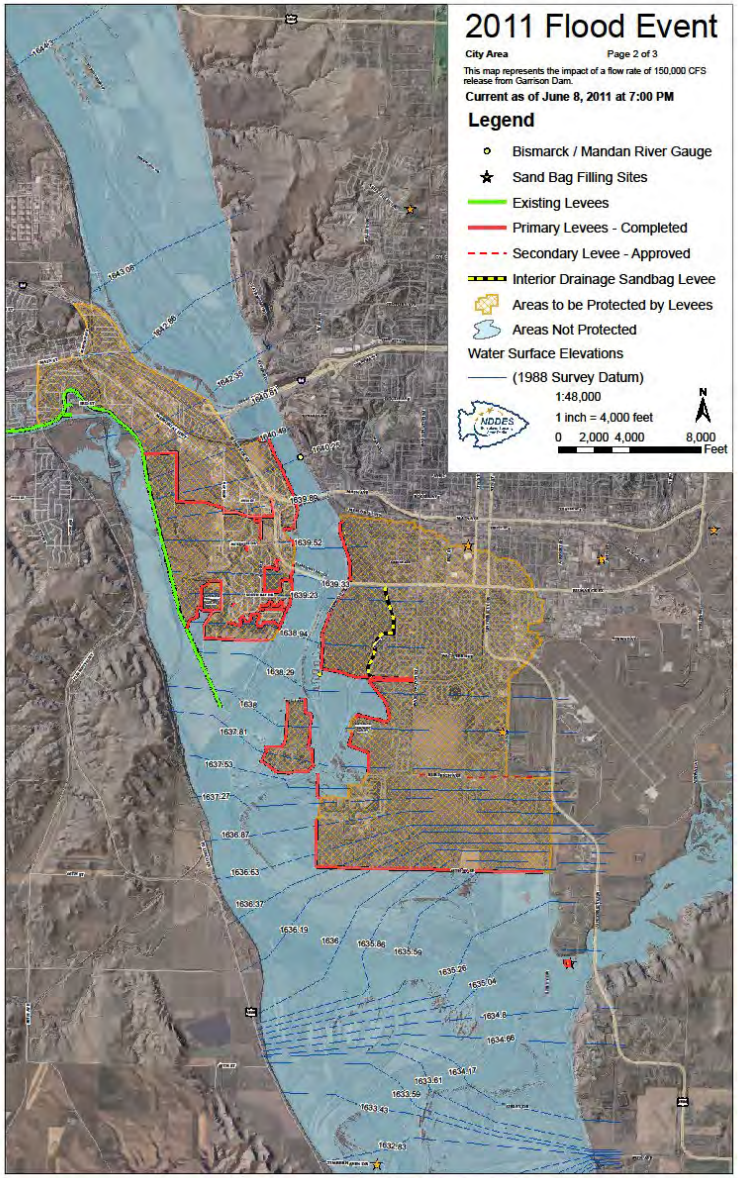
"Where is this flooding occurring?" Flooding is along the entire length of the longest river in the United States: the Missouri River- and many of its tributaries throughout Montana, North and South Dakota, Nebraska, Iowa, Kansas and Missouri. At 2,321 miles, the Missouri River's headwaters begin at Three Forks, MT and join the Mississippi River in St. Louis, MO.

"When did this inundation begin?" May 23, 2011 is recognized as the day that unparalleled flooding would soon commence.

"Why did this come about?" Flooding commenced with unseasonably heavy snows across the Great Plains. This was followed by three to six times the normal rainfall in May in eastern Montana, northern Wyoming and the western Dakotas. Then the snowpack melt came perhaps two weeks later than usual with an accumulation that was around 23 to 40 percent greater than normal. The June 2011 runoff in the Missouri River Basin above Sioux City was 13.8 million acre feet (MAF), the single highest monthly runoff amount since 1898. May 2011 runoff was 10.5 MAF, the third single highest monthly runoff amount since 1898 and more than one and a half times the previous record May inflow of 7.2 MAF in 1995. Combined runoff in May and June, at 24.3 MAF was short of the normal annual runoff of 24.8 MAF. The forecast for total annual runoff into the Missouri River basin during 2011 is 57.7 MAF, more than double the normal.

Garrison Dam levels from 1967 to 2011





1997 Flood Five years of high precipitation coupled with record and late season snowfall led to the extreme flood event of 1997. As the record snows began melting and an April blizzard compounded the problem, water levels all across the state began rising to unprecedented levels.

1993 Flood Statewide, excessive rains during the spring destroyed crops and heavy thunderstorms on July 15-16 (4-7 inches of rain), July 22-27 (6-10 inches of rain), and August 21-22 (up to 7 inches of rain) caused flash flooding and damage to public and private property. Minor to moderate flooding occurred in the Missouri, James, Souris, and Devils Lake basins.

1952 Flood Event Article:
http://www.bismarckcafe.com/blogs/252/remembering-the-flood-of-april-1952

Remembering The Flood of April 1952
Source: Bismarck Tribune. May 1, 2009 **Posted in:** 2011 Flood

Recent flooding has caused devastation across the state, and within Bismarck itself. It has left many in southern Bismarck worrying about flood potential of the Missouri River. 2009 marked the first major flooding of the Missouri River in 57 years.

Flooding was a common occurrence in Bismarck prior to the closure of Garrison Dam, which occurred in April 1953. It was not uncommon for springtime floods to cover much of the land south of present-day Main Avenue.

Missouri River Flooding in April 1952 - Liberty Memorial Bridge in background.

One of the worst of such floods occurred in April 1952, when the Missouri River crested at 27.9 feet. On April 6, the river rose 5 feet in just 2 hours, increasing from 20.2 feet at 11:30am to 25 feet at 1:30pm. Nearly everything south of U.S. Hwy 10 (Memorial Hwy/Main Ave) was under water. 200 houses were destroyed and the Wachter Family reported the loss of 300 cattle.

The completion of Garrison Dam allowed, for the first time, major development south of Main Avenue. Prior to this, the Wachter Family and Yegen Family owned most of the land.

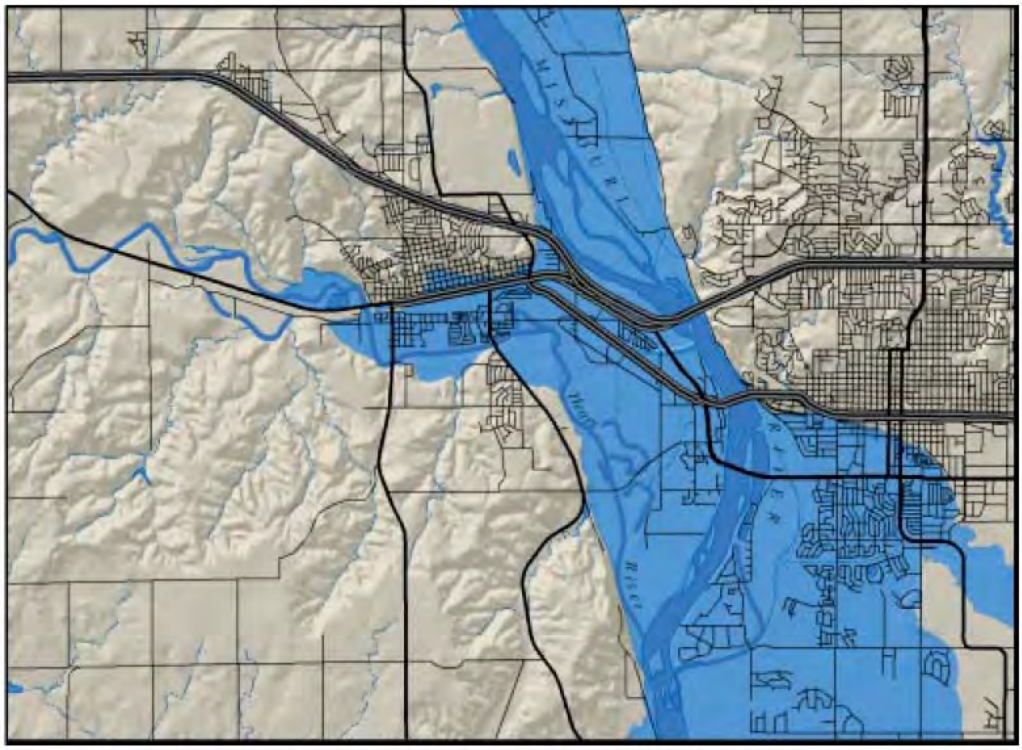
Like the flooding seen in 2009, the 1952 Flood was also primarily caused by ice jams. According to the National Weather Service, the April 1952 river level was the 4th highest recorded. The highest was 31.6 feet on March 31, 1881 *(year corrected).* Flood stage is 16 feet. **Date: 3/26/1939 -** Gage Number: 6342500 -Bismarck, ND Missouri River

The gage at Bismarck, North Dakota on the Missouri River recorded water levels of 19.1 feet on March 26, 1939 due to an ice gorge below the gage. Flood stage is 19 feet. The gorge was recorded through 30 March. -- Keywords: Missouri River at Bismarck, ND on Mar 26, 1939 [20020103133602]

Date: 03/31/1881 - Gage Number: 6342500 - Bismarck, ND Missouri River

Maximum annual gage height of 31.6 feet, affected by backwater from ice, reported at USGS gage Missouri River at Bismarck on March 31, 1881. This is the maximum stage for the period 1881, 1929-1963; maximum open-water stage for the same period was 27.9 feet on April 6, 1952 (500,000 cfs). -- Keywords: Missouri River at Bismarck, ND on Mar 31, 1881 [9352]

FLOODING AND SEEPAGE



Area inundated (in blue) by the historic flood of March 31, 1881.

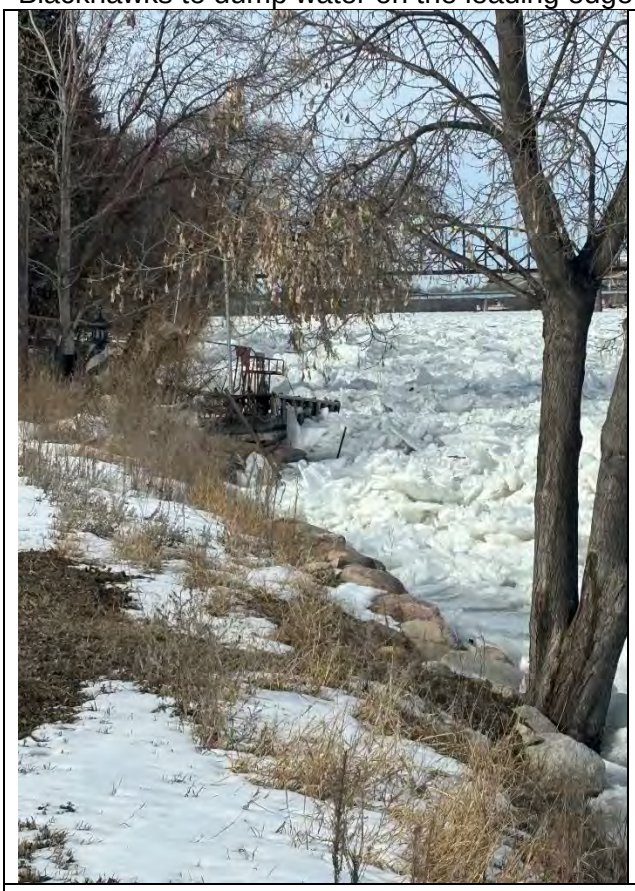
The highest recorded level of the Missouri River (1,649.88 feet) occurred on March 31, 1881. At this elevation, most of the area now occupied by the southern portions of Bismarck and Mandan would have been under 10 feet of water (see adjacent map.)

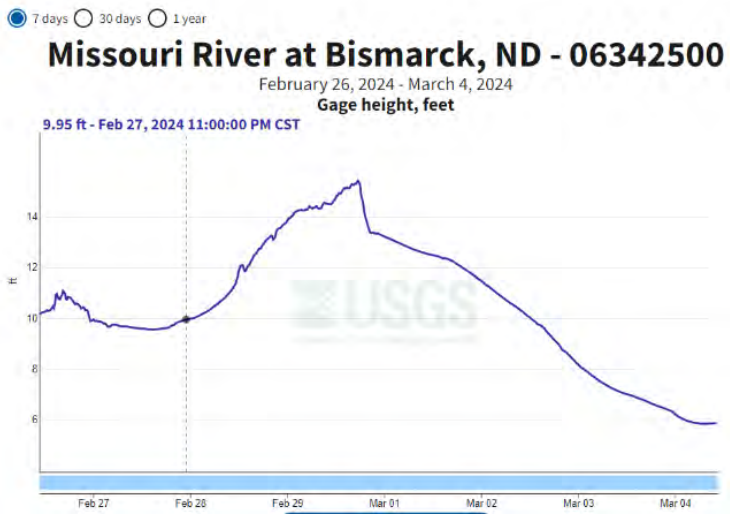
Overland flooding from unusually large rainfall events is a potential problem for homeowners in the area. Overland flow is focused into ravines and coulees that lead into the Heart and Missouri rivers. These ravines formed over the last 10,000 years, since the last glacier receded from this area. Development, particularly in north Bismarck, has partially or completely filled portions of these drainages with construction fill. Surface water and shallow groundwater still tend to concentrate along these courses. One of these, a four-mile long ravine, runs from Hay Creek to Zonta Park via the Tom O'Leary golf course. Perched groundwater can be concentrated at a number of stratigraphic horizons including: the base of construction fill, the contact between Cannonball sandstone and underling mudstone, as well as the upper surface of thin, well cemented sandstone layers in the Cannonball Formation. Seepage is a potential problem for basement slabs that are in close proximity to any of these settings.

Source: ND Geological Survey, Department of Mineral Resources
https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/geoinv/GI_3.pdf

Ice Jams

February 28-29, 2024: On the evening of February 28, 2024, an ice jam began forming at the confluence of the Heart and Missouri Rivers, between Bismarck and Mandan, ND. Rapid rises in the level of the Missouri River threatened homes in the Fox Island neighborhood, requiring a whole of government response. State of ND used Bambi Buckets slung under UH-60 Blackhawks to dump water on the leading edge of the ice jam to break it up.

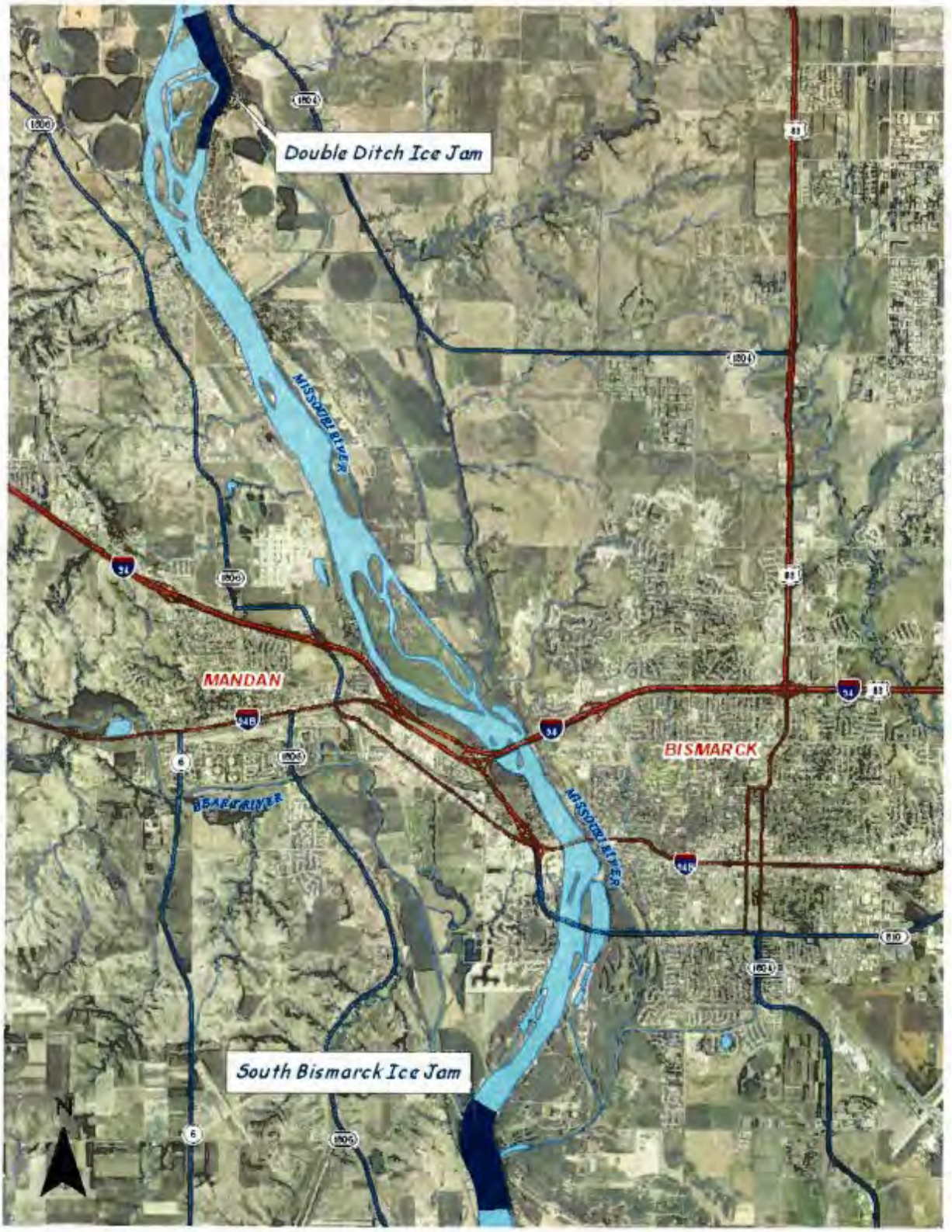




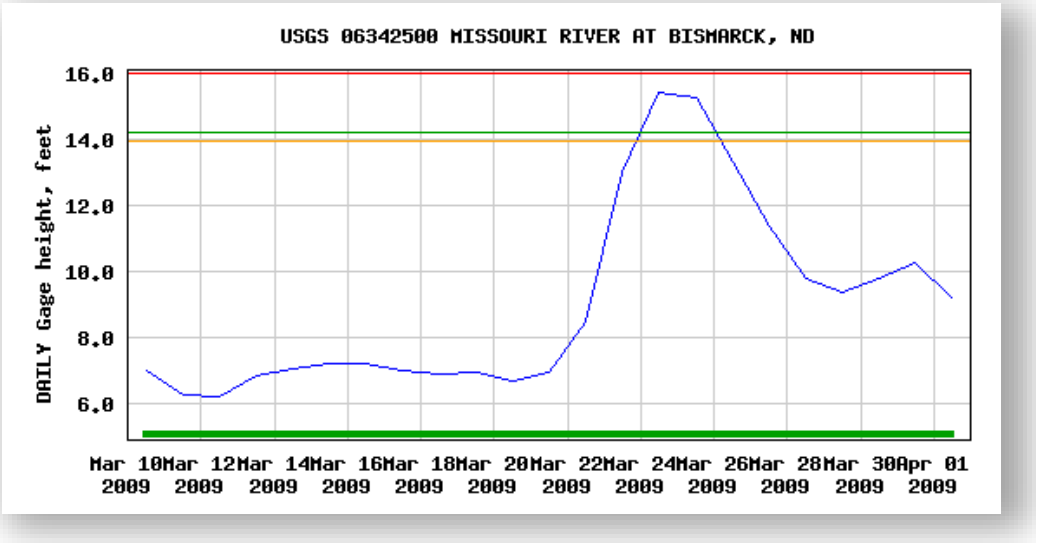
Additional ice jamming occurred one month later, in early March, 2024:

March 23-27, 2009: See ice jam location map, next page.

Spring Flood event was caused primarily by ice jams. Extensive amounts of ice floes from the Heart River were discharged into the Missouri and created an ice jam south of Bismarck. An ice jam also formed north of Bismarck near the Double Ditch area. (see ice jam location map) The ice jam (or ice dam) was created by ice and debris. The bends in the river, sediment, sandbars, and potentially the long cold winter of 2008 and 2009 contributed to the formation of the ice jam. Also, an extensive amount of snowfall from the winter season (73.9 inches through March 22), significant snow melt with 54 degrees as the high on March 20th, **a** thunderstorm on March 23rd adding 0.75 inches of rain on frozen ground, and a blizzard over March 23 and 24th dumped an additional 8.1 inches of snow. These events cumulatively exacerbated the flooding situation. High winds and blizzard conditions delayed evaluation (aerial view) of the ice jam by the COE ice jam expert. Prior to the flood event, snowmelt was causing isolated problems throughout the community – primarily relating to landscape and runoff issues. Throughout the flooding event, snow melt, additional moisture, and the ice jam contributed to backing up the storm drain system affecting the Airport Village / Skyway Park Village mobile home park residents and closing 12th Street and a section of Expressway from 9th Street to 12th Street. Bismarck Property impacted by the flooding was primarily in the areas of Fox Island (county), Southport, Munich Drive area, Santa Fe area, and the mobile home parks of Skyway Park Village and Airport Village. Solheim School relocated its students and staff to other area schools. Ultimately, the school was not impacted. Prairie Rose Elementary (just south of Bismarck) was threatened, but not impacted by the flood event.


Double Ditch Ice Jam
MISSOURI RIVER
MANDAN
BISMARCK
BEAVER RIVER
MISSOURI RIVER
South Bismarck Ice Jam
N

The graph below (2009 Ice Jam) illustrates limited time to react to an Ice Jam.



ICE Jam Flood Characteristics:

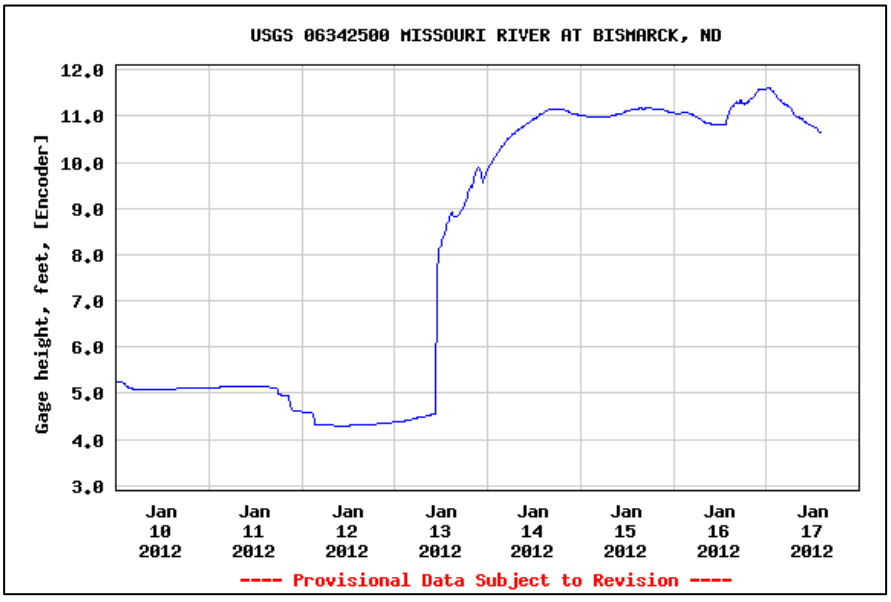
- **River Pool Effect**
- **Unpredictable (Timing and Location)**
- **Very Little Warning**
- **Require Closure of Key Internal Drainage Sys**
- **Protection Must be In Place Before the Event**

Freeze In 10-Year Average Rise at Bismarck

6.09-feet (2010-2019)

Freeze In 10-Year Average Stage at Bismarck

10.86-feet (2010-2019)



2012 Freeze-In

Missouri River – Ice Jam Date: March 23, 2009. Jam Type: Break-Up

Rapid warmup over heavy snowpack led to large increases in discharge on Missouri River tributaries throughout North Dakota, leading to breakup of ice in the headwaters region of Lake Oahe. USACE-Northwest Division Missouri River Region Water Management Office released news release 23 Mar 2009 that Garrison Dam releases were being reduced to near record low levels due to influx of tributary water and ice into Missouri River in Bismarck region. Burleigh County EM issued a Civil Emergency message shortly after noon (CDT) on 23 Mar 2009 asking residents of Fox Island to voluntarily evacuate as the river continues to rise and the unpredictability of stages due to a probable ice jam. Morton County EM issued a Civil Emergency Message at 534 pm Monday 23 March. Residents in the Jetty Beach and Tokach Bottoms area were also asked to voluntarily evacuate the area due to the rising river levels and unpredictable nature of the ice affected river. At 815 am Tuesday 24 March, the stage was 15.04 feet, Flood Stage is 16.0 feet. Burleigh County EM reported the Missouri River continuing to rise due to an ice jam, and advising any area south of Bismarck Expressway, west of South Washington Street, or south of Burleigh Ave, from the Missouri River to Apple Creek, to prepare for potential flooding. Lake Oahe is ice covered and river water will flow north. Monday, 0.75 inches of rain fell in Bismarck, with an additional 0.32 inches by 730 am Tuesday, as well as 3.0 inches of snow. The forecast for Bismarck at 1152 am Tuesday, was for heavy snow, freezing fog and wind, with a temperature of 28 F. At 220 pm Tuesday, NWS reported flooding or the potential for flooding across all of central and most of western ND. The stage was within 0.5 feet of Flood Stage, and rising, as a result of a jam just south of Fox Island. An additional jam was being reported north of Bismarck, near Double Ditch, with the effect uncertain, should the upstream jam release first. NWS reported the stage to be at 16.00 feet at 653 pm CDT Tuesday. By 615 am Wednesday, the stage had receded slightly to 15.77 feet. On Wednesday morning, 903 AM CDT, the ice jam north of Bismarck released and the ice was moving downstream. Officials were concerned about the potential for this ice to cause further increases in water level if it re-jammed at the ice jam at Fox island, south of Bismarck. Roger Kay of the USACE Omaha District was providing ice jam mitigation expertise at the scene. He relayed an update to Steve Daly of CRREL Wednesday morning, 25 March. The jam was reported to be 3 feet thick, having formed by ice released from the Heart River. Permits were in place to use rock salt on the sheet ice, located just downstream of the jam. Upstream of the jam, a 7-8 foot backwater rise was measured by USGS on Tuesday. Cooler temperatures and the river's response to Garrison Dam's water cutback on Monday, are likely causes for the drop in stages today, however, Roger Kay reported interior drainage to be a problem, with flooding ongoing. At 1030 am CDT NWS employees visually confirmed that the jam north of Bismarck, which was reported to have released, still remained in place. This jam is located from the Indian village of Double Ditch to Hogue Island. At 102 pm Weds NWS released a Public Information Statement reporting that the Morton County EM Office and the City of Mandan were downgrading the Mandatory Evacuation of residential areas along the west side of the Missouri River to a Voluntary Evacuation, in response to the fact that the jam north of Bismarck was still in place, but urged residents to be prepared, as a new Mandatory Evacuation Notice would be issued immediately should that jam release. Another Public Information Statement was issued at 127 pm Weds, reporting that the ND Department of Emergency Services needed the Morton County Sheriff's Department and Mandan Police Department to close Highway 1806 from Nineteenth St south to County Road 138 immediately so that experts can blast the ice jam, which was expected to occur between 1pm and 2pm. Water was reported to be flowing around the Double Ditch jam at 5 pm Wednesday. Overloaded storm drains have resulted in localized flooding in south Bismarck. By 915 am CDT Thursday 26 March, the stage at Bismarck had fallen to 13.52 feet, however, the ice jams still remained. Ongoing efforts continue Thursday to weaken the jam to the south of Bismarck. At 115 pm Saturday 28 March, the stage had dropped to 9.66 feet, below Flood Stage of 16.0 feet. In a 2010 review of the jam, it was noted that Gov. John Hoeven has said the cost of temporary levees, cleanup and repairs from last spring's flooding exceeded $78 million

Ice Jams in North Dakota 1881-May 2020

The US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CRREL) maintains a database of historic ice jams.

Jam date	Jam type	Damages
1/1/2020	Break-up: no flooding	-
2/15/2016	Break-up	-
1/23/2012	-	-
3/23/2009	Break-up	exceeded $78 million
12/1/2006	Unknown	-
12/10/2005	Unknown	-
12/26/2004	Unknown	-
1/2/2004	Unknown	-
12/9/2002	Freeze-up	-
2/14/2003	Unknown	-
12/27/2001	Unknown	-
12/20/2000	Unknown	-
1/15/2000	Unknown	-
1/16/1999	Unknown	-
1/1/1998	Unknown	-
11/28/1993	Unknown	-
1/1/1989	Unknown	-
2/5/1989	Unknown	-
2/25/1987	Unknown	-
1/13/1983	Unknown	-
12/18/1979	Unknown	-
12/23/1972	Unknown	-
1/29/1971	Unknown	-
1/25/1963	-	?
1/26/1962	-	?
3/27/1960	-	?
12/3/1958	-	?
3/30/1958	-	?
12/10/1956	-	?
4/2/1956	-	?
4/4/1951	-	?
4/3/1949	-	?
4/1/1948	-	?
3/27/1946	-	?
3/18/1945	-	?
4/7/1944	-	?
3/26/1939	-	Unknown
3/20/1936	-	?
3/6/1930	-	?
3/17/1929	-	?
03/31/1881	-	?

Ice Jam/Ice Damming Summary: 1980 – 2020

The table below identifies maximum gage heights due to backwater from ice at the Missouri River USGS gaging station 644250 at Bismarck.

Jam Date	Maxium Gage Height	Estimated Daily Avg Discharge
January 1, 2020	11.13	24,000 CFS
1/23/2012	12.08	22,000 cfs
3/23/2009	16.00	
USACE reduced Garrison Dame release to Zero CFS, first time in history of the dam as a result of the March 2009 ice jam.		
12/1/2006	11.10	14,800 cfs
12/10/2005	11.34	15,200 cfs
12/26/2004	10.63	NA
1/2/2004	12.08	NA
2/14/2003	10.91	NA
12/27/2001	10.25	13,300 cfs
12/20/2000	13.01	18,800 cfs
1/15/2000	13.01	NA
1/16/1999	12.22	25,000 cfs
11/28/1993	13.55	13,800 cfs
2/5/1989	13.12	26,200 cfs
1/1/1989	14.44	19,500 cfs
2/25/1987	13.92	30,400 cfs
1/13/1983	14.8	Not reported

The peak discharge recorded at Bismarck was 500,000 cfs on April 6, 1952; this peak discharge was the result of a combination of rapid snowmelt and the release of an upstream ice jam. Source: South Bismarck Sediment Management Study (USACE) - http://www.swc.nd.gov/pdfs/south_bismarck_sediment_study_2014.pdf

The table below illustrates a 10-year average and median the increase in the Missouri River level following the initial freeze-in.

	Ice form date	Pre-ice stage	Max Stage	Increase
2010	12/3/2010	6.5	11.9	5.4
2011	1/13/2012	5.1	12	6.9
2012	12/24/2012	3.7	10.1	6.4
2013	12/5/2013	3	8.9	5.9
2014	12/1/2014	5	11.1	6.1
2015	12/29/2015	3.8	10.2	6.4
2016	12/8/2016	3.8	10	6.2
2017	12/24/2017	4.5	10.95	6.45
2018	12/28/2018	5.8	12	6.2
2019	12/12/2019	6.5	11.4	4.9
Average:		4.77	10.86	6.09
Median		4.75	11.025	6.2

The following are considered reasonable interpretations of information contained within the table above, based on communications with the local NWS hydrologist: The “pre-ice stage” is the initial date of really noticeable start in rise due to ice, and approximate max stage during the initial rise due to ice. *There is no consensus or accepted criteria for selecting the dates or maximum stage.* It is important to remember that the USACE has been lowering the river intentionally to allow the freezing in of the river, so the pre-ice stage is somewhat due to that as it may have been a foot or more higher as little as a week ahead of the pre-ice stage listed. The table above includes only the first freezing over of that winter. Some winters have had multiple events. Typically, the first freeze in has been the most dramatic in terms of increase in river level.

Flash Flooding (Urban Flooding). *Note: When property damage does not occur, these events are technically referred to as "urban ponding."*

August 13, 2024: Although the official rainfall measured at the airport location (National Weather Service) was only 0.77 inches, in north Bismarck there were reports of as much as 3 to 5 inches which fell in a short amount of time. Sanford Health experienced significant flooding causing damage in the millions of dollars. Bismarck (City Govt) total damages estimated at **$**217,620 including property damage, infrastructure damage, equipment usage, and labor costs for clean-up, debris removal, and street closures during response. Local area businesses reported a total damage of $225,082 as well as business losses of $16,575.00. This estimate is limited to the downtown area. Several home owners in central Bismarck (south of Divide Ave along Merdith) had 3" to 8" of water in the basement. One apartment building in central Bismarck had 3 feet of water in the basement – occupants had to evacuate for a few days. Another homeowner near the Elks Swimming location reported 5 feet of water in his basement. Sanford Hospital had about 1 to 2 inches of water on the main floor – with water coming in from both the 7th Street side and from Rosser. The lower level was also impacted as water came "raining down" within an MRI room. In conjunction with the rain event, street construction/maintenance along Rosser Avenue and 7th Street near Sanford restricted normal drainage (bags and/or filters at inlets), and an interior roof drain failed, contributing to the damage of the medical facility and equipment.

July 3, 2018: 1.92 inches of rain fell in a very short time causing street flooding and pooling of water in Bismarck. Due to the higher river levels, the Tavis control gate structure had to be closed, requiring pumping to lower the level of the drainage channel, which requires more time for drainage to occur from streets in lower lying areas (ex: 12th Street, Basin Avenue). The underpasses took more than 8 hours to drain. Left photo below is the drainage channel near the Ascension Church on 3rd Street. Right photo is Basin Avenue.

July 14, 2016: 1.69 inches of rain fell within one hour. Total rainfall for the day was 2.62 inches. The heavy rainfall caused a railroad gate malfunction at 5th street as the ponding water created a connection between the two rails. Bismarck Tribune: *"A 46-year-old daily rainfall record has fallen in Bismarck. The old record of 1.94 inches, set in 1970, was broken by 11 a.m., according to the National Weather Service. The weather service says*

1.69 inches fell in just one hour in Bismarck Tuesday morning, and by 2:30 p.m., 2.62 inches had fallen."

July 10, 2016: 1.42 inches of rain fell within 50 minutes. The underpasses on 7th and 9th streets were filled with water and closed to traffic. One vehicle was stranded in the water after entering the underpass on 7th Street.

July 30, 2011: Multiple reports were received from across Bismarck of water up to 18 inches deep flowing over roads. Mainly the flash flooding was in low lying and poor drainage areas of the city. In some cases water washed up to the foundation of homes and into window wells. Rain amounts were around two inches.

June 15/16, 2009: Rain amounts varied within the Bismarck and surrounding areas - from just over 3 inches to over 7 inches of rain. Bismarck/Burleigh Experienced flash flooding the evening of June 15 into the early am hours of June 16th. Within Bismarck, flash flooding lifted/removed manhole covers and caused street flooding. Dispatch was inundated with calls. Four road closures occurred within Bismarck - Divide Avenue (35th street area impacted by Hay Creek), 12th Street between Expressway and University; Main Ave from 19th to 26th, and 3rd Street from Expressway to Front.

August 23, 2004: Streets and underpasses flooded causing several major arteries to be closed. Water flowed across yards and into several basements of homes.

August 31, 2002: Streets and underpasses filled with water in Bismarck.

July 27, 2001: Rainfall of 3 to 4 inches over Bismarck caused flooding of streets and underpasses. Two mudslides on River Road covered northbound lanes.

July 26, 2001: Around 2 inches of rain fell in a very short time causing street flooding and pooling of water in Bismarck.

June 9, 2001: Widespread street flooding throughout the city of Bismarck where a foot or more covered the roads. Travel not advised. Up to 12 feet of water accumulated in the railroad underpasses.

The June 9 storm also produced significant hail (also noted in the "Thunderstorm" section of the mitigation plan:
In June 2001, a hailstorm caused an estimated $230 million in property damage in Burleigh and Morton Counties; an estimated 57,000 insurance claims were filed. (North Dakota Insurance Department, 2007) This hailstorm affected the urban Bismarck and Mandan areas. As the most damaging hailstorm in the state's history, the insurance industry was severely impacted, and insurance availability and premiums were affected statewide; many insurance companies pulled out of the state after the storm. (North Dakota State Water Commission, 2007c) According to the state situation report, officials estimated the North Dakota State Capitol Complex received approximately $100,000 worth of damage. Thirteen windows in the tower were broken; shingles on the State Library were damaged as well as the skylight in the atrium of the Judicial Wing. The exteriors of the State Office Building and the Grounds Maintenance Building were also damaged. Officials estimated that 400 North

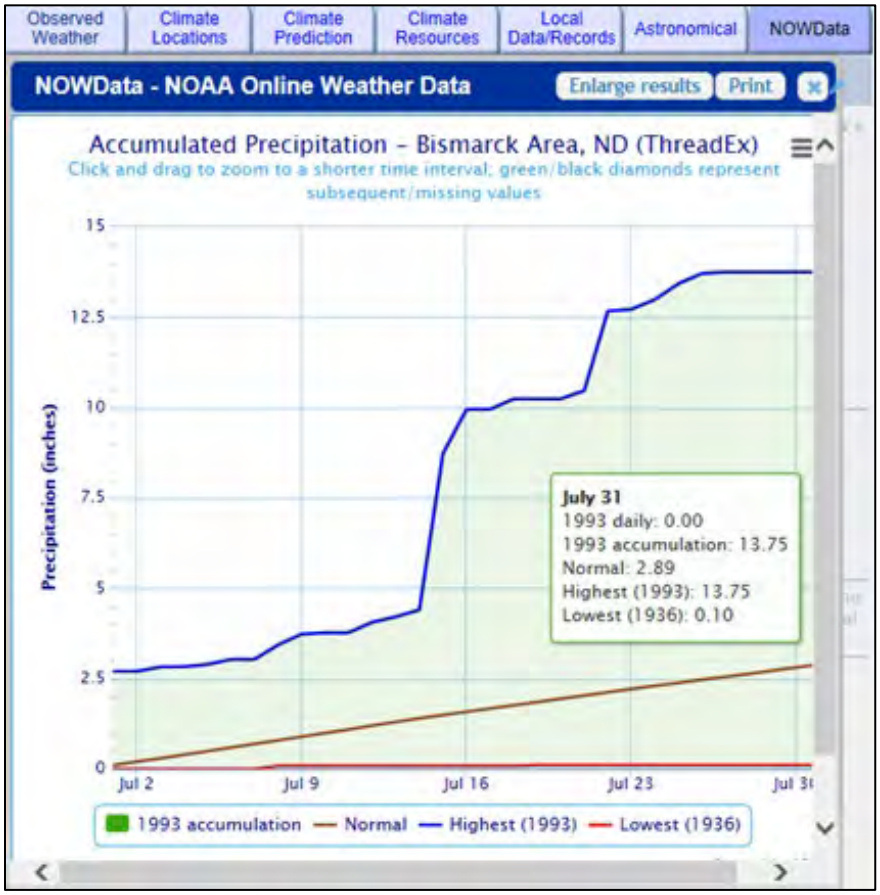
Dakota State Fleet vehicles suffered hail damage. Approximately 50 required glass replacement (North Dakota Department of Emergency Services, 2007).

August 12, 1999: Heavy rainfall from 4 to 7 inches. Hardest impact in the cities of Bismarck and Mandan. Two hundred twenty-one (221) homes and businesses received water damage. Twelve (12) road sites were damaged and a significant mudslide closed portions of Highway 1804 in north Bismarck.

August 21, 1998: 4.48 inches of rain in two hours

March 21, 1997: Minor overland flooding – wet basements.

July 15, 1993: National Weather Service reported 4.32 inches of rainfall. Cumulative rain for the month of July was 13.75, the record high for the month of July. Normal is 2.89 for the month.



Per Bismarck Tribune archived articles: 7 inches of rain in the Bismarck area causing damages of over $2 million in private property damages. Mayor Sorenson estimated that two-thirds of the flooded basements were on the north side, out of the flood plain, but that the most serious cases of individual damage were on the south side. The

American Red Cross provided services (clothes, housing and feeding) to 50 victims in Bismarck-Mandan, many of whom had been displaced from their homes. Norwest Bank set up unsecured low interest loans to help cover uninsured or underinsured flood related costs. Source: archived Bismarck Tribune articles

1993 Flood Statewide, excessive rains during the spring destroyed crops and heavy thunderstorms on July 15-16 (4-7 inches of rain), July 22-27 (6-10 inches of rain), and August 21-22 (up to 7 inches of rain) caused flash flooding and damage to public and private property. Minor to moderate flooding occurred in the Missouri, James, Souris, and Devils Lake basins.

Geologic Hazard – Hazard Profile

Description

A **landslide** is the movement of rock, soil, artificial fill, or a combination thereof on a slope in a downward or outward direction. The primary causes of landslides are slope saturation by water from intense rainfall, snowmelt, or changes in ground-water levels on primarily steep slopes, earthen dams, and the banks of lakes, reservoirs, canals, and rivers (US Geological Survey). Other causative factors include steepening of slopes by erosion or construction, alternate freezing or thawing, earthquake shaking, volcanic eruptions, and the loss of vegetation from construction or wildfires. The saturation or destabilization of a slope allows the material to succumb to the forces of gravity or ground movement.

Many different types of landslides exist: slides, falls, topples, flows, and lateral spreads. Slides involve the mass movement of material from a distinct zone of weakness separating the slide material from the more stable underlying material. The primary types of slides are rotational slides and translational slides. Falls occur when materials, mostly rocks and boulders, fall abruptly from a steep slope or cliff. Falls are strongly influenced by gravity, mechanical weathering, and the presence of interstitial water. Topples are similar to falls, yet they pivot around a connection point at the base of the material and are most often caused by gravity or fluids in the cracks of the rocks. Flows typically have a higher percentage of water material embedded in them and behave more like a liquid than other types of landslides. The five primary categories of flows are: debris flows, debris avalanches, earthflows, mudflows, and creeps. Lateral spreads usually occur on gentle slope or flat surfaces when liquefaction occurs and leads to fractures on the surface. Complex landslides involve any combination of these types (US Geological Survey).

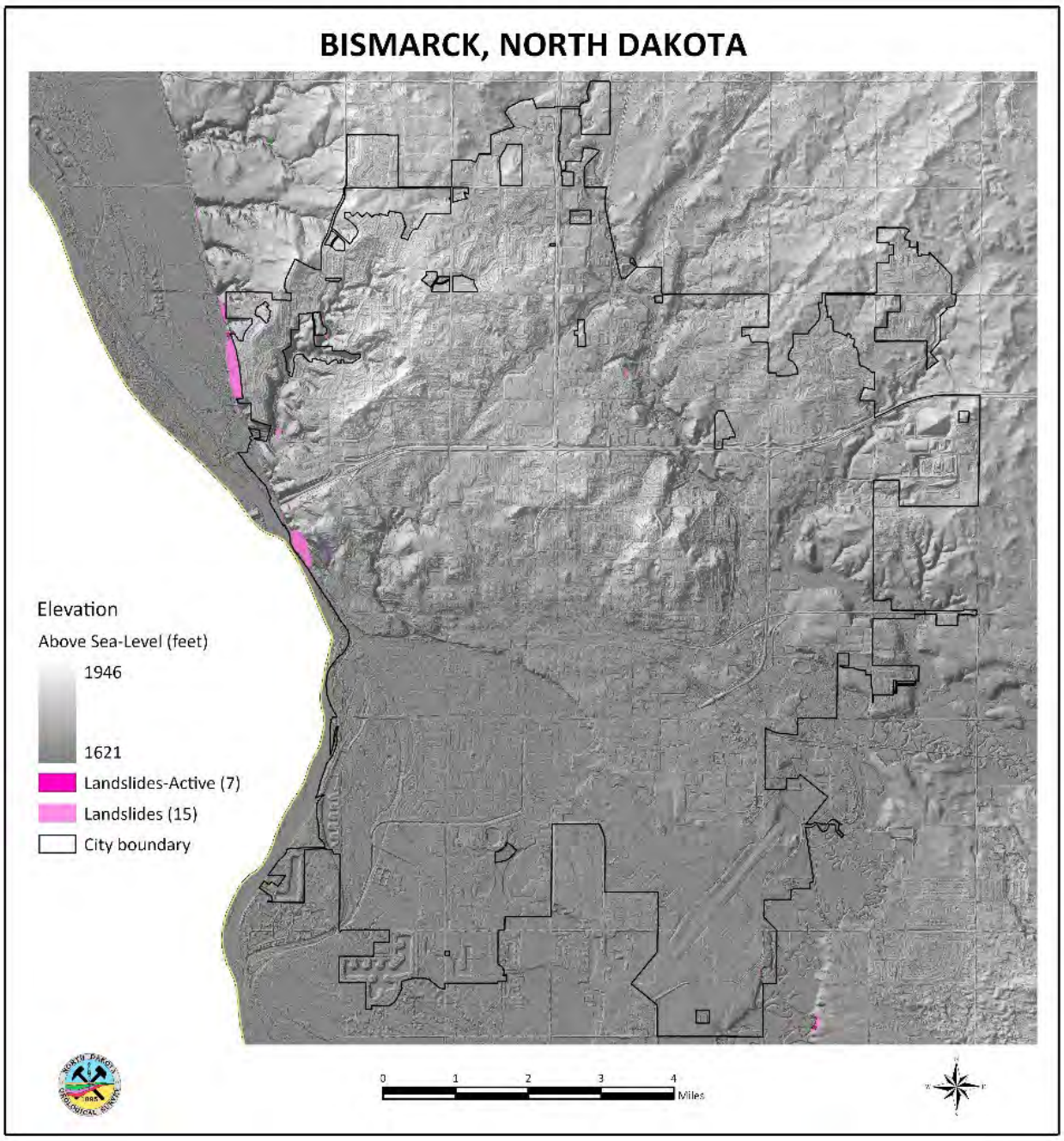
Landslides are typically associated with mountainous regions, but they can also occur in areas of low relief. In these areas, the landslides are often the result of cut-and-fill failures (from roadway and building excavations), river bluff failures, lateral spreading, or mine collapse (US Geological Survey).

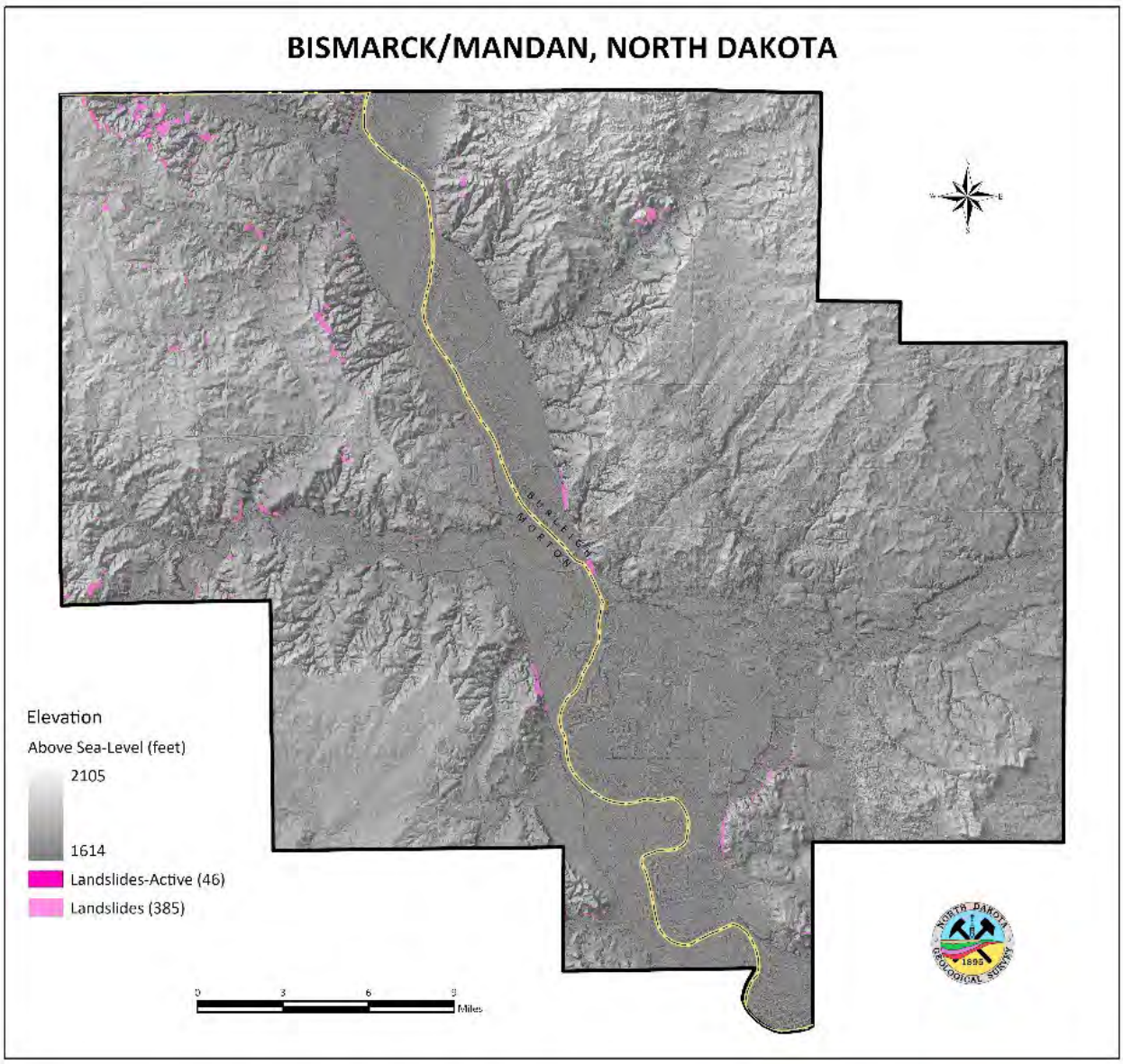
Landslides occur in natural and anthropogenic settings in North Dakota and are most commonly found within major river valleys and on engineered slopes along major transportation corridors. Landslides are dominantly found in two settings, controlled by the surface geology of the Great Plains in western and southwestern North Dakota and along major river valleys of the Missouri, Sheyenne, James, Souris, and Red Rivers (North Dakota Geological Survey).

Riverbank slumping can be considered a form of landslide and is often found along the rivers in North Dakota. The riverbank soils are inherently weak, and natural forces are always moving river channels.

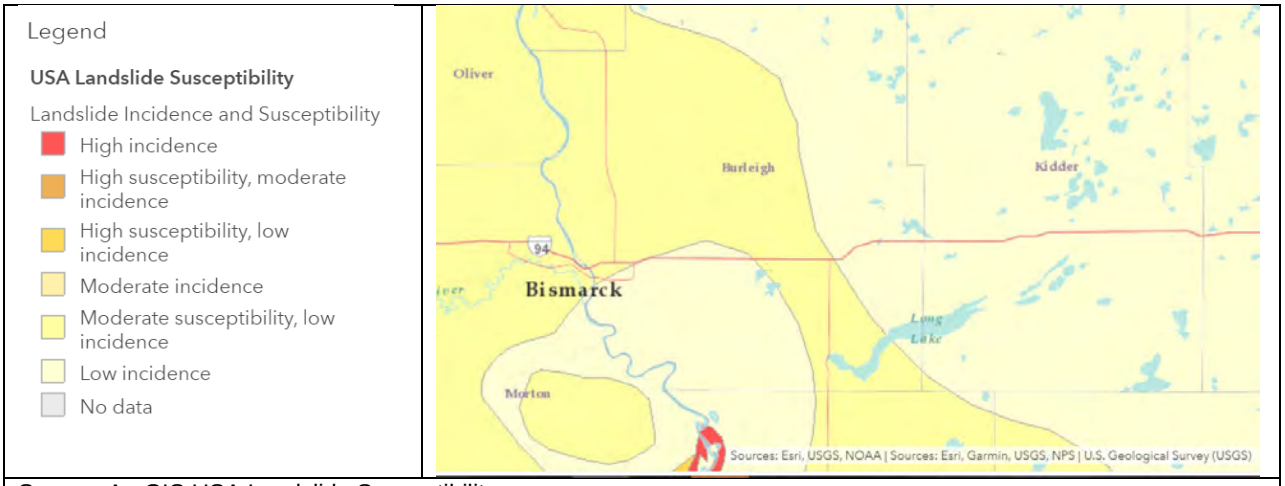
Landslides occur at an unobservable speed with regularity in North Dakota, and recent data upgrades make it possible to identify those small movements that will better enable forecasting the location of bigger movements with the capability to cause consequences. This new data improves warning time and helps to identify areas that may need intervention or warning signs ahead of an impactful landslide.

Fifteen landslides areas are identified to have occurred in the Bismarck area, with seven being considered “active.” Per ND Geological Survey, “active” landslides in the Bismarck area defined as "landslide areas showing movement between 2015 and 2024.

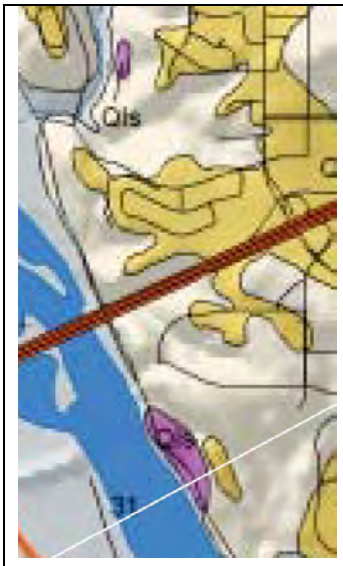




Some of these slides likely predate settlement of the area and are hundreds, if not thousands, of years old. Typically, more recent landslides are reactivations of these older, much larger landslide complexes. Landslides may occur throughout the year but are most prevalent in the spring and early summer due to the availability of moisture from snowmelt and rainfall events. In addition, studies have shown that landslides are most active during a wet period that follows an extended dry period. For these reasons, water is often said to “lubricate a slide.” Although this is an oversimplification of the mechanisms and rock properties, such as differential pore pressures, involved in slope failure, it is correct in its emphasis of the importance of water to slope movement. To a degree, landslides are self-perpetuating because more water seeps into the subsurface after a slide occurs due to the ponding of water in the newly formed surface depressions and infiltration of this water through numerous tension cracks.



Source: ArcGIS USA Landslide Susceptibility
https://www.arcgis.com/home/webmap/viewer.html?webmap=cc5e9da58860460188705c545e86c871

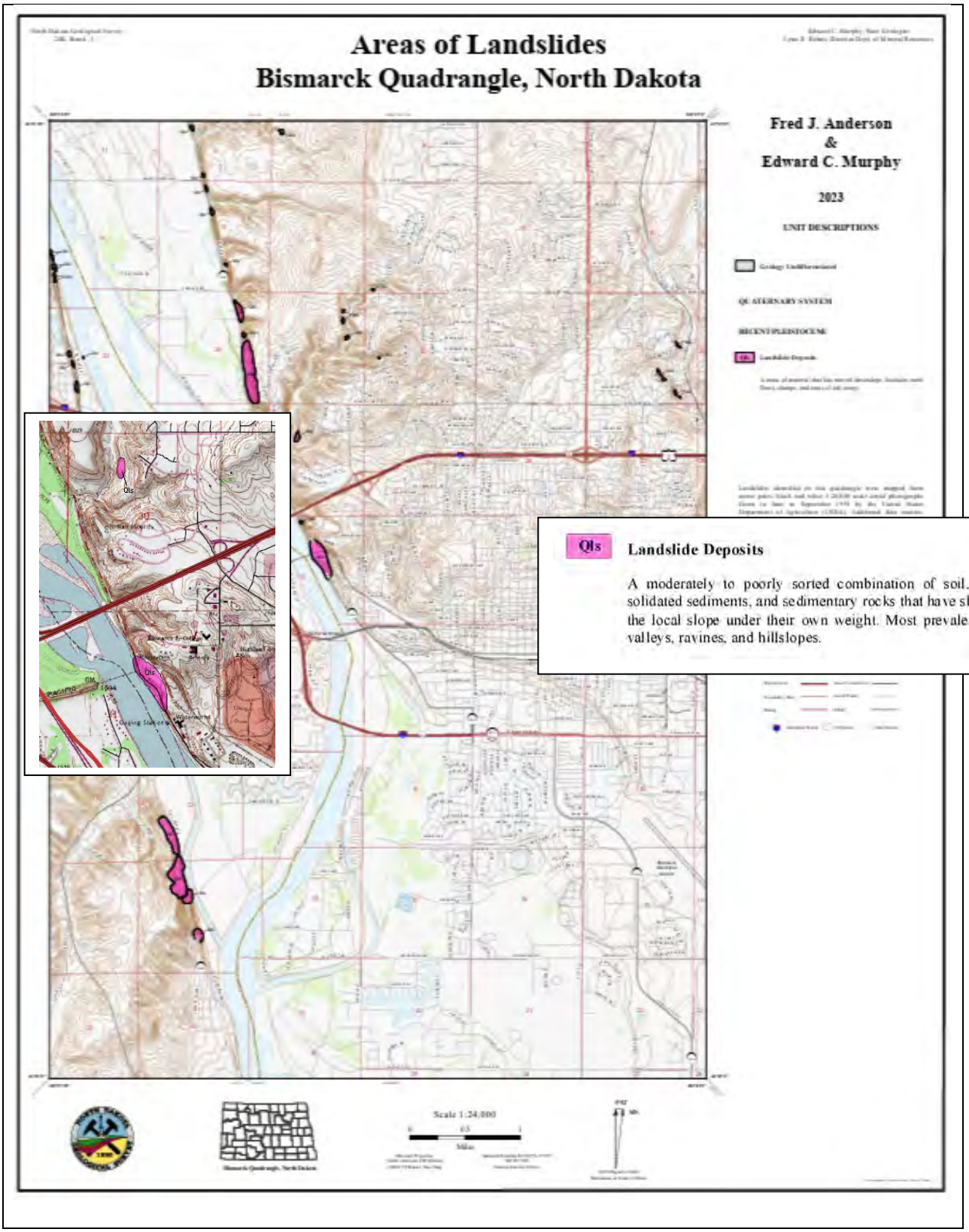


The areas in pink shading show previous areas of slope failure in Bismarck. The top location is north of Burnt Boat Drive. The bottom location is along River Road just south of the Interstate 94.
https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/geoinv/GI_3.pdf

The ND Geological Survey (within ND Department of Mineral Resources) has Bismarck area Landslide maps available:
https://www.dmr.nd.gov/ndgs/landslides/Bismarck/Bismarck_24K_l.pdf

as well as a surface geology map:
https://www.dmr.nd.gov/ndgs/surfacegeo/BISMARCK_100K/WebSurfaceGeology/24k/bsmk_sg.pdf

Slope failure, also referred to as mass wasting, is the downslope movement of rock debris and soil in response to gravitational stresses. Three major types of mass wasting are classified by the type of downslope movement: falls, slides, and flows. Land subsidence is another type of ground failure covered.



https://www.dmr.nd.gov/ndgs/landslides/Bismarck/Bismarck_24K_l.pdf
https://www.dmr.nd.gov/ndgs/landslides/

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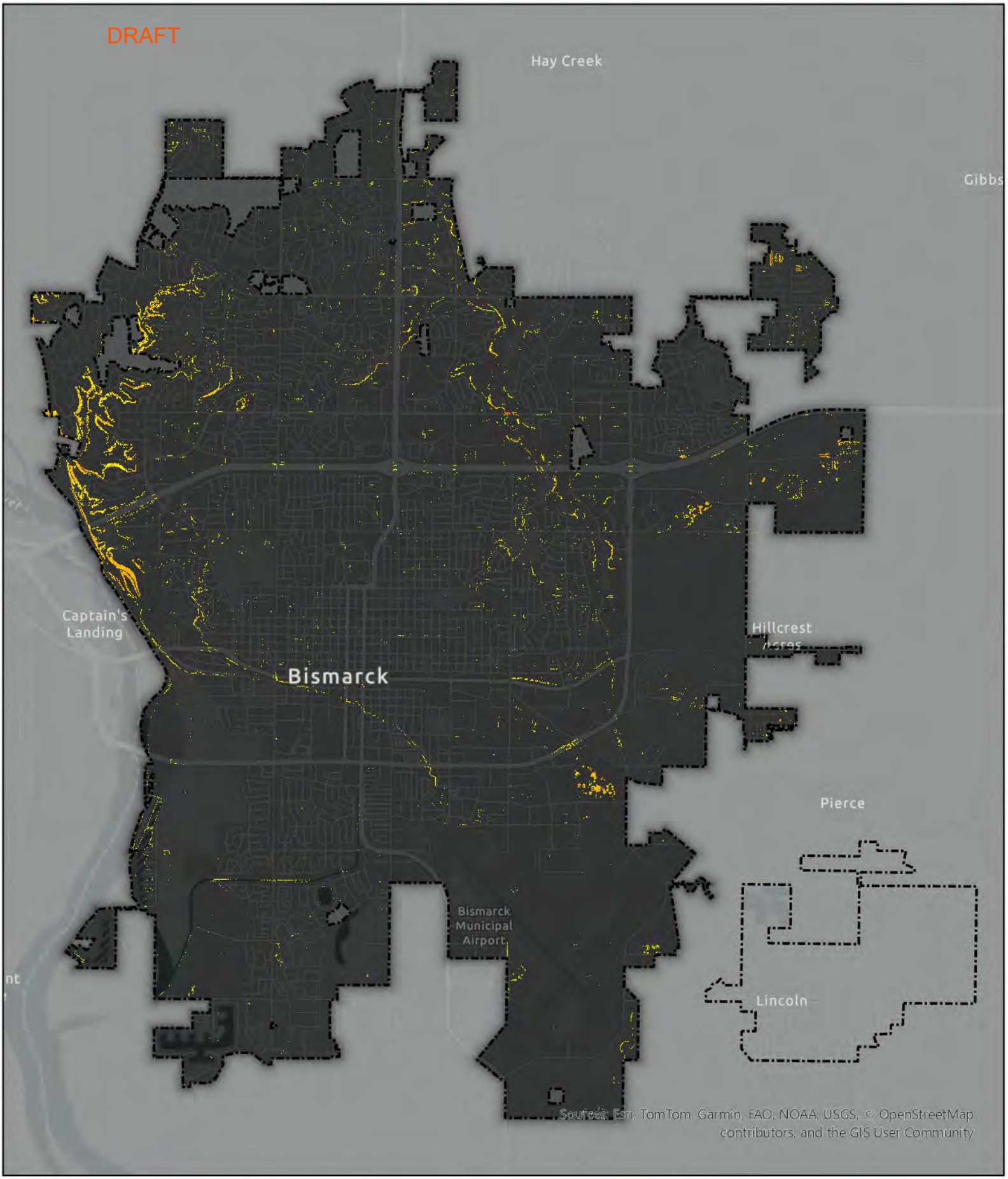


Bismarck

Percent Slope

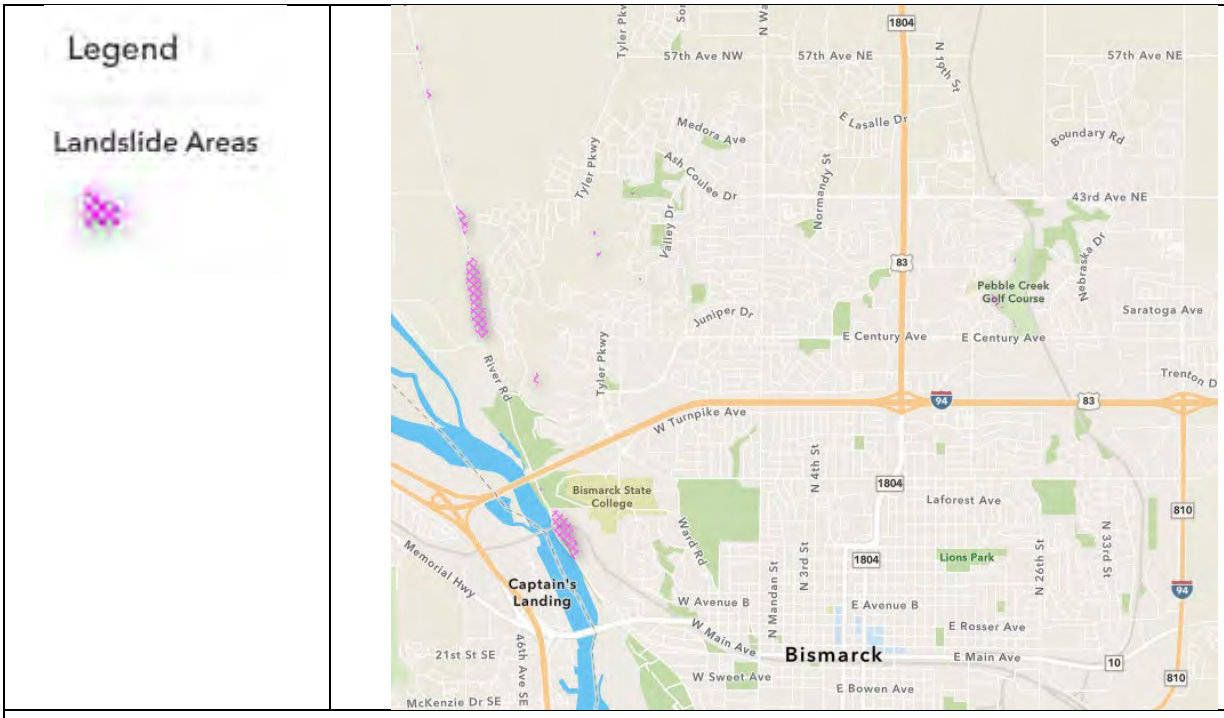
Map Created: June 2025
by GIS Division

<40%
40% - 50%
50% - 120%
120%<

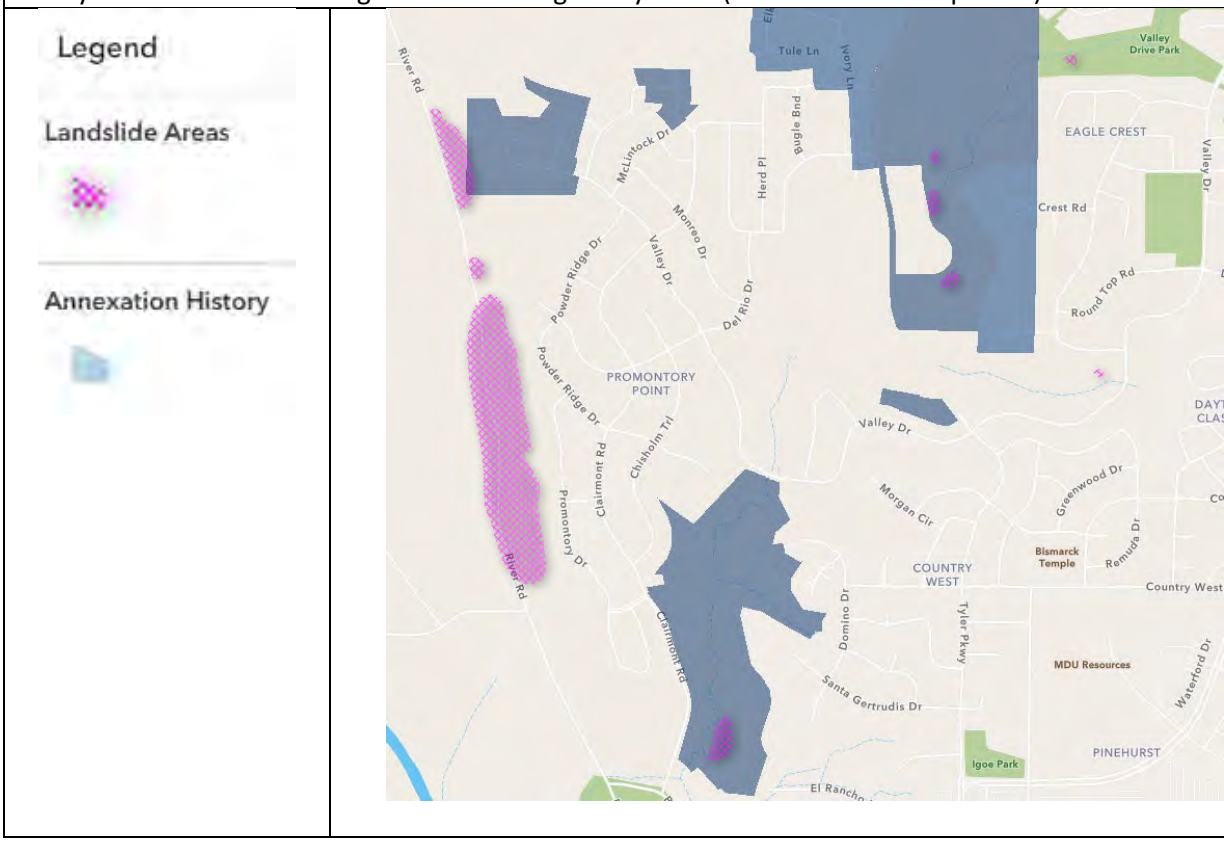
N

0 ½ 1 Mile

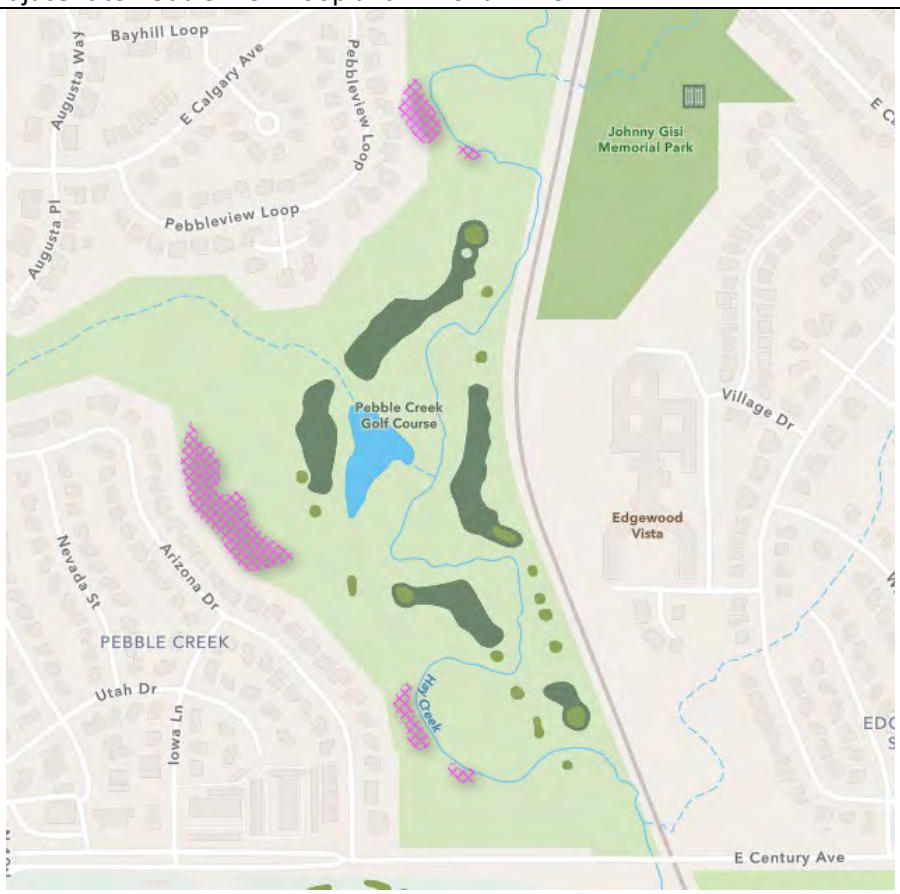
Locations of Landslide Occurrences



The following illustrates locations of landslide occurrences along River Road, as well as landslide areas that have been annexed since January 2020. Additional locations shown include landslide activity at Valley Drive Park and the single location along Valley Drive (south of Round Top Road)



The following illustrates locations of landslide occurrences within the Pebble Creek Golf course area and properties along Hay Creek adjacent to Pebble View Loop and Arizona Drive.

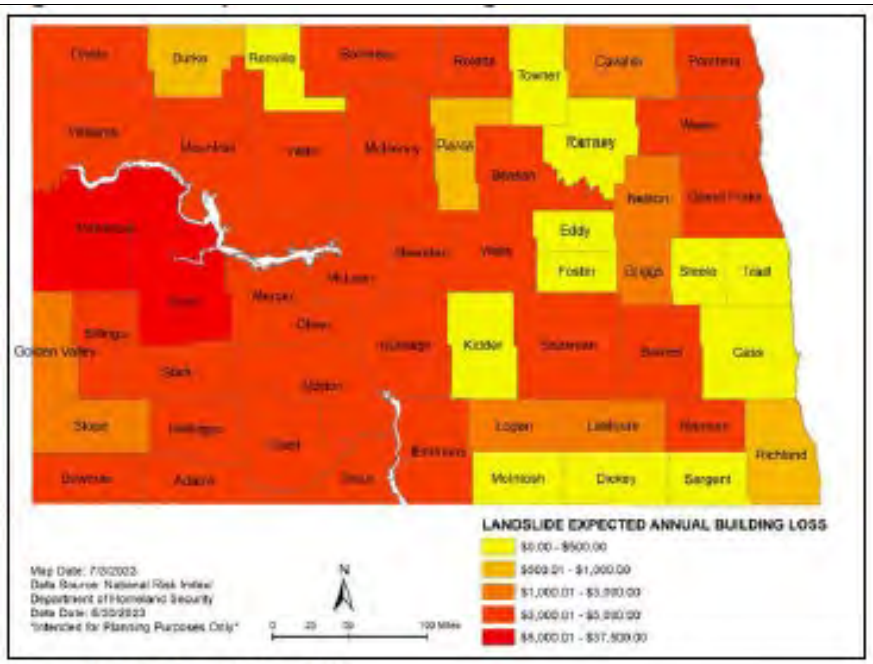


Landslide areas along River Road southwest of BSC and west of Gateway to Science.

Rivers and streams erode by undercutting the river banks on the outside of a meander or curve. This erosion creates over-steepened cliff faces that are highly susceptible to slope failure. Such is the case in west Mandan where landslides have occurred in the steep, tall cliffs overlooking the Heart River. A series of landslides in this area has displaced trees, a rock wall, and resulted in the abandonment of at least two lots due to safety concerns.

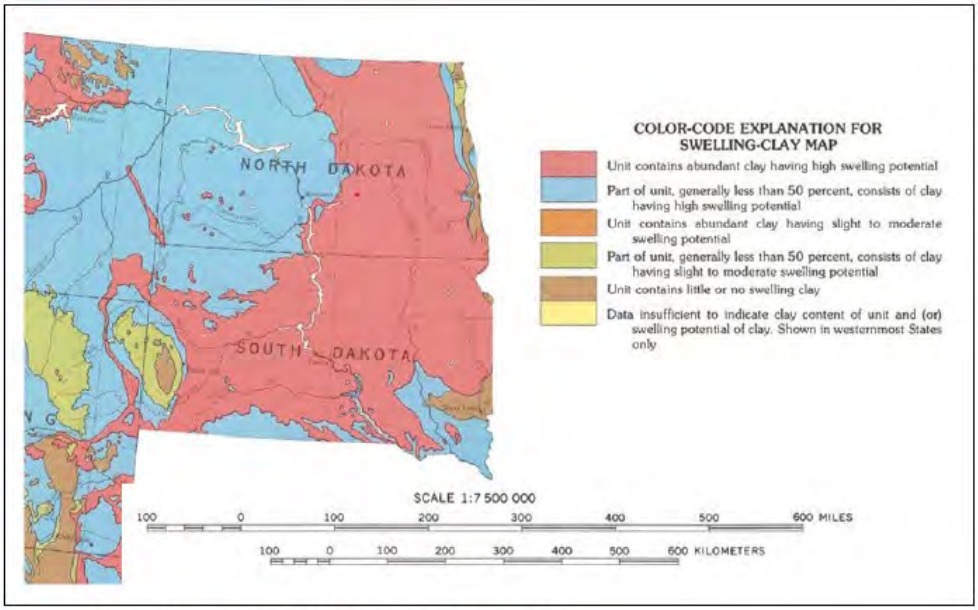
The mudstone of the Cannonball Formation contains interbedded lenses of sandstone and siltstone (grayish brown) and claystone (dark gray). The sand and clay content of the Cannonball mudstones is also variable, some mudstones are dominated by clay and others by sand and silt. Most of the mudstones in the Bismarck-Mandan area are dominated by claystone. The clays in the mudstone are mixed and contain varying percentages of swelling clays. Differential pore pressures within lenses in the mudstone and the presence of swelling clays may potentially damage building foundations.

All of the landslides identified in the Bismarck-Mandan area involve mudstones in the Cannonball Formation. Not only are these mudstones involved, but most of the slope failures appear to have originated within these rocks.
https://www.dmr.nd.gov/ndgs/documents/Publication_List/pdf/geoinv/GI_3.pdf

Expected Annual Building Loss from Landslides	 *Source: National Risk Index, 2023*

Land subsidence is a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials. The principal causes are aquifer-system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.

Expansive Soils. The Drift Prairie region of the state includes soil with substantial clay content that is prone to expansion and shrinkage based on moisture content (Anderson, 2004; NDPSC, 2023), as shown in the following map (swelling clay) included in the state's mitigation plan. The map illustrates that clay soils having high swelling potential are common in our area.



Source: Adapted from USGS IMAP 1940, Olive et al., 1989,

Excessively dry or wet conditions will cause the physical space that the soil takes up to expand and contract. This can cause buckling and cracks in cement foundations, roadways, and sidewalks.

The primary risk from landslides and expansive soil is to property, facilities and infrastructure that can be damaged due to ground movement. Underground infrastructure, including sewer and water lines and mains are perhaps at greatest risk. Even small movements of the soil or land can cause leaks or breaks. These can introduce bacteria or other undesired elements to the water system. Similarly, wastewater leaks or pipeline spills can create environmental damage, in addition to disruptions in service. Both hazards threaten transportation infrastructure beyond roads. Airport runways, sidewalks, bridges, and dams can all be damaged by landslides or expansive soil.

The damage done by expansive soils tends to be a sudden consequence from heavy precipitation, snowmelt, or drought event.

As the community grows, new areas of development run the risk of increased property vulnerability to the geologic hazards of expansive soils.

Radon is prevalent across the state, with the entire state falling into the EPA Zone 1, where testing is recommended for all homes, as shown in Figure 4.12-16. According to the EPA (2023), radon cannot be seen or smelled, but is a radioactive carcinogen known to cause lung cancer. Radon continues to be a persistent threat to North Dakotans, and as housing ages, the cracks and deterioration that allows radon to enter the home will increase. Therefore, in areas

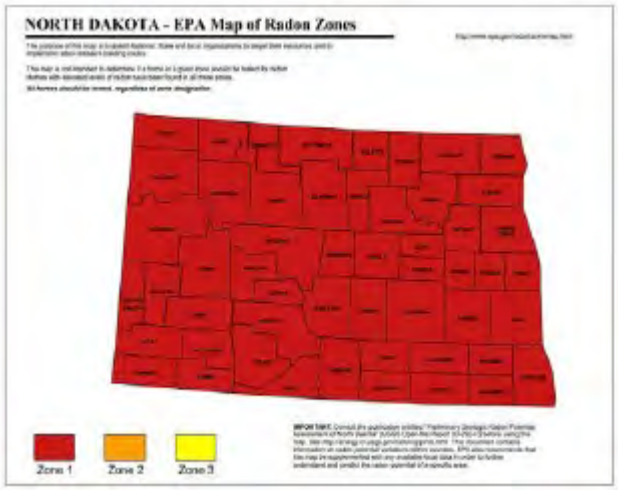
with aging housing stock, radon consequences are likely more probable than they were five years ago. New construction is less likely to expose individuals to radon.

North Dakota Radon Zones:

Radon is measured in picocuries per liter, though there is no known safe level.

Resources:
https://www.epa.gov/radon/what-epas-action-level-radon-and-what-does-it-mean

https://www.epa.gov/sites/default/files/2014-08/documents/north_dakota.pdf



Source: EPA, 2023

Earthquake is any sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another. The major fault lines of the world are located at the fringes of the huge tectonic plates that make up Earth's crust.

The Modified Mercalli Scale is used to describe the magnitude of an earthquake:

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale?qt-science_center_objects=0&qt-science_center_objects

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Landslide (Slope Failure)
Probability	Possible
Warning Time	No Notice event in many cases.
Duration	Less than 6 hours, but days/weeks to remove material
Geographic Area	See applicable maps.
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Falling Rock, road washouts. A. Those living or traveling near areas of potential land subsidence.
Mass Casualty Incident	Unlikely
Property Losses (points of vulnerability – high priority)	1. Properties built, potentially on backfill or without adequate setback (prior to current master planning methods). - Tyler Coulee area - Promontory Point – West of Clairmount Road
Environmental (points of vulnerability – high priority)	1. Hay Creek (waterway impacted). 2. Impact to the Missouri River would be minimal.
COG/COOP (points of vulnerability – high priority)	1. No impacts
Critical Facilities (points of vulnerability – high priority)	1. Water Treatment Plant, located off River Road
Critical Infrastructure (points of vulnerability – high priority)	1. River Road – potential loss of access similar to June 2009: closed for 5 months to make repairs. Necessary detour can potentially cause delays in emergency response. 2. DMVW tracks run adjacent to Hay Creek through much of Bismarck. 3. BNSF Railroad Bridge Piers. 4. Private Utility Infrastructure in NW Bismarck – both overhead and underground utilities (ie: near River Road) - gas main near water treatment plant - gas force main – below the Missouri River
Schools (points of vulnerability – high priority)	1. Burnt Boat Drive – bus route.
High Risk Facilities (chemical) (points of vulnerability – high priority)	1. No impacts
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	1. Limited to populations affected to by road closure (ie: River Road) or site specific property impacts (ie: slope failure).
Economy (community wide)	1. Road Closures – delays in productivity
OTHER: (points of vulnerability – high priority)	The failure zone in both the Mary College *(University of Mary*) and the NP Railroad Bridge slides appeared to occur in the Hell Creek – a unit that contains more swelling clays. *E-mail comment: Edward C. Murphy, State Geologist North Dakota Geological Survey, ND Department of Mineral Resources, ND Industrial Commission*

Note: Vulnerability within the previous table focuses on the landslide hazard because of the higher likelihood of occurrence and more signficant impact. Vulnerability of the other geologic hazards is discussed, where applicable, within the narrative throughout this hazard profile. Also, see Section 3 for hazard vulnerability highlights.

Changes in Vulnerability

Since the previous plan update in 2020.

Increase in Vulnerability	Decrease in Vulnerability
As the community grows, new areas of development run the risk of increased property vulnerability to the geologic hazards of slope failure or expansive soils. See map on page 7	See Geologic Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Severe Summer Weather and Flood. Heavy precipitation, snowmelt, and flood events can trigger geologic hazards. Floods and droughts can induce geologic hazards through the expansion and/or shrinkage of clay soils.

Future Conditions

- **Location**: The locations of geologic hazards will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** The extent and intensity of geologic hazards may change due to climate change, as impacts from projected future climate temperatures and/or precipitation increase.
- **Frequency:** Both drought and heavy precipitation events are projected to occur more frequently, which may contribute to an increased frequency of landslides where steep slopes are present or to riverbank collapse where undercutting due to subsoil flow and/or antecedent flooding is possible. There is also a potential for increased wind and water erosion.
- **Duration:** The duration of geologic hazards is not projected to change.

Anticipated Future Climate Impact – Geologic Hazard

Through the end of this century in North Dakota, expect more frequent, larger, and more intense geologic hazards, such as landslides, riverbank collapse, sink holes, and expansive (clay) soils. Both Drought and Heavy Precipitation events are projected to occur more frequently, which is expected to contribute to an increased frequency of expansive soils alternately cracking and swelling, landslides where steep slopes are present, or to riverbank collapse where undercutting due to subsoil flow and/or antecedent flooding is possible. Both extremes also increase the potential for wind and water erosion. Increased development pressure and the impacts of future climate conditions may increase the risk to a variety of state infrastructure and assets if constructed or situated in areas prone to geologic hazards.

Previous Occurrences - Landslides

December 9, 2025: A landslide just NW of Bismarck along River Road closed the two-lane road from Sandy River Drive to Wilderness Cove Road. The road was re-opened on December 16. This was the fourth landslide since 2019.

June 17, 2022: A landslide just NW of Bismarck along River Road closed the two-lane road from Sandy River Drive to Wilderness Cove Road. The road was re-opened on June 20. This was the third landslide since 2019.

March 3, 2020: A landslide just NW of Bismarck along River Road closed the two-lane road from Sandy River Drive to Wilderness Cove Road.

December 22, 2019: A large portion of the existing roadway back slope on the east side of River Road (around the 3900 block) let loose and blocked River Road. The material ranged from 10 to 15 feet deep on the east side of the roadway to around 2 to 5 feet deep on the west side. It extended along 200 feet of River Road. Clean-up activities were conducted on December 26. Stabilizing projects were initiated in July 2021. Construction included pavement rehabilitation and slope stability improvements north of the Grant Marsh Bridge at a cost of about 1.1 million.	

June 2016: Two properties along Arizona Drive in Bismarck backyards dropped as much as 7 feet in June, with continued dropping with every rainfall according to resident. Photo Credit: Bismarck Tribune	

June 2009 thru December 2009: River Road between the Memorial Bridge and the Railroad Bridge was closed as a result of slope failure (land subsidence). Sloping of the half-mile stretch between north of Bismarck's water plant and Keel Boat Park forced the city to close the road in June. Pavement had to be removed and pilings put in place. Permanent surfacing had to be applied in 2010.

Figure 6. Several landslide scarps are visible along the east slopes of the Missouri River Valley above the Bismarck Railroad Bridge. The top of a City of Bismarck water reservoir is visible just below the largest tree at the top of the east slope. Photograph taken by Ralph Peck in 1951.

The ND Department of Mineral Resources (DMR) July 2009 newsletter cites slope instability issue affecting the Northern Pacific Railway Bridge for several decades after it was completed in 1882: "…. Shortly after the railroad bridge was completed, the east pier began sliding towards the river. For the next 68 years, Northern Pacific engineers applied a variety of slope stabilization techniques in an attempt to stop the pier from moving. …. Peck seized the opportunity that was afforded during the straightening of the railroad track to remove a considerable amount of the hillside above the east pier and reduce the remaining slope to within his desired factor of safety. Finally, after all of those years, his efforts resulted in relative stability of the slope above the east bridge pier…"
https://www.dmr.nd.gov/ndgs/documents/newsletter/2009Summer/pdf/IceJamsLandslides.pdf

Photos below show slumping north of Burnt Boat Drive
Photo Date: October 9, 2009

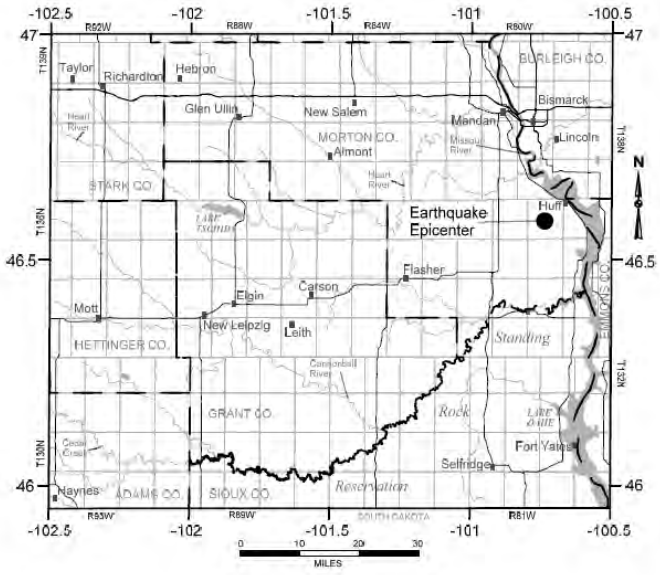
NDSU has documented (photos) of slumping in the Double Ditch Area http://www.ndsu.edu/nd_geology/nd_mass_wasting/index_mass_wasting.htm	
	
This large slump is located north of Bismarck, at the site of the Double Ditch Indian Village. It was initiated by erosion against this slope by the Missouri River (just out of view to the right on this photo). *In the next photo, we see the progress of this slump over just nine months. (Use the telephone pole and highway as reference points between the two photos).* *(Photo by J. Kostelecky, 1987).*	*This is the same slump as in the previous photo, but nine months later. (Use the telephone pole and highway as reference points between the two photos).* *(Photo by D.P. Schwert, North Dakota State University, 1988).*

Previous Occurrences - Earthquake

Source: North Dakota Geological Survey, North Dakota Earthquake Catalog (1870-2015) by Fred J. Anderson.

July 8, 1968 M 4.4 Earthquake near Huff, North Dakota.
A magnitude M 4.4 earthquake was recorded five miles southwest of Huff in eastern Morton County in south-central North Dakota during the morning of Monday, July 8, 1968 at an estimated depth of 20.5 miles. This earthquake was the first instrumentally verified earthquake recorded in North Dakota and was reported to have been felt over approximately 3,000 square miles of south-central North Dakota. It was reported that “a television set shifted and sounds like thunder were heard.” Additionally, Mercalli earthquake Intensity IV effects were noted at Bismarck, Fort Rice, Huff, Linton, Mandan, Menoken, and Moffit; and Mercalli intensity I-III effects at Almont, Flasher, Halliday, and St. Anthondy (Coffman and Cloud, 1970).

Day	Date	Time (local)	Time (UTC)	Magnitude	Depth (miles)	MMI	T & R	Longitude	Latitude
Monday	07/08/1968	10:50:12	16:50:12	4.4	20.5	IV	136-80	-100.74	46.59



Applicable Mercalli Intensity Level Descriptions

III Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

IV Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to a passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

V Felt indoors by practically all, outdoors by many or most: outdoors direction estimated. Awakened many, or most. Frightened few –slight excitement, a few ran out doors. Buildings trembled throughout. Broke dishes, glassware, to some extent. Cracked windows – in some cases, but not generally. Overturn vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. Pendulum clocks stopped, started or ran fast, or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes, shaken slightly.

The North Dakota Earthquake Catalog (1870-2015) provides seismological information on thirteen earthquakes that have been reported to have occurred in the state. Today and historically, the state continues to be in one of the most geologically stable areas of the North American Continent. Earthquakes that have occurred in the state are generally of magnitude (M) 3.0 or less and may occur about once per decade. The largest earthquake to have occurred in the state remains to be the July 8, 1968 M4.4 Huff earthquake which is also the first earthquake in the state to have had an instrumentally located epicenter. There are currently three seismic monitoring stations in operation in North Dakota with the capabilities to detect earthquakes that originate at local, regional, and global distances: one location south of Bismarck near Huff, one in the Red River Valley just northwest of Fargo, and one southeast of Devils Lake near Maddock.

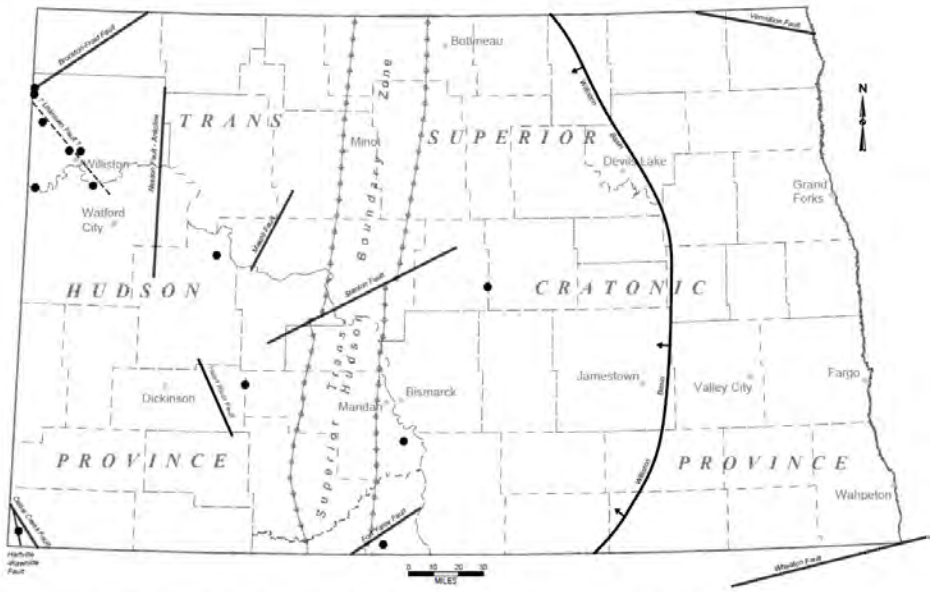


Figure 1. Locations of major faults and tectonic boundaries along with earthquakes that have occurred in North Dakota (as modified from Sims, et.al., 1991, and Nesheim, 2012).

Table 1. Summary of earthquakes that have been reported to have occurred in North Dakota.

Day	Date	Time (local)	Magnitude	Depth (mi.)	Modified Mercalli Intensity	Longitude	Latitude	City or Vicinity of Earthquake
Friday	September 28, 2012	05:53:43	3.3	0.4*	III	-103.48	48.01	SE of Williston
Monday	June 14, 2010	02:58:03	1.4	3.1	I	-103.96	46.03	Boxelder Creek
Sunday	March 21, 2010	11:56:40	2.5	3.1	II	-103.98	47.98	Buford
Sunday	August 30, 2009	20:24:23	1.9	3.1	I	-102.38	47.63	Ft. Berthold SW
Saturday	January 3, 2009	07:53:48	1.5	8.3	I	-103.95	48.36	Grenora
Saturday	November 15, 2008	10:21:27	2.6	11.2	II	-100.04	47.46	Goodrich
Wednesday	November 11, 1998	06:59:37	3.5	3.1	IV	-104.03	48.55	Grenora
Tuesday	March 9, 1982	07:10:50	3.3	11.2	III	-104.03	48.51	Grenora
Monday	July 8, 1968	10:50:12	4.4	20.5	IV	-100.74	46.59	Huff
Tuesday	May 13, 1947	00:02:--	3.7e	U	IV	-100.90	46.00	Selfridge
Sunday	October 26, 1946	15:37:--	3.7e	U	IV	-103.70	48.20	Williston
Friday	April 29, 1927	20:15:--	3.2e	U	III	-102.10	46.90	Hebron
Sunday	August 8, 1915	09:15:--	3.7e	U	IV	-103.60	48.20	Williston

e = magnitude estimated from reported Modified Mercalli Intensity value.

*estimated depth.

Source: North Dakota Geological Survey, North Dakota Earthquake Catalog (1870-2015) by Fred J. Anderson.

Hazardous Materials Release – Hazard Profile

Description

Hazardous materials are materials that if released, can pose a threat to human health or the environment. Hazardous material releases can cause long/short term health effects, damage to property, expensive cleanup/contractor costs, serious injury, and even death.

A Hazardous material release in Bismarck could result in either evacuation or “shelter-in-place” situations. A hazardous material release may be a rare occurrence, but one major release could have a significant impact.

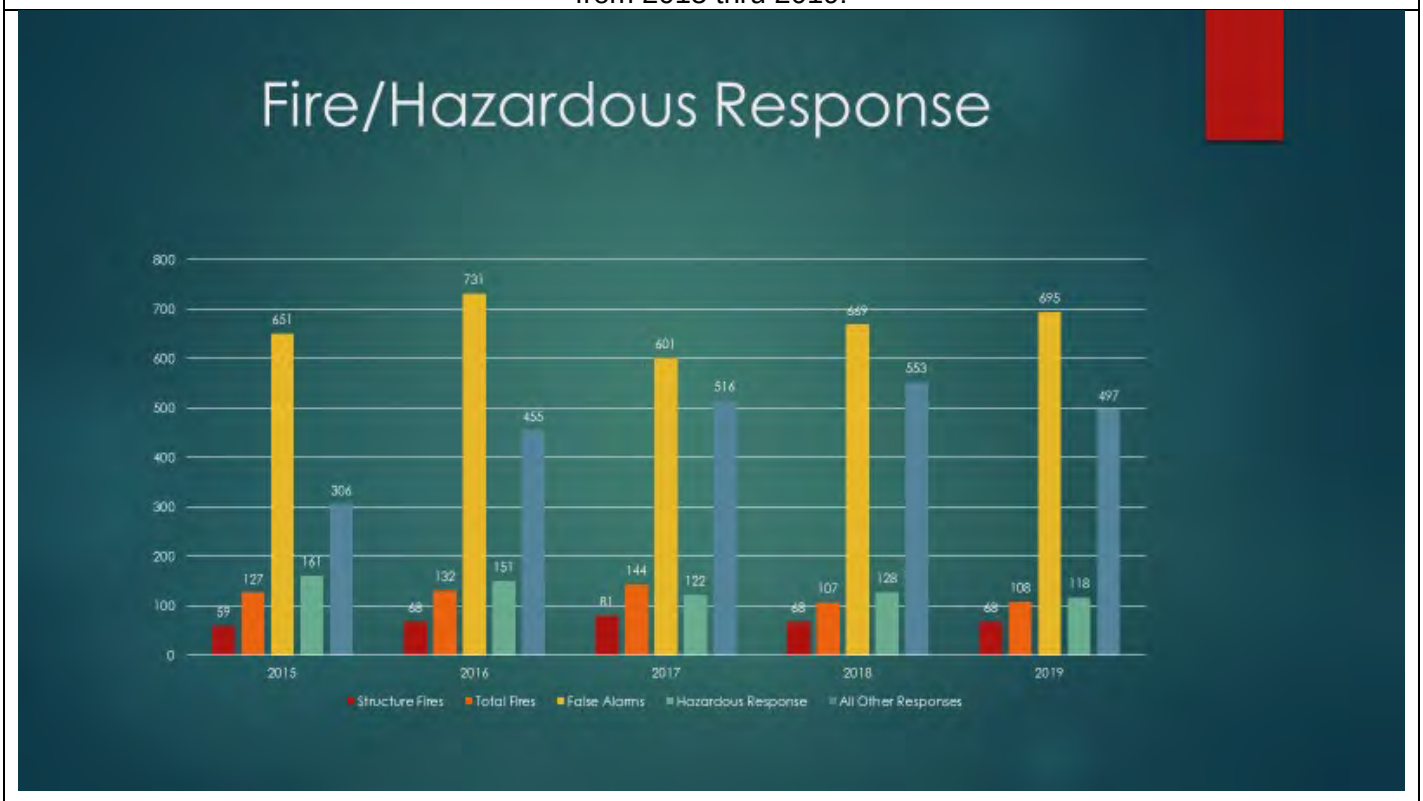
The hazard profile addresses three primary origins of potential hazmat incidents: Fixed Facilities, Transportation, and Pipeline. Train Derailment (including hazmat) is addressed as its own hazard with a separate hazard profile.

History

Within the last 20 years, Bismarck has not experienced many significant hazardous materials incidents. Actual Hazmat incidents of potential significant impact within the last 20 years include:

1. A Gasoline Tanker Leak: An MC 306 tank trailer, containing gasoline was unhooked from the semi-tractor, which was in the shop for engine repairs. It was parked on the street and set on the trailer's landing gear, which are not designed to support the trailer loaded. The excessive weight coupled with the slope of the street caused the landing gear to collapse and puncture the tank, releasing gasoline. The gasoline was running down the gutter towards a storm sewer that drained into the Hay Creek Watershed. The spill was confined and the trailer contents were offloaded successfully.
2. SuperValue Warehouse Ammonia piping system. All personnel evacuated safely and there was not impact outside the facility.

The following graph illustrates the Fire and Hazmat Responses conducted by the Bismarck Fire Department
from 2015 thru 2019:



This section of the hazard profile will address three primary origins of potential hazmat incidents: Fixed Facilities, Transportation, and Pipeline. Train Derailment (including hazmat) is addressed in its own hazard profile section. The hazard profile concludes with the vulnerability assessment.

Fixed Facilities

Hazardous materials being used or stored at industrial facilities and in buildings is defined as a *fixed facility* hazardous material release hazard. The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as SARA Title III, was enacted in November 1986 to enable state and local governments to adequately prepare and plan for chemical emergencies. Facilities covered by EPCRA must submit an emergency and hazardous chemical inventory form to the Local Emergency Planning Committee (LEPC), the State Emergency Response Commission (SERC) and the local fire department annually.

Bismarck has 69 facilities that are reported as “Tier II” facilities for year 2024 (down from 81 in year 20120). Tier II facilities are determined based on the quantity and/or type of material stored or used on site. Many facilities (ie: gas stations) are not considered “Tier II” facilities and are not required to report. However, the Bismarck Fire Department inspects all commercial and industrial businesses annually and is aware of those additional fixed facilities and materials on site.

The total number of facilities using, storing, or selling hazardous materials, including non-Tier II facilities, will fluctuate on a regular basis. The approximate number of facilities in Bismarck is 242 sites using, storing, or selling materials that are classified as hazardous (including common household products). The vast majority are NOT “Tier II” facilities, and are not required to report per EPCRA.

The Tier II sites (facilities) may be viewed online at https://arcg.is/04KXXn.

Tier II Facilities in Bismarck - 2024		
Name	**Address**	**Chemical (BOLD = EHS)**
AT&T - ND0410	1823 N 16th St	Lead, Diesel Fuel, **Sulfuric Acid**
Bismarck Public Schools Facilities and Transportation	705 S 9th St	Gasoline, Diesel Fuel
Bismarck Public Schools Legacy High School	3400 E Calgary Av	Propane
Bismarck Tribune, The	707 E Front Ave	CentraNews Vintage O/S Ink
Bobcat Doosan – Acceleration Center	3901 Morrison Ave.	Diesel, Lithium ion batteries
Burleigh County Highway Dept Shop	8100 43rd Av NE	Gasoline, Diesel Fuel, Asphalt Cement
Burleigh County Sheriff's Dept - East	514 E Thayer Ave	Gasoline
Central Power Electric Cooperative- Bismarck North Substation	2105 E Century Ave	**Sulfuric Acid**, Transformer Oil
Central Power, Hay Creek Substation	629 N Bismarck Expressway	**Sulfuric Acid**, Transformer Oil
Central Power, South Washington Substation	4100 South Washington St	Transformer Oil
Central Power Electric Cooperative	701 N Bismarck Expressway	**Sulfuric Acid**, Transformer Oil
CenturyLink (Qwest Corporation)	220 N 5th St	**Sulfuric Acid**, Lead Acid Batteries, Diesel Fuel
CHI St Alexius Health	900 E Broadway Av	Oxygen, Diesel Fuel
CHI St Alexius Health Technology & Education Building	1310 E Main	Diesel Fuel
City of Bismarck Public Works Department	601 S 26th St	Beet Brine Mix, BEET HEET, CRS-2 Dura Patch Oil, Diesel Fuel, Gasoline, Propane, Salt Wter Brine, Tac Oil
City of Bismarck Public Works Department-Haycreek Lift Station	3701 E Bismarck Expwy	Aqua Hawk HSX
City of Bismarck Public Works- Municipal Landfill	2111 N 52nd St	Chip Seal Oil CRS-2P, Crack Seal Oil, Diesel Fuel
City of Bismarck Public Works- Old Airport Lift Station	2301 University Dr #19	Azone
City of Bismarck Public Works- Pioneer Park Lift Station	2516 River Rd	Aqua Hawk HSX
City of Bismarck Public Works- Wastewater Treatment Plant	601 London Ave	Azone 15, Ferric Chloride, Sodium Bisulfite, Sodium hydroxide
City of Bismarck Public Works- Water Treatment Plant	615 River Rd	**Chlorine**, Carbon Dioxide, Diesel Fuel
City of Bismarck Public Works- West End Pump Station	1701 Edwards Av	Ammonium Sulfate
Coca-Cola Bottling Company High Country	3225 E Thayer Av	**Anhydrous Ammonia,** Carbon Dioxide, **Lead Acid Batteries,** Sodium hydroxide, **Sulfuric Acid**
Cofells Plumbing & Heating Inc	1000 Industrial Dr	Gasoline, Diesel Fuel
Dakota Carrier Network LLC (DCN)	4202 Coleman St	**Sulfuric Acid**
Dakota Supply Group	901 S 26th St	**Lead Acid Battery**
Dakota Supply Group	3021 E. Broadway	**Lead Acid Battery**
Dean Foods North Central (Land O'Lakes)	1207 E Main Ave	**AC-55-5 RED,** Diesel Fuel, **Lead**

Tier II Facilities in Bismarck - 2024		
Name	**Address**	**Chemical (BOLD = EHS)**
		Acid Battery, Mandate Plus, Sulfuric Acid, Vortexx
Doosan/Bobcat	521 S 22nd St	Argon, Carbon Dioxide, Powercron Charcoal Paste, Diesel Fuel, **Gardobond Additive**, **GF Adjust 105,** GF Adjust 213, **Lead Acid Batteries**, Meyer, Mitfloc
Duram School Services	3750 E Rosser Ave	Motor oil, used oil
Executive Air Taxi Corp Fuel Farm	2301 University Dr	100LL Aviation Gasoline, Type A Jet Fuel
Ferguson Waterworks	2005 Channel Drive	**Sulfuric Acid – contained in Lead Acid Batteries**
Ferrellgas Bismarck	2300 E Main Ave	Propane
GCCD Bismarck Terminal	1316 E Front Ave	Cement
General Services Administration Bismarck FB/CH/PO	220 East Rosser Ave.	Fuel Oil
Gerdau-Bismarck	1320 Airport Rd	Diesel Fuel, **Lead/Acid Batteries**
HERC Rentals Bismarck 9452	3101 Morrison Ave	Diesel Fuel, Hydraulic Fluid, Motor Oil, Propane
Holcim (US) Inc-NPCC Terminal	2103 Trade St	Cement
Jiffy Lube #519	1017 S Washington St	Methanol, Motor Oil
Knife River ND - Bismarck Rock Island Pl	3305 Rock Island Place	Fly Ash, Cement, Diesel Fuel
Linde Gas & Equipment	2730 Vermont Ave.	Argon Cryogenic Liquid, carbon dioxide, Nitrogen cryogenic Liquid, Oxygen Cryogenic Liquid
Lowe's of Bismarck, ND Store #2533	1402 Century Ave W	Diesel Fuel, **Lead Acid Batteries**
Montana-Dakota Utilities Bismarck Service Center	909 Airport Rd	Mineral Oil
Montana-Dakota Utilities General Office Generator	400 N 4th St	Diesel Fuel
National Weather Service	2301 University Dr. Blng 27	Diesel Fuel
ND Health & Human Services HHS Warehouse	1509 Gruman Lane	Carbon Dioxide
ND Department of Transportation Bismarck HQ	218 Airport Rd	Tar Oil, Diesel Fuel, Gasoline
ND Department of Transportation-Capitol Ground	600 E Boulevard Av	Gasoline
ND National Guard - Army Aviation Support Facility	3410 Airway Av	Gasoline, Diesel Fuel, Aviation Fuel, Used Oil
ND National Guard - Fraine Barracks	432 Fraine Barracks Rd	**Lead Acid Batteries**, Gasoline, Diesel Fuel, Used Oil
ND National Guard - Raymond J Bohn Armory	4200 E Divide Ave	Diesel Fuel, Gasoline, Used Oil
New Cingular Wireless PCS, LLC (Bismarck - ZX2GBF)	1925 N 11th St	**Sulfuric Acid**
Palmer Mfg & Tank	700 S 26th St	100 Clean Up Solvent
TSafety-Kleen Systems Inc	3704 Saratoga Ave	Petroleum Naphtha, Motor Oil

Tier II Facilities in Bismarck - 2024		
Name	**Address**	**Chemical (BOLD = EHS)**
Sam's Club #4933	2821 Rock Island Pl	**Lead Acid Batteries**
Sprint United Management Company	215 S 15th St	Fuel Oil, **Sulfuric Acid**
Stamart Travel Center #1224	3936 Miriam Ave	Diesel Fuel
Target T2194-Burleigh	600 Kirkwood Mall	Sulfuric Acid
UNFI Distribution (Food)	707 Airport Rd	**Anhydrous Ammonia**, Diesel Fuel, Lead, **Sulfuric Acid**
United Rentals	3925 Miriam Ave	Lead Acid Batteries
US Foods	3500 Saratoga Ave	**Sulfuric Acid,** Lead
Verizon Wireless-Country West 698998	1160 W Divide Ave	**Lead Acid Batteries**
Verizon Wireless-Expressway 4932311	911 S 9th St	**Lead Acid Batteries**
Vestis Uniforms	1238 Frontier Drive	Performance XXL Alkali, Performance Laundry Detergent, Pro Plus Alkali, Pro Plu Industrial Detergent
Western Area Power – Bismarck Warehouse	700 N Bismarck Expressway	**Sulfuric Acid,** Mineral Oil
Western Area Power Administration – Bismarck Administration Building	707 N Bismarck Expressway	**Sulfuric Acid**
Western Area Power – Bismarck Substation	719 N Bismarck Expressway	**Sulfuric Acid,** Mineral Oil
Williston Basin Interstate - Bismarck Station	850 57th Ave NW	New/Used Oil, Slop Oil with Natural Gas Condensate
Zayo Group	1520 E Sweet Av	**Sulfuric Acid**

The following table lists chemicals that are used at various facilities in Bismarck and are identified as EHS, and/or pose an inhalation hazard, and/or have a relatively low IDLH. This list is not all inclusive of chemicals used or stored in Bismarck.

Chemical Name	EHS	Inhalation Hazard	IDLH
Chlorine		x	10 ppm
Anhydrous Ammonia	x	x	300 ppm
Ammonia	x	x	300 ppm
Sulfuric Acid	x	x	15 mg/m
Nitric Acid	x	x	25 ppm
Sulfur Dioxide		x	
Sodium Hydroxide			10mg/m
Oxygen			0.5 ppm
Liquid Nitrogen			20 ppm
Benzene (gasoline)	x		500 ppm
Benzene (diesel fuel)	x		500 ppm
Lead (lead acid batteries)	x		100 mg/m
Paraquat Dichloride	x		1 mg/m
Petroleum Naphtha			1100 ppm
Propane	x		2100 ppm
Actamaster (ammonium sulfate)			1500 mg/m
Carbon Dioxide			40,000 ppm
Petroleum Distillate (liquid asphalt)			1100 ppm
Heptane			750 ppm
Mercury			10mg/m
Toluene			500 ppm
Trichloroethylene			1000 ppm

EHS= Extremely Hazardous Substance (per EPA List of Lists)
Inhalation Hazard – per NIOSH Guide
IDLH: Immediately Danger to Life or Health (parts per million)

The most common hazardous materials within Bismarck at fixed facilities are gasoline and diesel fuel in the sense that they are used, stored, and/or sold at the most locations throughout Bismarck. The number of locations is approximate since they can change frequently. The purpose of the table is to illustrate the common hazardous materials at many of the fixed facilities.

Product	**Number of Locations**
Gasoline	32
Diesel Fuel	28
Propane	16
Sulfuric Acid	12
Oxygen	10
Motor Oil	8
Acetylene	7
Fuel Oil #1	6
Sodium Hydroxide	6
Chlorine	4
Argon	4

Transport (ie: Truck)

Note: Hazardous Materials Release is also addressed in the “Train Derailment” Hazard Profile. Hazmat incidents as a result of train derailment will not be duplicated in this section.

Bismarck has designated truck routes which serve as hazmat routes. However, there are no hazmat routes specifically designated at this time.

Although a Hazmat Flow Study was conducted in 2012 for all of Burleigh County, it’s assumed that all materials stored or used at fixed facility locations in Bismarck or anywhere in North Dakota are transported through Bismarck via I-94 and US83 primarily, and also throughout the city (ie: truck routes) if used or stored at a local fixed facility.

The US Department of Transportation (DOT) defines hazardous material as items which pose a risk to health, safety, and property during commerce related transportation. Vehicles transporting hazardous materials are common. These materials could pose a risk should a spill or other release occur. The DOT divided these materials into nine hazard classes, each exhibiting a common threat to health and/or property. These classes offer the general nature of the material being transported when exact identification is not possible. US DOT class identifications are listed below:

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable Liquids
- Class 4: Flammable Solids/Spontaneously Combustible/Water Reactive
- Class 5: Oxidizers/Organic Peroxides
- Class 6: Toxic/Infectious
- Class 7: Radioactive
- Class 8: Corrosive
- Class 9: Miscellaneous

https://www.phmsa.dot.gov/about-phmsa/offices/office-hazardous-materials-safety

The harm posed to humans can be characterized by one or more characteristics:

- *Ignitability:* Sustains fire which may cause physical harm.
- *Corrosivity:* May corroding metal or other material, poses a chemical hazard.
- *Reactivity:* Can create explosions or toxic releases, posing a physical harm.
- *Toxicity:* Harmful ingested, breathed, or absorbed, posing a chemical harm.
  Definitions from USEPA at www.epa.gov

The US DOT in the Code of Federal Regulations has standards for marking, labeling, placarding, shipping papers, emergency response information, packaging, handling, and transporting of hazardous materials, but there are no reporting requirements for hazardous material transportation. (49 CFD 100-185)

Northern Plains Commerce Centre – Bismarck

The Northern Plains Commerce Centre (NPCC) is a premier industrial park with immediate access to road and rail transport located in Bismarck, North Dakota. The NPCC allows companies to improve their ability to efficiently distribute products within the Northern Plains region and globally. The facility offers both rail and non-rail served sites.

Located adjacent to the Bismarck Airport, the NPCC is home to a 100,000 square foot Bobcat Company Manufacturing Sequencing Center (MSC) and Tubular Transport and Logistics (TTL). Tubular Transport and Logistics offers rail to truck reloading, trucking and storage services allowing non-rail served businesses to take advantage of long haul cost savings by using rail.

The NPCC has access to both Canadian Pacific and the BNSF via the DMVW Railroad. The truck route between US I-94 and the Northern Plains Commerce Centre is considered a heavy haul corridor.
More information: https://www.bismarckmandanedc.com/site-selection/northern-plains-commerce-centre/

Hazmat Traffic Flow Overview

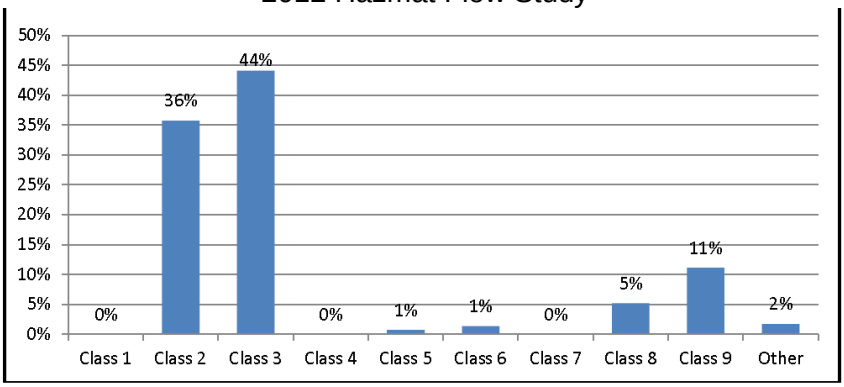
(The following overview is based on the 2012 Hazmat Flow Study for Burleigh County funded by the Local Emergency Planning Committee)

Surface Transportation by Highway: Within Burleigh County, the majority of hazardous materials transported by highway are transported via I-94 (approx. 71%) and US 83 (approx. 26%). Both I-94 and US83 intersect Bismarck. The remaining highways (ND1804, ND14, ND36, and ND41) account for the remaining 3%. The sample included 247 vehicles observed during the 2012 hazmat flow study.

The most common commodities transported by highway were identified as Anhydrous Ammonia, Gasoline, Diesel, Asphalt, and Propane. These top five commodities accounted for 78% of the hazardous materials during the traffic flow study in 2012.

The following graph, from the 2012 Hazmat Flow Study illustrates the hazard classification of the materials transported by highway noted during the study.

DOT Hazard Classification of Materials Transported by Highway
2012 Hazmat Flow Study



Schools and other locations of higher vulnerability based on proximity to I-94 are noted in the table below. Potential icy road conditions along with the higher traffic speed of I-94 enhances the risk of a more significant traffic accident which may involve hazardous materials. Certainly, additional locations are vulnerable, and those listed here would not necessarily be impacted depending on incident location, wind conditions, etc.

Schools and Other Populations in close proximity to I-94 (hazmat traffic)	
Schools	**Other**
Bismarck State College	Family Fare Supermarket (near I-94 clover leaf – west Bismarck)
Theo Art School	Hampton Inn (near I-94 clover leaf – west Bismarck)
Montessori Daycare (adjacent to I-94, significant slope)	Residential community Adjacent to 1-94 (properties are approximately 200 feet from I-94)
Grimsrud Elementary (> ¼ mile)	
Centennial Elementary (1/3 mile)	

Air Transportation: The 2012 hazmat flow study included hazardous materials transported in and out of the Bismarck Airport. Air transportation of hazardous materials has the smallest presence by mode as expected due probably to its relative high cost. Hazardous material shipments by air are handled by UPS and FedEx.

In the sample data period of June 1, 2011 through May 31, 2012 there were 960 inbound shipments of hazardous materials at the Bismarck Airport by FedEx (UPS declined to participate in the study citing homeland security concerns). These shipments are significantly smaller than the shipments that are transported by truck or by railway. When inbound hazardous shipments are categorized according to general DOT hazard classifications, hazards falling into class seven are the most reported. Hazard class seven is radioactive material. The majority of these shipments are shipped in Type A Packaging. Material typically shipped in Type A Packages include nuclear medicines (radiopharmaceuticals). Type A packaging are only used to transport non-life-endangering amounts of radioactive material. Type B(U) packaging is also used for shipments into Burleigh County. This packaging includes shipments in 55-gallon drums. Material typically shipped in Type B(U) packaging includes spent nuclear fuel, high-level radioactive waste, and high concentrations of other radioactive material such as cesium and cobalt.

The sample data period of June 1, 2011 through May 31, 2012 there were 192 outbound shipments of hazardous materials at the Bismarck Airport by FedEx. Hazards falling into class three are the most reported outbound shipments by air.

Top Commodities by Count
Radioactive Material: Type A
Compressed Gas, n.o.s.
Radioactive Material: expected
Sulphuric Acid
Radioactive Material: Type B(U)

Top Commodities by Count
Diesel Fuel
Gasoline
Radioactive Material: Type B(U)
Infectious Substance: Affecting Humans
Petroleum Crude Oil

Rail

The most common commodities transported by rail during the 2012 flow study are Petroleum Crude Oil, Liquefied Petroleum Gas, Alcohols, Anhydrous Ammonia, and Fak-Hazardous Materials with the vast majority being Petroleum Crude (72% in 2012). Since 2012, the percentage of crude oil shipments has increased dramatically. See Train Derailment Hazard Profile for more information.

Pipeline

Bismarck has a petroleum pipeline running east/west along north Bismarck which also runs under the Missouri River to Marathon Petroleum Corporation in Mandan. There is a natural gas pipeline (WBI) in northwest Bismarck running north/south.

NuStar

- Product names: Gasoline, Diesel, Jet Fuel
- Quantities: @1800 bbls per hour
- Pressure: 500 PSI

WBI

- Product names Compressed Methane / Natural Gas
- Quantities 12" Diameter Pipeline
- Pressure 204 PSI MAOP (maximum allowable operating pressure)
- Most common Methane / Natural Gas only
- Highest level of concern:

  Per the 2008 Emergency Response Guide Book :

  - Extremely Flammable
  - Easily ignited by heat, sparks or flames
  - Forms explosive mixtures with air
  - Displaces air and can cause asphyxiation without warning
  - High pressure compressed gas

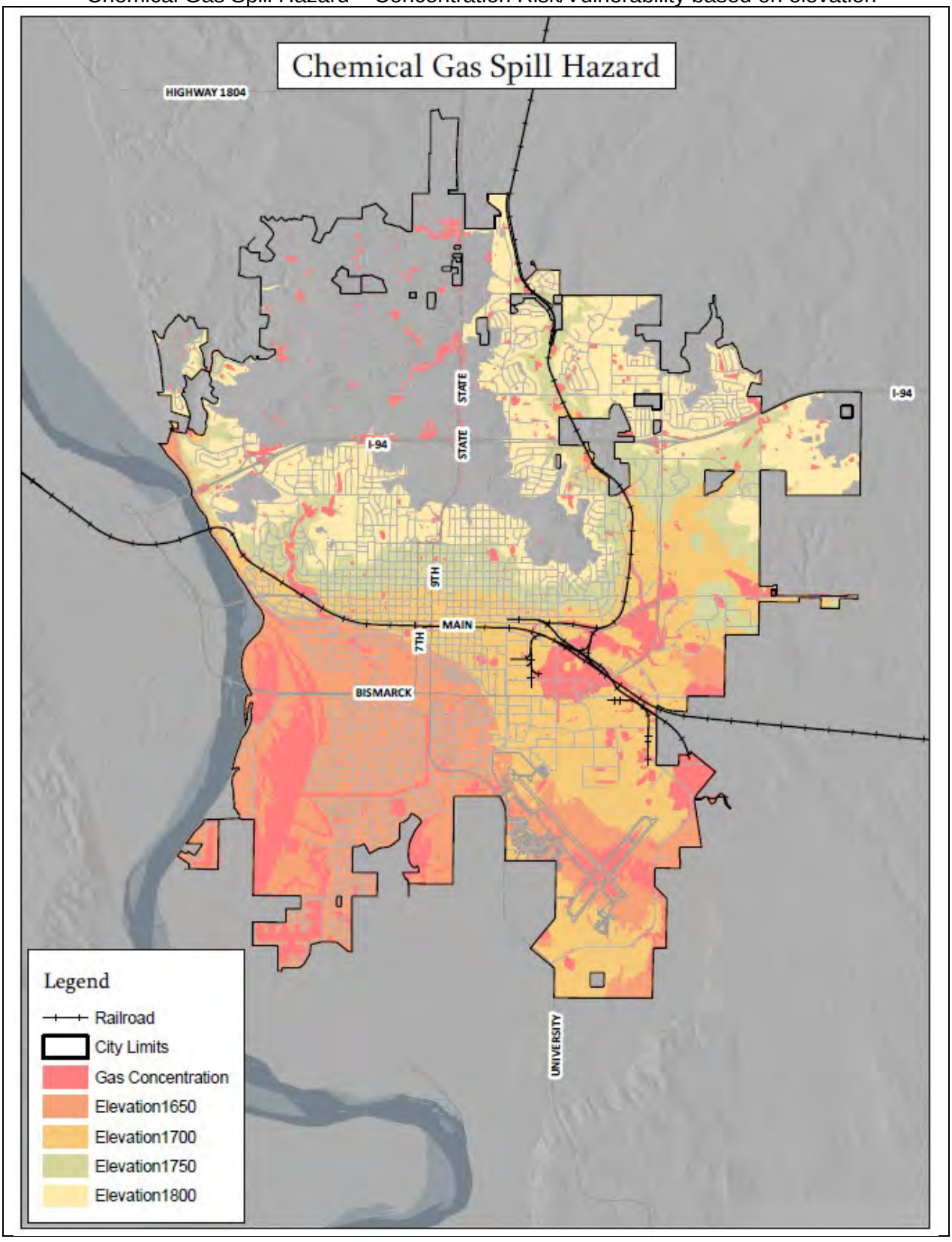
MDU

- Product names: Natural Gas
- Quantities : ~200,000 dkt/yr (dekatherms – heating measure)
- Pressure pressures range from 90 psi to .5 psi.
- Most common: 35 psi
- Highest level of concern: explosive.

Utility Map showing Natural Gas and Petroleum Pipelines

WBI Pipeline – High Consequence Area

Chemical Gas Spill Hazard – Concentration Risk/Vulnerability based on elevation



Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

*Note: Train Derailment is addressed separately within the mitigation plan.

Incident Type	**Fixed Facility Incident**	***Transportation (ie: Truck)**	**Pipeline**
Probability	Possible	Likely	Possible
Speed of Onset	No notice event	No notice event	No notice event
Geographic Area	Localized	Localized	Localized
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Fire, explosion, inhalation hazards A. Employees of hazmat facilities	1. Fire, explosion, inhalation hazards A. Involved parties in closer proximity	1. Fire, explosion A. WBI pipeline High Consequence Area as mapped
Mass Casualty Incident	Possible	Possible	Possible
Property Losses (points of vulnerability – high priority)	1. Involved property and properties in close proximity to incident	1. Property in close proximity 2. Properties along Interstate 94	1. Property in close proximity 2. WBI HCA as mapped
Environmental	1. Stormwater drainage system 2. Sanitary Sewer System	1. Stormwater drainage system 2. Sanitary Sewer System	1. Oil Pipeline – east/west pipeline 2. Hay Creek 3. Missouri River
COG/COOP	1. Public Works – proximity to Praxair 2. Water Treatment Plant 3. Wastewater Treatment Plant		

Incident Type	**Fixed Facility Incident**	***Transportation (ie: Truck)**	**Pipeline**
Critical Facilities	1. Public Works – proximity to Praxair Public Works 2. Fraine Barracks (proximity to Water Treatment Plant)	1. Sanford Health 2. CHI St. Alexius Health 3. Fire Station 2 4. Police Department 5. Water Treatment Plant - organic material overwhelming the sewage treatment process (ex: milk truck) 6. Metro Area Ambulance South 7. Public Health 8. Public Works	1. Water Treatment Plant (near WBI pipeline) 2. Fraine Barracks (WBI pipeline)
Critical Infrastructure	1. Potential impact to water or wastewater treatment plant	1. Temporary blocked streets / Interstate	1. Temporary disruption of petroleum or natural gas distribution.
Schools	1. Ehrmantraut Academy (proximity to Ferrelgas)	1. Jeanette Myhre Elementary 2. Bismarck High School 3. Century High School 4. Solheim Elementary 5. Wachter Middle School 6. Centennial Elementary 7. Emmanuel Christian School 8. St. Mary's Elementary 9. ECLC 10. Rasmussen College 11. Exploring Minds 12. Montessori Daycare 13. YMCA Daycare 14. Northridge Elementary 15. Open Door Community Center	1. Bismarck State College (WBI) 2. Horizon Middle School 3. Grimsrud Elementary School 4. Centennial Elementary School

Incident Type	**Fixed Facility Incident**	***Transportation (ie: Truck)**	**Pipeline**
		16. Super Kids Jr. Academy 17. Bismarck State College 18. Theo Art School	
High Risk Facilities (chemical)	1. Praxair (near Public Works) 2. Ferrell Gas (ie: propane bulk tanks) 3. Waste Water Treatment Plant (ie: chlorine) 4. Water Treatment Plant (ie: chlorine)		
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Individuals, including the homeless population, without immediate access to transportation resources (inability to evacuate). 2. Homeless population with limited or no building access to shelter in place.	1. Kirkwood Mall 2. Maple View (north) 3. Numerous Churches along truck (hazmat) routes 4. Primrose Assisted Living 5. Individuals, including the homeless population, without immediate access to transportation resources (inability to evacuate). 6. Homeless population with limited or no building access to shelter in place.	1. Waterford Apartment (HCA) 2. Touchmark Nursing Home 3. Horizon Care Home 4. Primrose Assisted Living 5. Women's Health Center (HCA) 6. Individuals, including the homeless population, without immediate access to transportation resources (inability to evacuate). 7. Homeless population with limited or no building access to shelter in place.
Economy (community wide)	Moderate (THIRA rating)	Moderate (THIRA rating)	Significant (THIRA rating)
OTHER:			

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No changes.	No changes. See hazard mitigation capabilities specific to Hazardous Materials in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Hazardous Materials events or releases may be initiated by other hazards including Fire (urban fire), as well as severe weather events including Tornado or lightning (to initiate fire and a hazmat release as a cascading event). Flood events can also interact with hazmat storage sites and initiate hazmat releases. Flood waters always need to be considered contaminated. A hazmat release can be intentional via Cyberattack or other intentional acts.

Future Conditions

- **Location**: No change, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See "Anticipated Future Climate Impact" below.
- **Frequency:** See "Anticipated Future Climate Impact" below.
- **Duration:** No change.

Future vulnerabilities to monitor: Nuclear Power Plants (if established in ND) and AI data centers. As of 2025, these do not apply.

Anticipated Future Climate Impact – Hazardous Materials Release Hazard

Although this hazard is largely human-caused, future climate conditions may cause both direct and indirect impacts. Warmer temperatures may directly result in the expansion of gases, increases in biologic agents, or other such actions that could put hazardous material storage containers, transporters, applicators (i.e., anhydrous), or facilities at an increased risk. Increased summer and winter storms, wildfires, floods, transportation incidents, etc. could indirectly put hazardous material containers, transports, applicators (i.e., anhydrous), or facilities at an increased risk.

Previous Occurrences

See page 2 of this section.

Infectious Disease - Hazard Profile

Description

Infectious diseases are naturally occurring biological diseases in humans as well as those biological agents found in the environment, or diagnosed in animals, that have the potential for transmission to humans. An infectious disease is a clinically evident illness resulting from the presence of pathogenic biological agents, including pathogenic viruses, pathogenic bacteria, fungi, protozoa, multicellular parasites, and aberrant proteins known as prions. These pathogens are able to cause disease in animals and/or plants. Infectious pathologies are also called Infectious diseases or transmissible diseases due to their potential of transmission from one person or species to another by a replicating agent (as opposed to a toxin).

Transmission of an infectious disease may occur through one or more of diverse pathways including physical contact with infected individuals. These infecting agents may also be transmitted through liquids, food, body fluids, contaminated objects, airborne inhalation, or through vector-borne spread. Transmissible diseases which occur through contact with an ill person or their secretions, or objects touched by them, are especially infective, and are sometimes referred to as contagious diseases. Infectious (Infectious) diseases which usually require a more specialized route of infection, such as vector transmission, blood or needle transmission, or sexual transmission, are usually not regarded as contagious, and thus are not as amenable to medical quarantine of victims.

Human epidemics may lead to quarantines, large-scale use of the medical care system, and mass fatalities. Typically, the elderly, young children, and those with suppressed immune systems at greatest risk from Infectious diseases. The following biologic agents are considered the highest bioterrorism threats (Category A) due to their ease of dissemination or person-to-person transmission, high mortality rate with potential for major public health impacts, and potential for public panic and social disruption: Anthrax, Botulism, Plague, Smallpox, Tularemia, and Viral Hemorrhagic Fevers. (Centers for Disease Control and Prevention, 2010)

In addition to global disease and bioterrorism concerns, naturally occurring diseases can threaten communities. Natural illnesses of particular concern include Influenza, Meningitis, Pertussis (Whooping Cough), Measles, Norwalk Virus, Severe Acute Respiratory Syndrome (SARS), and food-borne illnesses such as E. coli and Salmonella outbreaks, among others. These diseases can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

An **influenza pandemic** is a global outbreak of a new influenza A virus. Pandemics happen when new (novel) influenza A viruses emerge which are able to infect people easily and spread from person to person in an efficient and sustained way. https://www.cdc.gov/flu/pandemic-resources/index.htm

The COVID-19 pandemic has illustrated that incidents considered less likely to happen can and do occur, and that pandemics may impact areas that are considered less vulnerable due to the more rural nature and less densely populated areas such as here in North Dakota. The COVID-19 pandemic also demonstrated in 2019 through 2023 that the largest threat to human health may be from a disease currently unknown to the world.

Measles and mumps are less common since the emergence of vaccinations in the last century, but are becoming more common as vaccination rates decline. On May 2nd, the first case of Measles was reported in North Dakota (Williams County). Since then, 36 cases were reported in 4 counties through August 1, 2025.

A previous outbreak of Measles in the state occurred in 1986, when 25 people in nine counties tested positive for the disease. Local health officials encouraged parents to keep children from crowded areas, including churches and movie theaters. Unvaccinated children were encouraged not to attend school or daycare. A prom was canceled near Grand Forks, and the state track meet was in peril until the week of the event, the Grand Forks public health officials determined that after-school activity bans had reduced the spread of the disease. The differing guidance from one county to the next was seen as a contributor to the outbreak (Prairie Public, 2021). In response, the North Dakota Legislature passed a law that allowed state health officials to determine the control measures for outbreaks, which was next used for the COVID-19 pandemic.

According to the CDC, measles had been officially eliminated from the United States in 2000. https://www.cdc.gov/measles/data-research/index.html#cdc_data_surveillance_section_6-history-of-measles-cases

Measles can be prevented with immunizations but the percentage of kindergarten exemptions from vaccination for moral or philosophical reasons is increasing in North Dakota. (2.4% in 2014 to 6.72% in 2024). *August 1, 2025 ND Daily Intelligence Report (NDDES / NDHHS).*

There are 75 individual reportable infectious diseases among humans that can lead to death or serious illness. Roughly 20 of these have an individual vaccine that can reduce symptoms and/or increase resistance to contracting the disease. 2024-2029 ND Enhanced Mitigation Plan.

Foodborne Illness

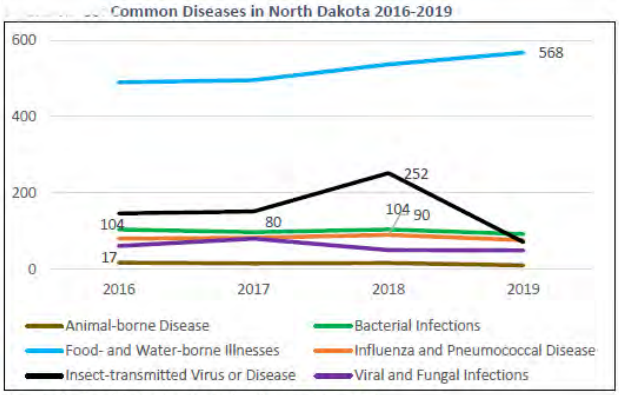
Foodborne illness (sometimes called "foodborne disease," "foodborne infection," or "food poisoning) is a common, costly—yet preventable—public health problem. The Centers for Disease Control and Prevention (CDC) define a foodborne illness outbreak when two or more people get the same illness from the same contaminated food or drink. Many different disease-causing microbes, or pathogens, can contaminate foods, so there are many different foodborne infections. In addition, poisonous chemicals, or other harmful substances can cause foodborne diseases if they are present in food. Foodborne illnesses are a major public health problem. The CDC estimate that each year one in six Americans get sick by consuming contaminated foods or beverages; 128,000 are hospitalized; and 3,000 die of foodborne diseases.

Recreational Water Illness

Recreational water illnesses (RWIs) are caused by germs spread by swallowing, breathing in mists or aerosols of, or having contact with contaminated water in swimming pools, hot tubs, water parks, water play areas, interactive fountains, lakes, rivers, or oceans. RWIs can also be caused by chemicals in the water or chemicals that evaporate from the water and cause indoor air quality problems. RWIs include a wide variety of infections, such as gastrointestinal, skin, ear, respiratory, eye, neurologic, and wound infections. The most commonly reported RWI is diarrhea. In the past two decades, there has been a substantial increase in the number of RWI

outbreaks associated with swimming. Crypto (short for Cryptosporidium) which can stay alive for days even in well-maintained pools, has become the leading cause of swimming pool-related outbreaks of diarrheal illness.

The figure at the right, derived from the 2024-2029 ND Enhanced Mitigation Plan illustrates that Food and Water-borne illnesses were the more common diseases experienced by North Dakotans (absent a pandemic) in the years of 2016-2019.



Source: Centers for Disease Control and Prevention, 2023

West Nile

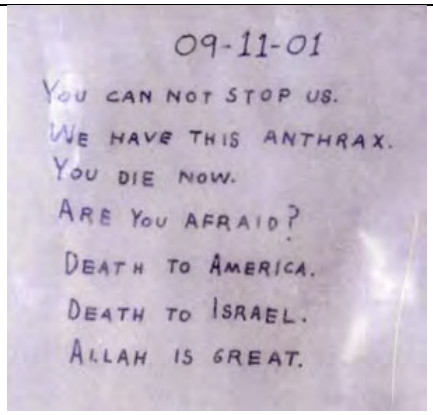
West Nile virus (WNV) is most commonly transmitted to humans by mosquitoes. There are no medications to treat or vaccines to prevent WNV infection. Most people infected with WNV will have no symptoms. About 1 in 5 people who are infected will develop a fever with other symptoms. Less than 1% of infected people develop a serious, sometimes fatal, neurologic illness.

In 2012, an unprecedented outbreak of WNV occurred in Texas; 1,868 cases were reported, including 844 (45%) cases of (WNV neuroinvasive disease [WNND], which included encephalitis, meningoencephalitis, and meningitis) and 89 deaths (case-fatality rate 5%). Male patients, persons >65 years of age, and minorities were at highest risk for neuroinvasive disease. Fifty-three percent of counties reported a case; 48% of case-patients resided in 4 counties around Dallas/Fort Worth. The economic cost was >$47.6 million.

Infectious diseases, whether human, animal, or plant are not governed by geographic boundaries. However, those jurisdictions with the highest human and livestock populations and crop exposure are at greatest risk from Infectious diseases.

Bio-Terrorism

The following biologic agents are considered the highest bioterrorism threats (Category A) due to their ease of dissemination or person-to-person transmission, high mortality rate with potential for major public health impacts, and potential for public panic and social disruption: Anthrax, Botulism, Plague, Smallpox, Tularemia, and Ebola Hemorrhagic Fever.
Centers for Disease Control and Prevention: https://www.cdc.gov/infection-control/hcp/isolation-precautions/appendix-a-table-3.html

Bioterrorism: A Brief History CDC and USDA: https://www.selectagents.gov/overview/history.htm	October 2001 U.S. Anthrax letter
A bioterrorism attack is the deliberate release of viruses, bacteria, or other biological agents used to cause illness or death in people, animals, or plants. In the hands of the wrong people, materials intended for legitimate scientific, medical, or commercial use have the potential to harm large numbers of people. Although the anthrax attacks in the weeks following the 9/11 terrorist attacks focused national attention more acutely on our potential vulnerability; bioterrorism is not a new phenomenon. Throughout history, individuals and groups have used it as a weapon against both military and civilian populations. • In one of the earliest recorded instances of bioterrorism, Persian armies in the 6th century BC poisoned wells with a fungus that affects rye plants (*rye ergot*). • During the American Civil War, it was reported that a Kentucky physician provided clothing exposed to smallpox and yellow fever to Union troops.	
In October 2001, bioterrorism in the U.S. became a reality again when four letters laced with anthrax were sent through the U.S. Postal Service. The attacks resulted in the illness in 22 people, the death of 5, and fear and anxiety in millions of others. The cost of decontaminating offices that were exposed totaled over $23 million.	
Evolution of the Federal Select Agent Program	
1995-1996 A former Aryan Nations member illegally obtained a bacterium that causes plague (*Yersinia pestis*) by mail order. As a result, Congress passed Section 511 of the *Antiterrorism and Effective Death Penalty Act of 1996* requiring HHS to publish regulations for the transfers of select agents that have the potential to pose a severe threat to public health and safety (Additional Requirements for *Facilities Transferring or Receiving Select Agents*, 42 CFR Part 72.6; effective April 15, 1997). **2001-2002** Following the anthrax attacks of 2001 that resulted in five deaths, Congress significantly strengthened oversight of select agents by passing the *USA PATRIOT Act* in 2001 and the *Public Health Security and Bioterrorism Preparedness and Response Act* of 2002 requiring HHS & USDA to publish regulations for possession, use, and transfer of select agents (Select Agent Regulations, 7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73; effective February 7, 2003). **2009** On January 9, 2009, President Bush signed Executive Order 13486, “Strengthening Laboratory Biosecurity in the United States,” to review the effectiveness of biosecurity policies regarding select agents. **2010** On July 2, 2010, President Obama signed Executive Order 13546 entitled “Optimizing the Security of Biological Select Agents and Toxins in the United States” that directed the Department of Health and Human Services (HHS) and the Department of Agriculture (Agriculture) as a part of their ongoing review, to tier, and consider the reduction of the select agent list; and establish physical security standards for select agents with the highest risk of misuse. A final rule published on October 5, 2012 designated Tier 1 select agents, reduced the number of agents on the select agent list, and established physical security and information security standards for Tier 1 select agents. The subset of select agents designated as Tier 1 present the greatest risk of deliberate misuse with significant potential for mass casualties or devastating effect to the economy, critical infrastructure, or public confidence. Select Agents and Toxins list: https://www.selectagents.gov/sat/list.htm	

Infectious Disease Information Resources

- The ND Department of Health identifies mandatory reportable diseases and conditions: https://www.hhs.nd.gov/health/diseases-conditions-and-immunization/STI/report
- Community Health reports for Bismarck/Burleigh area are available at: https://ruralhealth.und.edu/projects/community-health-needs-assessment/reports#burleigh
- Seasonal Flu Monitoring Website: https://www.health.nd.gov/flu http://www.ndflu.com/DataArchive/

Vulnerability Assessment (1 of 2)

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Scenario:	**Infectious Disease**	**Pandemic Influenza**	**Bio-Terrorism**
Probability	Likely	Possible	Possible
Speed of Onset	May be a “no-notice” event or slow onset depending on location of origin	May be a “no-notice” event or slow onset depending on location of origin	May be a “no-notice” event or slow onset depending on location of origin
Duration	Varies	Months/Years	Weeks
Geographic Area	Local, regional…. worldwide	Local, regional…. Worldwide	Local, regional…. worldwide
Death / Injury 1. Primary Causes	1. Reportable Infectious Diseases.	1. Reportable Infectious Diseases. 2. Supply chain issues, including no vaccine immediately available for new (novel) diseases. 3. Domestic abuse 4. Child abuse and neglect	1. Anthrax, Botulism, Plague, Smallpox, Tularemia, and Ebola Hemorrhagic Fever. Also, see CDC / USDA select agent list: https://www.selectagents.gov/sat/list.htm
A. Highest vulnerability	A. Those with underlying medical conditions or suppressed immune systems. B. Elderly and young C. Those living or working in close proximity. • Schools, universities, assisted living, nursing homes D. Those unvaccinated E.	A. Those with underlying medical conditions or suppressed immune systems. B. Elderly and young C. Those living or working in close proximity. D. Schools, universities, assisted living, nursing homes E. Those unvaccinated	A. Those who come in direct contact with the bio-agent (i.e.: targeted victims, first responder community and hospital staff). B. Those in close proximity to location of dispersal C. As bio-agent dissipates, risk and vulnerability are reduced.

Scenario:	**Infectious Disease**	**Pandemic Influenza**	**Bio-Terrorism**
Mass Casualty Incident	Yes Possible	Yes Probable	Yes Likely
Property Losses (points of vulnerability – high priority)	1. Decontamination of a facility may be required before reuse. 2. Use may be discontinued until threat has passed.	1. Decontamination of a facility may be required before reuse. 2. Use may be discontinued until threat has passed.	1. Decontamination of a facility may be required before reuse. 2. Use may be discontinued until threat has passed.
Environmental (points of vulnerability – high priority)	1. Incident Specific • Water, Soil, Air, Food	1. Incident Specific • Water, Soil, Air, Food	2. 1. Incident Specific • Water, Soil, Air, Food
COG/COOP (points of vulnerability – high priority)	1. Employee/Family Illness 2. Orders of Succession all departments. 3. Public Health Department, response capability compromised 4. Emergency Services staffing, services, and capabilities compromised.	1. Employee/Family Illness 2. Order of Succession all departments 3. Public Health Department, response capability compromised 4. Emergency Services staffing, services, and capabilities compromised. 5. Supply Chain issues.	1. First Response Emergency Services • Fire • EMS • Police 2. Public Health
Critical Facilities (points of vulnerability – high priority)	1. Hospitals 2. Clinics 3. Other Emergency Service Providers 4. Airport 5. Civic Center 6. Prison, jail and other institutional facilities	1. Hospitals - Including issues with capacity / available bed space - Workforce shortages 2. Clinics 3. Other Emergency Service Providers 4. Airport 5. Civic Center 6. Prison, jail and other institutional	1. Federal/State Agencies 2. Hospitals - may be treating victims with unknown bioterrorism agent 3. HVAC systems of Critical Facilities 4. Emergency Services 5. USPS Warehouse sorting facility

Scenario:	Infectious Disease	Pandemic Influenza	Bio-Terrorism
		facilities	
Critical Infrastructure (points of vulnerability – high priority)	1. Availability and capability to restore services may be impacted: such as Water, Food, Medication, Sanitation, Communications. 2. Transportation – Airport	1. Availability and capability to restore services may be impacted: such as Water, Food, Medication, Sanitation, Communications. 2. Transportation - Airport	1. Transportation - Airport
Schools (points of vulnerability – high priority)	1. Entire school population is of high vulnerability. 2. School facilities may require decontamination, delayed use, or may be needed for alternative purposes.	1. Entire school population is of high vulnerability. 2. School facilities may require decontamination, delayed use, or may be needed for alternative purposes.	
High Risk Facilities (chemical) (points of vulnerability – high priority)	1. Facilities containing hazardous materials may pose a greater risk depending on impact to staffing and on-site safety and security personnel.	1. Facilities containing hazardous materials may pose a greater risk depending on impact to staffing and on-site safety and security personnel.	
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	1. Elderly 2. Young 3. School population 4. Universities 5. Day Cares 6. Those living or working in close proximity 7. Senior Citizen Facilities 8. Nursing Home 9. Assisted Living 10. Incarcerated, institutional settings 11. Indoor/Outdoor Events 12. Malls/Stores 13. Churches 14. Social Gathering	1. Elderly 2. Young 3. School population 4. Universities 5. Day Cares 6. Those living or working in close proximity 7. Senior Citizen Facilities 8. Nursing Home 9. Assisted Living 10. Incarcerated, institutional settings 11. Indoor/Outdoor Events 12. Malls/Stores 13. Churches 14. Social Gathering 15. Vulnerable Populations	1. Non-specific, depends on terrorism group and motives. May involve special populations and motives relating to government or religion for example.

Scenario:	**Infectious Disease**	**Pandemic Influenza**	**Bio-Terrorism**
		including: • Economically disadvantaged • Uninsured (health insurance) • English as a 2nd language • Those without internet services (limited access to information and services)	
Economy (community wide)		1. Supply Chain issues 2. Significant impact to local, regional, national, and global economies. See additional impact and vulnerability statements following this table.	
OTHER: (points of vulnerability – high priority)	1. Those NOT vaccinated for vaccine preventable diseases. 2. Vaccines exist for many, but not all diseases. 3. Multi-Drug Resistant Organisms: fungi and bacteria resistant to antibiotics 4. ND allows for opting out of vaccines for religious, moral, or philosophical reasons.	1. Those NOT vaccinated for vaccine preventable diseases. 2. The unavailability of vaccines at the start of new (novel) disease. 3. ND allows for opting out of vaccines for religious, moral, or philosophical reasons.	

The following impact and vulnerability descriptions based on the COVID-19 event are derived from the 2024-2029 ND Enhanced Mitigation Plan:

- *The COVID-19 global pandemic demonstrated that the indirect consequences of a widespread infectious disease can be as difficult as the disease itself. Workplace shutdowns and restrictions initiated to stop the spread of the disease led to skyrocketing unemployment and economic impact. Supply-chain issues created shortages of essential goods such as infant formula. The need for medical care demonstrated the limits of health care systems and impacts of stress in healthcare professionals.*
- *COVID-19 demonstrated the vulnerability in supply chains and the criticality of low-skilled labor in the economy. Shutdowns from outbreaks in the food processing industry early in the pandemic impacted food supplies and prices. Outbreaks in the food processing industry were among some of the earliest in the United States, and most of the infected were poor, uninsured, and spoke English as a second language.*
- *Shortages exposed the vulnerability of the global supply chain. Among some of the more impactful shortages were the shortage of computer chips, lumber, baby formula, and tampons.*
- *Minorities and immigrants are in positions more likely to be deemed essential work, more likely to have essential workplaces that expose them to others, and less likely to have sick-pay benefits, creating a higher probability of infection in communities more likely to experience co-morbidities, health inequities, and less likely to have equal access to healthcare.*
- *As operations became more virtual in nature, households that did not have access to quality internet service would face additional challenges in receiving information and services.*
- *Domestic violence, child abuse and neglect, and divorce all increased during COVID-19. Stress, the disruption of protective and supportive social networks, decreased access to services, and fewer interactions with the public were contributors to the escalation of domestic abuse. Suicides and mental health crises increased during and after the public health emergency, sometimes in response to increased stress due to changing household economics, stressful essential work, resentment over the lack of employment options, or from regressive social behavior exhibited by adults (Turcotte-Tremblay, et al., 2021).*
- *Facilities that were designed for public gatherings often struggled financially during COVID-19 as these activities were delayed, canceled, or moved to a virtual space (Turcotte-Tremblay, et al., 2021). This led to an increase in bankruptcies and the need for financial assistance.*
- *Mandatory closures for in-person businesses in March and April 2020 economically impacted small business and municipal and state revenues. The implementation of the ND Smart Restart plan created additional costs for conducting in-person business, including decreasing the number of customers that could be served, masking and testing requirements, and social distancing (Turcotte-Tremblay, 2021).*
- *In government, losses in income at the household level result in lower tax revenues to provide government services.*

Vulnerability Assessment (2 of 2)

Scenario:	**Foodborne Illness**	**Rec Water Illness**	**West Nile Outbreak**
Probability	Likely	Likely	Likely
Speed of Onset	No notice	No notice	No notice
Duration			
Geographic Area	Statewide/nationwide	Statewide/nationwide	Statewide/nationwide
Death / Injury 1. Primary Causes A. Highest Vulnerability	1. Consuming food or drink that contains a pathogen (i.e.: bacteria, virus or parasite) or harmful chemical or substances A. Young, elderly and Immuno-compromised	1. Swallowing, breathing in mists or aerosols of, or having contact with contaminated water A. Young, elderly and Immuno-compromised	1. Getting bit by an infected mosquito A. People with certain medical conditions such as cancer, diabetes, hypertension and kidney disease are also at greater risk for serious illness.
Mass Casualty Incident	Yes, potentially	Most likely not	Yes, potentially
Property Losses	NA	NA	NA
Environmental	NA	NA	NA
COG/COOP	NA	NA	NA
Critical Facilities	NA	NA	NA
Critical Infrastructure	NA	NA	NA
Schools	NA	NA	NA
High Risk Facilities (chemical)	NA	NA	NA
Specific Populations: Public Assembly, Vulnerable / Special Populations	Those affected are likely to have consumed a common meal from a common source (ie: donated or intentional act)	Those recreating in untreated water – lakes, rivers, reservoirs.	Those who work outside or participate in outdoor activities
Economy (community wide)	Medical costs Lost productivity	Medical costs Lost productivity	Medical costs Lost productivity
OTHER:			

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
There is an increase in vulnerability since the previous plan update due to lower rates of vaccination among North Dakotans for various diseases as discussed in this plan. Not all parents choose to vaccinate their children. Consequently, parents who don't vaccinate their children are in essence depending on the vaccination of other children to protect their child from getting vaccine preventable diseases. *Lower-than-national-average, and generally decreasing rates of vaccination makes negative public health outcomes, illness, and death from communicable diseases more probable in the state. Source: 2024-29 ND Enhanced Mitigation Plan.*	Drive-thru vaccination and/or dispensing capability is established at the new Public Health facility (heated area). See additional Infections Disease Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Our winter weather season has an impact on infectious diseases as a result of changing behaviors (congregating and staying indoors more frequently). Infectious diseases may be caused intentionally as a Terrorist or Nation State Attack. Bioterrorism is discussed within this Infectious Disease Hazard profile.

Future Conditions

- **Location**: No change.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** See “Anticipated Future Climate Impact” below.
- **Duration:** No change.

Anticipated Future Climate Impact – Infectious Disease Hazard
North Dakota should expect larger, more frequent, and more intense outbreaks of certain infectious diseases and pests, though some human and animal diseases may also decrease in occurrence. Somewhat shorter and less cold winter seasons could lead to decreased incidents of certain infectious diseases among both human and animal populations during this period, depending on how and where population growth (or withdrawal) and development occur.

Previous Occurrences

COVID-19 Pandemic
Presidential Disaster Declaration issued in 2020 **DR-4509**
Incident Period: January 20, 2020 - May 11, 2023
Declaration declared on: April 1, 2020
Entire State Declared

Summary derived from the 2024-2029 ND Enhanced Mitigation Plan.

On March 11, 2020, the World Health Organization declared COVID-19 to be a global pandemic, and the nation followed on March 13, 2020. The emergency officially ended in the United States on April 10, 2023, and worldwide on May 5, 2023. The incident period for EM-3477-ND, issued for the entire state at the onset of COVID-19, spanned nearly four years, ending on May 11, 2023. As conditions deteriorated, North Dakota received a federal declaration on April 1, 2020, which also ended May 11, 2023.

North Dakota identified its first COVID-19 case and recorded its first death in March 2020, leading to the closure of schools and limiting of public gatherings to stop the spread. Businesses began re-opening in late spring 2020, although schools continued to operate through distance learning.

Vaccines were not available in North Dakota until December 14, 2020, about the time when hospitalizations and deaths peaked in North Dakota.

Although North Dakota COVID-19 cases peaked in January 2022, the state was in a better position to deal with the situation because vaccines and treatments were more readily available leaving North Dakota positioned to respond when the peak hit (UND School of Medicine and Health Sciences, 2023). Deaths reported to the North Dakota Department of Health and Human Services showed a pattern similar to that of hospitalizations, with an early virus peak during the Fall 2020 season, and a smaller peak as the Delta and Omnicron variants emerged, October 2021 through January 2022 (NDHHS, 2023). Indoor activities were likely a factor in these peaks as people congregate in indoor areas, increasing transmission. Mutations of the virus occurred during the global pandemic, and variations of the virus were dominant at different periods of the pandemic.

Burleigh County cumulative COVID-19 cases reported through April 2023: 41,598. Only Cass County had more cases. Burleigh County had a 0.42 infection rate per capita (3rd highest rate in the state behind Rolette and Sioux Counties). About one in three North Dakotans contracted COVID-19 during the emergency period (NDHHS, 2023).

Vaccines are reported to have reduced the rate of infection by 50 percent and reduced the rate of hospitalizations by 50 to 66 percent when compared to unvaccinated cohorts (NDHHS, 2023).

For those unvaccinated, immune-compromised or having other co-morbidities or health inequities, serious illness and death continue to be consequences of the disease.

Not all impacts were negative, such as opportunities created via remote work: Remote work increases opportunities for those who are homebound or struggle with mobility issues, increases the pool of workers beyond the local area, and allows people who also have caretaker duties in the home more opportunity to participate in the workforce.

2017 Influenza Season

Summary

The North Dakota Department of Health (NDDoH) received reports of 8,530 cases of laboratory-identified influenza, the largest seasonal case count on record. This statistic captures cases that are identified with a laboratory test. Cases diagnosed based on symptomology or contact with another known case are not reported. Additionally, not all people with influenza will seek the care of a medical professional. Therefore, the true seasonal burden of influenza is higher than presented in this report.

The predominant strain this season was the influenza A H3N2. This strain also predominated last season. According to the Centers for Disease Control and Prevention, the 2017-18 season was one of the most severe seasons on records, and the most severe since the 2009 pandemic.

As usual, the influenza A 2009 H1N1 pandemic strain circulated as well, in much lower numbers. As did both influenza B lineages, with B Yamagata making up a large majority of the influenza B cases.

County	Case Count
Adams	37
Barnes	111
Benson	169
Billings	0
Bottineau	51
Bowman	47
Burke	36
Burleigh	955
Cass	1983

Source: **https://www.hhs.nd.gov/sites/www/files/documents/Files/MSS/Flu/Weekly_Reports/2017-18/2017-18%20Influenza%20Seasonal%20Summary.pdf**

2009 H1N1

In the spring of 2009, a novel influenza A (H1N1) virus emerged. It was detected first in the United States and spread quickly across the United States and the world. This new H1N1 virus contained a unique combination of influenza genes not previously identified in animals or people. This virus was designated as influenza A (H1N1)pdm09 virus.

The (H1N1)pdm09 virus was very different from H1N1 viruses that were circulating at the time of the pandemic. Few young people had any existing immunity (as detected by antibody response) to the (H1N1)pdm09 virus, but nearly one-third of people over 60 years old had antibodies against this virus, likely from exposure to an older H1N1 virus earlier in their lives. Since the (H1N1)pdm09 virus was very different from circulating H1N1 viruses, vaccination with seasonal flu vaccines offered little cross-protection against (H1N1)pdm09 virus infection. While a monovalent (H1N1)pdm09 vaccine was produced, it was not available in large quantities until late November—after the peak of illness during the second wave had come and gone in the United States. From April 12, 2009 to April 10, 2010, CDC estimated there were 60.8 million cases (range: 43.3-89.3 million), 274,304 hospitalizations (range: 195,086-402,719), and 12,469 deaths (range: 8868-18,306) in the United States due to the (H1N1)pdm09 virus.
Source: https://archive.cdc.gov/www_cdc_gov/flu/pandemic-resources/2009-h1n1-pandemic.html

The following summary information is carried over from the previous mitigation plan due to the 2009-2010 H1N1 Pandemic Report no longer being available via ND HHS website.
The first case of novel H1N1 in a North Dakota resident was confirmed May 8, 2009. This marked the beginning of the first wave of 2009 H1N1 influenza illness in North Dakota. Seasonal influenza strains continued to co-circulate through the month of May but soon transitioned to only 2009 H1N1 influenza being detected by PCR testing methodologies. Children and teens were the age groups more affected by 2009 H1N1 influenza compared to all other age groups. The largest number of positive influenza cases was reported in the 11- to 19-year-old age range (877 in ND). Those ages 19 and younger comprised 69 percent of the total cases reported during the 2009- 2010 influenza season. The median age of reported cases was 12.96 years and ranged from 0.01 to 87.76 years. 618 influenza cases were from Burleigh County for the 2009-10 season which was the highest count in ND. Cass had the 2nd highest reported with 305. The report did not identify the number of deaths specific to ND other than the statement “no influenza associated deaths among children were identified in North Dakota.” The emergence of this virus caused the first influenza pandemic in more than 40 years.

1918 and 1920 Spanish Influenza epidemic
Source: 2024-2029 ND Enhanced Mitigation Plan.

North Dakota experienced two waves of the Spanish Influenza epidemic in 1918 and 1920. The 1918 outbreak in North Dakota began in Fargo in late September 1918, with unexpected lethality for people between 20 and 35 years old. Much as in modern day, schools and gathering places, including churches, shuttered to stem the spread of the disease that took more than 500,000 American lives and sickened 20 million (The Forum, 2005). According to the Report of (ND) State Board of Health, a total of 1,378 North Dakotans died of influenza between 1 July 1918 and 30 June 1919, versus 9 persons in the previous 12-month period (State Historical Society of North Dakota, 2023). The second wave came in early 1920, prompting a return to limiting social gatherings after an outbreak began at the North Dakota Agricultural College (now NDSU). Emergency field hospitals were opened in Grand Forks and Stark County and businesses were forced to limit patrons (Prairie Public, 2021). Dances and after-school activities were canceled. Some areas with especially prolific outbreaks went into complete shutdown, including Stark and Stutsman Counties.

Pest Infestation – Hazard Profile

Urban Forest Damaging Pests

Description

There are several pests and diseases, some more harmful than others, that are prevalent in Bismarck.

Dutch Elm Disease (DED): The most common disease in Bismarck every year is Dutch Elm Disease (DED). Approximately fifty Elm trees are removed in Bismarck each year due to DED. Click here to view the map showing the history of DED.

Dutch elm disease (DED) was first detected in Mandan, North Dakota in 1969 and has since been recorded in all North Dakota counties. Dutch elm disease is a wilt disease caused by the fungus *Ophiostoma novo-ulmi* and only affects trees in the elm family (*Ulmaceae*). Dutch elm disease (DED) is spread (vectored) by native elm bark beetles, European elm bark beetles and the banded elm bark beetle in North Dakota. DED is also spread by moving elm firewood from infected trees into new areas.

Dutch Elm Disease (DED) is a fungus that is spread by elm bark beetles. When an elm tree is infected with DED, branches in the upper crown will yellow, curl and wilt, commonly referred to as *flagging*. If a healthy elm tree is next to a tree infected with DED it is possible for the fungus to spread through the root systems. This happens when trees are planted close together and as they mature their roots fuse together, also known as root grafting.

Tree mortality can occur within one year of infection, though DED generally takes three years or more to kill a tree.

Why is Dutch elm disease a problem?

- Dutch elm disease kills trees rapidly and spreads readily if not properly managed.
- There is no 'cure' for DED and the disease is widespread in urban and rural areas throughout North Dakota.
- Dutch elm disease kills American elm trees, the North Dakota State Tree, which is well-adapted to environmental conditions in our state.
- Management of Dutch elm disease in North Dakota communities is costly.

What are the current impacts of Dutch elm disease in North Dakota?

- Continual need to spend considerable amounts of money to manage Dutch elm disease in North Dakota communities.
- Continual loss of a prominent, well-adapted tree species in natural settings.
- Continual incremental loss of a prominent and excellent tree for urban settings.

The Forestry Division is also on watch for **Emerald Ash Borer (EAB).** EAB attacks Ash (*Fraxinus*) trees. EAB has been found in LaMoure County in the State of North Dakota. It has also been found in Moorhead, MN and Winnipeg, Canada along with other Midwest States.

Emerald Ash Borer (EAB), Agrilus planipennis Fairmaire, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The adult beetles nibble on ash foliage but cause little damage. The larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. As of February 2025, it is now found in 37 states, and 6 Canadian provinces.

The world has become a Global Market, meaning North America and other countries are receiving material from other parts of the world. Along with these products invasive pests are also being shipped. Looking back at the major pest problems all are an invasive pest or disease; Gypsy Moth, Dutch Elm Disease (DED), Chestnut Blight, and now EAB. It is difficult to tell what future pest will be introduced to the North America and North Dakota. In the case of EAB, around 22% of Bismarck's boulevard trees are composed of an ash species. Bismarck has been successful in its efforts with DED. As the City report states when City staff has to address EAB this will detract from our DED program. This will then put the 14% elm street tree population at risk of finally succumbing to DED. With those two efforts the City of Bismarck has the potential of losing 36% of its street population. This does not account for the Bismarck Park District and private trees.

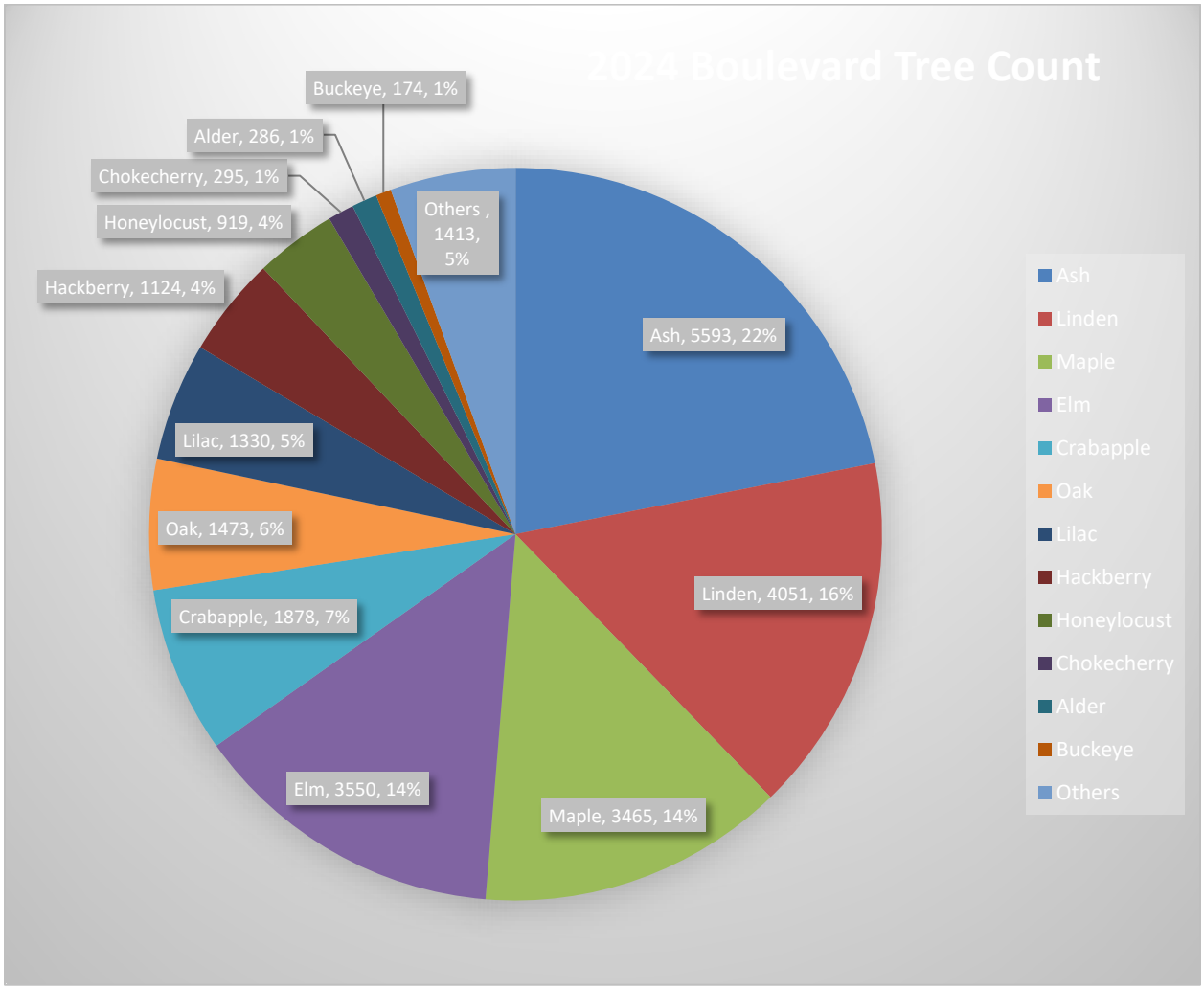
Scope of Emerald Ash Borer Impact on Bismarck:

Ash is one of the most important and abundant species in the City of Bismarck and the surrounding area. Ash composes nearly 22% of all street trees (5,593 street trees, all of these ash trees will be impacted by EAB) in Bismarck. This does not take into account park property and private trees in Bismarck. Once introduced to Bismarck and the surrounding area, it is likely that every ash tree will be impacted by EAB.

In 2020, the Forestry Division surveyed a few local tree services and nurseries to develop cost estimates. The estimates presented here represent 2020 dollars:

Removal and stump grinding of a medium sized tree could cost $1000 per tree. Replanting a 2" caliper tree would cost anywhere from $500-550 per tree. Taking a conservative approach, the City would be spending 5.5 million dollars for removals and citizens could spend 3 million dollars replanting lost ash trees. This does not account for the lost economic benefits that these trees provide to the City and the residents such as; more rainwater would work its way into the storm water systems without the trees to intercept the rainwater, household cooling cost would increase due to the lost shade provided by the trees, winter heating cost would increase without these trees blocking the harsh winter winds.

History: EAB is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The adult beetles nibble on ash foliage but cause little damage. The larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. As of February 2025, it is now found in 37 states, and 6 Canadian provinces. This pest has killed millions of ash trees along the way.



Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Pest Infestation – Emerald Ash Borer and Dutch Elm Disease
Probability	Likely
Speed of Onset	Slow
Duration	Years
Geographic Area	City, County, Statewide, Regional
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Trimming or removing trees. A. Those without adequate training or experience in tree removal, if attempting to trim or remove their own trees. B. City Forestry staff due to a potentially high number of impacted trees should EAB impact Bismarck.
Mass Casualty Incident	No.
Property Losses	1. Potentially ALL Ash Trees (Emerald Ash Borer) 2. Elm Trees (Dutch Elm Disease)
Environmental	1. Loss of shading and protection increases heating and cooling requirements (and costs) of surrounding facilities. 2. Aesthetics. 3. Storm water system impacted due to rainwater not being intercepted by mature trees.
COG/COOP	1. No impact on continuity of government or continuity of operations.
Critical Facilities	1. None.
Critical Infrastructure	1. None.
Schools	1. None.
High Risk Facilities (chemical)	1. None.
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. None.
Economy (community wide)	Moderate impact. See “Scope of Emerald Ash Borer Impact on Bismarck” on page 2.
OTHER:	Transporting of infested firewood.

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No changes aside from additional property as annexed into the city. See Community Profile Section 7.	See Pest Infestation Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: See "Anticipated Future Climate Impact" below.

Future Conditions

- **Location**: The locations of pest infestation hazard will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See "Anticipated Future Climate Impact" below.
- **Frequency:** See "Anticipated Future Climate Impact" below.
- **Duration:** The duration of pest infestation hazards is not projected to change.

Anticipated Future Climate Impact – Pest Infestation Hazard
As a result of slightly warmer and longer summers, more pests and invasive weeds will be able to thrive and spread, contributing to increases in insect populations such as *Emerald Ash Borers* and *Elm Bark Beetles*, or certain vector-borne diseases such as *Dutch Elm Disease Spores* or *West Nile Disease*.

Previous Occurrences

Dutch Elm Disease (DED): The most common disease in Bismarck every year is Dutch Elm Disease (DED). Approximately fifty Elm trees are removed in Bismarck each year due to DED. Click here to view the map showing the history of DED.

Severe Summer Weather Hazard Profile

Including Lightning, Wind (Downburst and Straight-Line), Hail, and Extreme Heat.
Note: Tornado is addressed as a separate hazard.

Description

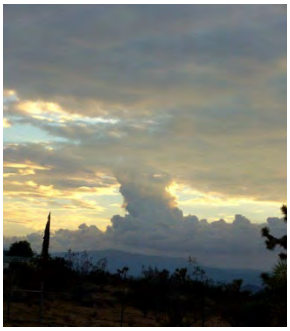
Thunderstorm
Severe summer storms can result in loss of life, injuries, and damage to property and crops. Although thunderstorms affect relatively small areas when compared to other hazards such as winter storms. All thunderstorms are dangerous. Every thunderstorm produces lightning, which kills more people each year than tornadoes. Heavy rain from thunderstorms can lead to flash flooding. Strong winds, hail, and tornadoes are also dangers associated with some thunderstorms.

Of the estimated 100,000 thunderstorms that occur each year in the United States, only about 10 percent are classified as severe. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. The National Weather Service considers a thunderstorm severe if it produces hail at least 1” in diameter, winds of 58 mph or stronger, or a tornado.

Thunderstorms are most likely to happen in the spring and summer months during the afternoon and evening hours, but they can occur year-round and at all hours. Annually, the central and northern parts of North Dakota may have an average of 10 to 30 days with thunderstorm activity, while the southern part of the state averages between 30 to 50 days.

Thunderstorms form when moisture, unstable air, and lift are present in the atmosphere. Thermal instability, fronts, and the sun’s heat are capable of lifting the air to help form thunderstorms. All thunderstorms proceed through a three-stage life cycle.

The Cumulus Stage



The cumulus stage occurs when thunderstorm development begins. At this stage, the storm consists only of upward-moving air currents called updrafts. These updrafts reach heights of around 20,000 feet above the ground, but the base of the storm may lower, as moisture becomes more plentiful. As a thunderstorm develops, towering cumulus clouds indicate rising air. There is usually little rain during this stage and only occasional lightning.
Source: photo http://en.wikipedia.org/wiki/File:Towering_Vertical_Cloud_1.jpg

The Mature Stage

The mature stage is the strongest and most dangerous stage of a storm's life cycle. As the storm matures, the clouds have a black or dark green appearance. Hail, heavy rain, frequent lightning, strong winds, and tornadoes are most likely to occur during this phase, lasting an average of 10 to 20 minutes. At this stage, the storm contains both upward and downward moving air currents (updrafts and downdrafts) with precipitation in the downdraft area. These updrafts and downdrafts can reach velocities of 170 mph.

When the cool downdraft hits the ground, it spreads out and forms a gust front, which may include damaging wind called a downburst. The updraft also causes the top of the storm to spread out.

Source: Photo http://upload.wikimedia.org/wikipedia/commons/0/0c/FoggDam-NT.jpg

The Dissipating Stage

In the dissipating stage, the precipitation and downdraft dominate the storm and weaken the updraft. As the gust front moves away from the storm, the inflow of energy into the storm is cut off. As the thunderstorm dissipates, rainfall may decrease in intensity, but lightning and strong winds remain a danger.

Severe Summer Weather Data Resources:

- US Climate Extremes Data may be found at https://www.ncdc.noaa.gov/extremes/cei/graph/wn/06-08/1
- NOAA Storm Events Database: http://www.ncdc.noaa.gov/stormevents/

Lightning

Lightning Season Start/End Dates 1995-2019	
March 8, 2000	Earliest seasonal lightning strike
October 19, 2004	Latest seasonal lightning strike

Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder. (National Weather Service, 2007c)

Lightning occurs with all thunderstorms, and averages 80 to 93 deaths and 300 injuries in the United States each year. Lightning also causes several hundred million dollars in damage to property and forests annually. Most lightning deaths and injuries occur when people are caught outdoors, especially under or near tall trees, in or on water, or on or near hilltops. Between 1984 and 1994, over 15,000 lightning induced fires nationwide resulted in several hundred million dollars in damages and the loss of two million acres of forest.

Lightning can cause fatalities, injuries, and property damage directly and indirectly. Lightning can strike humans, animals, aircraft, buildings, equipment, and the surface of the earth causing death and destruction. Lightning can trigger other hazards including fires, power surges, interruption of communications, downed power lines, and exposure to noxious gas due to vaporization of materials. Computer equipment is especially vulnerable to damage from power surges.

A CG (cloud-to-ground) lightning forecast predicts the likelihood of cloud-to-ground lightning strikes from thunderstorms, often combined with the expected flash rate.

Lightning Threat Levels (National Weather Service)
Source: https://www.weather.gov/mlb/lightning_threat

Lightning Threat Level	Threat Level Descriptions
Extreme	**"An Extreme Threat to Life and Property from Lightning."** Within 12 miles of a location, a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of excessive CG lightning. AND/OR...a high likelihood of CG lightning (or 60% to 70% thunderstorm probability), with storms capable of frequent CG lightning. AND/OR...a very high likelihood of CG lightning (or 80% to 90% thunderstorm probability), with storms capable of occasional CG lightning.
High	**"A High Threat to Life and Property from Lightning."** Within 12 miles of a location, a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of excessive CG lightning. AND/OR...a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of frequent CG lightning. AND/OR...a high likelihood of CG lightning (or 60% to 70% thunderstorm probability), with storms capable of occasional CG lightning.
Moderate	**"A Moderate Threat to Life and Property from Lightning."** Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm probability), with storms capable of excessive CG lightning. AND/OR...a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of frequent CG lightning. AND/OR...a moderate likelihood of CG lightning (or 50% thunderstorm probability), with storms capable of occasional CG lightning.
Low	**"A Low Threat to Life and Property from Lightning."** Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm probability), with storms capable of frequent CG lightning. AND/OR...a low likelihood of CG lightning (or 30% to 40% thunderstorm probability), with storms capable of occasional CG lightning.
Very Low	**"A Very Low Threat to Life and Property from Lightning."** Within 12 miles of a location, a very low likelihood of CG lightning (or 10% to 20% thunderstorm probability), with storms capable of occasional CG lightning.
Non-Threatening	**"No Discernable Threat to Life and Property from Lightning."** Within 12 miles of a location, environmental conditions do not support CG lightning.

Note: With cloud-to-ground (CG) lightning, every strike is potentially lethal.
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.

Wind

Strong winds can form along the leading edge of a thunderstorm. **Downburst winds** occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. Cold air is denser than warm air, and therefore, wants to fall to the surface. On warm summer days, when the cold air can no longer be supported up by the storm's updraft, or an exceptional downdraft develops, the air crashes to the ground in the form of strong winds. These winds are forced horizontally when they reach the ground and can cause significant damage. These types of strong winds can also be referred to as straight-line winds. Downbursts with a diameter of less than 2.5 miles are called microbursts and those with a diameter of 2.5 miles or greater are called macrobursts. A derecho, or bow echo, is a series of downbursts associated with a line of thunderstorms. This type of phenomenon can extend for hundreds of miles and contain wind speeds in excess of 100 mph.

Straight-line winds are responsible for most thunderstorm wind damage. During the summer in the western states, thunderstorms often produce little rain but very strong wind gusts and dust storms. Downbursts can be extremely dangerous to aviation. Damage attributed to tornadoes is frequently caused by straight-line winds from a downburst. Downbursts can produce a "roaring" sound and damage similar to a tornado. These strong winds can damage trees, blow vehicles off the road, break windows, down power lines, damage roofs and fences, and cause other structural damages. Individuals caught outside are also at risk of injury from blowing dust and debris.

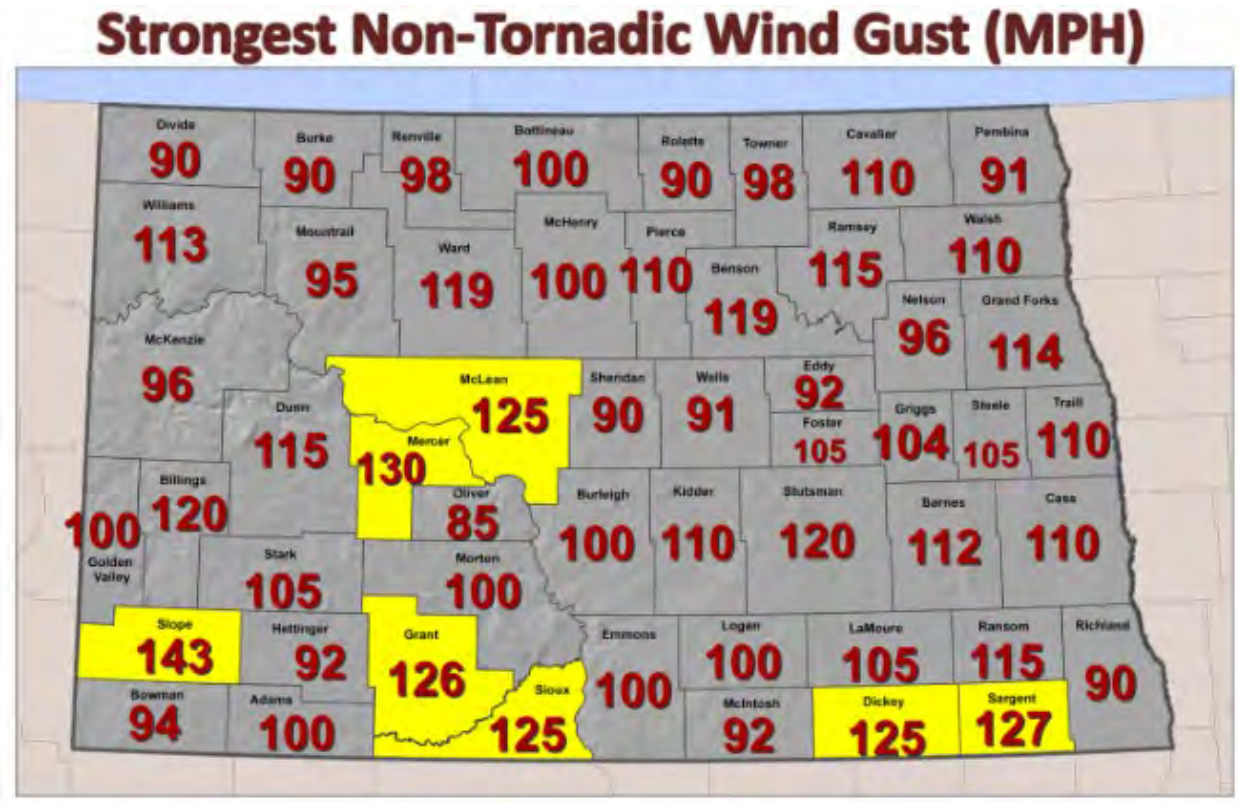
Severe winds associated with thunderstorms are not uncommon during the summer months in North Dakota. Wind events can cause death injury due to flying debris, collapsed structures, and to those in tractor trailers, vehicles, mobile homes, campers, tents or aircraft.

Strong winds can also occur outside of tornadoes and severe thunderstorms. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems (one high pressure, one low pressure) are, the stronger the pressure gradient, and therefore, the stronger the winds are. Strong winds can occur at any time of year.

Based on the historical record, North Dakota can expect over 76 high wind events, not related to tornadoes or thunderstorm winds, in any given year. This makes a high wind event highly likely (greater than 90% chance of probability) in a given year. The Federal Emergency Management Agency places the majority of North Dakota, including Bismarck, in Zone II (160mph) for structural wind design. As history demonstrates, these types of winds can remove roofs, move mobile homes, topple trees, take down utility lines, and destroy poorly-built or weak structures.

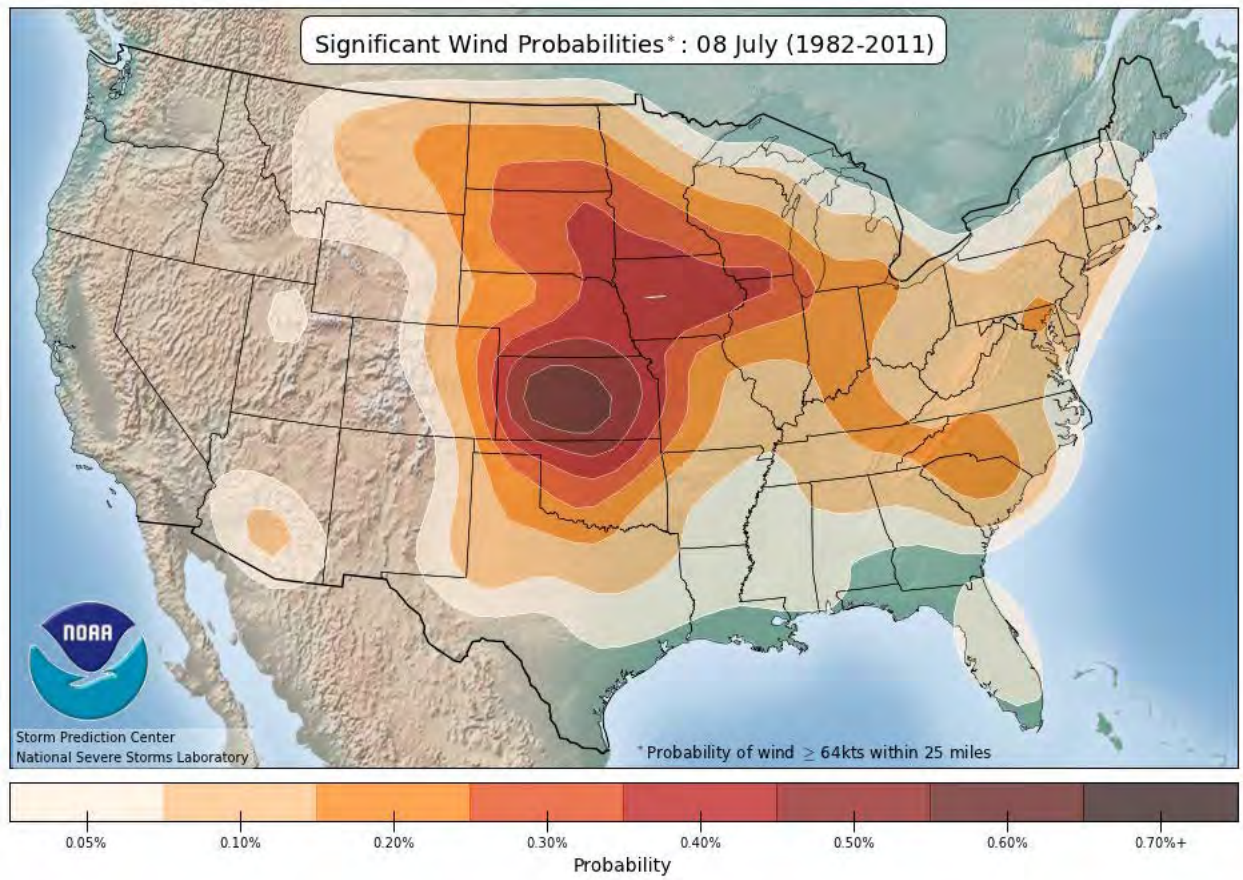
Criteria for high wind includes **sustained winds equal to or greater than 40 mph or gusts greater than or equal to 58 mph.** Sustained wind speeds can be estimated using the Beaufort Wind Scale. https://www.weather.gov/mfl/beaufort

Maximum wind speed reported 1950-2024



Burleigh County High Wind Speed Records Source: NWS Bismarck			
Speed	Date	Location	Damage Estimate
110	June 20, 2025	Near Lincoln	
Damage includes several homes with roof damage, siding, and deck damage, as well as damage to garages, including one with a side of a wall blown out.			
100	August 28, 2024	Just south of Sterling	$800,000
Significant damage in and to the south of Sterling. A large grain bin was dislodged. Power poles were broken on both sides of US Highway 83. Sunflower fields flattened. Damage estimated at $800,000.			
90	June 25, 1999	Bismarck	$2 Million
78 knots. Widespread damage to building, downed power lines, uprooted trees, street flooding and water damage to homes. Property damage from this storm is estimated at $2 million.			
96	July 10, 2011	3.5 miles southwest of Moffit	$250,000
Double poled wood transmission lines were snapped. A ranch sign with three foot long concrete anchors was torn from the ground. A camper was flipped off the highway and tossed over a tree row 25 yards away.			

Significant Wind Probability



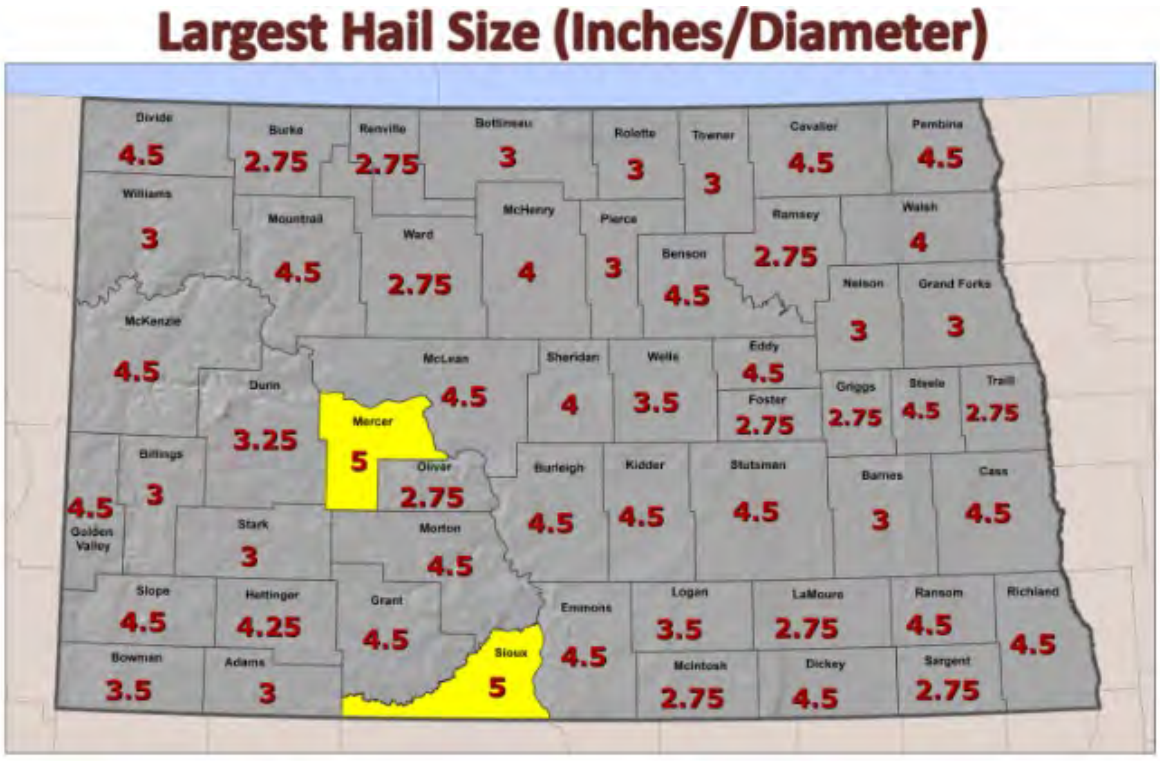
*These probability values were estimated from a 30-year period of severe weather reports from 1982-2011. http://www.spc.noaa.gov/new/SVRclimo/climo.php?parm=sigWind

Hail

Hail is precipitation in the form of a lump of ice. Hail occurs when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. The ice particles grow in size, finally becoming too heavy to be supported by the updraft and fall to the ground. Hailstones are usually round but can be conical or irregular in shape. They can range from pea size to the size of grapefruit, and large hailstones can fall at speeds faster than 100 mph. Hail tends to fall in swaths that range from a few acres to an area ten miles wide and one hundred miles long.

Most hail events affect only relatively small areas. Hail causes considerable damage to crops and property in the United States, occasionally causing death to farm animals, but seldom causing loss of human life. The damaging aspects of hail falls include the **hailstone sizes (average and maximum), number of hailstones per unit area, and associated winds**; hail risk is a combination of these factors plus the frequency of hail at a point or over an area. Crop hail losses in recent years nationally are estimated at $1.3 billion annually, representing between 1 and 2 percent of the annual crop value. Hail losses vary considerably regionally, representing, for example, 1 to 2 percent of the crop value in the Midwest, 5 to 6 percent of the crops produced in the High Plains, and much less elsewhere in the nation. Property hail losses have been increasing with time, now appearing to approximate crop-hail losses recently with crudely estimated annual losses of $1 billion. (Changnon, 1997)

Maximum **hail size** reported 1950-2024



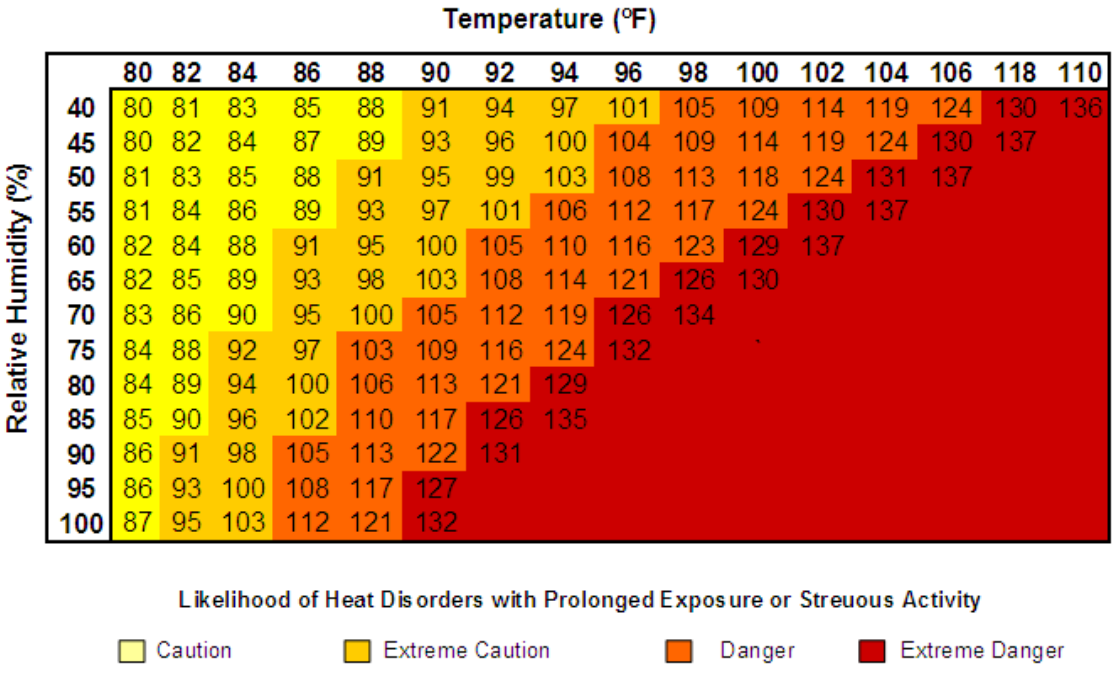
Extreme Heat

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980, more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

The following two charts show the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes it feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the HI rises, so do health risks.

- When the HI is 90°F, heat exhaustion is possible with prolonged exposure and/or physical activity.
- When it is 90°-105°F, heat exhaustion is probable with the possibility of sunstroke or heat cramps with prolonged exposure and/or physical activity.
- When it is 105°-129°F, sunstroke, heat cramps or heat exhaustion is likely, and heatstroke is possible with prolonged exposure and/or physical activity.
- When it is 130°F and higher, heatstroke and sunstroke are extremely likely with continued exposure. Physical activity and prolonged exposure to the heat increase the risks.



Possible Heat Disorders by Heat Index Level

Heat Index	Category	Possible heat disorders for people in high risk groups
130°F or higher	Extreme Danger	Heatstroke risk extremely high with continued exposure.
105° - 129°F	Danger	Sunstroke, Heat Cramps and Heat Exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity
90° - 105°F	*Extreme Caution*	*Sunstroke, Heat Cramps and Heat Exhaustion possible with prolonged exposure and or physical activity.*
80° - 90 °F	Caution	Fatigue possible with prolonged exposure and/or physical activity.

Source: National Weather Service

The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days. The NWS offices in Bismarck and Grand Forks can issue the following heat-related advisory as conditions warrant.

- **Excessive Heat Outlook**: are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to Heat Index forecast map for the contiguous United States those who need considerable lead time to prepare for the event, such as public utilities, emergency management and public health officials.
- **Excessive Heat Watch**: is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. A Watch provides enough lead time so those who need to prepare can do so, such as cities that have excessive heat event mitigation plans.
- **Excessive Heat Warning/Advisory:** are issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

	Lightning	Hail	High Winds or Downbursts
Probability	Very Likely	Very Likely	Very Likely
Speed of Onset	Warning lead time: 30 minutes to several hours	Warning lead time: 30 minutes to several hours	Warning lead time: 30 minutes to several hours
Geographic Area	All of Bismarck Typically 15 miles in diameter	All of Bismarck	All of Bismarck
Duration	Average of 30 minutes Can last much longer	Usually 30 minutes or less.	Minutes to Hours (high wind)
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Direct or indirect lightning strike. A. Those outdoors, especially under or near tall trees, or B. On Water, or C. On Hilltops	1. Impact by large hail stones. Hail seldom causes loss of life. A. Those outdoors with no access to shelter.	1. Flying Debris *Non-secure outdoor items* A. Aviation B. Mobile home C. Motor Home D. Camp sites E. Being Caught Outdoors F. In a vehicle G. Insufficient shelter H. Windows
Mass Casualty Incident	No mass casualty incidents reported in ND. Lightning kills – averaging 80 to 93 deaths and 300 injuries in the US each year.	No mass casualty incidents reported in ND.	No mass casualty incidents reported in ND.

	Lightning	Hail	High Winds or Downbursts
Property Losses (points of vulnerability – high priority)	1. Property losses due to Fire (lightning as cause) 2. Computer equipment due to power surges 3. Downed power lines and trees	1. Shingles 2. Windows 3. Siding 4. Auto body damages 5. Trees/plants/crops	1. Mobile home 2. Motor Home 3. Windows/doors 4. Trees 5. Fences 6. Power lines 7. Roofs
Environmental			1. Debris 2. Hazardous Waste debris
COG/COOP	1. Computers and other electronic equipment 2. Loss of power	1. Could delay emergency response time.	1. Employee / family casualties 2. Key personnel – Orders of Succession
Critical Facilities	1. Computers and other electronic equipment 2. Loss of power	1. Windows	1. Windows 2. Garages 3. Doors 4. Large Span Roofs Structure – depending on design / materials
Critical Infrastructure	1. Loss of Power	1. Similar to snow event – blocked streets	2. Electricity: Substations & Overhead Power Lines 3. Streets Blocked 4. Communications
Schools	1. Computers and other electronic equipment	1. Windows	1. Portable Classrooms 2. Windows

	Lightning	Hail	High Winds or Downbursts
	2. Loss of power		3. Doors 4. Loss of roofing materials
High Risk Facilities (chemical)	1. Computers and other electronic equipment 2. Loss of power		1. Windows 2. Garages/doors 3. Doors 4. Large Span Roofs
Specific Populations: PublicAssembly,Vulnerable or Special Populations	1. Outdoor Activities – sporting events, water sports, etc.	1. Outdoor Activities – sporting events, water sports, etc.	1. Outdoor Recreation Areas 2. Public Assembly (high population densities) 3. Special Outdoor events
Economy (community wide)	Localized properties impacted	Significant impact to Insurance Industry and to property owners	Impact to insurance industry and property owners
OTHER:			

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
New properties and population within newly annexed areas. See Community Profile Section 7.	See Severe Summer Weather Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Also see tornado hazard profile (separate hazard profile). Flooding events as a result of heavy rain may occur simultaneously. Heat and extreme heat for an extended period contributes to the potential for drought and fire.

Future Conditions

- **Location**: The location of the severe summer weather hazard will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** See “Anticipated Future Climate Impact” below.
- **Duration:** See “Anticipated Future Climate Impact” below.

Anticipated Future Climate Impact – Severe Summer Weather Hazard

Through the end of this century in North Dakota, expect more frequent, larger, and longer duration storms with an increase in intense rain and flooding, and an increase in large hail. Potential Impacts include an expected increase (high confidence) in heavy precipitation events overall, higher in NC and NE ND and somewhat lesser in SW ND, with a likely increase in areal and/or flash flooding but less certain impacts on summertime riverine flooding. Hail size, frequency of large hail, and length of the hail season should increase (medium confidence) with a commensurate increase in the frequency and intensity of lightning and damaging downburst winds which are tied to hail production. Expected increases in temperature are likely to lead to an increase in days with a high Heat Index and the potential for lost workhours during such periods.

Previous Occurrences

Also see the separate"Tornado Hazard Profile."

Lightning Events

The following storm events are identified for Bismarck (1995 to 2025):
http://www.ncdc.noaa.gov/stormevents/

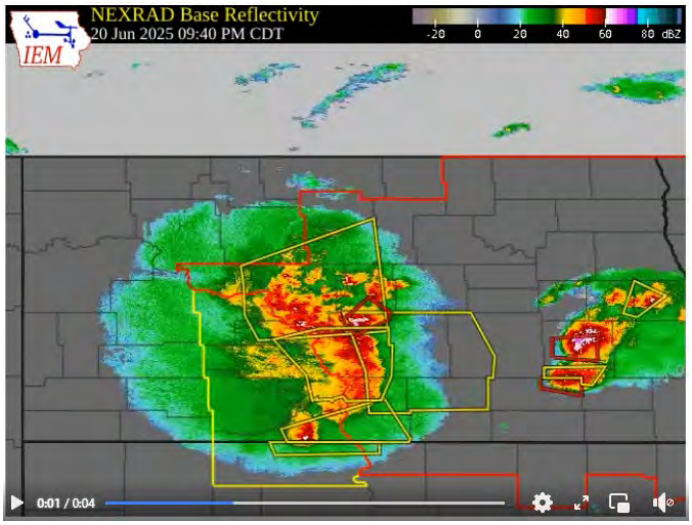
July 30, 2011: A lightning strike to a rural north Bismarck home caused a fire that destroyed the home several hours later.

August 2, 1996: Lightning struck the roof of a garage in Bismarck. Property damage as a result of this storm is estimated at $2,000.

Wind Events

Notable high wind events within Bismarck are noted below. Additional high wind events may be reviewed via the NOAA storm events database: http://www.ncdc.noaa.gov/stormevents/

June 20, 2025: The state of ND issued a statewide Disaster Declaration and received a Presidential Disaster Declaration **DR-4888** as a result of high winds and tornadic activity throughout much of the state. Bismarck wind speeds were reported at 66 mph (Bismarck Airport) to 82 mph (2 WNW Bismarck). Damages include extensive tree damage and damage to homes and property (sporadic). There were 14 transformer/power line fires reported. At one point, MDU power outage map showed 5,539 customers without power in the Bismarck/Mandan area. Within Bismarck, power loss occurred primarily between Divide Avenue and Main Avenue. This storm also produced thirteen (13) tornadoes throughout the state. None occurred in Burleigh County.
https://www.weather.gov/bis/SevereWx06202025



The June 20, 2025 wind event was classified as a Derecho by the Storm Predication Center. To learn more about what a derecho is and how it is classified, visit **https://www.spc.noaa.gov/misc/AbtDerechos/derechofaq.htm**

June 29, 2018: 65 knots. The Broadcast Media estimated thunderstorm wind gusts of 75 mph. (NWS database)	
70 mph gusts reported (Bismarck Tribune).	 Bismarck Tribune Photo.

June 17, 2016: Hail/Wind Event:
A severe thunderstorm struck northern portions of the city of Bismarck around 4:30 AM. Large hail combined with strong wind gusts to cause substantial damage. The largest hail with a diameter of 3.25 inches fell near Legacy High School. Winds of 75 mph combined with large hail to cause a swath of substantial damage from along Divide Avenue in north Bismarck to approximately 5 miles north of the city of Bismarck. Siding, roofs, and windows were damaged on homes. Multiple car dealerships sustained hail damage, which included the largest dealership in the city. Source: NWS

June 19, 2015: The strongest winds were reported in Burleigh County, where winds blew up to 90 mph. Extensive tree damage and power line damage with some structural damage was reported in the city of Bismarck and surrounding rural areas. Power outages lasted up to 72 hours. Source: NWS

• 82 mph wind gusts from the N-NW. Sustained wind of 60 mph. o Event Time (approx): 9 PM to 9:30 PM (higher winds). • 0.87" rainfall (heavy rain) – short amount of time (approximately 1 hour). • Two cars submerged in flooded underpass– 7th Street Underpass. • 11,000 customers impacted by power outages in Bismarck/Mandan area. Many without power overnight. • Spaedy Office complex on 25th and • Broadway had roof torn off by the wind. • New siren installation ended up with a 20 degree tilt or angle. • City Forestry: The heaviest hit section of town is between Divide Ave and Main Ave from the river east to 26th St. A lot of trees uprooted or completely failed trees in this section of town. The south and north parts of town experienced limb breakage and hangers. Some smaller trees uprooted.	 

June 22, 2013
Tree debris primarily located from Divide Avenue south to Denver Avenue and from Washington Street to 3rd Street Area. Extensive tree damages in Sertoma Park area as well.

Bismarck – June 22, 2013 Tree debris primarily located from Divide Avenue south to Denver Avenue and from Washington Street to 3rd Street area. Extensive tree damages in Sertoma Park area as well. Photos: Gary Stockert, Bismarck Emergency Manager

July 31, 2011: High winds peaking at 68 mph were measured at the National Weather Service ASOS at the Bismarck Airport during this severe thunderstorm. The wind gusted at or above 60 mph for 20 minutes. This storm also impacted many trees in flood impacted areas including Fox Island and Sibley Park areas. Due to saturated soils as a result of the 2011 flood, many trees were tipped or leaning because the soils could not hold the root systems in place. This caused additional damages to homes already impacted by the Missouri River Flood of 2011.

October 26, 2008: A 59 mph wind gust was reported three miles east of Moffit. High winds were also blamed for a house fire in Bismarck. Local authorities reported the high winds tore down a tree onto power lines, which then started a house basement on fire. No injuries or fatalities were reported.

July 21, 2005: Thunderstorm, High Winds & Hail – Winds estimated between 60 and 70 mph – golf ball-size hail. The storm occurred on July 21 around 8:00 pm. Damage includes destroyed trees, tree damage, broken windows, damaged shingles, and damage to cars. It had been reported by citizens that a few man-hole covers had been displaced. Downed trees reported were primarily in the areas of River Road north of the interstate, North Grandview, Juniper, Ave B near the Cathedral Church, 12th Street, and Pioneer Park.

August 23, 2004: The severe thunderstorm brought strong winds, very heavy rainfall and hail across the Bismarck area. Numerous tree damage was reported. Power lines were downed by the winds causing citywide power outages. Hail sizes up to 2.00 inches were reported in the city. Streets and underpasses flooded causing several roads to become impassible. Water flowed across yards and into several basements of homes.

March 13, 2004: An Alberta Clipper brought very strong winds, sustained at 50 mph and gusting to around 60 mph at times, to western and central North Dakota during the afternoon

and early evening hours on March 13, 2004. The winds subsided during the late evening hours on the 13th.

November 29, 2002: After record high temperatures on Thanksgiving Day a strong Canadian cold front moved rapidly south through the state producing strong northwest winds of 40 to 70 mph over western and central North Dakota. The winds diminished during the evening hours. The cold front brought much colder air and a few snow showers to the region Friday night and Saturday.

February 11, 2002: Strong low pressure system moving across southern Canada produced a tight surface pressure gradient over North Dakota. Wind speeds averaged 50 to 70 miles an hour beginning early in the day and ending late in the evening. Overall, wind damage was minimal, however one semi-truck, which was empty, was blown over on its side along Interstate 94 in Bismarck. In Jamestown, a power outage occurred, but just for a short time period. Other locations reported loose objects were tossed around in the wind. (69 knots)

July 19, 2001: Thunderstorm winds (66 knots) were reported at the Bismarck Airport. Widespread tree damage across the southern half of the city of Bismarck. The property damage figure ($50,000) was for cleanup only. Power outage across much of the city. Several homes and business, including the Bismarck airport terminal building sustained damage.

April 5, 2000: A low-pressure system over Alberta, Canada moved southeast and intensified along the Canadian/North Dakota border. A very tight pressure gradient resulted in very high winds causing injuries and property damages throughout western and central North Dakota. Wind gusts of 55 to 70 mph were common. The injuries were mainly in Burleigh County in the city of Bismarck where 9 people were taken to area hospitals injured from flying debris. One person suffered a broken wrist from falling. Damage was widespread. Widespread power outages occurred. Homes, automobiles, trees, power lines, and businesses were damaged. Several grass fires erupted across the region.

June 25, 1999: Thunderstorm winds (78 knots) were reported in Bismarck. Widespread damage to buildings, downed power lines, uprooted trees, street flooding and water damage to homes. Property damage from this storm is estimated at $2 million.

July 17, 1996: The Bismarck area received anywhere from 1 to 2 inches of rain in an hour. There were reports of manhole covers being blown out. An 80 yr. old man suffered a heart attack while shoveling water away from his apartment complex.

May 16, 1996: As the storm moved into the Bismarck area, the National Weather Service at the airport received a gust to 79 mph. A small plane was tipped over at the airport, with part of the airport terminal roof blown off. There was at least 1 mobile home that was destroyed. Significant damage was done to trees, buildings and road signs. An estimated 3,000 people in Bismarck lost power. The Melroe
Company had its roof lifted off. Property damage from this storm is estimated at $3.2 million.

May 21, 1995: Thunderstorm winds (55 knots) were reported in Bismarck. Two thunderstorms merged north of Mandan causing torrential rain, hail up to golf ball-size for over 20 minutes, and winds to 65 mph, in Bismarck and Mandan. Piles of pea to golf ball-size hail covered the ground. Homes in Mandan had windows broken due to the hail.

Hail Events

Notable hail events within Bismarck are noted below. Additional events may be reviewed via the NOAA storm events database: http://www.ncdc.noaa.gov/stormevents/

In June 2001, a hailstorm caused an estimated $230 million in property damage in Burleigh and Morton Counties; an estimated 57,000 insurance claims were filed. (North Dakota Insurance Department, 2007)

This hailstorm affected the urban Bismarck and Mandan area. As the most damaging hailstorm in the state's history, the insurance industry was severely impacted and insurance availability and premiums were affected statewide; many insurance companies pulled out of the state after the storm. (North Dakota State Water Commission, 2007c)

In July 2005, nickel size to tennis ball size hail combined with 70 mph winds and caused extensive and widespread damage in Bismarck. The larger hail fell on the north side of the city where most of the damage occurred. Numerous homes and vehicles were damaged. There was damage to siding and roofs, and windows were broken. (National Climatic Data Center, 2007)

Burleigh County: Largest hailstone... 4.5 inch diameter – July 29, 2024
5:55 PM CDT to 6:40 PM CDT -2.5 miles west-southwest of Bismarck to 5.7 miles south of Lincoln - Extensive damage to housing developments south of Bismarck, and through the city of Lincoln. Slow moving thunderstorms with an extended period of large hail. The largest stone fell one mile south of the city of Lincoln. Damage estimated at $10.25 million.

Hail – 2 inches and larger January 1, 2000 thru June 24, 2025 See property damage (PrD) below.	23 events within Burleigh County. 10 events within Bismarck. Source: NWS https://www.ncdc.noaa.gov/stormevents

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD
Totals:								0	0	157.485M
BISMARCK	BURLEIGH CO.	ND	07/21/2005	18:25	CST	Hail	2.50 in.	0	0	93.000M
BISMARCK	BURLEIGH CO.	ND	06/17/2016	03:30	CST-6	Hail	3.25 in.	0	0	50.000M
BISMARCK	BURLEIGH CO.	ND	07/29/2024	16:55	CST-6	Hail	4.50 in.	0	0	10.000M
BALDWIN	BURLEIGH CO.	ND	07/29/2024	16:35	CST-6	Hail	2.50 in.	0	0	2.000M

August 25, 2019: A thunderstorm moved through Bismarck producing hail up to two inches in diameter, damaging many roofs and gutters.

June 17, 2016:
A severe thunderstorm struck northern portions of the city of Bismarck around 4:30 AM. Large hail combined with strong wind gusts to cause substantial damage. The largest hail with a diameter of 3.25 inches fell near Legacy High School. Winds of 75 mph combined with large hail to cause a swath of substantial damage from along Divide Avenue in north Bismarck to approximately 5 miles north of the city of Bismarck. Siding, roofs, and windows were damaged on homes. Multiple car dealerships sustained hail damage, which included the largest dealership in the city. Source: NWS

July 21, 2005: 2.50 inches of hail was reported in Bismarck. Nickel size to tennis ball size hail combined with 70 mph winds caused extensive and widespread damage in Bismarck. The larger hail fell on the north side of the city where most of the damage occurred. Numerous homes and vehicles damaged.
There was damage to siding and roofs, and windows were broken. Property damage estimates were provided by the North Dakota Insurance Commissioner.

June 9, 2001: 1.00 inch hail reported at the Bismarck Airport. An approaching upper level system provided lift to produce severe thunderstorms over central North Dakota Saturday afternoon and evening. Abundant low-level moisture combined with relatively cool air aloft lead to the formation of an incredible amount of hail with many of these storms. The hail caused a tremendous amount of damage to homes and vehicles in the Bismarck and Mandan areas. An estimated damage from the hail in the two cities amounted around $260 million. The wind speed associated with the storm ranged between 50 to 60 mph.

June 9, 2001: 1.75 inch hail reported 3 miles north of Bismarck Airport causing an estimated $113,000,000 in property damages.

June 9, 2001
Severe Storms Pummel Southern North Dakota

An approaching upper level system provided lift to produce thunderstorms across western North Dakota Saturday afternoon. The storms intensified as they traveled east southeast along an instability axis extending into South Dakota. Abundant low level moisture combined with relatively cool air aloft lead to the formation of an incredible amount of hail with many of these storms. The hail caused a tremendous amount of damage to homes and vehicles in Bismarck and Mandan. One tornado was reported just north of Hazelton, which is about 30 miles southeast of Bismarck. No known deaths occurred with these storms but numerous injuries were reported. The pictures below will help put the damage into perspective.

The day after: clearing hail from the railroad underpass on 7th street in Bismarck. Photo taken by NWS employee.

June 20, 1995: 0.75 inch hail and 60 to 80 mph winds were reported. Extensive damage done to the city of Bismarck. Extensive tree damage. A mobile home northeast of Bismarck had its roof blown off. Reports of a few vehicles totaled due to large trees or tree branches falling on them. Extensive house damage due to falling trees or tree branches.

May 21, 1995: Two thunderstorms merged north of Mandan causing torrential rain, hail up to golf ball size for over 25 minutes, and winds to 65 mph, in Bismarck and Mandan. Piles of pea to golf ball-size hail covered the ground. Homes in Mandan had windows broke due to the hail.

State Historical Society of North Dakota

Extreme Heat Events

Excessive Heat

January 1, 2001 through June 24, 2025

Source: NWS
https://www.ncdc.noaa.gov/stormevents

Storm Events Database

Search Results for Burleigh County, North Dakota

Event Types: Excessive Heat

Burleigh county contains the following zones:
Burleigh

1 events were reported between 01/01/2000 and 06/24/2025 (9307 days)

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	1
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

July 19, 2011

Heat index values topped out between 110 and 120 degrees, not a common thing in North Dakota. Although no human life was lost and no injuries were reported, there were livestock losses associated with the heat. It is estimated that up to 700 head of cattle died from the heat wave.

Space Weather – Hazard Profile

Description

According to the NOAA Space Weather Prediction Center, Space Weather is the condition in space that affects Earth and its technological systems. Space Weather is a consequence of the behavior of the Sun, the nature of Earth‘s magnetic field and atmosphere, and our location in the solar system. The active elements of space weather are particles, electromagnetic energy, and magnetic field, rather than the weather contributors on earth of water, temperature, and air.

The Space Weather Prediction Center forecasts space weather to assist users in avoiding or mitigating severe space weather. These are storms that originate from the sun and occur in space near Earth or in the Earth‘s atmosphere. Most of the disruptions can be categorized into three types of events that can have environmental effects on Earth. They are: geomagnetic storms, solar radiation storms, and radio blackouts.

Solar flares, coronal mass ejections, solar particle events, and the solar wind form the recipe for space weather that affects life on Earth and astronauts in space. (NASA)
https://science.nasa.gov/heliophysics/focus-areas/space-weather/#:~:text=This%20is%20what%20we%20define,objects%20in%20the%20solar%20system

Space Weather describes the variations in the space environment between the sun and Earth. In particular Space Weather describes the phenomena that impact systems and technologies in orbit and on Earth. Space weather can occur anywhere from the surface of the sun to the surface of Earth. As a space weather storm leaves the sun, it passes through the corona and into the solar wind. When it reaches Earth, it energizes Earth’s magnetosphere and accelerates electrons and protons down to Earth’s magnetic field lines where they collide with the atmosphere and ionosphere, particularly at high latitudes. Each component of space weather impacts a different technology. (NOAA SWPC)
https://www.swpc.noaa.gov/phenomena#:~:text=Space%20Weather%20describes%20the%20variations,to%20the%20surface%20of%20Earth

Space Weather Impacts
Different types of space weather can affect different technologies at Earth. Solar flares can produce strong x-rays that degrade or block high-frequency radio waves used for radio communication during events known as Radio Blackout Storms. Solar Energetic Particles (energetic protons) can penetrate satellite electronics and cause electrical failure. These energetic particles also block radio communications at high latitudes during Solar Radiation Storms. (NOAA SWPC)

Coronal Mass Ejections (CMEs) can cause Geomagnetic Storms at Earth and induce extra currents in the ground that can degrade power grid operations.

Geomagnetic storms can also modify the signal from radio navigation systems (Global Positioning System (GPS) and Global Navigation Satellite System (GNSS)), causing degraded accuracy. Space weather will impact people who depend on these technologies.
The electrical transmission grid within North Dakota is at risk from potential geomagnetic storms, particularly in eastern North Dakota, and less so in the west and central.

Geophysical investigation and moedling by the USGS and NOAA's Space Weather space Weather Prediction Center show that eastern North Dakota has a higher susceptibility to geomagnetically induced currents. This is due to the shallower depth of more electrically resistant rocks in the eastern part of the state as opposed to the west.

Geomagnetically induced currents can travel along power lines and pipelines, creating overloads in the power grid and causing damages to transformers, resulting in large scale power blackouts. one of the more famous historical space weather events was the Carrington event (named after richard Carrington, an amateur sky observer in redhill, england) which occurred in september of 1859 and set telegraph lines afire and resulted in an aurora seen around the world (Dobrijeciv and may, 2022). the Carrington solar storm is considered the largest on record. it is estimated that a Carrington-scale event occurring in today's electrified world would result in damages in the trillions of dollars.
https://www.dmr.nd.gov/ndgs/documents/newsletter/2023Summer/Recent_Geophysical_Research_Identifies_North_Dakota_Electrical_Transmission_Grid_At_Risk_From_Potential_Geomagnetic_Storms_-_July_2023.pdf

Geomagnetic storms also produce the aurora.

Electric Power Transmission
The electric power grid, and consequently the power to homes and businesses, can be disrupted by space weather.

HF Radio Communications
Space weather impacts radio communication in a number of ways. At frequencies in the 1 to 30 mega Hertz range (known as "High Frequency" or HF radio), the changes in ionospheric density and structure modify the transmission path and even block transmission of HF radio signals completely. These frequencies are used by amateur (ham) radio operators and many industries such as commercial airlines. They are also used by a number of government agencies such as the Federal Emergency Management Agency and the Department of Defense.

Satellite Communications
Satellite communication refers to any communication link that involves the use of an artificial satellite in its propagation path. Satellite communications play a vital role in modern life. There are over 2000 artificial satellites in use. Space weather can lead to a total loss of communication due to attenuation and/or severe scintillation when the broadcast signals cross the ionosphere.

GPS System
The use of single and dual frequency satellite radio navigation systems, like the Global Positioning System (GPS), has grown dramatically. GPS receivers are now in nearly every cell phone and in many automobiles, trucks, and any equipment that moves and needs precision location measurements. High precision dual frequency GPS systems are used for farming, construction, exploration, surveying, snow removal and many other applications critical to a functional society.

There are several ways in which space weather impacts GPS function. GPS radio signals travel from the satellite to the receiver on the ground, passing through the Earth's ionosphere. When the ionosphere is disturbed by a space weather event, receivers are unable to calculate an accurate position based on the satellites overhead (due to inaccurate modeling).

The Sun goes through approximately 11-year periods of minimum activity and maximum activity called solar cycles. It's currently in Solar Cycle 25, which began at the end of 2019 and is expected to peak in late 2024 or early 2025.

Every sunspot creates an impactful geomagnetic event potentially aimed at Earth. However, not every geomagnetic event impacts the Earth, as its magnetic field repels portions of what is thrown at it. In every 11-year solar cycle, there has been an average of 360 days of G2 events, 130 days of G3 events, 60 days of G4 events, and 4 days of G5 events. **If G4 and G5 are the only events that are likely to do harm to people on the planet, this represents 64 days over 4,019 days, or a 5.8 percent chance annually, of experiencing an event that has the possibility of causing impacts (Gannon et al., 2017).** According to Maffei (2023), these severe G4 and extreme G5 events create an expanded terrestrial impact or danger zone (areas with highest geomagnetically induced currents) in the geomagnetic latitudinal band between 50 and 60 degrees. Their modeling studies show that North Dakota lay within that geomagnetic danger zone during the 1859 Carrington Event, is in that zone now, and will likely remain in the danger zone through 2070, if not beyond.

Where the Earth is in relation to its orbit around, and angle relative to, the Sun may also help give some direction as to when impacts are more likely to occur. Looking at previous longitudinal data divided by month, September and March were the most active months from 1932 to 2007.

NOAA Space Weather Scales

The NOAA Space Weather Scales were introduced as a way to communicate to the general public the current and future space weather conditions and their possible effects on people and systems.

The scales describe the environmental disturbances for three event types: **geomagnetic storms, solar radiation storms, and radio blackouts**. The scales have numbered levels, analogous to hurricanes, tornadoes, and earthquakes that convey severity. They list possible effects at each level. They also show how often such events happen, and give a measure of the intensity of the physical causes. https://www.swpc.noaa.gov/noaa-scales-explanation

DRAFT

NOAA Space Weather Scales

Category		Effect	Physical measure	Average Frequency (1 cycle = 11 years)
Scale	Descriptor	Duration of event will influence severity of effects		
Geomagnetic Storms			Kp values* determined every 3 hours	Number of storm events when Kp level was met; (number of storm days)
G 5	Extreme	Power systems: widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. Spacecraft operations: may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. Other systems: pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).**	Kp=9	4 per cycle (4 days per cycle)
G 4	Severe	Power systems: possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. Spacecraft operations: may experience surface charging and tracking problems, corrections may be needed for orientation problems. Other systems: induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).**	Kp=8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	Power systems: voltage corrections may be required, false alarms triggered on some protection devices. Spacecraft operations: surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. Other systems: intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).**	Kp=7	200 per cycle (130 days per cycle)
G 2	Moderate	Power systems: high-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. Spacecraft operations: corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).**	Kp=6	600 per cycle (360 days per cycle)
G 1	Minor	Power systems: weak power grid fluctuations can occur. Spacecraft operations: minor impact on satellite operations possible. Other systems: migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).**	Kp=5	1700 per cycle (900 days per cycle)

* Based on this measure, but other physical measures are also considered.
** For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see www.swpc.noaa.gov/Aurora)

Solar Radiation Storms			Flux level of ≥ 10 MeV particles (ions)*	Number of events when flux level was met**
S 5	Extreme	Biological: unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. *** Satellite operations: satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. Other systems: complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	Biological: unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. Other systems: blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	Biological: radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.*** Satellite operations: single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. Other systems: degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	Biological: passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.*** Satellite operations: infrequent single-event upsets possible. Other systems: effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S1	Minor	Biological: none. Satellite operations: none. Other systems: minor impacts on HF radio in the polar regions.	10	50 per cycle

* Flux levels are 5 minute averages. Flux in particles·s^{-1}·$ster^{-1}$·cm^{-2} Based on this measure, but other physical measures are also considered.
** These events can last more than one day.
*** High energy particle (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.

Radio Blackouts			GOES X-ray peak brightness by class and by flux*	Number of events when flux level was met; (number of storm days)
R 5	Extreme	HF Radio: Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 ($2x10^{-3}$)	Fewer than 1 per cycle
R 4	Severe	HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. Navigation: Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	HF Radio: Limited blackout of HF radio communication on sunlit side of the Earth, loss of radio contact for tens of minutes. Navigation: Degradation of low-frequency navigation signals for tens of minutes.	M5 ($5x10^{-5}$)	350 per cycle (300 days per cycle)
R 1	Minor	HF Radio: Weak or minor degradation of HF radio communication on sunlit side of the Earth, occasional loss of radio contact. Navigation: Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

* Flux, measured in the 0.1-0.8 nm range, in W·m^{-2}. Based on this measure, but other physical measures are also considered.
** Other frequencies may also be affected by these conditions.

URL: *https://www.spaceweather.gov/noaa-scales-explanation* December 11, 2023

Highlights, conclusions, and data limitations noted below are identified in the 2024-2029 North Dakota Enhanced Mitigation Plan, and are relevant at the local level.

Highlights and conclusions regarding Space Weather:

- Most space weather poses a threat primarily to users of specialized GPS technology, HF radio communications, or upper-latitude avionics over a brief period and limited geography, though stronger events generally produce impacts over expanded areas.
- North Dakota is far enough north that it is more at risk for impacts from stronger space weather events than most states, and in the danger zone for severe G4 and G5 geomagnetic events.
- A severe G4 or G5 geomagnetic event could do significant damage to the electrical infrastructure, hinder communications, and cause massive blackouts across the state.
- The SWPC works with regional council coordinators when geomagnetic levels reach G4 levels to assure that levels are being monitored to avoid overloading and serious damage and outages.
    - *The North American Electric Reliability Corporation (NERC) is the organization of grid operators who work together to assure reliable and secure bulk electric production and distribution throughout Canada and the United States.*
- There is limited certainty and limited time available for warning about upcoming large events. Significant space weather eruptions from the Sun can be observed from one to three days in advance, but the severity and timing of what will impact Earth can be estimated less than a day before those consequences are felt.
- In the event of a severe space weather event, the loss of normal communications and electrical power will complicate communications with the public and other emergency agencies.
- Power outages from transformer damage may be long-lasting, and if occurring in connection with extreme heat or cold, may lead to increased human suffering and possible loss of life.
- In the event of a severe G4 or G5 storm, loss of precision GPS applications and eventual pipeline corrosion are two areas of industrial impacts that will hit North Dakota hard.
- Opportunities exist to work with pipeline operators to assure they are aware of events that may impact the durability of their systems.
- North Dakota's annualized loss from severe space weather events is estimated at around $238,865.00.
- Newer industrial technology for grid infrastructure is costly, and sometimes bulky, but can increase grid resilience.

Data Limitations:
There is a great deal of unknown science involved in the prediction of space events. There are just two spacecraft that are focused on relaying information to scientists about solar flares and geomagnetic storms and they are very near Earth. The orbit of the Earth is such that both spacecraft are not always able to simultaneously monitor the sun, thus compromising the ability of space weather forecasters to make accurate and timely forecasts. Even with clear data and forecast tools operating at their best, forecasting is just a few days out at best, which gives local and state agencies limited time to plan or mobilize for potential space weather impacts in their respective areas.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Scenario	**Radio Blackout Activity R-ratings Extreme – R5**	**Solar Radiation Activity S-ratings Extreme – S5**	**Geomagnetic Activity G-ratings Extreme – G5**
Probability	1 in 4,000 chance (annually)	1 in 4,000 chance (annually)	1 in 1,000 for a G5 event (annually) *5.8% chance for a G4 or G5*
Note: Probabilities for minor events are MUCH higher. See NOAA Space Weather Scales Chart on page 3.			
Speed of Onset	Less than 24 hours for estimated impact – 1 to 3 days for advance warning to monitor. There is limited certainty and limited time available for warning about upcoming large events. Significant space weather eruptions from the Sun can be observed from one to three days in advance, but the severity and timing of what will impact Earth can be estimated less than a day before those consequences are felt.		
Duration	Several hours	More than one day	Hours to days. However, impacts may require months to years for full recovery. Power outages from transformer damage may be long-lasting.
Geographic Area	Regional +	Regional +	Regional +
Death / Injury 1. Primary Causes A. Highest vulnerability	Not expected.	Radiation hazard impacting high-flying aircraft Pregnant women at higher risk.	The loss of power, especially if prolonged due to transformer damage, could lead to indirect deaths from heat or cold if a space weather event caused infrastructure damage that took significant time to repair (NERC, 2008). Wait times for these massive systems may exceed 12 months, meaning that an affected area would be without power until workarounds could be implemented.

Scenario	Radio Blackout Activity R-ratings **Extreme – R5**	Solar Radiation Activity S-ratings **Extreme – S5**	Geomagnetic Activity G-ratings **Extreme – G5**
			Elderly, patients, infants, and those impacted by loss of heat, cooling, and loss of electronic medical devices.
Mass Casualty Incident	Unlikely	Unlikely	Some possibility – indirect due to power outages – potentially concurrent with winter storms
Property Losses (points of vulnerability – high priority)	NA	NA	Sensitive Electronics impacted. Secondary effect may be loss of security at facilities (theft, etc)
Environmental	NA	NA	Impacts to pipelines can cause leaks, impacting the environment (land and waterways)
COG/COOP	Impact to HF Radio – Ham Radio and Satellite Communications. Ham Radio is a back-up communications system. Bismarck City Government does not use Satellite Communications.	Anything that relies on satellite communications will be impacted. GPS may not be functional or accurate.	Severe loss of city government functionality due to power loss for duration of event. Could be hours or days. Communicating with the public prior to the event will be critical – but time is very limited. Communicating with the public during the event will be extremely difficult to nearly impossible due to loss of electricity and impact to sensitive electronics. *Normal means of communicating via broadcast, the Emergency Alert System, and the internet may be unavailable to the public when power is lost, and public reaction to the loss and lack of information about the return of electricity would be difficult to predict.*

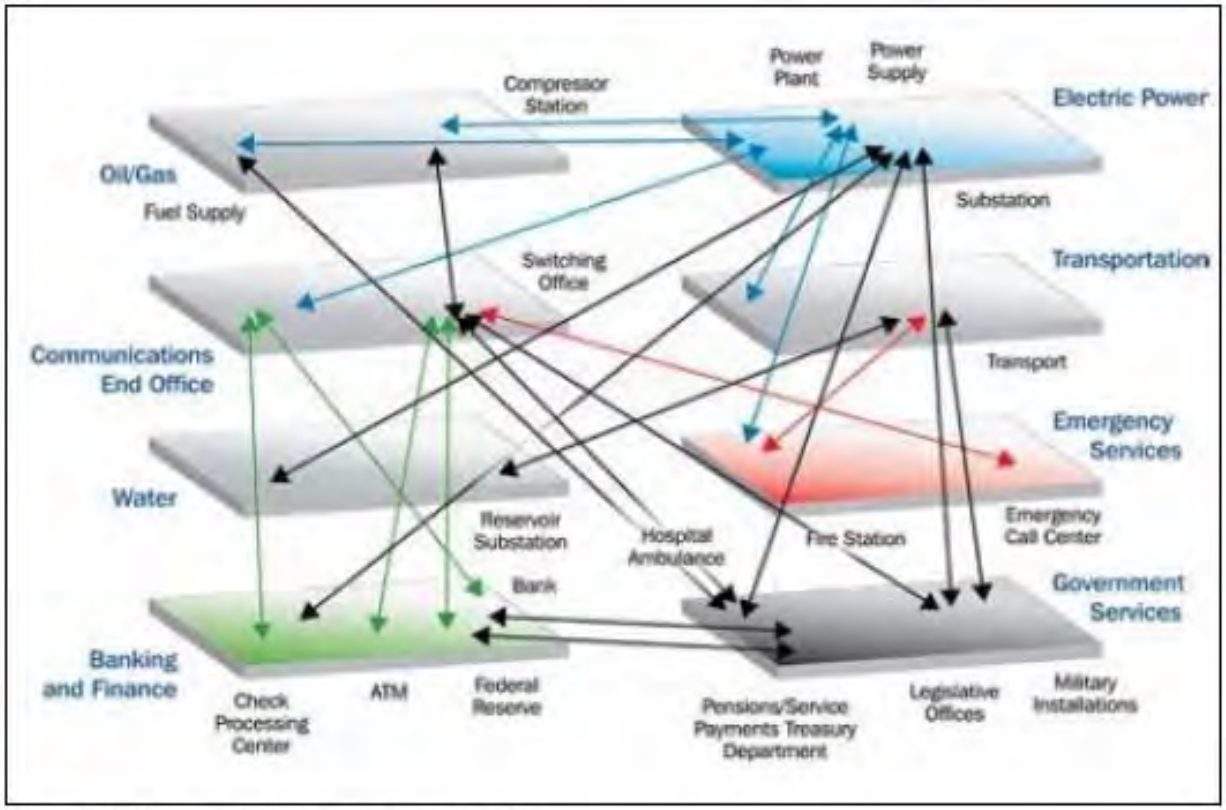
Scenario	Radio Blackout Activity R-ratings **Extreme – R5**	Solar Radiation Activity S-ratings **Extreme – S5**	Geomagnetic Activity G-ratings **Extreme – G5**
			Even with clear data and forecast tools operating at their best, forecasting is just a few days out at best, which gives local and state agencies limited time to plan or mobilize for potential space weather impacts in their respective areas.
Critical Facilities	NA	NA	Same as above (COG/COOP) Also, loss of Airport operations.
Critical Infrastructure	HF Radio impacted.	NA	Significant impact to electric grid. *Transformers can be 200-ton machines that are built in place and have a backlog of years to replace.* Also, Space weather has been linked to pipeline corrosion. Pipelines are natural conduits of currents generated in geomagnetic storms. Pipeline corrosion can cause a hazardous materials incident by weakening the pipe and leading to leaks or catastrophic failure. This can release hazardous substances, which can result in fires, explosions, and severe environmental damage. Corrosion is a significant cause of pipeline incidents, especially for hazardous liquid and gas transmission pipelines.

Scenario	Radio Blackout Activity R-ratings **Extreme – R5**	Solar Radiation Activity S-ratings **Extreme – S5**	Geomagnetic Activity G-ratings **Extreme – G5**
			Water and Wastewater systems impacted *(pipelines and loss of electricity)* *Water may need to be boiled for consumption. Lack of electricity limits the ability to boil water.*
Schools	NA	NA	Limited impact. May need to close for the duration of the event due to lack of electricity (lights, refrigeration, etc)
High Risk Facilities (chemical)	NA	NA	Same impact as schools, as well as additional potential impact if any necessary back-up generators are impacted.
Specific Populations: Public Assembly, Vulnerable / Special Populations	NA	NA	In a combined severe weather/space weather event, the vulnerability presented with the elderly, children, and sick would apply, and hospitalized individuals would be at an increased risk. According to the National Research Council (2008), if an outage or internet loss impacts medical care, or generators during hot or cold events, more human suffering and indirect death could occur. *Hospitals working without power or on generators, will be working at a reduced capacity. Simultaneously, there are likely to be spikes in the need for medical care due to the lack of electricity for home medical aid devices,*

Scenario	Radio Blackout Activity R-ratings **Extreme – R5**	Solar Radiation Activity S-ratings **Extreme – S5**	Geomagnetic Activity G-ratings **Extreme – G5**
			increased panic, and the lack of modern conveniences and sanitation facilities, all of which may overwhelm healthcare facilities.
Economy (community wide)	None to Limited	None to Limited	Significant to Catastrophic Impact Financial Systems Impacted (banking, use credit cards, etc) Railways and pipelines affected impact the economy.
OTHER:			Interpersonal communications capabilities, business and home operations, online banking and other money transfer technologies, energy production and transmission, and even the operation of gas pumps are increasingly reliant on technologies that are most at risk to space weather events (in the event of power loss). See graphic on next page, illustrating interconnectedness of critical infrastructure impacted by power loss.

The following graphic produced by the US Department of Homeland Security examines the interconnectedness of sectors from the National Infrastructure Protection Plan (2012). It shows the cascading effects that can be felt from the loss of power in the upper right extending into all sectors of the economy and government.

Interconnectedness of Public and Economic Sectors



Source: U.S. Department of Homeland Security, 2012

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No change.	No change.

Risk
See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Although Space Weather would not be impacted by other hazards, and other hazards would not cause a Space Weather event, a space weather event could potentially occur at the same time as other hazards, making the event more challenging to manage, adding Space Weather impacts and vulnerabilities to those of the other hazard occurrence.

Future Conditions

- **Location**: No change.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** No change.
- **Duration:** No change.

Anticipated Future Climate Impact – Space Weather Hazard
Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of space weather events, though indirectly the Extent, Intensity, and Frequency of hazard related impacts could potentially be increased. Indirectly, if extreme climate variability and/or climate change begin to stress area power grids, satellite and terrestrial communications infrastructure, and other critical facilities, then there is a potential for increased (compounding) impacts from any concurrent Space Weather Hazard phenomena in these and related areas.

Previous Occurrences

There are no recorded catastrophic space weather events within North Dakota. There are several relevant historical occurrences noted in the 2024 ND Enhanced Mitigation plan. Some of those are noted here to illustrate likelihood and potential impacts.

- The Carrington Event in September 1859 disrupted communications, caused sparks, and ignited fires in telegraph offices in a largely pre-electric world. Vivid auroras were seen across the globe, in both northern and southern hemispheres.

- An event in 1921 known as the New York Railroad Storm is considered the biggest in the 20th century and may have rivaled the Carrington Event. Its name comes from the disruption to trains caused by a fire in the railroad control tower in Brewster due to build up on the third rail from the geomagnetic storm. That control tower burned to the ground and telegraph services across the U.S., including ND, were delayed due to blown fuses and damaged equipment (O'Callaghan, 2019). Ontario and Sweden also experienced similar impacts.

- The Great Quebec Blackout of 1989 was the result of a solar storm/space weather event that brought significant power fluctuations and outages to the bulk power distribution systems in North America, including areas like North Dakota which are served by the Western Area Power Administration along with portions of Northern Europe and Scandinavia (NERC, 1990; OECD, 2011). Damages were most extreme across Quebec and portions of New England, with Hydro-Quebec experiencing outages lasting nine hours or longer, leaving an estimated 6 million people without electricity, with cascading impacts across the United States/Canada shared electrical grid. New York Power and New England Power had a significant loss of power with service disrupted to 96 utilities in New England before backup power sources came online. Satellites tumbled in space and the space shuttle Discovery had unusual error messages (Odenwald, 2009). That CME, 36 times the size of Earth, produced power surges that destroyed a transformer at a nuclear reactor in New Jersey.

- In July 2012, a potentially Carrington-scale event was a near-miss to Earth. It tore through Earth's orbital route on July 23, but Earth was one-week further down its path.

- SpaceX owner Elon Musk sent 49 satellites into space on February 3, 2022, only to have them encounter space weather the next day, losing up to 40 of the 49 satellites that were sent to join his Starlink satellite internet network (BBC News, 2022). The satellites fell from orbit and were burned up in the Earth's atmosphere. According to Patel (2022), the Starlink satellites are smaller than most satellites and orbit at a lower altitude, making them more vulnerable to even mild events like this 2022 event.

What if this 1859 solar storm happened today?

Back then, the telegraph was just about the only communication technology they had. Today, such a storm could severely damage satellites, disable communications by telephone, radio, and TV, and cause electrical blackouts over whole continents. It could takes weeks or longer to fix the damage.
Solar storms like the one in 1859 happen only about every 500 years—thankfully. But smaller storms happen frequently, and storms half as intense as the 1859 storm happen about every 50 years.

https://scijinks.gov/what-was-the-carrington-event/

- Recent research has uncovered an extreme type of solar event that may occur in an approximate 1,000-year interval. These events, known as “Miyake Events”, named from the Japanese scientist who discovered them in 2012, have the potential to be severely destructive to global infrastructure and communications. Although these types of events are currently not well understood or predicted, their possibility of occurrence should continue to be evaluated and considered as an extreme end case in space weather and long-term mitigation planning.

Terrorist, or Nation-State Attack

Description

This section examines the risks posed by an attack from a terrorist group or a nation-state as it would impact the state of North Dakota and/or Bismarck specifically. These would include any chemical, biological, radiological, nuclear, explosive, industrial, food/food production, or armed assault intended to force political action or to single out a group of people for harm. This section also includes a description and outlines the potential impact of an intentional electromagnetic pulse event.

ND follows the FBI's categories of terrorism:

- **International terrorism** -- Violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations (state-sponsored) (FBI, 2023).
- **Domestic terrorism** -- Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature (FBI, 2023).
- **Lone offenders** – (FBI, 2023). Terrorist threats evolved from large-group conspiracies toward lone-offender attacks can be domestic or international terrorism. These individuals often radicalize online and mobilize to violence quickly. Without a clear group affiliation or guidance, lone offenders are challenging to identify, investigate, and disrupt.
- **Foreign Terrorist Organizations (FTOs)** -- Foreign organizations that are designated by the Secretary of State in accordance with section 219 of the Immigration and Nationality Act (INA), as amended (U.S. Department of State, 2023). FTO designations play a critical role in our fight against terrorism and are an effective means of curtailing support for terrorist activities and pressuring groups to get out of the terrorism business. Attacks under this categorization can be international or domestic.

In its 2023 Strategic Intelligence Assessment submitted to Congress, the FBI designates five threat categories of domestic terrorism, which are defined as follows:

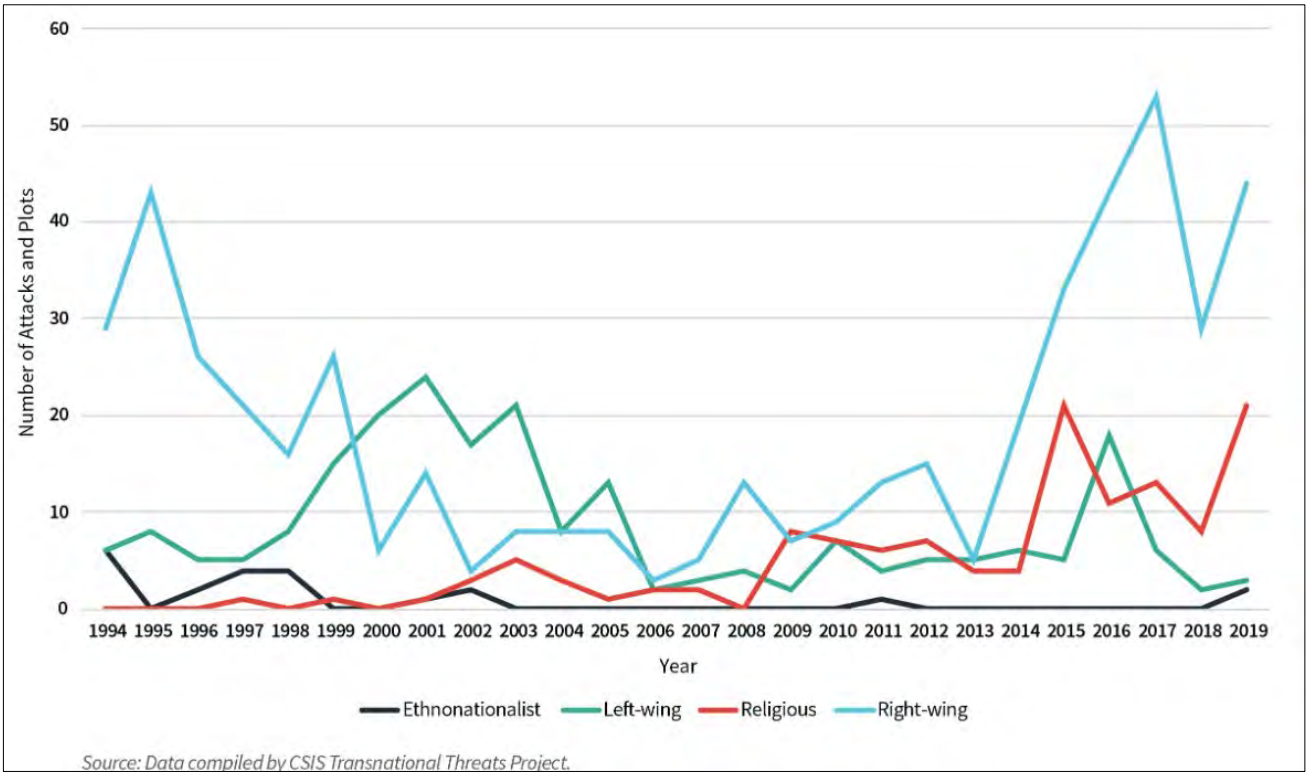
1) **Racially or Ethnically Motivated Violent Extremism** – violent acts or threats that are derived from bias of the actor against a given population group, often a racial group.
2) **Anti-Government or Anti-Authority Violent Extremism** – violent acts or threats derived from an anti-government or anti-authority sentiment, which includes actions from anarchists, militia, or sovereign citizen extremists.
3) **Animal Rights/Environmental Extremism** – violent acts or threats derived to further a political or social agenda related to animal cruelty, harm, or exploitation of animals and/or destruction of natural resources or the environment.

4) **Abortion-Related Violent Extremism** – violent acts or threats related to political or social agendas relating to abortion, whether that position be one of support or opposition to the practice.

5) **Other Domestic Terrorism Threats** – violent acts or threats derived from other agendas that may include personal grievances, political concerns, conspiracy theories or sexual orientation (DHS and FBI, 2022).

The Center for Strategic & International Studies (CSIS) examined the risk of terrorism in the United States and noted that there are shifting origins and targets. There are an increasing number of right-wing attacks in the nation, while attacks on religious groups are also increasing (Jones, Doxsee, & Harrington, 2020), as shown below.
Source: https://www.csis.org/analysis/escalating-terrorism-problem-united-states

Terrorist Attacks and Plots by Perpetrator Orientation, 1994-2019
Source: Jones et al, 2020



The NDSLIC (ND State and Local Intelligence Center) mission is “to gather, store, analyze and disseminate information on crimes, both real and suspected, to the law enforcement community, government officials and private industry concerning dangerous drugs, fraud, organized crime, terrorism and other criminal activity for the purposes of decision making, public safety and proactive law enforcement while ensuring the rights and privacy of citizens” (NDSLIC, 2023). Serving as a knowledge and communications agent for the public and government agencies around terrorism incidents is part of its responsibility (DHS, 2023). As part of that role, it

disseminates bulletins from the National Terrorism Advisory System, which is used by the Department of Homeland Security to make the public aware of the risk for terrorism.

Identifying and Reporting Suspicious Activity

The North Dakota State Local and Intelligence Center (NDSLIC) is the primary state agency for terrorism and has a system to report suspicious activities to the state for further investigation (NDSLIC, 2023). Online reports are made at https://apps.attorneygeneral.nd.gov/tip

But how is suspicious defined? The NDSLIC follows the Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI) regarding the following indicators of terrorism or criminal behavior:

- Breach/attempted intrusion of a nonpublic area
- Misrepresentation to hide illegal activity
- Theft/loss/diversion of articles associated with a building or infrastructure, such as a uniform or security badge
- Sabotage/tampering/vandalism of a building or infrastructure
- Cyberattacks
- Expressed or implied threats
- Suspicious aviation activity
- Eliciting information about a building
- Recruiting/financing the gathering of information about a building, its staff, or financials
- Testing or probing of security
- Suspicious photography of buildings or security features
- Suspicious observation/surveillance of structures or infrastructure beyond professional or touristic curiosity
- Materials acquisition or storage of unusual materials that could be used in an attack
- Acquisition of security, weapons, or tactical skills
- Collecting weapons
- Suspicious sector-specific incidents, i.e., public health sector

Nation-State Attack

A nation-state attack is an attack that originates from a foreign government. These may be cyber in nature. Similar to terrorism attacks, the goal of a nation-state attack is politically coercive in nature in that such an attack would be to force action or inaction by the federal government through an act of violence or targeted attack. In the event of a nation-state attack impacting the state of North Dakota, the United States military would be the lead agency in the event of an armed incursion. If the attack comes in the form of cyber, espionage, assassination, etc., the FBI will be the lead agency.

For a nation-state attack, American military targets, federal buildings, and targets that could impact the national economy would be the likely targets of any nation-state attack in the state. In North Dakota, these would likely be high-value oil or agricultural targets.

Both terrorist and nation-state attackers are unlikely to give warning for law enforcement to act in a manner to thwart the attack. However, law enforcement activities and reporting of suspicious activity by the public can identify indicators of terrorist plans allowing intervention that stops violence. The duration of most attacks is brief, as the goal is typically to enact the most violence before law enforcement can respond.

In many terror or nation-state attacks, the public has been the main target with the goal to enact enough violence to influence social or political behavior. Many terror attacks are violent criminal attacks on other people, either for the point of doing the most harm or targeting a particular group of people that the actor wants to change or cause to leave.

Attacks can have impacts on members of the public who were not directly impacted. Fear and trauma can impact the lives, mental, and physical health of members of the public not involved in the attack due to stress and fear of a repeat or similar attack.

Propaganda and vandalism can also create trauma and fear, and breed hostility within communities where it is occurring. Often, that is the goal of the actions.

The list of organizations that the FBI, ADL (Anti-Defamation League), or SPLC (Southern Poverty Law Center) identify as extremist changes regularly, as do the threats posed to the public. Cultural, political, and demographic shifts can newly disgruntle a person who might enact violence on their beliefs. Access to information and like-minded people through the internet, and the proliferation of propaganda, conspiracy theories, and provocations through the internet can help generate local violence before law enforcement understands the threat. Technology, demographic change, and national politics are not something that state and local responders can control but will likely shape the nature and motivation of future activities and attacks. Given growing international geopolitical hostilities, the presence of military bases in Minot, ND and Grand Forks, ND and presence of missiles or the perceived presence of such may make North Dakota a target.

Areas with large numbers of people provide more targets and damage for terrorist and nation-state attacks. The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, ND, Grand

Forks, ND, Bismarck, ND, and Williston, ND will see more people and events, making these areas more appealing targets.

Various media and social media platforms make the distribution of misinformation, disinformation, or mal-information potentially more effective in promoting lack of trust in government and officials who are traditionally considered subject matter experts, and civil disturbance incidents may occur, partially as a result of inaccurate information or propaganda.

Definitions from the Princeton Library https://princetonlibrary.org/guides/misinformation-disinformation-malinformation-a-guide/

- **Misinformation** is defined as false, incomplete, inaccurate/misleading information or content which is generally shared by people who do not realize that it is false or misleading. This term is often used as a catch-all for all types of false or inaccurate information, regardless of whether referring to or sharing it was intentionally misleading.
- **Disinformation** is false or inaccurate information that is intentionally spread to mislead and manipulate people, often to make money, cause trouble or gain influence.
- **Malinformation** refers to information that is based on truth (though it may be exaggerated or presented out of context) but is shared with the intent to attack an idea, individual, organization, group, country or other entity.Mediadefence.org

Data Limitations:

Much of the data that can give the clearest picture of probable risk and consequences or that could identify targets is appropriately unavailable for analysis. The exact likelihood of North Dakota falling victim to a nation-state attack, and the actions taken by law enforcement to infiltrate or thwart terror attacks is privately held so as not to interfere with ongoing law enforcement activities or to disclose methods and leads.

Electromagnetic Pulse (EMP)
A worst-case scenario

Most of the drivers of terrorist and nation-state activity are out of state and local control, such as an Electromagnet Pulse, caused intentionally by a high-altitude nuclear explosive.

The use of a high-altitude nuclear detonation with the intention of causing an Electromagnetic Pulse to shut down critical infrastructure (electric utility) over a wide geographic area is potentially the worst-case scenario in creating a shortage of critical materials. A highly effective EMP event could potentially cause a shortage of all critical materials and services.

Below are excerpts from the May 8, 2014 Opening Statement remarks prepared for the Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies Committee on Homeland Security.

"… EMP is simply a burst of electromagnetic radiation that results from certain types of high energy explosions or from a suddenly fluctuating magnetic field. A frightening point is that EMP can be generated by nuclear weapons, from naturally-occurring sources such as solar storms, or specialized non-nuclear EMP weapons. Nuclear weapon EMPs are most catastrophic when a nuclear weapon is detonated at high altitude, at approximately 30 kilometers (20 miles), above the intended target. The consequences of such an attack could be catastrophic; all electronics, power systems, and information systems could be shut down. This could then cascade into interdependent infrastructures such as water, gas, and telecommunications. While we understand this is an extreme case, we must always be prepared in case a rouge state decides to utilize this technology…"
Source: https://www.govinfo.gov/content/pkg/CHRG-113hhrg89763/pdf/CHRG-113hhrg89763.pdf

EMP Commission and Commission and Commission Report:
http://www.empcommission.org/
http://www.empcommission.org/docs/A2473-EMP_Commission-7MB.pdf

Vulnerability Assessment (1 of 2)

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.	**Terrorist, or Nation State Attack**
Probability	Low
Speed of Onset	No Notice
Duration	Months/Years
Geographic Area	City-Wide, Statewide, Regional, or Nationwide
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Direct or indirect impact by explosives or chemical, biological, radiological, or nuclear attack. 2. Loss of essential services and/or supplies (ex: power, water) 3. Lack of evacuation capability (transportation) for relocation to a safer location A. Targeted groups such as government entities/employees and first responders. B. Critical Infrastructure and Critical Facilities C. Vulnerable Populations including Elderly, Young, Hospital Patients, and the Disabled. All populations are the primary target of terrorism.
Mass Casualty Incident	Yes, Likely
Property Losses (points of vulnerability – high priority)	Government Buildings (ie: Federal, State) Property owned by or catering to groups targeted for hate crimes.
Environmental (points of vulnerability – high priority)	Intentional Contamination of Water and/or Air. Missouri River (intentional destruction of the Garrison Dam)
COG/COOP (points of vulnerability – high priority)	State Government (ie: State Capitol) Law Enforcement All City Departments
Critical Facilities (points of vulnerability – high priority)	Airport Federal Buildings Hospitals Water Treatment Plant
Critical Infrastructure (points of vulnerability – high priority)	Electric Substations Pipelines Water Treatment Plant Communications Internet
Schools (points of vulnerability – high priority)	Equally vulnerable as the general population
High Risk Facilities (chemical) (points of vulnerability – high priority)	Potential Theft of Hazardous Materials (Domestic Terrorism) Water Treatment Plant
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	Dense Populations (ex: Event Center) Places of Worship Government Buildings & Staff
Economy (community-wide)	Supply Chain Disruption (ex: Railway disruption)
OTHER: (points of vulnerability – high priority)	Oil Industry Energy Industry

Electromagnetic Pulse (EMP) Event, Intentional Event

EMP Vulnerabilities

"….Today's microelectronics are the foundation of our modern civilization, but are over one million times more vulnerable to EMP than the far more primitive and robust electronics of the 1960s, that proved vulnerable during nuclear EMP tests of that era. Tests conducted by the EMP Commission confirmed empirically the theory that, as modern microelectronics become ever smaller and more efficient, and operate ever faster on lower voltages, they also become ever more vulnerable, and can be destroyed or disrupted by much lower EMP field strengths.

Microelectronics and electronic systems are everywhere, and run virtually everything in the modern world. All of the civilian critical infrastructures that sustain the economy of the United States, and the lives of 310 million Americans, depend, directly or indirectly, upon electricity and electronic systems.

Of special concern is the vulnerability to EMP of the Extra High-Voltage (EHV) transformers, that are indispensable to the operation of the electric grid. EHV transformers drive electric current over long distances, from the point of generation to consumers (from the Niagara Falls hydroelectric facility to New York City, for example). The electric grid cannot operate without EHV transformers--which could be destroyed by an EMP event. The United States no longer manufactures EHV transformers. They must be manufactured and imported from overseas, from Germany or South Korea, the only two nations in the world that manufacture such transformers for export. Each EHV transformer must be custom made for its unique role in the grid. A single EHV transformer typically requires 18 months to manufacture. The loss of large numbers of EHV transformers to an EMP event would plunge the United States into a protracted blackout lasting years, with perhaps no hope of eventual recovery, as the society and population probably could not survive for even one year without electricity.

Another key vulnerability to EMP are Supervisory Control And Data Acquisition systems (SCADAs). SCADAs essentially are small computers, numbering in the millions and ubiquitous everywhere in the critical infrastructures, that perform jobs previously performed by hundreds of thousands of human technicians during the 1960s and before, in the era prior to the microelectronics revolution. SCADAs do things like regulating the flow of electricity into a transformer, controlling the flow of gas through a pipeline, or running traffic control lights. SCADAs enable a few dozen people to run the critical infrastructures for an entire city, whereas previously hundreds or even thousands of technicians were necessary. Unfortunately, SCADAs are especially vulnerable to EMP.

EHV transformers and SCADAs are the most important vulnerabilities to EMP, but are by no means the only vulnerabilities. Each of the critical infrastructures has their own unique vulnerabilities to EMP…"

Source: Dr. Peter Vincent Pry, Congressional EMP Commission, Congressional Strategic Posture Commission, Executive Director of the Task Force on National and Homeland Security, Witness Statement [PDF]

Additional statements regarding the EMP Threat:

- Hon. Trent Franks, A Representative in Congress from the State of Arizona, Witness Statement [PDF]
  https://docs.house.gov/meetings/HM/HM08/20140508/102200/HHRG-113-HM08-Wstate-F000448-20140508.pdf
- Dr. Peter Vincent Pry, Congressional EMP Commission, Congressional Strategic Posture Commission, Executive Director of the Task Force on National and Homeland Security, Witness Statement [PDF]
  https://docs.house.gov/meetings/HM/HM08/20140508/102200/HHRG-113-HM08-Wstate-PryP-20140508.pdf
- Dr. Michael J. Frankel, Senior Scientist, Penn State University, Applied Research Laboratory,
  Witness Statement [PDF]
  https://docs.house.gov/meetings/HM/HM08/20140508/102200/HHRG-113-HM08-Wstate-FrankelM-20140508.pdf
- Dr. Chris Beck, Vice President, Policy and Strategic Initiatives, The Electric Infrastructure Security Council, Witness Statement [PDF]
  https://docs.house.gov/meetings/HM/HM08/20140508/102200/HHRG-113-HM08-Wstate-BeckC-20140508.pdf

Vulnerability Assessment (2 of 2)

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.	**ElectroMagnetic Pulse, Intentional High Altitude Nuclear Detonation** (a worst case scenario)
Probability	Unlikely, yet "unknown"
Speed of Onset	Warning time would depend on detection or recognition of event. A "no notice" event is possible.
Geographic Area	Statewide, Regional, National
Duration	Months to Years
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Starvation, disease, societal collapse A. Those who are not self-reliant for all necessities (food, water, heat, etc.) and those who require medicines or medical attention.
	Some residents will have stand-by generators but the majority of residents do not.
Mass Casualty Incident	Yes, potentially a majority of the population directly impacted. Food, potable water, and medical supplies likely to be depleted.
Property Losses (points of vulnerability – high priority)	1. Power Grid and other Electric Utility property and equipment losses. 2. Equipment having electronic components being disabled or destroyed.
	Structures may be affected by sewer back-up if back-up generators would fail (lift stations)
Environmental (points of vulnerability – high priority)	1. Loss of Power would impact water and sewer services. 2. Waste management. 3. Availability of potable water for drinking, food processing, etc.
COG/COOP (points of vulnerability – high priority)	1. Community Safety and Security. 2. Limited or no communications with the public. 3. Most, if not all government services would be very difficult to sustain. 4. Emergency Services impacted by loss of utility and loss of phone and radio communications 5. Lack of fuel *(depleted based on impact to transportation and utilities)*

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.	**ElectroMagnetic Pulse, Intentional High Altitude Nuclear Detonation** (a worst case scenario)
Critical Facilities (points of vulnerability – high priority)	1. Water and Wastewater. 2. All critical facilities due to lack of electricity, water, as well as impacts to communications and transportation infrastructure. 3. Grocery Stores – food supplies depleted. 4. Hospitals, Nursing Homes, Assisted Living Centers 5. Prisons, Jails
Critical Infrastructure (points of vulnerability – high priority)	1. Power Grids may take months to years to repair. 2. All critical infrastructure requiring electricity would be impacted including transportation, communications, water, wastewater, heating/cooling).
Schools (points of vulnerability – high priority)	1. Schools closed, potentially used for alternative emergency response purposes.
High Risk Facilities (chemical) (points of vulnerability – high priority)	1. All businesses would be closed or severely impacted. High risk facilities may pose additional risk due to limited (if any) emergency services. 2. Safety/Security may be compromised at high risk facilities when fuel for back-up power is depleted.
Specific Populations: Public Assembly, Vulnerable / Special Populations (points of vulnerability – high priority)	1. Life threatening risk in the very short term for those requiring medical attention, medicines, or use of electricity for life support. 2. Evacuation and relocation capabilities seriously compromised.
Economy (community-wide)	1. Catastrophic 2. Potential for societal collapse.
OTHER: (points of vulnerability – high priority)	It may take hours or days to confirm and then communicate the cause of the power outage to the public.

The Bismarck Community is reliant on mitigation stakeholders to deter, prevent, and mitigate the impacts of an electro-magnetic pulse (EMP) attack or other intentional attacks on utility infrastructure. Stakeholders include state and federal government as well as the utility industry and scientific community.

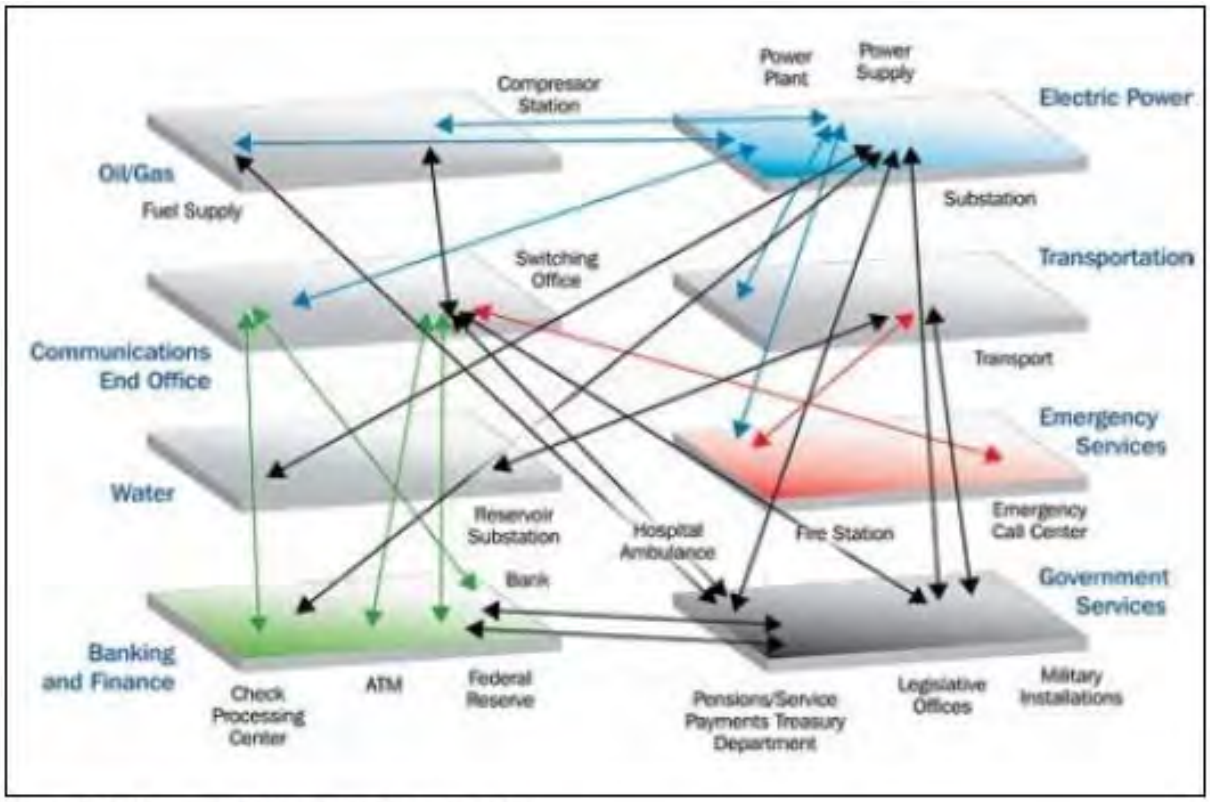
The electric utility industry on a nationwide basis is not hardened against the electro-magnetic pulse threat. In turn, communities nationwide including Bismarck are vulnerable. Assuming a significant EMP event would impact the transportation infrastructure, our population would be vulnerable due to lack of deliveries: food, medicines, fuel, etc.

In general, our society has become reliant on the electric utility industry to maintain operations for other critical infrastructure, and to sustain life and quality of life. Additionally, other critical infrastructures are reliant on computer and other sophisticated electronics which are very susceptible to the effects of an EMP attack.

Loss of Power

The following graphic produced by the US Department of Homeland Security examines the interconnectedness of sectors from the National Infrastructure Protection Plan (2012). It shows the cascading effects that can be felt from the loss of power in the upper right extending into all sectors of the economy and government.

Interconnectedness of Public and Economic Sectors



Source: U.S. Department of Homeland Security, 2012

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No change.	No changes. See Hazard-Specific Mitigation Capabilities listed in Section 3.

Risk
See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Cyberattack, as a hazard, may be the approach to a Terrorist-Nation State Attack.

Future Conditions

- **Location**: No change.
- **Extent/Intensity:** No change.
- **Frequency:** No expected change.
- **Duration:** No change.

Anticipated Future Climate Impact – Terrorist or Nation-State Attack Hazard
Similar to Civil Disturbance, most Terrorism results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR_2005). Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains (NGP) region. *Source: 2024-29 ND Enhanced Mitigation Plan.*

Previous Occurrences

Bismarck has not had previous occurrences of Terrorism or Nation-State Attack incidents. Previous occurrences have occurred relating to Civil Disturbance and Active Threat (separate hazard profiles).With North Dakota being centrally located in the continent and its rural nature.

Tornado – Hazard Profile

See Severe Summer Weather Hazard Profile regarding additional hazards relating to summer weather.

Description

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The term "tornado" was derived from the Latin word, "tornare" which means "to make round by turning." A tornado is initially a cloud within the thunderstorm, composed of condensed water vapor. A tornado forms when a change in wind direction and increase in wind speed with increasing height creates a horizontal spinning effect in the lower atmosphere. This area of rotation may be two to six miles wide, extending through much of the storm. Most tornadoes form within this area of strong rotation when the rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical. Tornadoes may appear nearly transparent until the circulating wind in the funnel reaches the ground and picks up debris that eventually darkens the whole funnel.

Tornadoes are nature’s most violent windstorm. In an average year, the United States experiences an average of 1,200 tornadoes that result in an average of 70 to 80 deaths and 1,500 injuries. Most fatalities occur when people are struck by flying debris or do not leave mobile homes and automobiles. Tornadoes can vary greatly in shape, size, and wind speed. Most tornadoes, 88 percent, have wind speeds less than 110 mph and a lifetime of less than ten minutes. These weak tornadoes result in less than five percent of tornado deaths. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. The average forward speed is 30 mph, but may vary from nearly stationary to 70 mph. Approximately 11 percent of all tornadoes have wind speeds between 110 and 205 mph and result in nearly 30 percent of all tornado deaths. These strong tornadoes may last 20 minutes or longer. Less than one percent of all tornadoes have resulted in 70 percent of all tornado deaths. These violent tornadoes can be over a mile wide with documented rotating winds of more than 250 mph, and they can have lifetimes exceeding one hour and stay on the ground for over 50 miles.

Fujita Scales

A funnel cloud is the rotating column of air extending out of a cloud base, but not yet touching the ground. The funnel cloud does not become a tornado until it touches the ground. Once in contact with the surface, it can create great damage over a small area. In 1971, Dr. Theodore Fujita developed the Fujita tornado damage scale to categorize various levels of tornado damage. In fact, Dr. Fujita's first major case study on tornado damage was the 1957 Fargo tornado. (North Dakota State Water Commission, 2007)

In 2006, enhancements to this scale resulted in more accurate categorizations of damage and the associated wind speeds. The Enhanced Fujita (EF) scale was implemented in February 2007.

Tornado Scales

Fujita Scale (through January 2007)		**Enhanced Fujita Scale** (Feb 2007 - current)	
Scale	**Estimated Wind Speed**	**Scale**	**Estimated Wind Speed**
F0	<73 mph	EF0	65-85 mph
F1	73-112 mph	EF1	86-110 mph
F2	113-157 mph	EF2	111-135 mph
F3	158-206 mph	EF3	136-165 mph
F4	207-260 mph	EF4	166-200 mph
F5	261-318 mph	EF5	>200 mph

Source: National Climatic Data Center, 2013.

F0  ***F1***  ***F2*** 

F3  ***F4***  ***F5*** 

Photos Source: Wikipedia

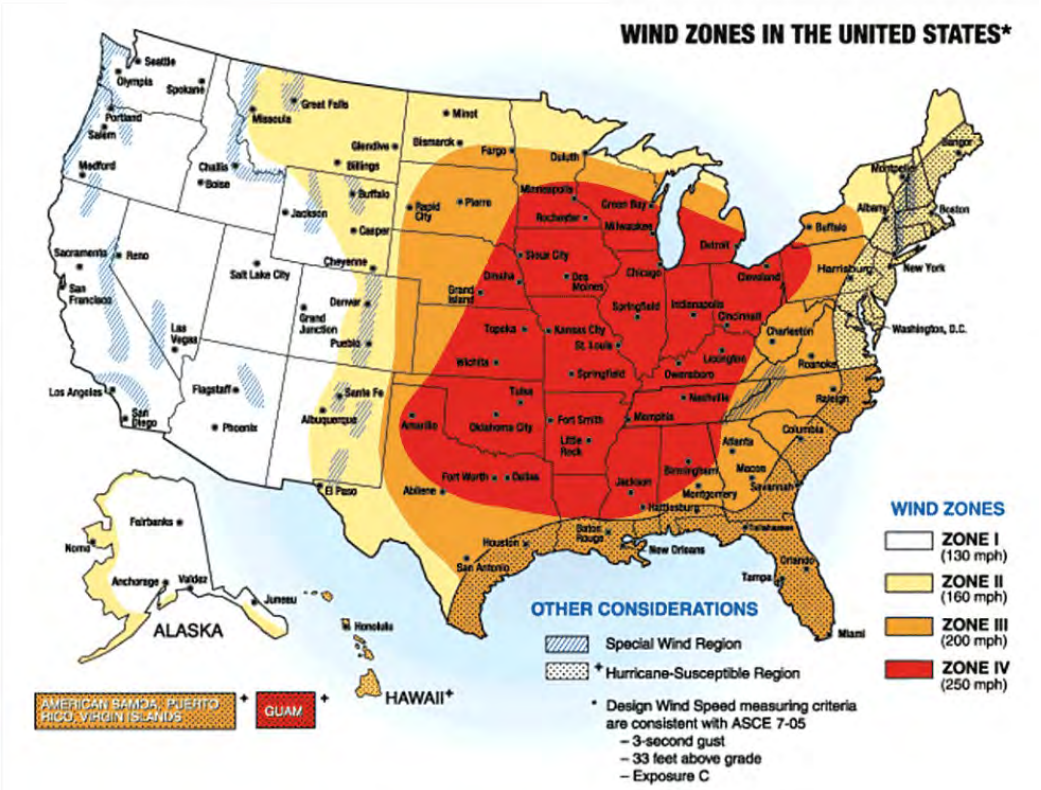


Figure 1A – Safe room wind speed map 2015 (courtesy of the ICC).

https://iibec.org/giving-tornadoes-their-due/

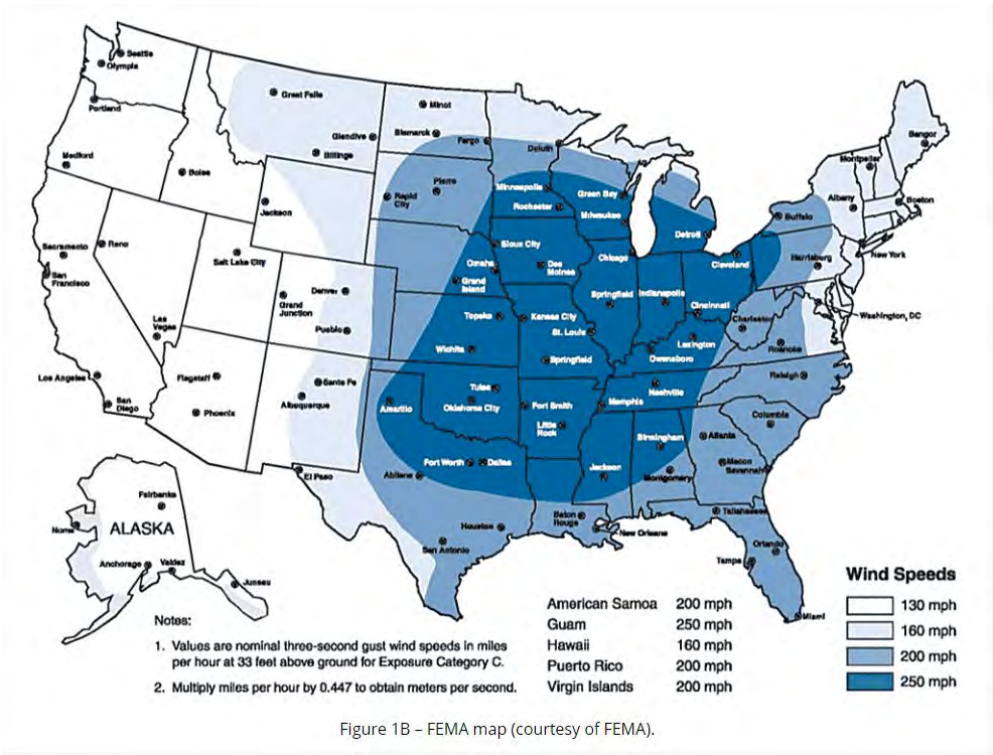


Figure 1B – FEMA map (courtesy of FEMA).

Burleigh County Tornado Statistics - January 1, 1950 through December 31, 2024:

- Total number of tornadoes: 49
- Deaths: 1 (1 on 07-01-1952)
- Injuries: 28 (26 on 07-01-1952, 2 on 11-01-2000)
- Highest rated tornado (EF) 2007-2024: EF1 (86 to 110 mph) on July 16, 2011 5:35 PM CDT to 5:46 PM CDT. Length: 4.05 miles from 8.5 miles north of Regan to 12.5 miles north of Regan. Width: 50 yards. Deaths: 0. Injuries: 0
- Highest rated tornado (F) 1950-2024: F4 (207-260 mph) on July 01, 1952 (data lists two F4 tornadoes on 07-01-1952). Length: 28 miles. Width: 150 yards. Deaths: 1. Injuries: 26.

Estimated Annual Probability of a tornado of any magnitude Based on Historical Occurrences: *2%

***This estimate is for planning purposes only** – and is based on the following limited and short-term data and assumptions: There has been an average of 0.7 tornado events per year in Burleigh County from 1996 to 2025 (not all tornadoes are reported). The ratio or target size of Bismarck compared to the geographic square miles of Burleigh County is 2%. It's assumed all of Burleigh County has equal chances.

When considering the statewide statistics regarding intensity of tornadoes since 1950, a majority of the estimated chance is for the weaker tornadoes (EF0 and EF1).

Annual Tornado Frequency in ND since 1950, by EF Rating:

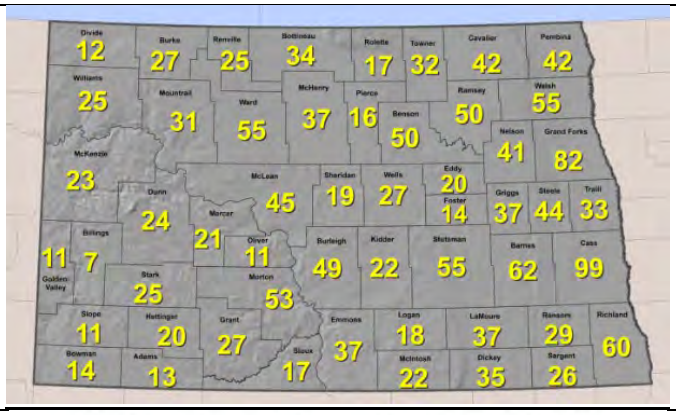
Magnitude	Frequency
EF0/F0	13.4 per year
EF1/F1	5.4 per year
EF2/F2	2.0 per year
EF3/F3	0.6 per year
EF4/F4	0.2 per year
EF5/F5	0.04 per year

Source: NCEI, 2023

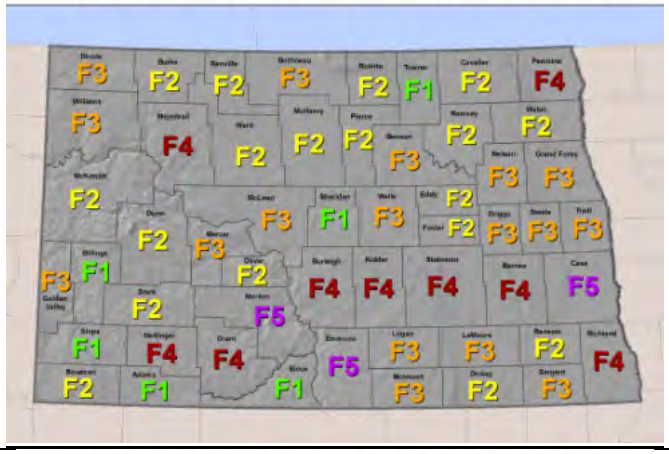
The peak time of the year for tornadoes in North Dakota is from the end of May through the beginning of August, with most tornadoes in the state occurring between 3:00 p.m. and 11:00 p.m. in the months of June, July, and August; however, tornadoes have been reported as early as March 26 and as late as November 1.

Statewide Tornado Events Summary

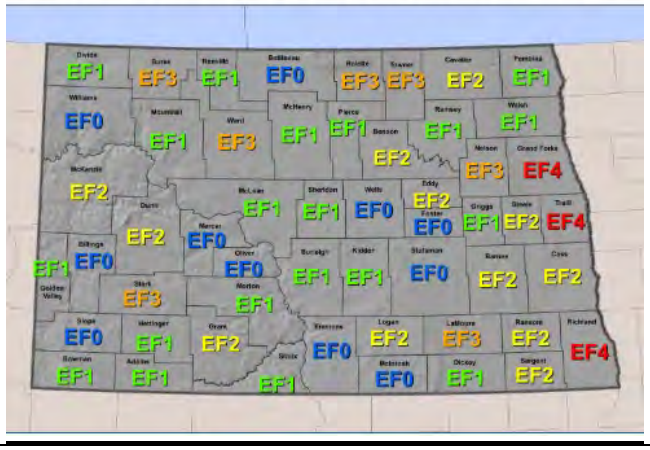
Tornadoes by County 1950-2024



Highest Rated Tornado (F) 1950-2006



Highest Rated Tornado (EF) 2007-2024



Source: https://www.weather.gov/bis/ndtorhistory
http://www.ncdc.noaa.gov/stormevents/

Statewide Tornado Statistics (1950 through 2024):

- Tornado deaths 30.
- Tornado injuries 388.
- Earliest tornado (calendar year) March 26, 2003 Stutsman County.
- Latest tornado (calendar year) November 1, 2000 Bismarck/Mandan area.
- Most tornadoes in a year is 61 in 1999.
- Least tornadoes in a year is 2 in 1950, 1951, and 1961.
- Most tornadoes in a calendar day is 24 on June 11, 1976.
- Most tornadoes in any 24-hour period is 29 on June 11-12, 1976.
- There were 30 tornadoes, 24 on June 11 and 6 on June 12. One occurred outside the 24-hour window.
- NCDC web site is missing June 1993 (11 tornadoes in 12 counties) and July 1993 (22 tornadoes in 23 counties) data.
- There were 5 tornadoes in 5 counties in August for a total of 38 in 40 for the year. NCDC web site is missing 3 tornadoes in Kidder County, 07-01-1952, 06-17-1956, and 07-04-1960. They are listed for Burleigh County and based on LAT/LON most likely crossed into Kidder County.

This data was compiled from several sources and contains the best information available. Due to difficulties inherent in the collection of weather data it may not be all inclusive.
https://www.weather.gov/bis/ndtorhistory

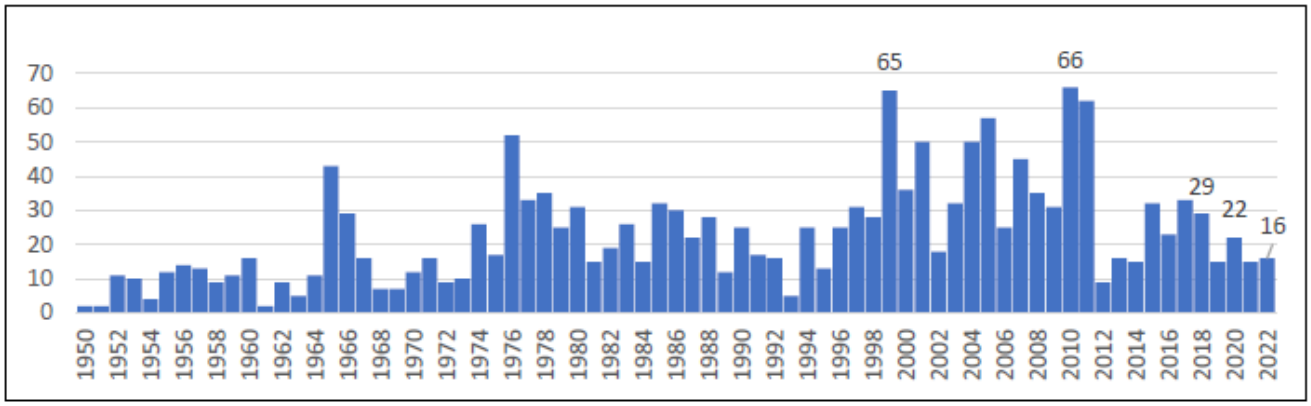
For a tornado to be counted in these statistics, it must be reported, and it is entirely possible for a tornado to occur in the state without anyone knowing it.

Note that these findings may be more indicative of the spotter networks in the state rather than the actual occurrence. The state also conducts cloud seeding operations in the western part of the state for hail suppression.

Deadly Tornadoes in North Dakota 1950-2024

Location	Date	Magnitude	Fatalities	Injuries
Cass County (Enderlin)	June 20, 2025	EF3	3	
Stutsman County	June 20, 2025	EF2	1	
Burleigh and Kidder Counties	July 1, 1952	F4	*2 fatalities (1 per county)	*26 injuries (total from both counties)
Morton County	May 29, 1953	F5	2 fatalities	20 injuries
Richland County	July 2, 1955	F4	2 fatalities	19 injuries
Cass County	June 20, 1957	F5	*10 fatalities	103 injuries
Cavalier County	June 24, 1966	F1	1 fatality	1 injury
Hettinger County	June 29, 1975	F4	1 fatality	4 injuries
Elgin, Grant County	July 4, 1978	F4	5 fatalities	35 injuries
12 miles South of Greene Renville County	July 23, 1997	F2	1 fatality	2 injuries
Northwood, Grand Forks County	August 26, 2007	EF4	1 fatality	18 injuries
10 miles north-northeast of Niobe, Ward County	August 12, 2010	EF3	1 fatality	1 injury

North Dakota Tornadoes by Year, 1950 – 2022:



Source: NCEI, 2023

Data Limitations (statewide):

Summer storms can be such isolated events that the vulnerability to a particular area can be hard to determine. Weather data is often limited by the observations taken, and events in the National Climatic Data Center database are only recorded if reported to the National Weather Service. The addition of trained spotters to the area may improve data collection.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Note: Loss / Impact and Vulnerabilities are assumed to be cumulative from previous columns to the left. Tornado intensity is determined AFTER the incident and is based on level of damage.

Tornado Intensity =	**EF 0 - EF 1** **"Weak"**	**EF 2 - EF 3** **"Strong"**	**EF 4 – EF 5** **"Violent"**
Probability	"Possible" *Highest Probability* *(and frequency)*	"Possible" *Lower Probability* *(and frequency)*	"Unlikely" *Lowest Probability* *(and frequency)*
Speed of Onset	15 minutes approximately	15 minutes approximately	15 minutes approximately
Duration	Less than 30 minutes	Less than 30 minutes	Less than 30 minutes
Geographic Area	300 yards wide 1 to 2 miles long is typical	1 mile wide is possible but wide rare (EF3) 1 to 2 miles long Is typical – can be longer	1 mile wide is possible but rare 1 to 2 miles long is typical – can be longer
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Flying Debris *Non-secure outdoor items* A. Mobile home occupancy B. Motor Home C. Camp sites D. Being Caught Outdoors E. In a vehicle F. Insufficient shelter G. Windows H. Smaller detached buildings	1. Flying Debris *Secured items* 2. Structure collapse *Average "stick" construction* A. Homes / buildings of average "stick" construction B. High population density within "average construction" structures	1. Flying Debris 2. Structure collapse *All structures* A. All Structures B. All structures with high population density

Tornado Intensity =	**EF 0 - EF 1** **"Weak"**	**EF 2 - EF 3** **"Strong"**	**EF 4 – EF 5** **"Violent"**
Mass Casualty Incident			Burleigh County July 1, 1952 1 Death 26 Injuries 28 miles long 150 yards wide Also, see Table "Deadly Tornados in ND" on page 6
Property Losses (points of vulnerability – high priority)	1. Mobile home 2. Motor Home 3. Windows/doors 4. Trees	1. Homes / buildings of average "stick" construction	1. All Structures
Environmental	1. Debris 2. Hazardous Waste debris	1. HazMat Releases 2. Oil Refinery - Mandan	1. HazMat Releases 2. Oil Refinery - Mandan
COG/COOP	1. Employee / family casualties 2. Key personnel – Orders of Succession	1. Employee / Family casualties 2. Key personnel – Orders of Succession	1. Employee / Family casualties 2. Key personnel – Orders of Succession 3. Property / Building(s) Destroyed 4. Equipment destroyed
Critical Facilities	1. Windows 2. Garages 3. Doors 4. Large Span Roofs Structure – depending on design / materials	1. Windows 2. Garages 3. Doors 4. Large Span Roofs Structure – depending on design / materials	1. Response agencies (includes 911) 2. City Buildings - Airport 3. Hospitals 4. Ambulance Service

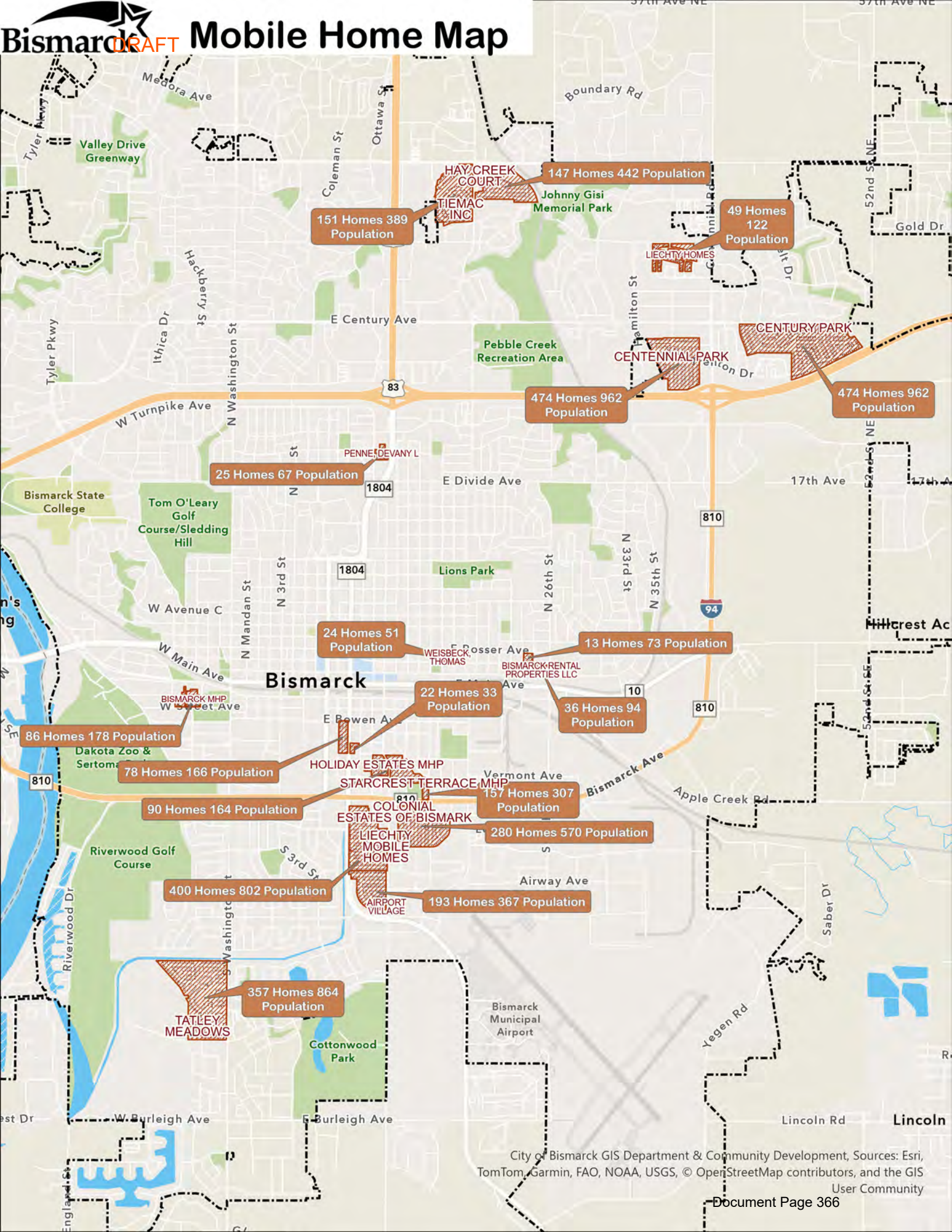
Tornado Intensity =	**EF 0 - EF 1** **"Weak"**	**EF 2 - EF 3** **"Strong"**	**EF 4 – EF 5** **"Violent"**
Critical Infrastructure	1. Electricity - Substations & Overhead Power Lines 2. Streets Blocked 3. Communications	1. Electricity - Substations & Overhead Power Lines 2. Streets Blocked 3. Communications	1. Electricity - Substations & Overhead Power Lines 2. Streets Blocked 3. Communications
Schools	1. Portable Classrooms 2. Windows 3. Doors 4. Large Span roofs 5. Loss of roofing materials	High end EF 3: 1. All Schools structurally damaged 2. Loss of non-bearing walls 3. Loss of load bearing walls 4. Interior walls of 2nd floor or higher collapsed	1. Structures Destroyed Most Elementary Schools (BPS) do NOT have basements for sheltering
High Risk Facilities (chemical)	1. Windows 2. Garages/doors 3. Doors 4. Large Span Roofs	1. Windows 2. Garages/ doors 3. Doors 4. Large Span Roof	1. Water Treatment Plant 2. Waste Water Treatment Plant 3. All Haz Mat storage facilities
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Outdoor Recreation Areas 2. Public Assembly (high population densities) 3. Special Outdoor events	1. Outdoor Recreation Areas 2. Public Assembly (high population densities) 3. Special Outdoor Events	1. Outdoor Recreation Areas 2. Public Assembly (high population densities) 3. Special Outdoor Events
Economy (community wide)	Minor	Moderate	Catastrophic *Significant recovery challenges*
OTHER:	Mobile HazMat (truck)	Mobile Hazmat	Mobile Hazmat – including railroad

The Federal Emergency Management Agency places the majority of North Dakota in Zone II (160 mph) for structural wind design; however, southeastern and south central North Dakota are in Zone III (200 mph).
Source: Federal Emergency Management Agency, 2004 via 2014 ND DES Mitigation Plan

Mobile Home Parks within Bismarck

NAME	PROPERTY ADDRESS	UNITS	POPULATION ESTIMATE
Capitol Park Village	1821 N 11th St	28	49
18th St/Thayer Av	1713 E Rosser Av	28	31
Bismarck Mobile Home Park	2406 E Thayer Av	34	78
Dakota Mobile Home Park	2520 E Broadway Av	51	89
Holiday Park	600 S 9th St	109	197
Airport Village	1437 University Dr	192	404
Century Centennial	2500 Centennial Rd	265	542
Century Park	4191 E Century Av	475	956
Colonial Estates	1501 E Bismarck Ex	282	599
Hay Creek Court	4005 NE 19th St	132	263
Parkview Estates	614 W Sweet Av	87	192
North Valley	4224 N 19th St	151	335
Skyway Park Village	1119 University Dr	397	689
Stardust Terrace	725 S 12th St	254	630
Tatley Meadows	2200 S Washington St	362	769
TOTAL		2,847	5,823

Bismarck DRAFT Mobile Home Map



City of Bismarck GIS Department & Community Development, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Mobile homes are regulated by HUD. The International Building Code requirements do not apply to mobile homes. Therefore, mobile homes are exempt from this particular International Building Code: Chapter 16 Structural Design - Section 1609 Wind Loads.

International Building Code - Chapter 16 Structural Design - Section 1609 Wind Loads:

1609.1 Applications states "Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures."

- 105 MPH (3 second gust) 33 feet above ground for Risk Category I Buildings and other Structures
- 115 MPH (3 second gust) 33 feet above ground for Risk Category II Buildings and other Structures
- 120 MPH (3 second gust) 33 feet above ground for Risk Category III and IV Buildings and other Structures

Source: http://publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_16_par090.htm

The table on the following page, extracted from the 2012 International Building Code is used to identify the risk category of buildings and other structures.

structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral force-resisting system.

Every structure shall be designed to resist the overturning effects caused by the lateral forces specified in this chapter. See Section 1609 for wind loads, Section 1610 for lateral soil loads and Section 1613 for earthquake loads.

1604.5 Risk category. Each building and structure shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein.

1604.5.1 Multiple occupancies. Where a building or structure is occupied by two or more occupancies not included in the same *risk category*, it shall be assigned the classification of the highest *risk category* corresponding to the various occupancies. Where buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required

TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupa load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000[a]. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released [b].
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released [b]. • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.2 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
As the community continues to grows (via annexations), the existing outdoor warning siren system (sirens) may not provide for adequate coverage in those new areas, including outdoor recreational areas and residential areas.	Three new outdoor warning sirens were added in 2023. The new sirens are located in north Bismarck; one in the northwest, north central, and northeast part of Bismarck due to community growth

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: A Tornado event may initiate or contribute to the cause of additional hazards including Geologic Hazard (impact to trees/vegetation promoting soil instability), Fire (interaction with power lines and causing sparks or arching), as well as transportation incidents such as Train Derailment or Aircraft Accident.

Future Conditions

- **Location**: The location will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** See “Anticipated Future Climate Impact” below.
- **Duration:** The duration of tornado hazards is not projected to change.

Anticipated Future Climate Impact – Tornado Hazard
Through the end of this century in North Dakota, expect more frequent, larger, and longer duration thunderstorms with an increase in intense rain and flooding, and an increase in relative size (areal coverage) of the impact areas of any corresponding tornadoes. Not necessarily more intense tornadoes, but tornadoes with a larger damage footprint.

EF0 – EF2 Tornado Impact Damage Level Indicators http://www.spc.noaa.gov/efscale/ef-scale.html				
Type	**Property Type**	**Expected Wind Speed**	**EF Scale**	**Description**
TS	Trees – Softwood	60	EF0	Small limbs broken (up to 1” diameter)
TH	Trees – Hardwood	60	EF0	Small limbs broken (up to 1” diameter)
TH	Trees – Hardwood	74	EF0	Large branches broken (up to 3” diameter)
MHSW	Single Wide Manufactured Mobile Home	74	EF0	Loss of shingles or partial uplift of one-piece metal roof covering
MHDW	Manufacture Home – Double Wide	78	EF0	Damaged porches or carports
FR12	One and Two-Family Residences	79	EF0	Loss of roof covering material (>20%), gutters and/or awning; loss of vinyl or metal siding
MHDW	Manufacture Home – Double Wide	83	EF0	Broken Windows
TS	Trees – Softwood	87	EF1	Uprooted
MHSW	Single Wide Manufactured Mobile Home	87	EF1	Unit slides off block piers but remains upright
MHDW	Manufacture Home – Double Wide	88	EF1	Uplift of roof deck and loss of significant roof covering material (>20%)
MHSW	Single Wide Manufactured Mobile Home	89	EF1	Complete uplift of roof; most walls remain standing
TH	Trees – Hardwood	91	EF1	Uprooted
MHDW	Manufacture Home – Double Wide	93	EF1	Complete uplift of roof; most walls remain standing
MHDW	Manufacture Home – Double Wide	94	EF1	Unit slides of CMU block piers
FR12	One and Two-Family Residences	96	EF1	Broken glass in doors and windows
MHDW	Manufacture Home – Double Wide	97	EF1	Removal of entire roof structure leaving most walls standing
FR12	One and Two-Family Residences	97	EF1	Uplift of rood deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward; failure of porch or carport.
MHSW	Single Wide Manufactured Mobile Home	98	EF1	Unit rolls on its side or upside down; remains essentially intact
TS	Trees – Softwood	104	EF1	Trunks Snapped
MHSW	**Single Wide Manufactured Mobile Home**	**105**	**EF1**	**Destruction of roof and walls, leaving floor and undercarriage in place**
MHSW	Single Wide Manufactured Mobile Home	109	EF1	Unit rolls or vaults; roof and walls separate from floor and undercarriage
TH	Trees – Hardwood	110	EF1	Trunks Snapped
SBO	Small Barns and Farm Outbuildings (sheds)	112	EF2	Total destruction of building

MHDW	**Manufacture Home – Double Wide**	**113**	**EF2**	**Complete destruction of roof and walls leaving undercarriage in place**
MHDW	Manufacture Home – Double Wide	114	EF2	Unit rolls, displaces or vaults
MHSW	Single Wide Manufactured Mobile Home	118	EF2	Undercarriage separates from unit; rolls, tumbles and is badly bent
FSP	Free Standing Light Poles, Luminary Poles, Flag Poles	118	EF2	Collapsed Pole
ETL	Electrical Transmission Lines	118	EF2	Broken wood poles
MBS	Metal Building Systems	118	EF2	Buckling of roof purlins
SRB	Small Retail Building	119	EF2	Uplift or collapse of entire roof structure
FR12	One and Two-Family Residences	121	EF2	Entire house shifts off foundation
MAM	Masonry Apartments or Motels	121	EF2	Uplift of pre-cast or cast-in-place concrete roof decking
FR12	One and Two-Family Residences	122	EF2	Large sections of roof structure removed; most walls remain standing
SM	Strip Mall	122	EF2	Uplift or collapse of entire roof structure
M	Motels	123	EF2	Uplift or collapse of roof structure leaving most walls standing
WHB	**Warehouse Building**	**124**	**EF2**	**Collapse of pre-cast concrete tilt-up panels**
SPB	Small Professional Building	124	EF2	Uplift or collapse of entire roof structure
ACT	Apartments, Condos, and Townhouses	124	EF2	Uplift of roof decking; significant loss of roof covering (>20%)
ES	**Elementary School**	**125**	**EF2**	**Uplift or collapse of roof structure**
JHSH	**Junior or Senior High School**	**125**	**EF2**	**Uplift or collapse of roof structure**
ASR	**Automobile Showroom**	**126**	**EF2**	**Exterior Walls Collapsed**
MHSW	**Single Wide Manufactured Mobile Home**	**127**	**EF2**	**Complete destruction of unit; debris blown away**
MHSW	Single Wide Manufactured Mobile Home	127	EF2	Undercarriage separates from floor, rolls and tumbles, badly bent
ASB	**Automobile Service Building**	**128**	**EF2**	**Collapse of load-bearing walls**
LSM	Large Shopping Mall	128	EF2	Roof structure uplifted or collapsed
MROB	Mid-Rise Building	129	EF2	Broken curtain wall panel anchors
HROB	High-Rise Building	129	EF2	Broken curtain wall panel anchors
TS	Trees – Softwood	131	EF2	Trees debarked with only stubs of largest branches remaining
IB	Institutional Building	131	EF2	Damaged curtain walls or other wall cladding
FR12	**One and Two-Family Residences**	**132**	**EF2**	**Exterior walls collapsed**
FST	**Free-Standing Towers**	**133**	**EF2**	**Collapsed cell-phone tower**
SSC	Service Station Canopy	133	EF2	Complete destruction of Canopy
LRB	Low-Rise Building	133	EF2	Uplift of lightweight roof structure
MHDW	**Manufacture Home – Double Wide**	**134**	**EF2**	**Complete destruction of unit; debris blows away**
LIRB	Big Box Stores – Large Isolated Retail Building	134	EF2	Uplift and removal of roof structure

Relative Vulnerability of Property and Structure Types *Based on **Damage Level Indicators** Expected Wind Speed and associated EF Scale **to cause destruction of property** http://www.spc.noaa.gov/efscale/ef-scale.html				
***Type**	**Property Type**	**Expected Wind Speed**	**EF Scale**	**Description**
TS	Trees – Softwood	87	EF1	Uprooted
TH	Trees – Hardwood	91	EF1	Uprooted
TS	Trees – Softwood	104	EF1	Trunks Snapped
TH	Trees – Hardwood	110	EF1	Trunks Snapped
SBO	Small Barns and Farm Outbuildings (sheds)	112	EF2	Total destruction of building
FSP	Free Standing Light Poles, Luminary Poles, Flag Poles	118	EF2	Collapsed Pole
MHSW	Single Wide Manufactured Mobile Home	127	EF 2	Complete destruction of unit; debris blown away
TS	Trees – Softwood	131	EF2	Trees debarked with only stubs of largest branches remaining
SSC	Service Station Canopy	133	EF2	Complete destruction of canopy
MHDW	Double Wide Manufactured Mobile Home	134	EF2	Complete destruction of unit; debris blown away
FST	Free Standing Tower	136	EF3	Collapsed micro-wave tower
ETL	Electrical Transmission Line	141	EF3	Collapsed metal truss towers
TH	Trees – Hardwood	143	EF3	Trees debarked with only stubs of largest branches remaining
ES	Elementary School (see additional entry below)	153	EF3	Collapse of load bearing walls
MBS	Metal Building System	155	EF3	Total destruction of building
SPB	Small Professional Building (single story, less than 5,000 sf)	157	EF3	Total destruction of entire building
ASB	Automotive Service Building	157	EF3	Complete Destruction of all or a large section of the building
ASR	Automobile Showroom	157	EF3	Complete Destruction of all or a large section of the building
WHB	Warehouse Buildings (non-metal buildings)	158	EF3	Total destruction of large section of building or entire building
SRB	Small retail building (ex: fast food restaurant)	167	EF4	Total destruction of entire building
SM	Strip Mall	171	EF4	Complete destruction of all or a large section of building

LIRB	"Big Box" Store. Large Isolated Retail Building	173	EF4	Complete Destruction of all or a large section of the building
ES	Elementary Schools	176	EF4	Total destruction of a large section of building or entire building
MAM	Masonry Apartments or Motels	180	EF4	Total destruction of large section of building
ACT	Apartments, Condos, and Townhouses (3 stories or less)	180	EF4	Almost total destruction of top two stories
ACT	Apartments, Condos, and Townhouses (3 stories or less)	>180	EF4	Total Destruction of entire building
LRB	Low Rise Building	188	EF4	Complete Destruction of all or a large section of the building
M	Motels (4 or fewer stories)	190	EF4	Total destruction of entire building
JHSH	Junior or Senior High School	192	EF4	Complete Destruction of all or a large section of the building
FR12	One and Two Family Residences	200	EF4	Destruction of engineered and/or well constructed residence; slab swept clean
LSM	Large Shopping Mall	204	EF5	Complete Destruction of all or a large section of the building
IB	Institutional building (ex: hospitals, university buildings)	210	EF5	Significant damage to building envelope
MROB	Mid-Rise building (5-20 stories)	210	EF5	Permanent structural deformation
HROB	High-Rise > 20 stories	228	EF5	Significant structural deformation

Single-Wide Mobile Homes

Damage Description	**Wind Speed Range (expected in parentheses)**
Threshold of visible damage	51-76 mph (61 mph)
Loss of shingles or partial uplift of one-piece metal roof covering	61-92 mph (74 mph)
Unit slides off block piers but remains upright	72-103 mph (87 mph)
Complete uplift of roof; most walls remain standing	73-112 mph (89 mph)
Unit rolls on its side or upside down; remains essentially intact	84-114 mph (98 mph)
Destruction of roof and walls leaving floor and undercarriage in place	87-123 mph (105 mph)
Unit rolls or vaults; roof and walls separate from floor and undercarriage	96-128 mph (109 mph)
Undercarriage separates from unit; rolls, tumbles and is badly bent	101-136 mph (118 mph)
Complete destruction of unit; debris blown away	110-148 mph (127 mph)

One and Two Family Residences

Damage Description	Wind Speed Range (expected in parentheses)
Threshold of visible damage	53-80 mph (65 mph)
Loss of roof covering material (<20%), gutters, and/or awning; loss of vinyl or metal siding	63-97 mph (79 mph)
Broken glass in doors and windows	79-114 mph (96 mph)
Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward; failure of porch or carport	81-116 mph (97 mph)
Entire house shifts off foundation	103-141 mph (121 mph)
Large sections of roof structure removed, most walls remain standing	104-142 mph (122 mph)
Top floor exterior walls collapsed	113-153 mph (132 mph)
Most interior walls of top story collapsed	128-173 mph (148 mph)
Most walls collapsed in bottom floor, except small interior rooms	127-178 mph (152 mph)
Total destruction of entire building	142-198 mph (170 mph)

School Building (Junior or Senior High School)

Damage Description	Wind Speed Range (expected in parentheses)
Threshold of visible damage	55-83 mph (68 mph)
Loss of roof covering (<20%)	66-99 mph (79 mph)
Broken windows	71-106 mph (87 mph)
Exterior door failures	83-121 mph (101 mph)
Uplift of metal roof decking; significant loss of roofing material (>20%); loss of rooftop HVAC	85-119 mph (101 mph)
Damage to or loss of wall cladding	92-127 mph (108 mph)
Collapse of tall masonry walls at gym, cafeteria, or auditorium	94-136 mph (114 mph)
Uplift or collapse of light steel roof structure	108-148 mph (125 mph)
Collapse of exterior walls in top floor	121-153 mph (139 mph)
Most interior walls of top floor collapsed	133-186 mph (158 mph)
Total destruction of a large section of building envelope	163-224 mph (192 mph)

Source: Storm Prediction Center, 2007

Previous Occurrences - Tornado

June 27, 2025. Three tornadoes occurred within 8 miles of Bismarck. Statewide, 9 tornadoes occurred on June 27.

Confirmed Tornadoes from June 27th, 2025
As of 8:30 AM Sunday, June 29th

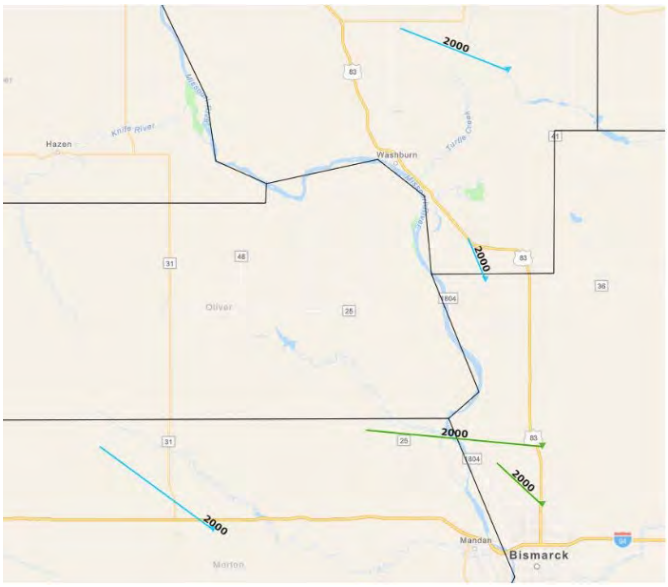
Approximate Time (CDT)	General Location
7:41 PM	6 SW Hannover
8:29 PM	8 NNE Crown Butte Lake
10:14 PM	4 WSW Temvik
10:19 PM	2 W Temvik
10:24 PM	8 N Bismarck
10:29 PM	7 N Bismarck
10:43 PM	3 WNW Menoken
11:06 PM	8 SE Driscoll
11:10 PM	6 SSW Mckenzie

The tornado 8 miles north of Bismarck was rated as an EF-1. The tornado 7 miles north is rated EF-Unknown (no known damage). The tornado northeast of McDowell Dam (3 WNW of Menoken) was also rated EF-Unknown.

Derecho and Tornadoes on June 20, 2025
https://www.weather.gov/bis/SevereWx06202025
An outbreak of severe thunderstorms brought extreme winds, very large hail, and tornadoes across much of southern North Dakota from the late afternoon into the nighttime hours on Friday, June 20, 2025.

Multiple tornadoes occurred on June 20, 2025 in various locations throughout North Dakota. None occurred in Burleigh County. Per Bismarck Tribune article, the Weather Service stated there were thirteen (13) confirmed tornadoes in the state. https://bismarcktribune.com/news/state-regional/article_a062eb73-1061-48bb-94c2-025fee0a2ce1.html#tracking-source=home-top-story

November 1, 2000:
A tornado event on the 1st of November was a rare and unusual weather phenomenon to occur so late in the year in North Dakota. Five tornadoes hit south-central North Dakota, causing property damage and injuries. The majority of the damage and injuries occurred in the Bismarck area. Forty-two homes suffered minor to moderate damage. The tornadoes were rated F0 and F1, packing winds up to 90 mph. Another unusual phenomenon, these tornadoes traveled from east to west. The track was caused by an intense low-pressure system, centered over north-central South Dakota, spinning counterclockwise, allowing the low-level flow over Bismarck to move east to west. At the same time, these tornadoes were occurring, snow began to fall in the far western area of North Dakota. Winter storm watches and warnings were posted across north-west and central North Dakota that afternoon. Before this, the last recorded tornado to occur in the state was October 11th, 1979, in Sargent County in southeast North Dakota. https://www.weather.gov/abr/This_Day_in_Weather_History_Nov_01



The map above of the five tornadoes is from the Midwest Regional Climate Center

June 18, 1965: EF0 Tornado touched down in SW Bismarck at 7:55 PM. One-tenth of a mile and only 10 yards wide near the intersection of Anderson Street and Garden Drive.
Source: NWS Storm Prediction Center http://www.spc.noaa.gov/gis/svrgis/ and on record at the Bismarck NWS office.

Deadly Tornadoes in Burleigh County

Location	Date	Magnitude	Casualties
Burleigh and Kidder Counties	July 1, 1952	F4 28 miles long 150 yards wide	1 fatality 25 injuries

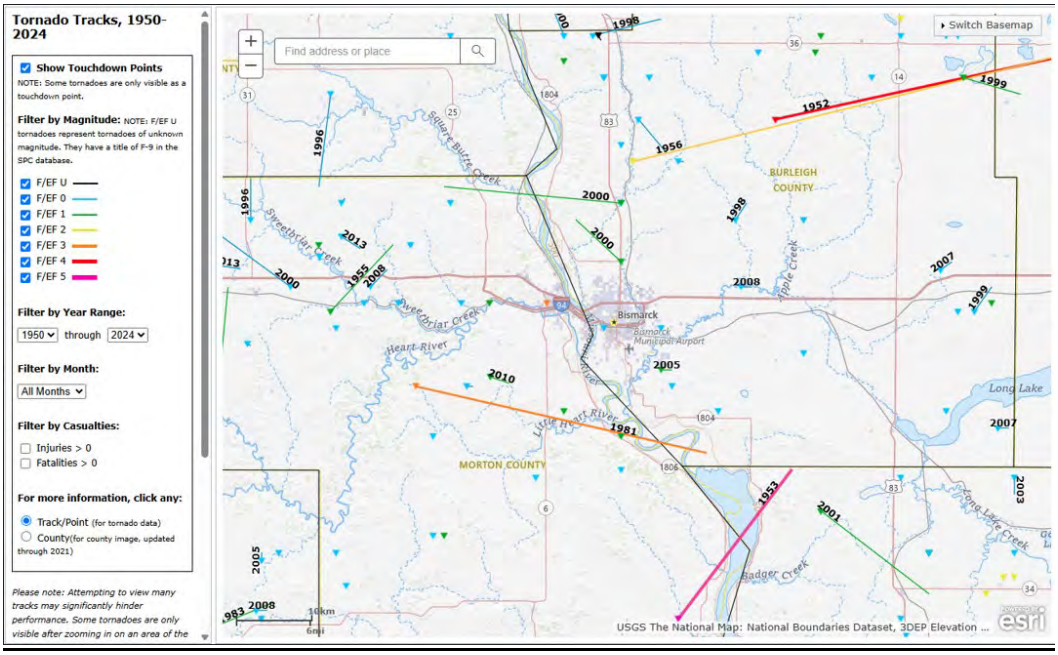
24 Tornado Events
1995-2025 Burleigh County

Magnitude	Number of Events	Percent
Unrated	3	not included in calculation
EF0	14	67%
EF1	6	28%
EF2	1	5%

http://www.ncdc.noaa.gov/stormevents/

Note: Of the 24 reported, three occurred on June 27, 2025. One rated as EF1, the other two not rated as of June 30, 2025.

Of **8 tornadoes** which have struck **within 8 miles of downtown Bismarck**, from 1950 **through 2024**, and affecting part of the current Bismarck-Mandan Metro area, **the 25 May 1978 event was rated EF3** (NOAA Tornado Tracks, 2025; StormData, 2025). This tornado mainly affected Mandan, with property damages their estimated at $250k in 1978, which is over $1.2M in 2025 dollars (Alioth Finance, 2025). Likewise, the Fort Rice F5 Tornado of 29 May 1953, which tracked from far southeast Morton County into far northwest Emmons County, ending just shy of the Burleigh County line, or 20 miles southeast of downtown Bismarck, produced an estimated $500k in 1953 dollars, which is over $5.9M in 2025 dollars.



Train Derailment – Hazard Profile

Description

For purposes of this plan, a train derailment is a technological or human-caused transportation incident that involves a derailment of one or more engines or train cars. Bismarck has experienced three train derailment incidents since 2002 (within city limits). This hazard profile is intended to illustrate the risk and vulnerabilities relating to both the east/west railroad line (BNSF) as well as the north/south railroad line (DMVW) through Bismarck. The magnitude or impact of a train derailment transportation incident will vary widely depending on the incident location, product involved, and the existence of cascading hazards such as fire, explosion, and/or hazardous materials release. A train derailment transportation incident has potential to be the cause of mass casualties. A mass casualty event can be defined as an incident resulting in a number of deaths and/or injuries that overwhelms local resources and capabilities. Although Bismarck does not have primary responsibility or authority to mitigate or prevent train derailments from occurring, Bismarck has developed this mitigation plan section to better identify vulnerabilities and identify mitigation opportunities or recommendations to share with stakeholders as well as those that might be pursued at the local level.

Deaths, Injuries, and Evacuations per Train Incident Reports Bismarck/Burleigh 1975-2025					
# of Deaths	**# of Injuries**	**People Evacuated**	**Year**	**Location**	**Railroad**
0	2	0	1995	Sterling	BN
0	1	0	1987	Regan	BN
0	1	0	1977	Bismarck	BN
0	1	0	1976	Driscoll	BN
No deaths or evacuations reported for Bismarck/Burleigh Incidents from 1975-2019.					

Two Incident Reports Involving Hazardous Materials 1975-2025					
# of Hazmat Cars Derailed Or Damaged	**Total # of Hazmat Cars**	**Total # of Cars**	**Incident Year**	**Location**	**Railroad**
0	3	81	1976	Driscoll	BN
0	1	17	1978	Bismarck	SOO

Product Involved – Train Derailments				
Incident Date	**Railroad**	**Location**	**Description**	**Product**
August 8, 2021	BNSF	Just outside Bismarck city limits near Yegan Road and Apple Creek Road	The coal was spilled into an adjacent wetland. Estimated coal spilled was 4,200,000 pounds and was recovered.	Coal Cars - 17
March 18, 2011	BNSF	East Main – near 100 block of South Airport Road. Blocked 26th street crossing	14 coal cars derailed – 13 destroyed. The train blocked several crossings including 26th Street and Airport Road.	Coal Cars - 14
July 10, 2010	BNSF	Near 93rd Street	Rail cars filled with coal derailed and were lying on the bank of the Apple Creek east of Bismarck.	Coal Cars - 30
July 5, 2003	BNSF	Near State Penitentiary in Bismarck	Coal was spilled against the trestle on the Expressway Bridge. No cars hit the bridge.	Coal Cars – 37 100 ton of coal each
September 5, 2002	DMVW	Intersection of Rosser and North 35th Street	Dakota Missouri Valley & Western Railroad authorities said they believe work on the tracks and 90-degree heat caused the rails to shift outward about four feet and the train to derail at 3:30 p.m. (source: Bismarck Tribune)	Fly Ash 7 Cars

Most Common Hazardous Materials in Transport by BNSF (by Loaded Car Count)		
2013	**2019**	**2024**
• Petroleum Crude Oil – 85% • Liquefied Petroleum Gas – 4% • Anhydrous Ammonia – 2% • Alcohols – NOS – 2% • Diesel Fuel – 1.5% • Environmentally Hazardous Substances, Liquid NOS – 1% • Petroleum Distillates, NOS - <1	• Petroleum Crude Oil – 40% • Liquefied Petroleum Gas – 14% • Anhydrous Ammonia – 0% • Alcohols – NOS – 3% • Diesel Fuel – 5% • Environmentally Hazardous Substances, Liquid NOS – 5% • Petroleum Distillates, NOS - 14% • Butane – 4% • Elevated Temperature Liquid, NOS – 3% • Isobutane – 2% • Hydrocarbons, Liquid, NOS – 2%	• Petroleum Crude Oil – 31% • Butane – 10% • Environmentally Hazardous Substances, Liquid NOS – 8% • Diesel Fuel – 7% • Elevated Temperature Liquid, NOS – 5% • Liquefied Petroleum Gas – 5% • Propane – 2% • Isobutane – 2% • Fuel Oil – 1% • Methanol – 1% • Gasoline – 1% Other hazardous materials are listed (less than 1% of shipments) including Anhydrous Ammonia listed at 0% of shipments.

	2013	2020
# of Trains Per Day (24 hours)	18	16
Distribution:		
Coal	*8 – 44%*	*4 – 44%*
Mixed Merchandise (including hazmat)	*4 – 22%*	*4 – 25%*
Grain	*3 – 17%*	*4 – 25%*
Crude Oil	*3 – 17%*	*1 – 5%*
Average Train length (cars)	110 cars	92 cars
Train Length – High		129 cars
Train Length - Low		6 cars (local train)
Averages identified within this table were provided to Bismarck Emergency Management by a BNSF representative in January 2014 and September 2020. These averages are provided for planning purposes only. Actual number of trains will vary.		

In 2013, the average number of trains carrying crude was 3 per day. During the time period of June 2014 through September 2017, the average number of crude oil trains per week was 11.8 with the number declining to a typical number of 4 oil trains per week in 2017.

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Vulnerabilities identified within the table are within ½ mile of the railroad. The properties and populations noted in the table are representative of the significant vulnerabilities within ½ mile radius of the railroad lines. Due to the extensive number of properties within a ½ mile, not all are listed. Maps illustrating the ½ mile radius from the railroad lines follow the vulnerability table.

Scenario	**Train Derailment Fire/HazMat – Significant Event**	
Probability	Possible	
Speed of Onset	No Notice Event	
Duration	Minutes to occur. Hours, days, weeks for response and recovery.	
Geographic Area	See maps included, this section.	
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Fire 2. Explosion/projectiles 3. Inhalation Hazards A. Those within close proximity to the railroad lines (1/4 mile) B. Those within close proximity to the railroad lines (1/2 mile) C. Those downwind of hazmat release.	
Mass Casualty Incident	Yes, potentially significant	
Property Losses (points of vulnerability – high priority)	1. All Structures within ¼ to ½ mile radius of incident.	
Environmental	1. Storm Water System – Hazardous Materials 2. Air, Water, Soil contamination depending on material involved 3. Missouri River 4. Hay Creek	
COG/COOP	1. Public Health – Bismarck/Burleigh 2. City/County Building 3. Water Treatment Plant 4. Public Works and proximity of Praxair	
Critical Facilities	1. Public Health 2. City/County Office Building 3. Fraine Barracks – DES, NDNG 4. Water Treatment Plant 5. Waste Water Treatment Plant – via spill,	14. ND State Penitentiary 15. US Postal Processing and Distribution 16. Post Office 17. ND State Lab 18. ND Department of Health Warehouse

Scenario	Train Derailment Fire/HazMat – Significant Event	
	drainage system 6. Metro Area Ambulance – South 7. Sanford Health 8. Sanford Health Powerhouse 9. St. Alexius Medical Center 10. St. Alexius Purchasing / Warehouse 11. Burleigh County Courthouse 12. Burleigh County Social Services 13. Public Works Department	19. MDU – Airport Road 20. MDU Operations – 4th Street 21. Civic Center 22. Bismarck Police Department 23. Metro Area Ambulance – North 24. Metro Area Ambulance - South 25. Bank of North Dakota
Critical Infrastructure	1. Western Area Power Substation 2. Clear Channel Radio 3. KFYR 4. BisMan Transit 5. Missouri River Train Bridge 6. Railroad Bridge over Main Avenue 7. Railroad Bridge over Washington Street 8. Main Avenue Bridge over Washington Street	9. Railroad Bridge over 7th Street 10. Railroad Bridget over 9th Street 11. Railroad Bridge over Bismarck Expressway 12. Railroad over Hay Creek (3 locations) 13. I-94 Bridge over Railroad
Schools	1. Bismarck State College 2. Roosevelt Elementary 3. Cathedral Elementary 4. St. Mary's Elementary 5. St. Mary's Preschool and Daycare 6. Rita Murphy Elementary 7. Shiloh Christian School 8. Child's Hope Learning Center 9. Kidz First Daycare 10. Angel Academy 11. First Presbyterian Church Daycare	12. Highland Acres Elementary 13. South Central High School 14. Robert Miller Elementary 15. Door of Hope 16. Little Einsteins 17. Kinder Kidz Daycare 18. Believe and Blossom 19. Angel Academy 20. Merry Go Round Daycare 21. First Steps Learning Center 22. The After School Place
High Risk Facilities (chemical)	1. Water Treatment Plant 2. LaFarge 3. Ferrell Gas 4. Praxair (9th Street) 5. Praxair (near Public Works)	
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Edgewood Vista 2. St. Vincent's Care Center 3. Marillac Manor 4. Dakota Boys Ranch 5. Elks Pool 6. Custer Home 7. Front Street Plaza 8. Patterson Place	

Scenario	Train Derailment Fire/HazMat – Significant Event
	9. The Terrace (Assisted Living) 10. Radisson Inn 11. Crescent Manor 12. Bismarck Community Bowl 13. Kirkwood Mall 14. Bismarck Transition Center 15. ND State Penitentiary
Economy (community wide)	Significant impact
Other	

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
Additional development in NE Bismarck would include properties near the north/south rail line (DMVWW).	No changes. See hazard specific mitigation capabilities in Section 3.

Risk
See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: A train derailment may involve hazardous materials. This hazard profile focuses on the relationship between the two hazards. A train derailment may also initiate a fire, either associated with train car content, or may involve adjacent property. Other hazards, such as tornado, may initiate a train derailment with potential cascading effects of fire and/or hazardous materials release.

Future Conditions

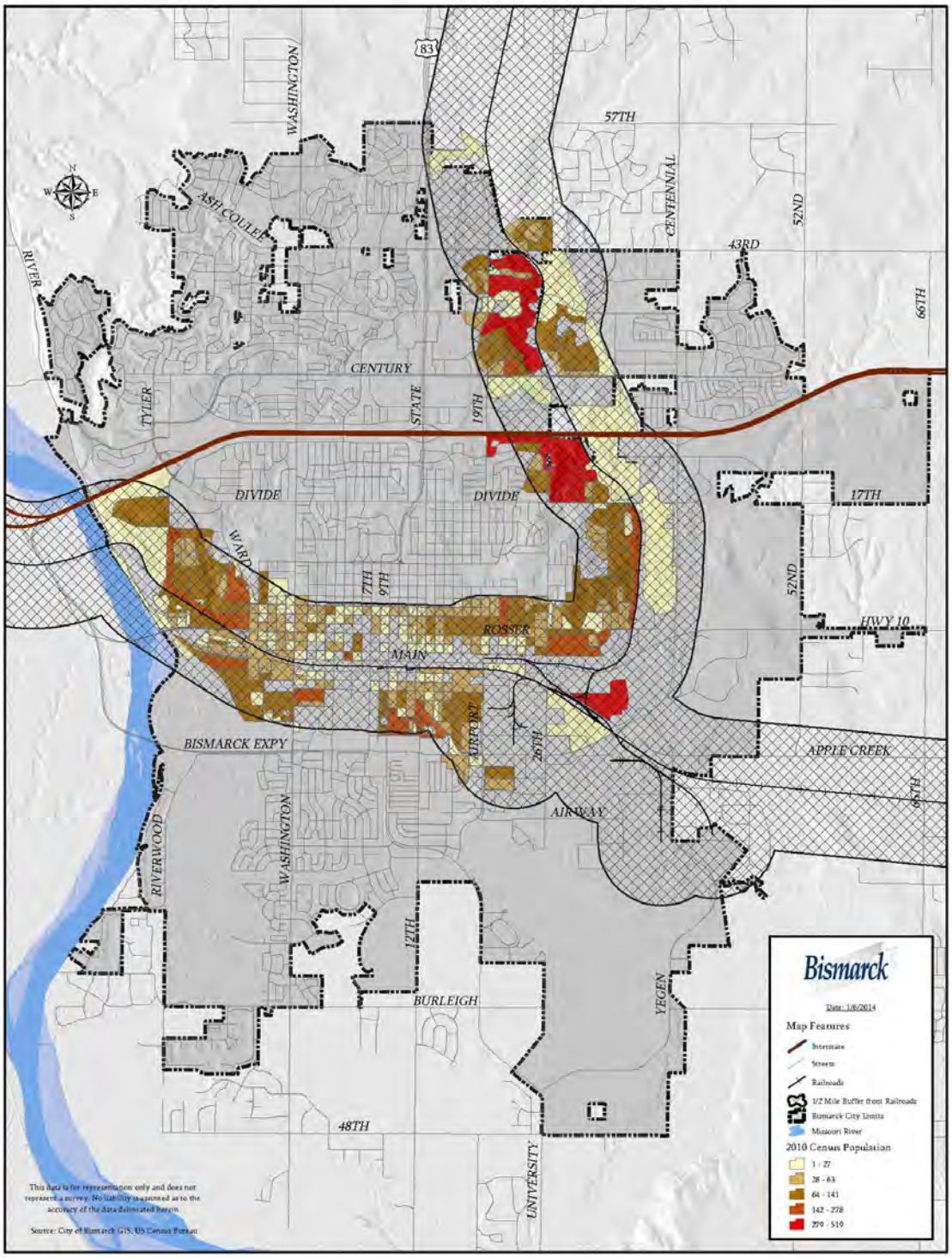
- **Location**: No change.
- **Extent/Intensity:** No change.
- **Frequency:** No change.
- **Duration:** No change expected relating to this hazard.

Anticipated Future Climate Impact – Train Derailment Hazard

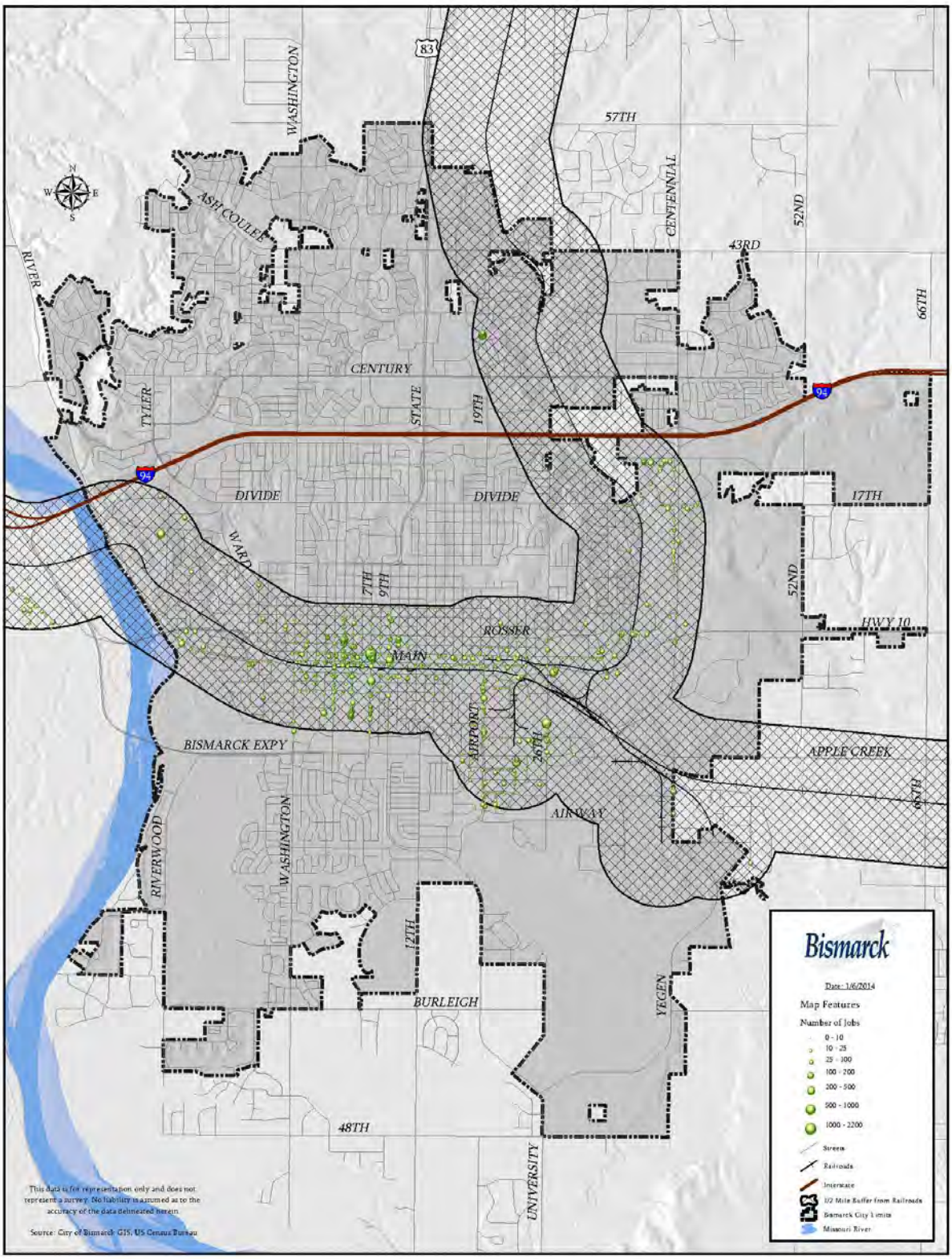
Through the end of this century in North Dakota, expect more frequent, larger, more intense, and/or longer duration droughts, floods, summer storms, winter storms, and attendant impacts - most of which are expected to adversely impact corresponding transportation corridors and lead to more frequent transportation incidents. Projected changes in these natural hazards will indirectly impact transportation incidents, primarily through a potential increase in hazardous **road**, **rail**, and **runway** conditions.

Population and Property Estimates

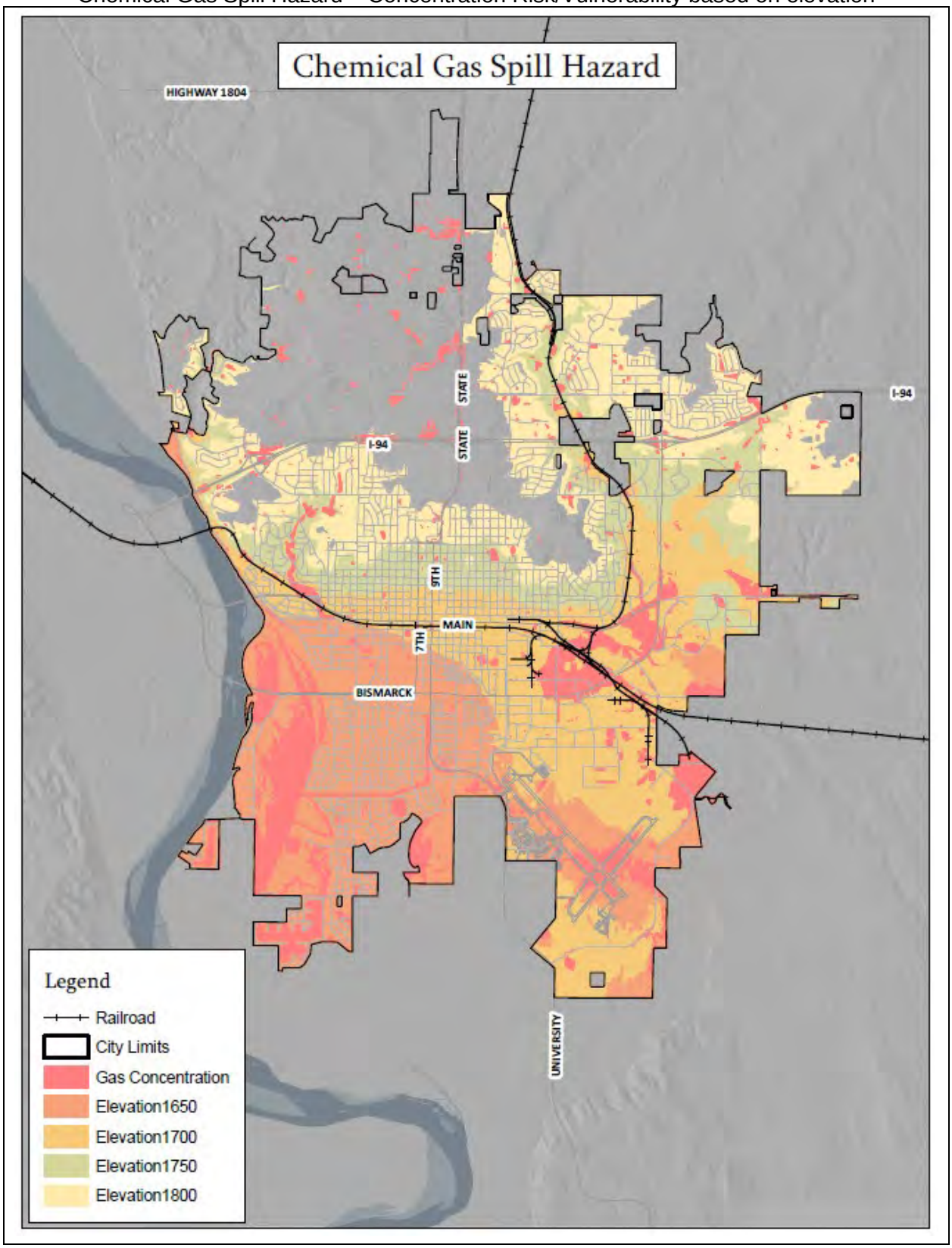
- Total City of Bismarck population within ½ mile: 17,796
- Total Burleigh County Population within ½ mile of railroad: 25,125
- Buildings within ½ mile (Bismarck): 9,384



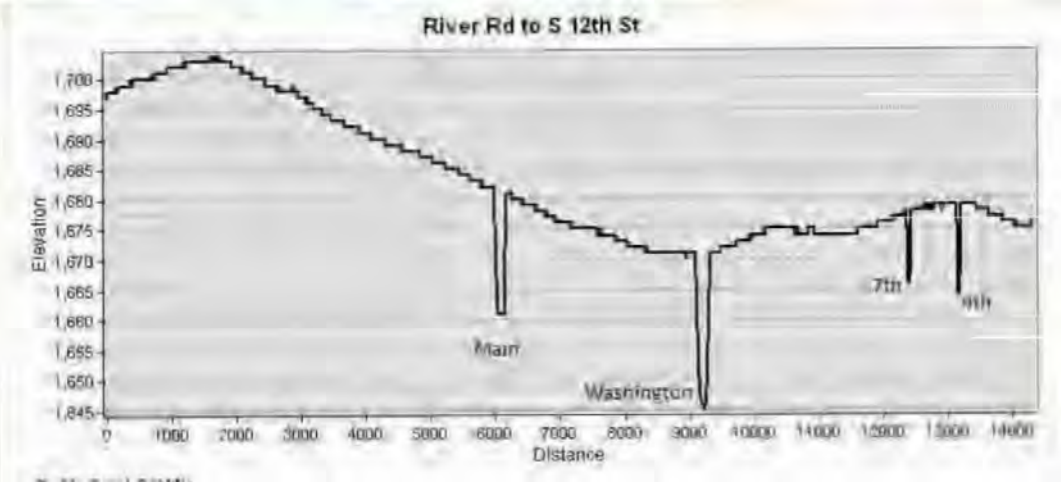
Employment Estimates 22,068 jobs within ½ mile radius of railroad.



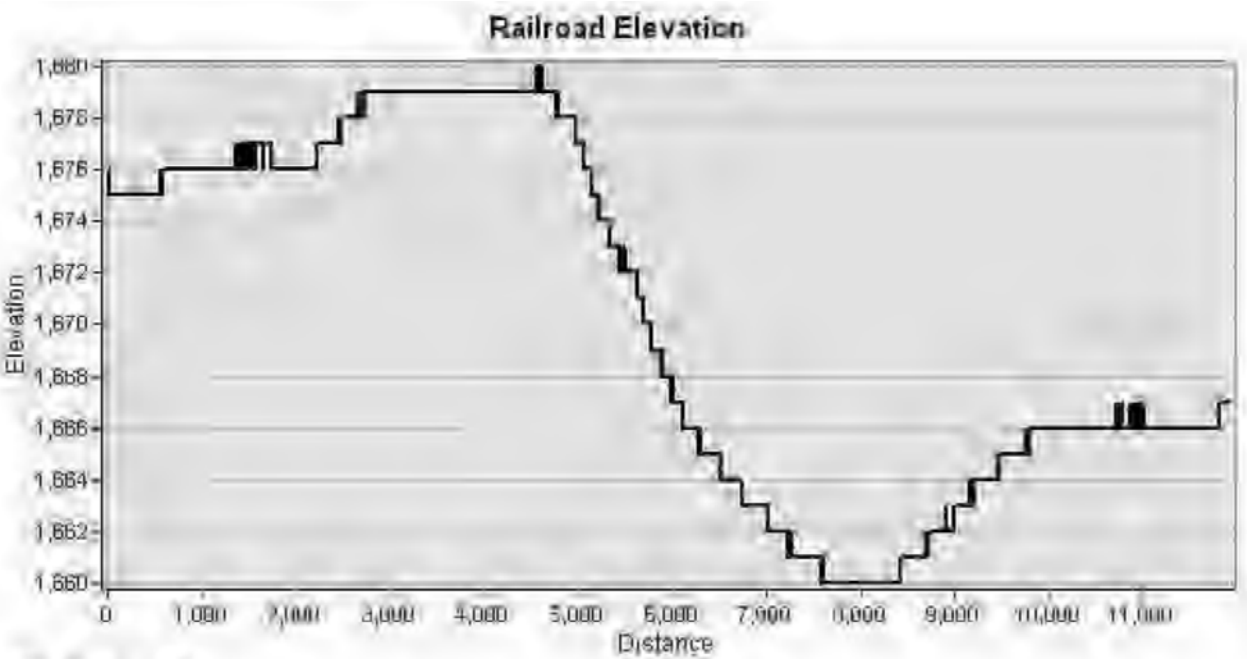
Chemical Gas Spill Hazard – Concentration Risk/Vulnerability based on elevation



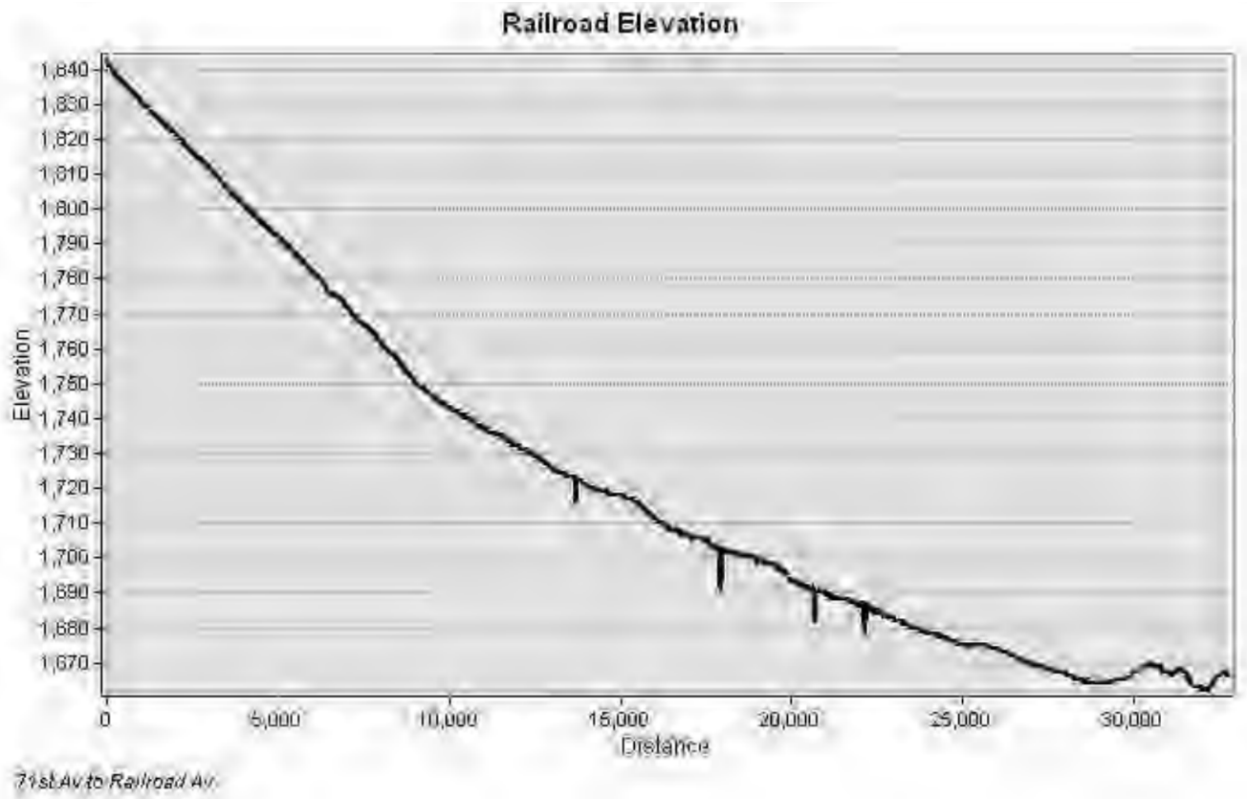
The elevation changes from River Road to South 12th Street (BNSF line) range from an elevation of approximately 1700 feet down to an elevation of 1,675 at the Washington Street bridge location. This is a 25-foot gradual elevation change in just under a 2-mile distance.



The elevation changes between South 12th Street and Yegen Road (BNSF line) range from an elevation of approximately 1680 feet down to an elevation of 1,660. bridge location. This is a 20-foot elevation change within about ½ mile.



The elevation changes between 71st Avenue NE and Railroad Avenue (DMVWW line) range from an elevation of approximately 1840 feet down to an elevation of 1,670. This is a 170-foot elevation change within about 5 ½ miles.



Previous Occurrences & Causes

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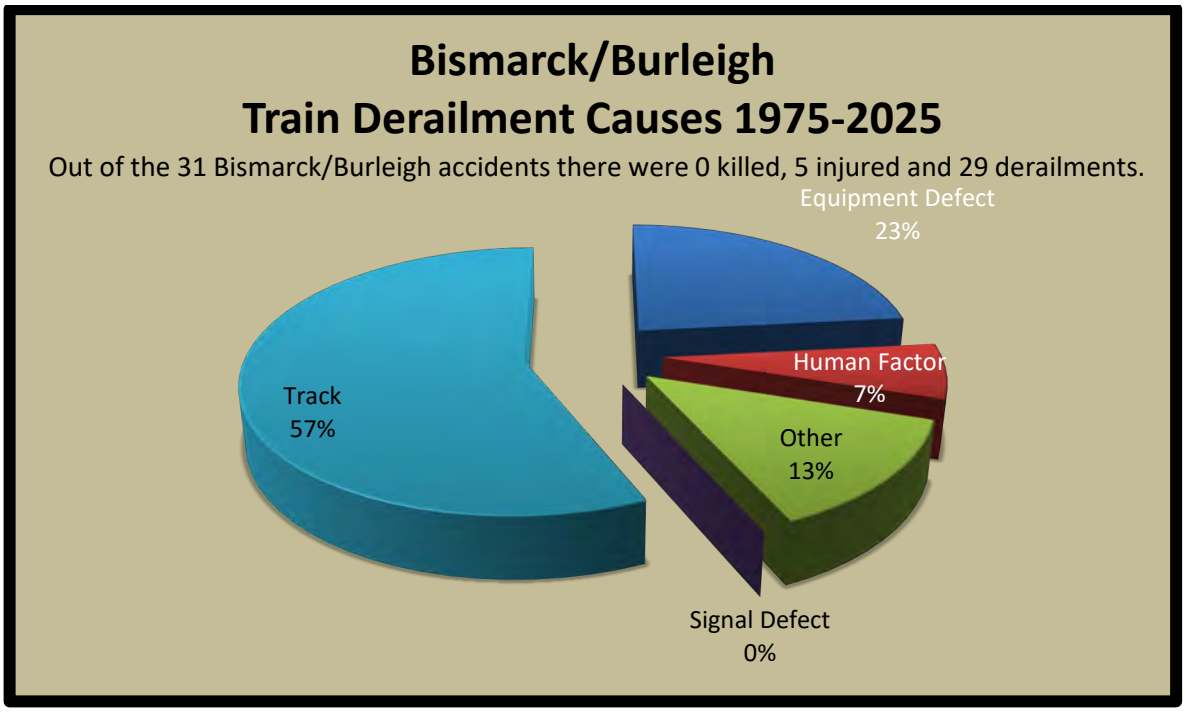
Bismarck/Burleigh Train Derailments
1975-2019 (45 years)

Unless otherwise specified, train derailment statistics within this plan section are derived by Bismarck Emergency Management from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx

- **Total Number of Train Derailment Incident Reports from 1975-2025 for Burleigh County: 31**
- **Incidents In or Near Bismarck: 11 of 31**
- Incident Average within Burleigh County: 1 per 19 months (includes Bismarck)
- Incident Average within the City of Bismarck: 1 per 4.5 years

Incident Type Description:

Derailment: 29 of 31
Obstruction: 1 of 31
Explosion – Detonation: 1 of 31



Total Derailed Cars Per Incident Report Bismarck/Burleigh 1975-2025					
Derailed Cars +Derailed Loco	**Year**	**Cause**	**Speed Estimated Recorded**	**Location (In or Near)**	**Rail Line**
37	2003	T109 Track alignment irregular (buckled/sunkink)	35-R	Bismarck	BNSF
31	2010	T109 Track alignment irregular (buckled/sunkink)	39 - R	Bismarck	BNSF
19+2	1977	T221 Broken Rail - Vertical split head	30 – R	Bismarck	BN
20	2006	T109 Track alignment irregular (buckled/sunkink)	21 - R	McKenize	BNSF
18	1983	E35C Coupler carrier broken or defective	39 - E	Burleigh	BN
14	2011	T199 Other track geometry defects (Provide detailed description in narrative)	24-R	Bismarck	BNSF
13	1976	M501 Interference (other than vandalism) with railroad operations by non-railroad employee	60-E	Driscoll	BN
11	1987	M204 Improperly loaded car	28-E	Bismarck	BN
9	1977	E42C Side bearing(s) broken	25-R	Baldwin	SOO
9	1978	T101 Cross level of track irregular (at joints)	10-E	Bismarck	BN
Bismarck (In or Near) Additional Incidents					
17	2021	Track Failure	Not available in new database	Bismarck	BNSF
7	2002	T109 Track alignment irregular (buckled/sunkink)	5-E	Bismarck	DMVW
3	1981	T110 Wide gage (due to defective or missing crossties)	8-R	Bismarck	SOO
1	1978	H503 Buffing or slack action excessive, train handling	10-E	Bismarck	SOO
1	2001	M203 Overloaded car	7-R	Bismarck	BNSF

Potential Magnitude

Actual Incidents (at other locations) may be used to understand the potential magnitude of a significant train derailment incident involving fire, explosion, and/or hazardous materials. However, the likelihood of similar incidents within Bismarck is less probable due to speed limits and other existing mitigation capabilities. See Section 3 for hazard-specific mitigation capabilities.

Derailment of Canadian Pacific Railway Freight Train 292-16 and Subsequent Release of Anhydrous Ammonia.	
Minot, North Dakota January 18, 2002	NTSB Number: RAR-04-01 NTIS Number: PB2004-916301.

Executive Summary:
At approximately 1:37 a.m. on January 18, 2002, eastbound Canadian Pacific Railway freight train 292-16, traveling about 41 mph, derailed 31 of its 112 cars about 1/2 mile west of the city limits of Minot, North Dakota. Five tank cars carrying anhydrous ammonia, a liquefied compressed gas, catastrophically ruptured, and a vapor plume covered the derailment site and surrounding area. The conductor and engineer were taken to the hospital for observation after they complained of breathing difficulties. About 11,600 people occupied the area affected by the vapor plume. One resident was fatally injured, and 60 to 65 residents of the neighborhood nearest the derailment site were rescued. As a result of the accident, 11 people sustained serious injuries, and 322 people, including the 2 train crewmembers, sustained minor injuries. Damages exceeded $2 million, and more than $8 million has been spent for environmental remediation.

Probable Cause
The National Transportation Safety Board determines that the probable cause of the derailment of Canadian Pacific Railway train 292-16 was an ineffective Canadian Pacific Railway inspection and maintenance program that did not identify and replace cracked joint bars before they completely fractured and led to the breaking of the rail at the joint. Contributing to the severity of the accident was the catastrophic failure of five tank cars and the instantaneous release of about 146,700 gallons of anhydrous ammonia.
The safety issues identified in this accident were as follows:

- Canadian Pacific Railway's programs and practices for the inspection and maintenance of joint bars in its continuous welded rail;
- The Federal Railroad Administration's oversight of continuous welded rail maintenance programs;
- Tank car crashworthiness, specifically the adequacy of non-normalized steels to resist tank fracture propagation.

The analysis also addresses the appropriateness of using shelter-in-place to protect the public from the release of hazardous material.

http://www.ntsb.gov/investigations/summary/RAR0401.html

Casselton Train Derailment - Near Casselton, North Dakota December 30, 2013

On December 30, 2013, a broken axle caused a Burlington Northern Santa Fe (BNSF) train carrying 112 cars of grain to derail 13 cars just a mile west of Casselton in rural Cass County. The first of those cars spilled and leaned over onto adjacent tracks. Less than a minute later, a 104-car BNSF train carrying crude oil failed to hear the emergency alert and struck the derailed grain car, causing 476,000 gallons of crude oil to combust. Explosions could be heard and felt in Casselton as tanker cars exploded. The train carrying Bakken crude oil derailed a total of 21 cars, 20 of them tanker cars. Response exceeded the Casselton Fire Department's (CFD's) capabilities (NTSB, 2017; Springer, 2018). The Cass County Sheriff's Department was called in to assist in setting up a safety perimeter to protect the public during the firefight. With the derailment occurring outside of a heavily populated area, there were no injuries or fatalities, and crew members were able to escape without consequence. Nearby Casselton evacuated 1,400 residents as a precaution. Damages were estimated at $6.1 million.

In reaction to the event industry safety standards, the requirements for tanker cars were raised, requiring stronger double-sided tanks and improved braking and venting systems. Since the 2013 event, pipeline capacity has increased which has reduced the amount of Bakken crude travelling by rail through communities like Casselton, which at the time of the incident had more than 10 oil trains pass through each day, became a case study that helped develop better training for train-derailment response. CFD's response capacity was found to have benefited significantly from its planning for an explosive incident at the nearby Tharaldson Ethanol Plant, using many of the developed protocols and practices in the oil-train derailment (NTSB, 2017; Springer, 2018). Yet they were one of many local agencies that responded.
Source: 2024-29 ND Enhanced Mitigation Plan

Lac-Mégantic runaway train and derailment investigation summary

The accident

On the evening of July 5, 2013, at about 10:50 p.m., a Montreal, Maine & Atlantic Railway (MMA) train arrived at Nantes, Quebec, carrying 7.7 million liters of petroleum crude oil in 72 Class 111 tank cars. Originating in New Town, North Dakota, these were bound for Saint John, New Brunswick.

In keeping with the railway's practice, after arriving in Nantes, the locomotive engineer (engineer) parked the train on a descending grade on the main track. A replacement engineer was scheduled to continue the trip east in the morning.

The engineer applied hand brakes on all five locomotives and two other cars, and shut down all but the lead locomotive. Railway rules require hand brakes alone be capable of holding a train, and this must be verified by a test. That night, however, the locomotive air brakes were left on during the test, meaning the train was being held by a combination of hand brakes and air brakes. This gave the false impression that the hand brakes alone would hold the train.

The engineer then contacted the rail traffic controller in Farnham, Quebec, to advise that the train was secure. Next, the engineer contacted the rail traffic controller in Bangor, Maine, who controls movements for the crews east of Lac-Mégantic. During this conversation, the engineer indicated that the lead locomotive had experienced mechanical difficulties throughout the trip, and that excessive black and white smoke was coming from its smoke stack. Because they expected the smoke to settle, it was agreed to leave the train as it was and deal with the situation the next morning.

Shortly after the engineer left, the Nantes Fire Department responded to a 911 call reporting a fire on the train. After shutting off the locomotive's fuel supply, the firefighters moved the electrical breakers inside the cab to the off position, in keeping with railway instructions. They then met with an MMA employee, a track foreman who had been dispatched to the scene but who did not have a locomotive operations background.

Once the fire was extinguished, the firefighters and the track foreman discussed the train's condition with the rail traffic controller in Farnham, and departed soon afterward. With all the locomotives shut down, the air compressor no longer supplied air to the air brake system. As air leaked from the brake system, the main air reservoirs were slowly depleted, gradually reducing the effectiveness of the locomotive air brakes. Just before 1 a.m., the air pressure had dropped to a point at which the combination of locomotive air brakes and hand brakes could no longer hold the train, and it began to roll downhill toward Lac-Mégantic, just over seven miles away.

As it moved down the grade, the train picked up speed, reaching a top speed of 65 mph. It derailed near the center of the town at about 1:15 a.m.

Aftermath and emergency response

Almost all of the 63 derailed tank cars were damaged, and many had large breaches. About six million liters of petroleum crude oil was quickly released. The fire began almost immediately, and the ensuing blaze and explosions left 47 people dead. Another 2000 people were forced from their homes, and much of the downtown core was destroyed.

The pileup of tank cars, combined with the large volume of burning petroleum crude oil, made the firefighters' job extremely difficult. Despite the challenges of a large emergency, the response was well coordinated, and the fire departments effectively protected the site and ensured public safety after the derailment.

Source: http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054-r-es.asp

Wildland Fire – Hazard Profile

Wildland Urban Interface (WUI)

Description

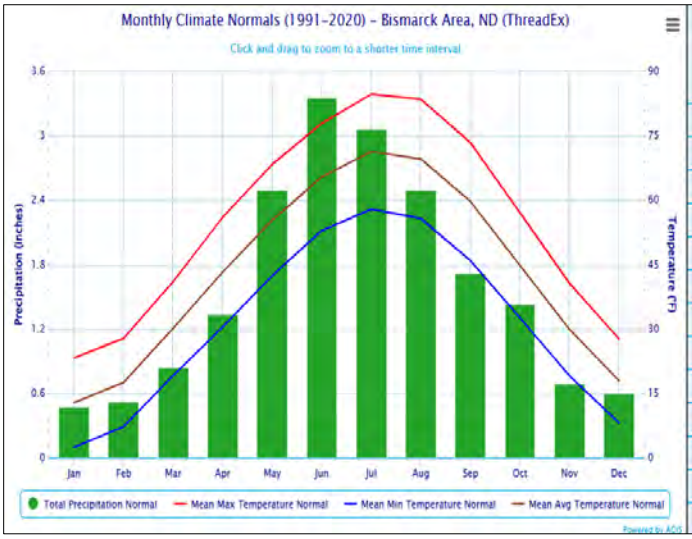
A wildland fire is an event dealing with a fire in the wildland; originating from an unplanned ignition, such as lightning, volcanoes, unauthorized and accidental human-caused fires, and prescribed fires that are declared wildfires.

A **wildland/urban interface fire** involves a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels, resulting in the potential for ignition of the structures within the area from flames or firebrands of a wildland fire.
Source: National Fire Protection Association Glossary of Terms

The City of Bismarck has a relatively low potential of significant loss due to wildfire. Some areas in the NW part of the city interface with a larger prairie area where, depending on climatological conditions, including past rainfall, relative humidity, and wind, a wildland fire may gain some momentum. These areas are part of a "Wildland Urban Interface" (WUI), defined as areas where homes and other structures are built near or among lands prone to wildland fire. Homes and other structures that are located in these areas should practice wise fire mitigation plans such as those described in www.firewise.org.

Bismarck has a semi-arid climate with average annual precipitation of 19.05". Summer monthly rainfalls include; May: 2.5", June: 3.36", July: 3.07" and August: 2.50."

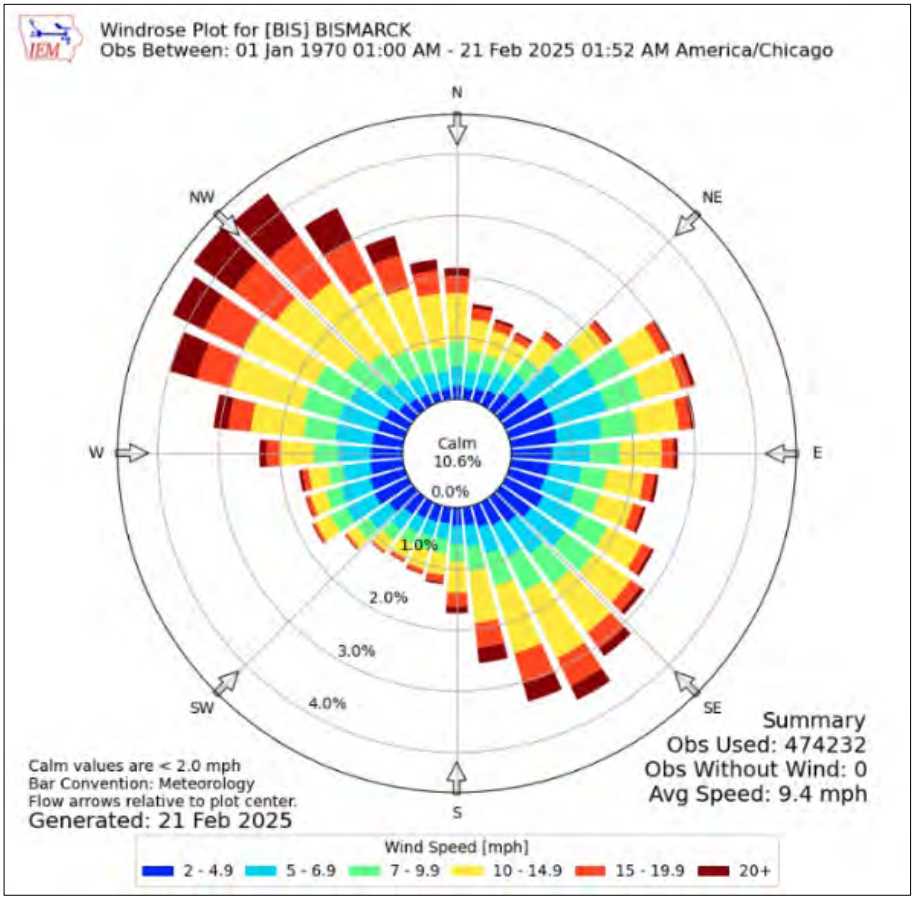
The graph and chart below show the average monthly precipitation and the range of monthly average high and low temperatures for the Bismarck area during the most recent 30-year climate normal period, 1991-2020 (XM-ACIS, 2025; Climate Toolbox, 2024).



Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	0.48	23.2	2.4	12.8
February	0.52	27.8	7.2	17.5
March	0.84	41.0	19.1	30.1
April	1.34	56.0	30.4	43.2
May	2.50	68.3	42.4	55.3
June	3.36	77.9	52.9	65.4
July	3.07	84.7	57.9	71.3
August	2.50	83.5	55.7	69.6
September	1.72	73.4	45.9	59.7
October	1.43	57.1	32.6	44.8
November	0.69	40.6	19.1	29.9
December	0.60	27.7	8.1	17.9
Annual	19.05	55.1	31.1	43.1

The Bismarck Wind Speeds table and Windrose below illustrate the prominent wind directions as well as average wind speeds and 3-second wind gusts. In addition to the effects of wind, there are also some topographical interface areas, mostly in coulees and closer to the Missouri River, where fire may gain momentum as it moves from lower areas to higher areas.

Month	Bismarck Winds		
	Average Wind Speed (mph) 1991-2000	Prevailing Wind Direction (16 pt)	1941-2020 3-Second Wind Gust
January	9	NW	71
February	9	NW	68
March	10.1	NW, E	79
April	10.8	N, E	77
May	10.7	E, SSE	80
June	9.6	E	90
July	8.6	SSE	91
August	8.6	E, SSE	86
September	9.1	NW, SSE	80
October	9.5	WNW	75
November	9	WNW	81
December	8.9	NW	75
Annual	9.4	NW	91



While the City of Bismarck's risk of a wild-land fire in dry years can be relatively high; the damage potential is relatively low as our vegetation and topography do not readily allow a wild-land fire to gain momentum. The concern lessens even more when property owners have a yard that is cared for with short-cut grass creating a buffer between a fire and a home

When compared to mountainous and heavily forested areas similar to those in Colorado, California, and even the Black Hills of South Dakota, we have relatively flat lands, which provide less risk of a high-magnitude event.

Even though our overall vulnerability is low, there are areas that may have more exposure potential than others; those areas would include the northwest portion of the city that is adjacent to undeveloped property and the southwest portion of the city that is adjacent to more heavily forested areas.

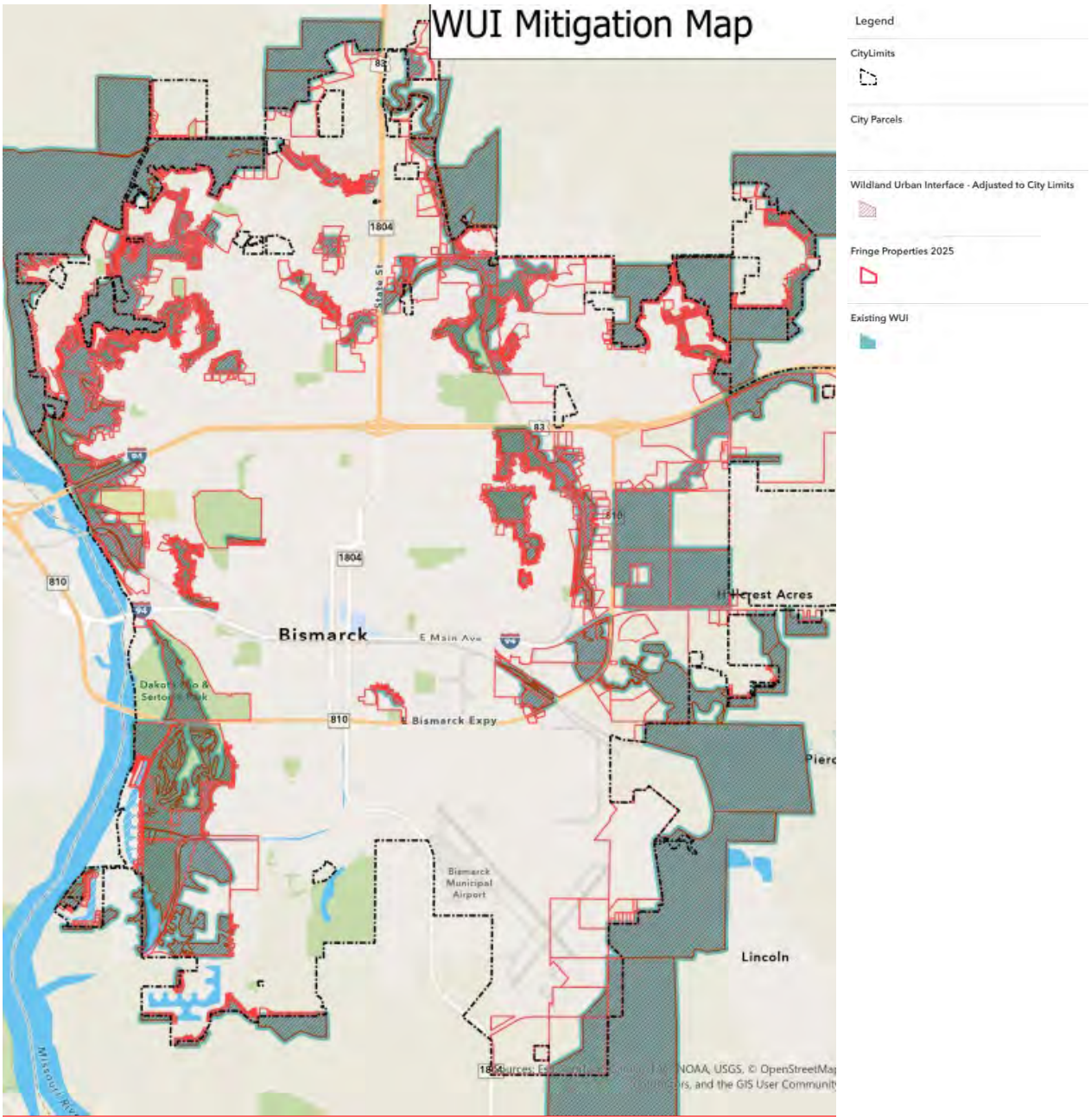
Property owners can make their property safer by practicing wise fire mitigation planning. A great resource is www.firewise.com.

Air quality issues arise from Wildland Fire incidents that occur near or far away, such as Canadian Wildfires and fires occurring in the west. The air quality issues pose health risks, especially for those with higher sensitivity.

Location and Extent

In general, the areas within Bismarck that are at risk are those areas where houses or other properties meet or intermingle with undeveloped wildland vegetation. Wildland Fires are measured in acres burned.

Bismarck Wildland Fire: Wildland Urban Interface Risk Areas



Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Scenario	Wildland Fire – Wildland Urban Interface
Probability	Very Likely However, a high magnitude / high impact event is not likely.
Speed of Onset	No Notice Event
Duration	Usually less than 4 hours (WUI). Wildland Fires in rural areas can last several days.
Geographic Area	See map – previous page.
Death / Injury 1. Primary Causes A. Highest vulnerability	 1. Asphyxiation. A. Those living adjacent to the wildland risk areas that do not evacuate, either by choice or as a result of not receiving notice of the event.
Mass Casualty Incident	Not likely. A high magnitude / high impact event is not likely. • Population within Wildland Fire Risk Area: Near Zero. Areas as mapped are open, vacant land or parks. • Population adjacent to wildland risk areas: Approximately 7,500
Property Losses	A high magnitude / high impact event is not likely. 1. Properties adjacent to wildland risk areas: Approximately 1,800 o based on a distance of 100 feet from within the wildfire risk areas 2. Total number of Structures in or adjacent to wildland risk areas: Approximately 2,200 3. Total building value adjacent to wildland fire risk area: Approximately 516,000,000. 4.
Environmental	1. Temporary air pollution from Wildland Fire itself 2. Erosion as a result of temporary loss of vegetation. 3. Potential loss of mature trees.

Scenario	Wildland Fire – Wildland Urban Interface
COG/COOP	1. Waste Water Treatment Plant
Critical Facilities	1. Capital Electric Coop 2. Wastewater Treatment Plant 3. ND Dept of Health Warehouse 4. CHI/St. Alexius Purchasing / Warehouse 5. Fire Station 4 – Northeast 6. American Red Cross
Critical Infrastructure (points of vulnerability – high priority)	1. Wastewater Treatment Plant 2. Sanitary Sewer Pump Station 3. Clear Channel Radio - KFYR/Y93 4. Bis-Man Transit 5. Taxi 9000 6. Central Power 7. Public Works – Landfill
Schools	1. Horizon Middle School 2. Discovery Daycare
High Risk Facilities (chemical)	1. South Port Marina~ 125 feet from building 2. Public Works – Landfill ~ 100 feet to building 3. Wastewater Treatment Plant ~ 100 feet from outbuildings, 300 feet to large buildings 4. Cofells Plumbing and Heating ~ 200 feet to nearest building on property
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Dakota Boys Ranch 2. Dakota Zoo 3. Non-ambulatory population requiring evacuation assistance. 4. Holiday Inn 5. Door of Hope 6. Edgewood Vista 7. Missouri River Correctional Facility (Burleigh Co – just SW of city limits)
Economy (community wide)	None/Negligible
OTHER:	

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
No change in vulnerability. Additional properties at risk based on annexations.	No change. See Wildland Fire Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

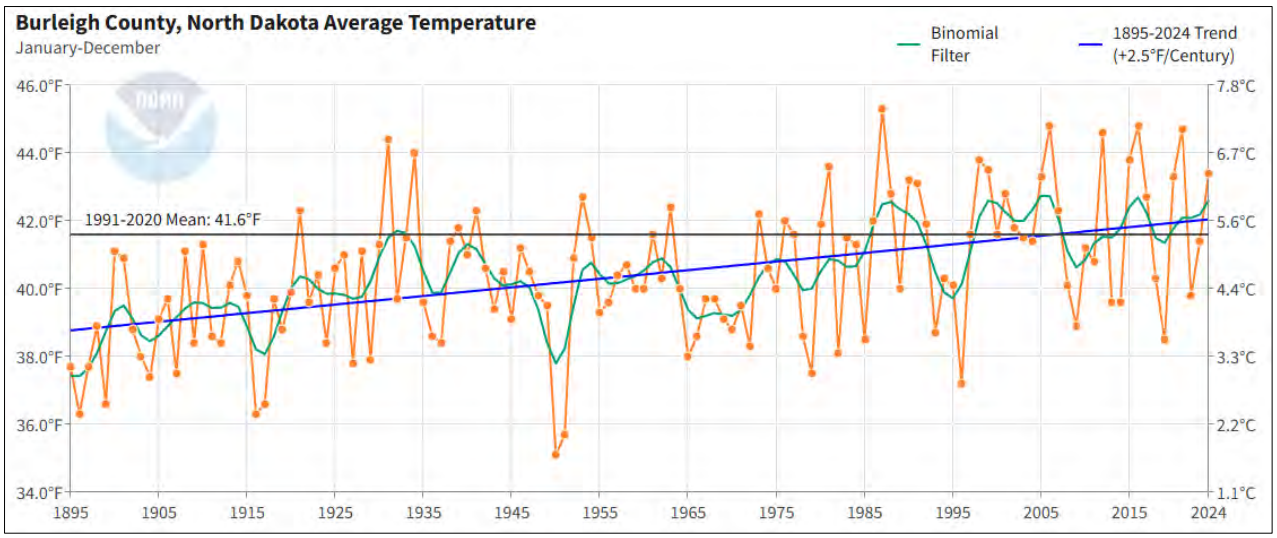
Relationship to other Hazards: Drought conditions contribute to the risk of Wildland Fire events. Lightning is another natural hazard that may initiate a fire. Fires may also be started intentionally (Civil Disturbance) or accidentally such as a train derailment (sparks or fire associated with engine or cars). A wildland fire often promotes future geologic hazards due to loss of vegetation.

Future Conditions

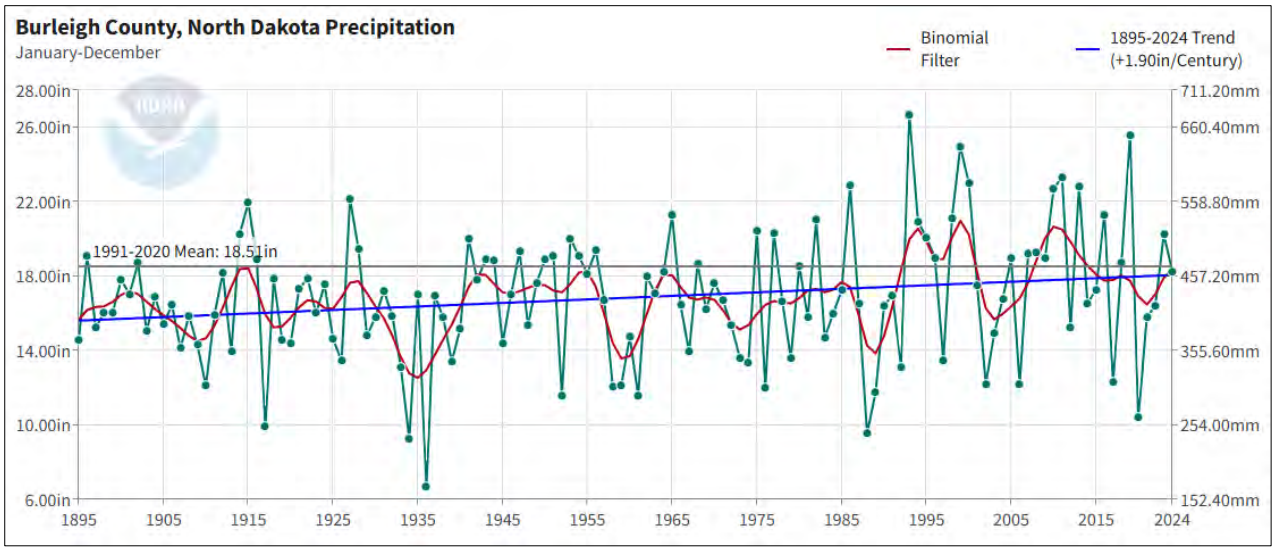
- **Location**: The locations of wildland fire (WUI) in Bismarck will change based on future annexations and changes to adjacent property within the ETA or county.
- **Extent/Intensity:** See “Anticipated Future Climate Impact” below.
- **Frequency:** See “Anticipated Future Climate Impact” below.
- **Duration:** The duration of Wildland Fire hazards is not projected to change.

Anticipated Future Climate Impact – Wildland Fire (WUI) Hazard
Droughts are projected to increase in size, frequency, and duration. The expected increases in temperatures and frequency of droughts translate into an increase in the size, frequency, and intensity of both wildland and urban fires, with an added risk due to increasing development in the Wildland-Urban Interface. Also, water supplies used for fire suppression may become compromised during drought conditions.

An increase in temperature promotes drought potential and fire potential.



An increase in precipitation enhances growth of vegetation, an indirect increase in fire risk in the event drought conditions follow.



Previous Occurrences

The City of Bismarck has not suffered loss of physical property as a result of wild-land fire; none-the-less the city is committed to protect all homes in the city limits from all hazards, including wild-land fires.

May 30 to June 1, 2025: Air Quality Index reaches the "Unhealthy" category due to wildland fires in Manitoba, Canada. This level is considered unhealthy for all, including sensitive groups. According to ND Department of Environmental Quality, people should consider taking precautions including limiting or avoiding outdoor activity, staying indoors with windows and doors closed, and setting air conditioners and vehicle vents to recirculate indoor air when the air quality index reaches unhealthy levels.

May 17, 2023: Wildland fires in northwestern Canada send smoke across North Dakota. ND DEQ advises people with respiratory conditions, the elderly and young children to avoid prolonged outdoor exposure.

September 16, 2020: At approximately 1:00 PM, a fire occurred between Hay Creek and Hamilton Street to the North side of Interstate 94. Approximately 10 acres of wildland (open field) were burned. Wind was blowing from the north at 8 mph. Five fire department apparatus and 9 firefighters were dispatched to the scene. The Bismarck Rural Fire Department provided mutual aid. The Bismarck Police Department assisted with scene control. Metro Area Ambulance was on scene to provide medical support. There were no injuries to first responders. No structures were damaged.

2014 through 2019:
The Bismarck Fire Department responded to 56 natural vegetation fires from November 1, 2014 through October 31, 2019.

Type	Number
Natural Vegetation Fire	14
Grass Fire	19
Brush, or brush and grass mixture fire	17
Forest, woods or wildland fire	4
Total	**54**

2005: The most significant wildfire with potential impact to Bismarck occurred on April 2, 2005.

- Incident Name: Wildland Fire
- Date: April 2, 2005
- Time: 1448
- Time Cleared: 1711
- Incident Location: 2800 South Washington (West of Tatley Meadows, north of the Waste Water Treatment Plant, south of drainage ditch and walking path)
- Fire was extinguished by Bismarck Fire and Mutual Aid (Bismarck Rural)

Winter Storm – Hazard Profile

Description

Winter storms take many forms and vary significantly in size, strength, intensity, duration, and impact. The composition of a storm varies with the temperature, wind, and amounts of precipitation. Important factors in winter storms include temperature, wind, wind chill, rain, sleet, snow, and blowing snow. Exceptional winter storms can and do cause problems for the communities, residents, and travelers. Examples of these types of storms include blizzards, ice storms, heavy snow events, and extended extreme cold temperatures. The combinations of cold temperatures, wind, snow, wind chills, ice, and reduced visibility can make these storms very deadly and costly.

The winter season can begin as early as September and last into May. The bulk of North Dakota's winter weather is from mid-November until early April. On average, there are around ten winter storms (ice storms, heavy snow events, winter storms, and blizzards) each year in North Dakota. Three to four of these storms reach blizzard intensity. As a result, North Dakota typically leads the nation in blizzard frequency. (National Climatic Data Center, 2010; National Weather Service, 2007)

Another hazard associated with Severe Winter Weather is prolonged periods of cold often associated with high winds, which produce life-threatening situations. This type of winter weather sometimes catches people unprepared, resulting in tragedy. Researchers have said that 70 percent of the fatalities related to ice and snow occur in automobiles and about 25 percent are related to people who have been caught off guard out in the storm. Ice storms with wind, or heavy snow without wind, have been extremely dangerous and costly to businesses, industries, state, tribal, and local governments, and citizens. Blizzards can last from less than 24 hours (in the fast moving storms) to more than four days (in the slower moving ones).

There are two major winter storm tracks that occur in the United States. The northern track produces the Alberta Low Pressure System, commonly called the "Alberta Clipper." This usually is a fast moving storm producing blizzard conditions for a relatively short period of time. Extremely low temperatures usually follow storms of this nature. Alberta Lows have traveled as fast as 90 mph and have not been known to become stationary systems. The southern track produces the Colorado Low Pressure System. These types of storms move more slowly and more erratically. The Colorado Low has traveled as fast as 60 mph, but has also been known to stop and become stationary for as long as 18 hours. Both of these types of storm systems can become very deadly.

Blizzards
Blizzards, as defined by the National Weather Service, are a combination of sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling or blowing snow for 3 hours or more. A blizzard, by definition, does not indicate heavy amounts of snow, although they can happen together. The falling or blowing snow usually creates large drifts from the strong winds. The reduced visibilities make travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills.

Blizzard conditions can also exist without a major storm system being near the state. Strong surface winds can blow already fallen snow, which is known as a "ground blizzard." Visibility can be reduced to near zero even though the sun is shining and the tops of power poles and trees are seen easily. These conditions are extremely variable in duration, from hours to even greater than a day. Ground blizzards are usually accompanied by very cold temperatures and wind chill conditions, making them as potentially deadly as a conventional blizzard.

The impact of a severe blizzard with low visibility, heavy snow, and cold temperatures can bring the entire region to a standstill. Utility and communication systems are often interrupted. Road systems are rendered impassable which causes school, workplace, and commercial shutdowns. This in turn magnifies the emergency and medical management needs of the community.

Heavy Snow

Other hazardous winter storms also exist that do not meet the criteria of a blizzard. Winter storms containing heavy amounts of snow, rapid snowfall rates, or enough wind to reduce visibilities and create hazardous road and outdoor conditions are an annual occurrence in the state. Six inches of snow or more in 12 hours or eight inches or more in 24 hours constitutes conditions that may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous, but in most cases, only results in minor inconveniences. Heavy wet snow before the leaves fall from the trees in autumn or after the trees have leafed out in the spring may cause problems with broken tree branches and power outages.

Ice Storms

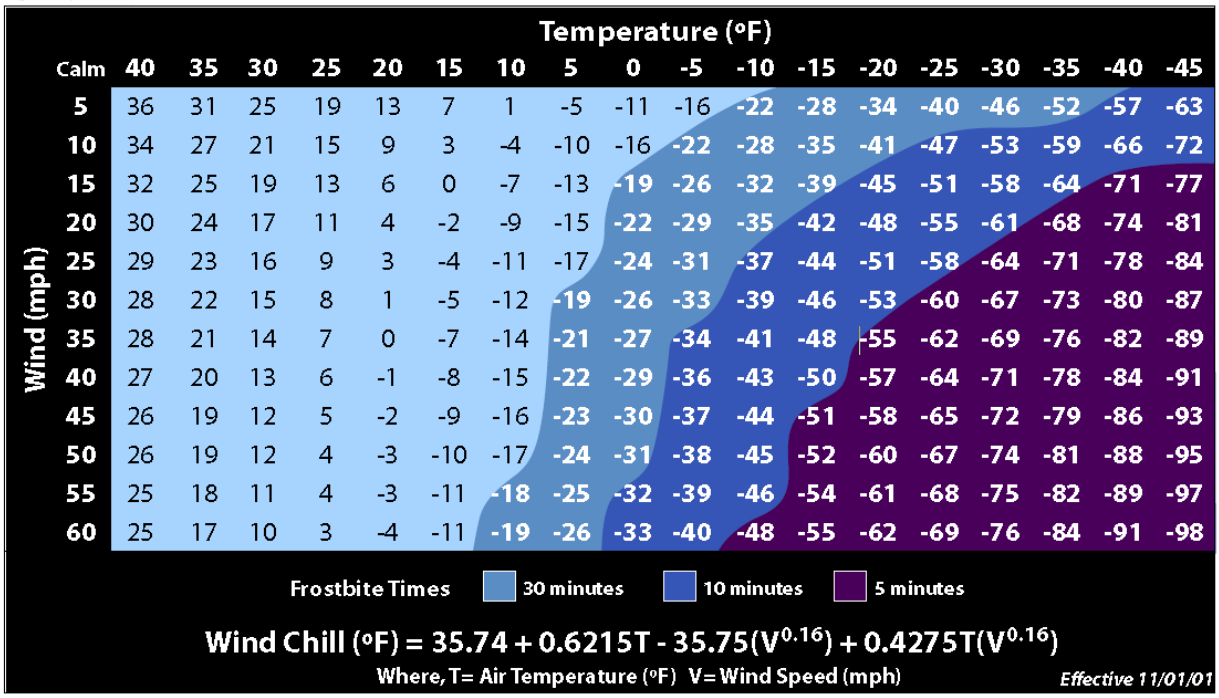
An ice storm is a winter event in which damaging accumulations of ice from freezing rain, greater than or equal to one-quarter inch, occur (NWS, 2023). Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into a warm layer of air, it melts to rain, and then freezes on contact when hitting the frozen ground or cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Similarly, sleet occurs when the rain in the warm layer subsequently freezes into pellets while falling through a cold layer of air at or near the Earth‘s surface. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Thick accumulations can bring down trees and power lines.

Extreme Cold

Extended periods of cold temperatures frequently occur throughout the winter months in North Dakota. Heating systems generally compensate for the cold outside. Most people limit their time outdoors during extreme cold conditions, but common complaints usually include pipes freezing and cars refusing to start. When cold temperatures and wind combine, dangerous wind chills can develop.

Wind chill is how cold it feels when outside. Wind chill is based on the rate of heat loss on exposed skin from wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature, and eventually, internal body temperature. Therefore, the wind makes it feel much colder than the actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service, 2007)

Wind Chill Chart



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

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

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

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

http://www.nws.noaa.gov/os/windchill/images/windchillchart3.pdf

Wind chill conditions become very relevant when human tissue is exposed to the outside air. This can occur when people become stranded in a blizzard and attempt to walk to safety and become lost. Lowering of the body core temperature leads to the condition known as "hypothermia." Hypothermia has often been called "the killer of the unprepared.‖ It also claims the lives of many outdoor sports enthusiasts. This condition occurs when the body or "core temperature" is lowered. The blood is cooled, thereby reducing the amount of oxygen which is carried to the brain, thus dulling the senses. The victim becomes fatigued, delirious, and loses dexterity and control of arms and legs. If the body core temperature continues to drop and nears 85°F, the victim eventually slips into unconsciousness. If treatment is not started immediately, the result is arrest of the circulatory and respiratory systems and death.
Winter storms can often be associated with other hazards. The most common hazards thought of during winter weather events are transportation accidents. Roadways become hazardous quickly during snow, blowing snow, and ice events. Most accidents involve passenger vehicles; however, an accident involving a commercial vehicle transporting hazardous materials is also possible.

Strong winds and ice or snow accumulations can take down utility lines. A long-term utility outage becomes more significant during extended cold periods as sheltering and cold weather exposure becomes more challenging. In North Dakota, severe winter seasons often translate to severe flooding potential in the spring.

Large quantities of snow may fall during winter storms. Six inches or more in 12 hours or eight inches or more in 24 hours constitutes conditions that may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous, but in most cases, only results in minor inconveniences. Heavy wet snow before the leaves fall from the trees in autumn or after the trees have leafed out in the spring may cause problems with broken tree branches and power outages. In addition to Winter Storm Watches and Warnings, the National Weather Service issues the following products for heavy snow events:

Snow Squalls

Snow squalls are intense, but limited duration, periods of moderate to heavy snowfall, accompanied by gusty surface winds resulting in reduced visibilities and often whiteout conditions. They move in and out quickly, and typically last less than an hour (NWS, 2023). Although snow accumulations are generally not significant, the combination of accumulating snow, gusty winds, falling temperatures and quick reductions in visibility can cause extremely dangerous conditions for motorists.

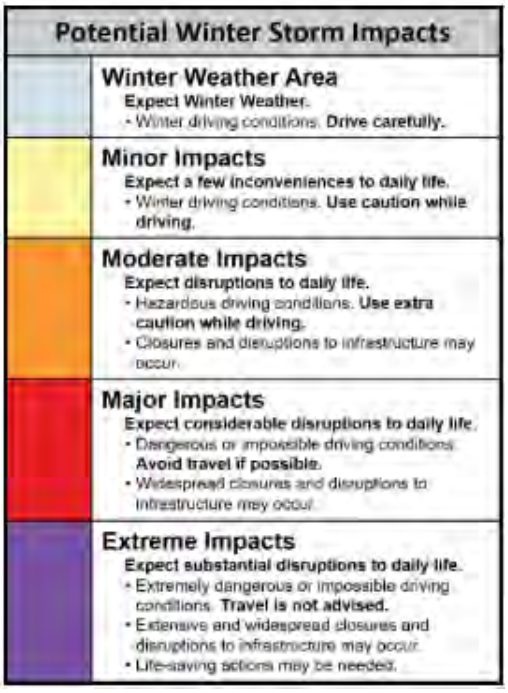
Location and Extent

The winter storm hazards, such as blizzards, ice storms, heavy snow, and extreme cold, usually occur on a regional or even statewide scale. As the historical record indicates, winter storms are a formidable hazard for all parts of the state.

The location, intensity, and impacts of developing winter storms are depicted by the NWS Weather Prediction Center using the Winter Storm Severity Index (WSSI), shown at right. WSSI is a spatial assessment of the societal impacts of winter storms that highlights areas with the forecasted potential for damaging and life-threatening effects brought on by winter weather (NOAA, 2023). WSSI allows forecasters, emergency management, and the public to make informed and tactical decisions about the potential for significant weather-related impacts. According to NOAA (2023), WSSI is comprised of six components of winter storms:

- Blowing snow,
- Flash freeze,
- Ground blizzard,
- Ice accumulation,
- Snow amount, and
- Snow load.

The WSSI is strictly a gauge of anticipated or forecast storm conditions and potential impacts, with no direct correspondence to any post-storm analysis of actual storm intensity or impacts produced by the storm. Also, the WSSI does not integrate extreme cold or wind chill, a very common North Dakota winter storm ingredient.



https://www.wpc.ncep.noaa.gov/wwd/wssi/wssi.php

Vulnerability Assessment

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Scenario	Heavy Snow	Blizzard	Extreme Cold & Wind Chill	Ice Storm
Probability	High Probability (and frequency) *Refer to Characteristics and History*	High Probability (and frequency) *Refer to Characteristics and History*	High Probability (and frequency) *Refer to Characteristics and History*	Medium Probability (and frequency) *Refer to Characteristics and History*
Speed of Onset	12 to 24 hours warning	12 to 24 hours warning	12 to 24 hours warning	12 to 24 hours warning
Duration of impact	1 to 5 days (typically)	1 to 5 days (typically)	1 to 5 days (typically)	1 to 5 days (typically)
Geographic Area	Local to regional	Local to regional	Local to regional	Local to regional
Death / Injury 1. Primary Causes	1. Heart Attack (shoveling) 2. Traffic accidents – poor driving conditions 3. Carbon Monoxide – stranded vehicle	1. Traffic accidents – low visibility 2. Snow plow accidents	1. Exposure to weather elements 2. Alternate Heat source 3. Carbon Monoxide Poisoning	1. Traffic accidents 2. Power lines down – coming in contact with live wires 3. Slips/falls
A. Highest vulnerability	A. Elderly or others with heart health issues B. Stranded travelers	A. Travelers – high speed travel (highways)	A. Stranded travelers – attempting to find shelter B. Loss of power / heat C. Mechanical / vent failure – carbon monoxide	A. Travelers B. Proximity to overhead power lines C. Trees falling – pulling down power lines

Scenario	Heavy Snow	Blizzard	Extreme Cold & Wind Chill	Ice Storm
Mass Casualty Incident	Possible (traffic accidents)	Possible (traffic accidents)	Possible	Possible (traffic accidents)
Comments: No History of mass casualty events within Bismarck as a result of Winter Storms				
Property Losses (points of vulnerability – high priority)	1. Roof collapse *(large span roofs)*	1. Vehicles – *due to accidents*	1. Mechanical failures more likely 2. Batteries exposed to cold more likely to fail	1. Trees 2. Power lines and power poles 3. Vehicles *(due to accidents)*
Environmental			1. Pipeline breaks	
COG/COOP	1. Essential personnel not able to work 2. Transportation 3. Supplies – not able to deliver / receive	1. Ability to provide services is compromised 2. Transportation 3. Supplies – not able to deliver / receive 4. Safety – working outdoors	1. Water main breaks 2. Safety – working outdoors	1. Power outages 2. Safety of workers
Critical Facilities	1. Roof Collapse (large span roofs) 2. Lack of Access to critical facility	1. Access to critical facility compromised	1. Water main break 2. Power outage	1. Power outage 2. Backup generators in place and functional
Critical Infrastructure	1. Transportation *(Access)*	1. Transportation (visibility)	1. Backup generators – ensure heating capability	1. Power Outages 2. Backup generators – ensure heating capability
Schools	1. School closures *(due to closed roads/access)* 2. Roof Collapse *(large span roofs)*	1. Bus Travel 2. Students walking to/from school	*1.* Exposure to extreme cold *(students not prepared)*	1. Power outages – school closure. 2. Potential contact with downed power lines *(students)*

Scenario	Heavy Snow	Blizzard	Extreme Cold & Wind Chill	Ice Storm
High Risk Facilities (chemical)	1. Transporting hazardous materials 2. Roof Collapse	1. Transporting hazardous materials		1. Transporting hazardous materials 2. Power outage at facility 3. Backup generators in place and functional
Specific Populations: Public Assembly, Vulnerable / Special Populations	1. Roof collapse (gyms, auditoriums, etc.) 2. Medical attention / prescription needs 3. Travelers	1. Travelers 2. Medical attention / prescription needs 3. Homeless Population	1. Travelers 2. Outdoor recreation 3. Homeless Population	
Economy (community wide)	Affected – discontinued until storm lifts	Affected – discontinued until storm lifts	Affected - minimal business interaction	Affected – reduced business interaction – possible power outages – unsafe travel conditions
OTHER:	Mobile HazMat (transportation) Emergency Response time	Mobile Hazmat (transportation) Emergency Response time	Mobile Hazmat (transportation) Emergency Response time (outdoor work)	Mobile Hazmat (transportation) Emergency Response (travel / slippery conditions) Additional hazards – tree limbs, power lines, falling ice, slippery conditions

Snow Removal Costs:

October 2022 through April 30, 2023 Winter Season: Heavy Snowfall for the winter season.
Snow removal costs for Bismarck Public Works for the season was just over **$5.2 million.**
Senate Bill 2183 of the 68th Legislative Assembly of North Dakota appropriated $20 million to the North Dakota Department of Emergency Services (NDDES) in order to provide snow removal assistance grants to eligible counties/townships, cities and tribal entities**.** Bismarck Public Works applied and received approximately $1.57 million in reimbursement.

April 12-14, 2022: A significant winter storm brought widespread blizzard conditions to western and central North Dakota from April 12th through April 14th, 2022. Bismarck received 18.3” of snow over the three-day event while Minot received three feet. Peak wind gusts for Bismarck were 51 mph. Bismarck declared a snow emergency and closed city offices on April 13. **Snow removal cost for this single storm incident was $395,000.**

Vulnerability Assessment due to power outage caused by Winter Storm Events

Vulnerability: Characteristics of community assets that make them susceptible to damage from a given hazard.

Note: Losses, Impact and Vulnerabilities are assumed to be cumulative from previous columns to the left using winter season as timeframe of occurrence.

Scenario	**3-Day Power Outage (ex: winter storm)**	**1 Week Power Outage & Interstate/Hwy Transportation Closure (ex: winter storm)**
Probability	Likely	Possible
Speed of Onset	No warning for power outage. Adequate warning for storm is assumed.	No warning for power outage. Adequate warning for storm is assumed.
Geographic Area	Regional & City-Wide Impact	Regional & City-Wide Impact
Duration	3 days	7 days
Death / Injury 1. Primary Causes A. Highest vulnerability	1. Improper use of alternative heating sources. 2. Carbon Monoxide poisoning. 3. Injury due to cold temperatures and heavy snow. 4. Lack of back-up power for personal life personal supportive equipment. A. Those more affected by colder temperatures and those with poorly insulated homes. B. Those with medical conditions residing at home.	Same as column to the left.
Mass Casualty Incident	1. No. Some injury and loss of life is possible, but avoidable through sheltering and other response efforts.	1. Possible, but avoidable through sheltering and other response efforts.
Property Losses (points of vulnerability – high priority)	1. Frozen and burst water pipes. 2. Personal property sensitive to colder temperatures	1. Frozen and burst water pipes (extensive) 2. Personal property sensitive to colder temperatures damaged.

Scenario	3-Day Power Outage (ex: winter storm)	1 Week Power Outage & Interstate/Hwy Transportation Closure (ex: winter storm)
	damaged.	
Environmental		
COG/COOP	1. Non-essential services discontinued. 2. Staffing challenges due to personal impacts.	1. Critical and essential functions maintained. 2. Other functions discontinued. 3. Staffing challenges due to personal impacts.
Critical Facilities	1. Grocery Stores closed. 2. Gas Stations – not able to pump gas.	1. Grocery Stores closed. 2. Gas Stations – not able to pump gas. 3. Hospitals, Nursing Homes, Assisted Living Centers 4. Prisons, Jails
Critical Infrastructure	2. Heating/Cooling Systems down. Back-up power required. 3. Communications (phone / cell) impacted.	2. Transportation – deliveries delayed for one week. 3. Reduced inventory of food and medicines due to Interstate and Hwy road closures.
Schools	1. School Closures – some may be used as shelters.	1. School Closures – some may be used as shelters.
High Risk Facilities (chemical)	1. Facilities without back-up power may be impacted. Safety/security may be impacted without power. 2. Closed for business – economic impact.	1. Same as left column.
Specific Populations: Public Assembly, Vulnerable / Special Populations	2. Evacuation and sheltering would be necessary for those without back-up power at place of residence.	1. Evacuation and Sheltering would be necessary for those without back-up power at place of residence.
Economy (community wide)	Minor	Minor
OTHER:		

Changes in Vulnerability Since the previous plan update in 2020.	
Increase in Vulnerability	Decrease in Vulnerability
As the community grows, new areas of development are impacted by snow events and require snow removal services. The growing population, especially those new to the area may not be familiar with the impacts of severe winter weather.	See Winter Storm Hazard Mitigation Capabilities listed in Section 3.

Risk

See Section 10 of this plan document for risk assessment and hazard ranking of all hazards addressed in this plan.

Relationship to other Hazards: Heavy snowfall followed by rapid snowmelt runoff enhance the risk of spring flooding. The need for heating in the winter months enhances the risk of fire and carbon monoxide poisoning as a result of using alternate heating sources inappropriately or lack of maintenance on furnaces or other heating appliances.

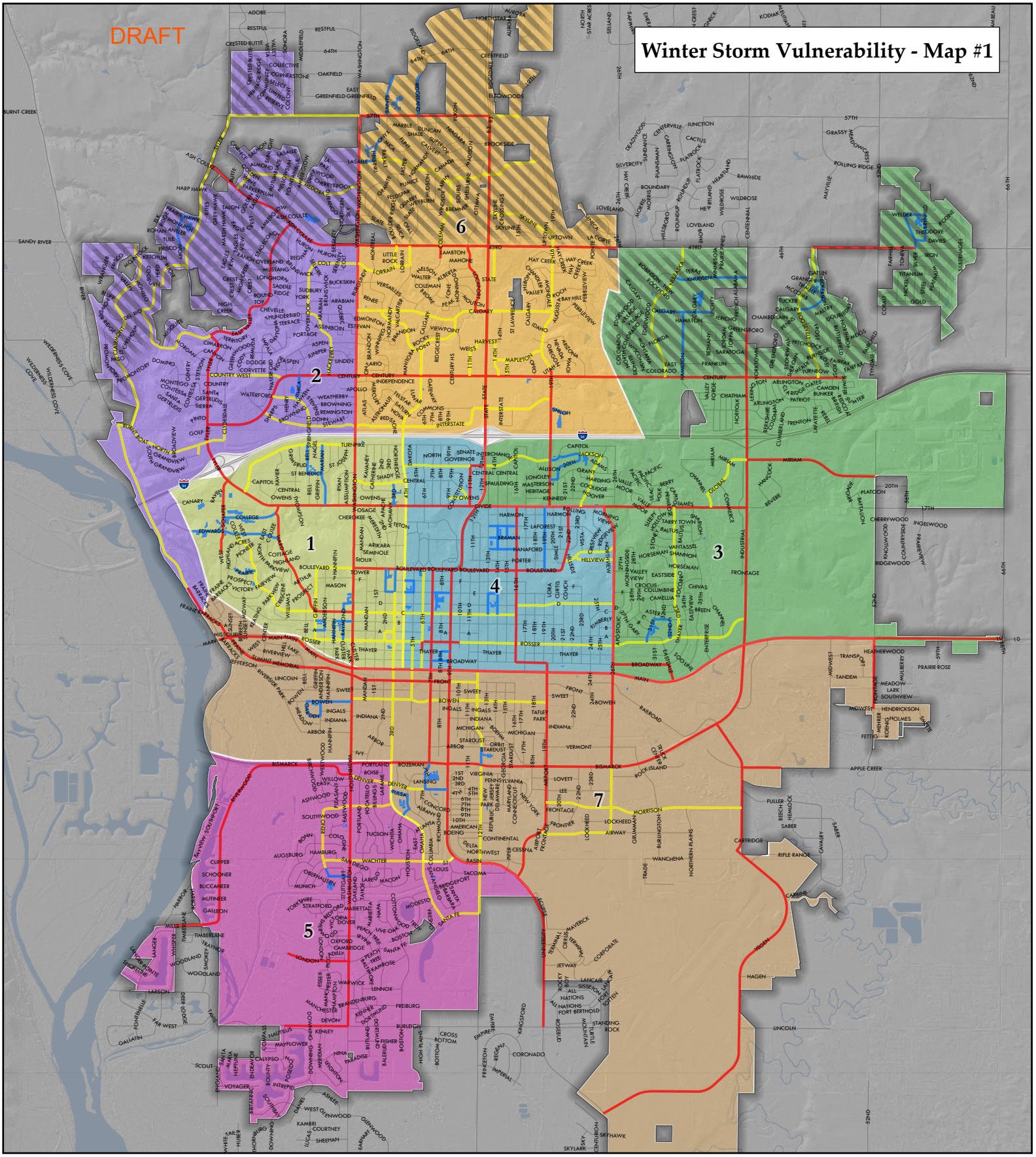
Future Conditions

- **Location**: The location of winter hazards will remain the same, with the exception of additional areas as annexed into the city.
- **Extent/Intensity:** See "Anticipated Future Climate Impact" below.
- **Frequency:** See "Anticipated Future Climate Impact" below.
- **Duration:** The duration of winter hazards is not projected to change.

Anticipated Future Climate Impact – Winter Hazard

Through the end of this century in North Dakota, expect larger, more frequent, and more intense periods of heavy wet snow, mixed precipitation or ice storms, and freezing drizzle or mist, with somewhat warmer temperatures. Potential Impacts include a likely increase in winter season precipitation, overall, along with more periods of heavy snowfall and/or freezing rain/ice events. Warmer winter season temperatures will support a higher incidence of mixed precipitation (sleet), freezing rain, or ice storms, which will likely impact transportation, power transmission, roof loading, critical facilities, and infrastructure, along with general health and safety. Human health impacts include an increased incidence of heart, back, and/or muscle related injuries from shoveling snow or falling on ice.

Other potential future impact includes a decrease in demand for energy (heating).



Bismarck

Snow Plowing Map

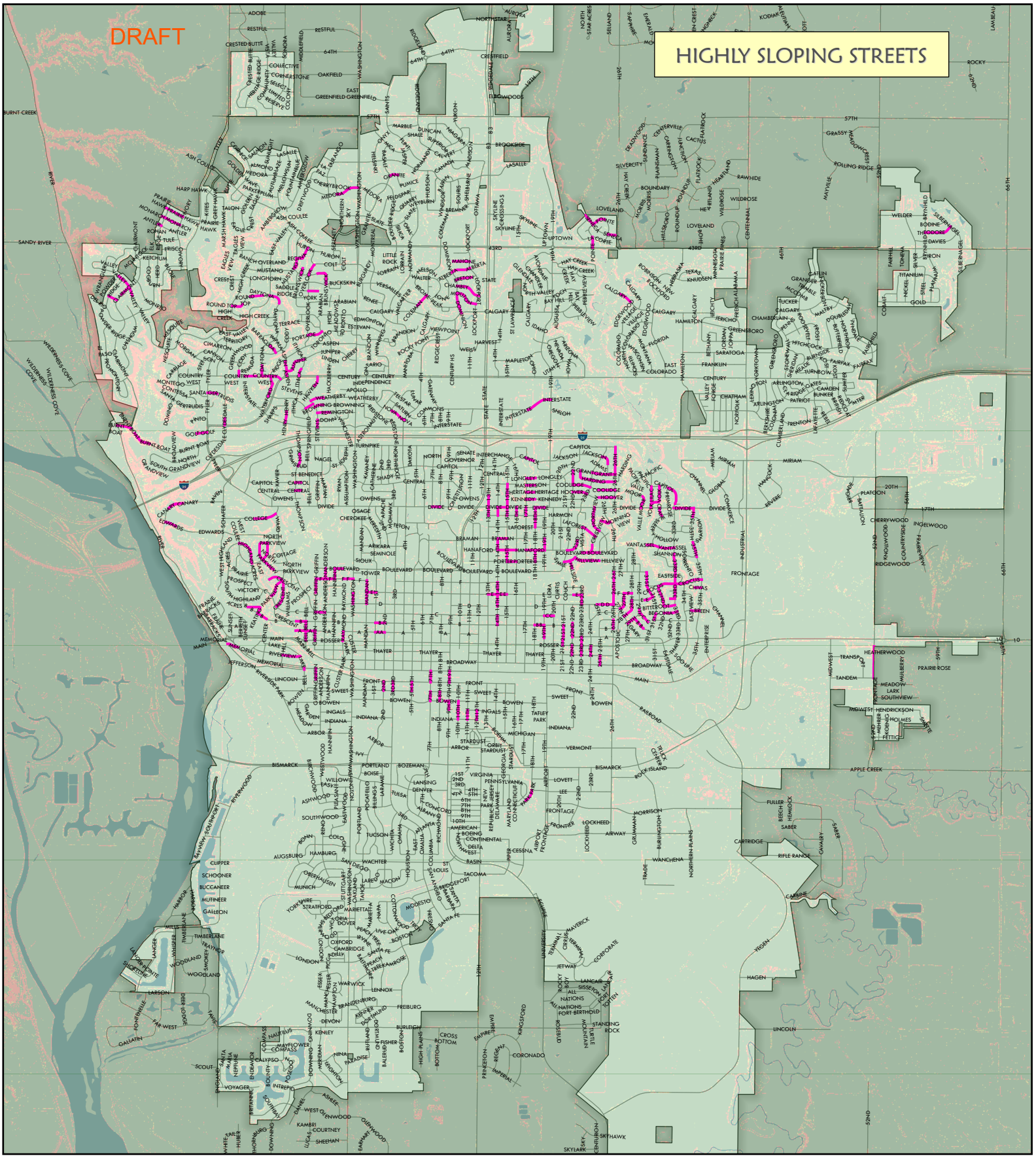
Map Created: July 2025
by GIS Division

Snow Plow Priority
- 1
- 2
- 3
- Streets
- City Limits
- Schools/Daycares
- Areas of New Development (Prone to Heavy Snow Drifting)

Snow Plowing Zones
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- Waterbodies

N

0 ½ 1 Mile



Streets

City Limits

Waterbodies

Slope Percent

Value

100

0

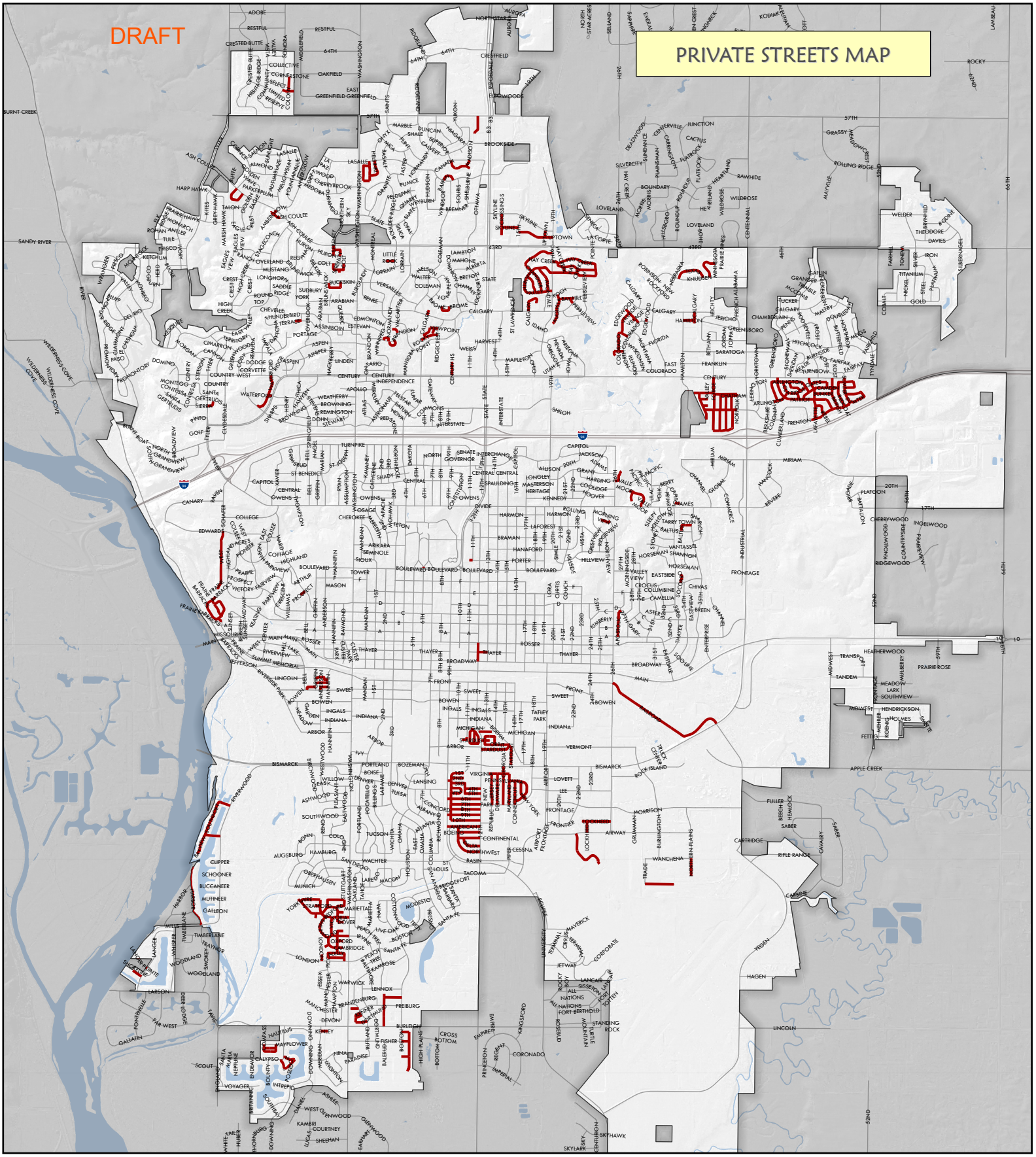
Streets With >10% Slope

Bismarck

Map Created: July 2025
by GIS Division

N

0 ½ 1 Mile



Bismarck

Map Created: July 2025
by GIS Division

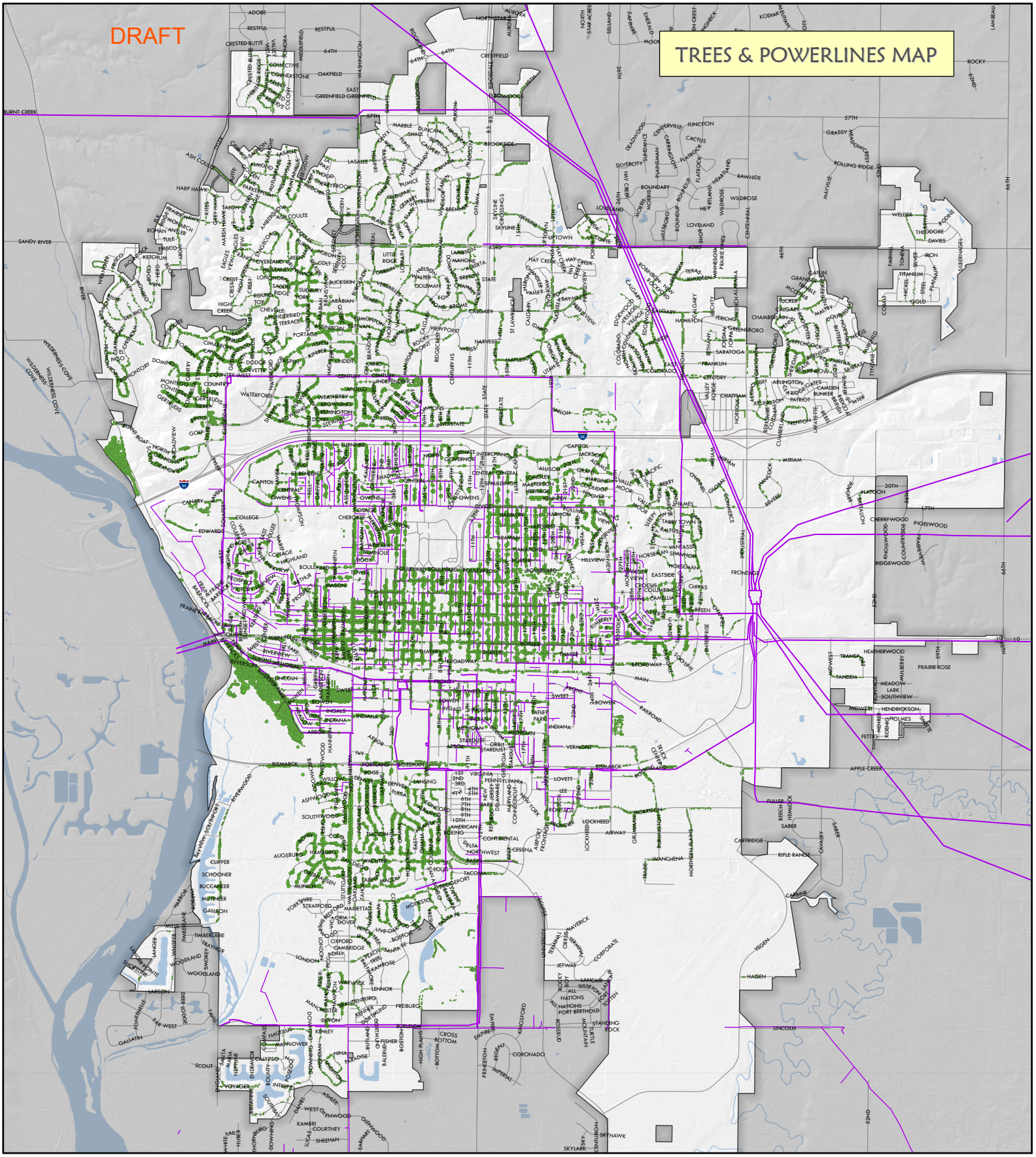
Private Streets
Streets
Waterbodies
City Limits

N

0 ½ 1 Mile

DRAFT

TREES & POWERLINES MAP



Trees
Size
- 1
- 5
- 10
- 50
- 100

- Streets
- Waterbodies
- City Limits
- MDU Overhead Lines
- Major Transmission Lines

Bismarck

Map Created: July 2025
by GIS Division

N

0 ½ 1 Mile

Previous Occurrences

Winter Storm Disaster Declarations – Burleigh County Since 1989			
Declaration	**Incident**	**Incident Period**	**Declaration Date**
DR-1901	Severe Winter Storm	April 1, 2010 to April 3, 2010	Major Disaster Declaration declared on April 21, 2010
DR-1157	Severe Winter Storms/Blizzards	January 3, 1997 to January 31, 1997	Major Disaster Declaration declared on January 12, 1997

Source: http://www.fema.gov/disasters?field_state_tid=11&field_disaster_type_term_tid=6843&field_disaster_declaration_type_value=All&items_per_page=10&page=1

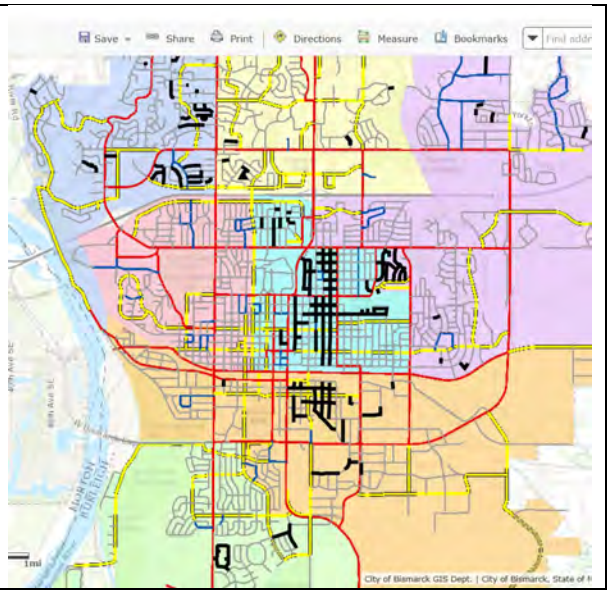
October 2022 thru April 30, 2023: Heavy Snowfall for the winter season. Snow removal costs for Bismarck Public Works for the season was just over $5.2 million. Senate Bill 2183 of the 68th Legislative Assembly of North Dakota appropriated $20 million to the North Dakota Department of Emergency Services (NDDES) in order to provide snow removal assistance grants to eligible counties/townships, cities and tribal entities**.** Bismarck Public Works applied and received approximately $1.57 million in reimbursement.

April 12-14, 2022: A significant winter storm brought widespread blizzard conditions to western and central North Dakota from April 12th through April 14th, 2022. Bismarck received 18.3" of snow over the three-day event while Minot received three feet. Peak wind gusts for Bismarck were 51 mph. Bismarck declared a snow emergency and closed city offices on April 13. Snow removal cost for this single storm incident was $395,000.

October 10-11, 2019: 11.6 inches of snow fell within a 24 hour period (7am Thursday to 7 am Friday) setting a new record for Bismarck.

January 2017: The total accumulation of snow (July 2016 to January 2, 2017) is 53.1 inches. That is the most amount of snowfall ever accumulated to date, according to the National Weather Service in Bismarck. The 1993-94 snowfall season, July 1 through Jan. 2, held the record prior and now takes second place, with 49.3 inches.

December 25, 2016: As a result of the winter storm which started on Christmas Day, the volunteer snowmobile club was utilized to provide transportation of critical staff to both hospitals and area nursing homes throughout the Day on December 26. Over 30 personnel were transported by snowmobile. On December 25, plows were pulled from the streets and were utilized for providing access based on 911 calls. Clearing of emergency snow routes was resumed on December 26 during the day. As of Thursday December 29, plows still had not reached many of the residential areas. Snowfall was reported at 12.5 inches.

As of December 29, 2016, extensive snow removal operations continued. Streets shown in black still needed to be cleared (again):	

December 6, 2016: The City of Bismarck declares Snow Emergency due to accumulation of snowfall and the blowing and drifting snow conditions (blizzard conditions). Bismarck PD issues a no travel advisory as numerous vehicles were stranded and blocking intersections and creating unsafe conditions for law enforcement, emergency vehicles, first responders and snowplows. Bismarck City offices close. Public Works snow removal crews work 24/7 to remove snow.

April 14-15, 2013: A total of 17.7 inches of snow fell beginning with a trace on April 13 (.1 inch) with a majority of the snow falling on Sunday April 14, 2013 (17.3 inches) and an additional. 3 inches on April 15. The snow had a high moisture content (wet/heavy) and made travel difficult to impossible.

A snow emergency declaration was issued by the city of Bismarck on April 14, 2013. Snow plows focused on clearing emergency routes only (red - priority 1 routes) on April 14th until noon on April 15 before snow plows were able to begin clearing second, third, and fourth level priority routes (residential). No travel was advised and the city of Bismarck closed its offices on Monday April 15 along with many other closings including ND State Government, Burleigh County, and Bismarck Public Schools.

NOAA Storm Event Database:
April 14, 2013 – Blizzard Event: Very heavy snow combined with winds gusting to 40 miles per hour to create a blizzard for much of the day on the 14th.

April 14-15, 2013: Winter Storm Event
Strong low pressure pushed across the Rockies April 13th, slowed down over the Dakotas April 14th, then moved east on April 15th. The peak of the storm occurred on Sunday when much of west and central North Dakota received heavy amounts of snow, with portions of the south central and southeast having a blizzard. A combination of favorable moisture feed and strong surface and mid-level dynamics brought historic snowfall to parts of west and central North Dakota. A moist conveyer belt extended from the eastern portions of Iowa and Illinois back northwest into North Dakota, situated along and north of an inverted surface trough stretched

from southeast to northwest across South Dakota. Combined with strong diffluent flow aloft associated with the upper level low, snowfall rates approached two inches per hour across south central North Dakota on Sunday.
In addition to the heavy snow, strong surface winds developed across south central North Dakota west of the Missouri River and into the James River Valley. Wind gusts to 40 miles per hour combined with the heavy snow resulting in a blizzard. Storm total snowfall amounts ranged from 15 to 22 inches from the James River Valley into the Missouri River Valley. Lesser amounts were reported across the far west and north, with up to eight inches at Watford City, and around an inch near the Canadian border. The highest snowfall amounts were reported at Center and Flasher with 22 inches. A record snowfall for any calendar day of the year was set at Bismarck, with 15.5 inches falling on April 14th. The storm total in Bismarck was 17.7 inches. This also resulted in setting a new record April snowfall of 21.5 inches.
Impacts from this storm were numerous. All roads across the southwest, south central, and southeast were under no travel advisories due to the heavy snow. Interstate 94 was closed from the Montana border to Jamestown, and Highway 83 was closed from Bismarck to Underwood. In addition, multiple school closings occurred on the 15th due to the heavy snow.

March 22-23, 2011: A storm total snowfall amount of 10.4 inches was reported near Bismarck.

April 2, 2010: Five to twelve inches of heavy wet snow and sleet fell across Burleigh County. The combination of strong winds and the wet snow resulted in damages to electrical utilities, causing power outages across the county. In some areas it took several days to restore power. Preliminary damage assessments estimated there was around two million dollars in damage from this storm for Burleigh County. Western portions of the county were hit the hardest.

Presidential Disaster Declaration for Severe Winter Storm issued in 2010 **DR-1901**
Including Burleigh County
Incident Period: April 1, 2010 - April 3, 2010
Declaration declared on: April 21, 2010

January 22-23, 2010: A wintry mix of freezing rain, sleet, and snow spread north across the local area. Precipitation eventually changed over to all snow, with up to five inches of accumulations reported by early Saturday morning. Hazardous travel conditions and scattered power outages resulted.

January 5-6, 2010: Six to eight inches of snow fell across Burleigh County. The National Weather Service Office in Bismarck reported 7.1 inches of storm total snowfall. Strong northwest winds of 20 to 40 mph created areas of significant blowing and drifting snow, resulting in near blizzard conditions.

December 25, 2009: Winter Storm / Blizzard Conditions: Bismarck received 9.2 inches of snowfall on Christmas Day and a total of 13.8 inches from December 23 through 26. Most of North Dakota received heavy snow as a result of this storm. A no travel advisory was issued for the entire state on Christmas Day. Blowing snow caused reduced visibility, drifting, and dangerous driving conditions throughout the state. Road closures included I-29 from S.D. border to Canadian border (and from South Dakota to the Iowa border), I-94 from Montana border to Minnesota border, Hwy 83 from Bismarck to the Canadian border and Hwy 2 from Berthold to Devils Lake. Snow plows in Bismarck focused on clearing emergency routes and major arterials. Duration of the storm and impacts is at least 4 days (starting Dec 23 thru 26).

2008/2009 Winter Snowfall total: 100.3 inches (2nd place behind 1996-97 with 101.6 inches). Snow removal assistance (Federal Disaster Declaration) was received by Bismarck and many communities throughout the state.

March 23-24, 2009: A blizzard began later on the 23rd and continued into the 24th. Wind gusts to 47 mph on the 24th with a snow total of 8.1 inches (.2 on the 23rd and 7.9 on the 24th). This blizzard exacerbated the flooding/ice jam situation and caused delay in response/recovery efforts.

March 29 - 30, 2009: Heavy Snow/Blizzard - Strong northwest winds of 20 to 45 mph accompanied the snow and produced widespread blizzard conditions mainly south of Interstate 94 closer to the North Dakota and South Dakota border. Widespread 14 inch or greater storm total snowfall amounts were common across southwest and south central North Dakota during this event, with a few isolated reports greater than 20 inches. No travel advisories, road closures, including Interstate 94 from Bismarck to the Montana border, and school and business closures were common during this significant spring storm.

March 23, 2009: Blizzard: This blizzard occurred at the onset of the Ice Jam Flooding that occurred in Bismarck/Burleigh spring of 2009. A storm total snow amount of 8.1 inches was recorded at the Bismarck National Weather Service Forecast Office. The heavy snow combined with strong northwest winds resulted in widespread blizzard conditions. Storm total snow amounts ranged from 12 to 22.5 inches across southwest North Dakota, to five to 11 inches central. No travel advisories, road closures, power outages, and school and business closures were common during this significant spring storm.

January 11, 2009: Blizzard: Strong northwest winds of 25 to 35 mph, with gusts up to 45 mph, combined with falling snow and existing loose snow cover to create widespread and prolonged blizzard conditions across the county. Storm total snowfall accumulations by Monday morning ranged from two to five inches. The blizzard warning encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, all of which had a blizzard. Periods of light to moderate snow and blizzard conditions, very strong winds creating significant blowing and drifting snow and near zero visibilities, forced numerous road closures and the issuance of no travel advisories by law enforcement officials throughout the event.

January 8, 2009: Heavy Snow - A strong winter storm system brought moderate to heavy snow, areas of freezing rain, and considerable blowing and drifting snow to much of west and central North Dakota from early morning Thursday, January 8th, through Friday afternoon, January 9th. This significant storm resulted in numerous no travel advisories being issued by law enforcement throughout the event due to freezing precipitation, heavy snow accumulations, and blowing and drifting snow blocking roadways.

December 2008: Snowiest month on record (all months /years) with a total of 33.3 inches.

December 29, 2008: Heavy Snow - A fast moving surface low pressure system developed a band of moderate to heavy snow from northwest North Dakota, southeast through much of central North Dakota, Monday night, December 29th, and lasting through the early afternoon of Tuesday, December 30th. Storm total snow amounts ranged from three to four inches around the perimeter of the heavy snow band to around one foot within the center. In addition, occasional winds of 20 to 35v mph a produced considerable blowing and drifting snow and

resulted in the issuance of no travel advisories over several counties Monday night into Tuesday morning.

December 20, 2008: Extreme Cold / Wind Chill - Cold Arctic air combined with winds of 15 to 25 mph to create wind chill temperatures of 40 below to near 50 below zero. - from Saturday the 20th, through Sunday morning the 21st.

December 14, 2008: Extreme Cold / Wind Chill - After a significant winter storm that brought a blizzard to western and central North Dakota moved out of the Northern Plains, wind chill continued to be a problem. Strong cold air advection combined with gusty northwest winds and resulted in wind chill temperatures of 40 to 55 below zero from Sunday night the 14th, through Monday morning the 15th.

December 13, 2008: Blizzard - A significant winter storm impacted all of western and central North Dakota beginning Saturday, December 13th, and lasting through much of Sunday, December 14th. A blizzard warning was posted well in advance of the storm, with the warning lead time more than a full day in advance. The blizzard warning encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, all of which verified. Heavy snow and blizzard conditions, significant snow combined with very strong winds and near zero visibility, forced numerous road closures and the issuance of no travel advisories throughout Saturday and Saturday night. A statewide no travel advisory was then issued early Sunday morning by the North Dakota Department of Transportation. Total snow amounts by Monday morning the 15th were as much as 13.8 inches at Williston. Bismarck had 12 inches.

November 6, 2008: Blizzard: - A significant and complex winter storm impacted much of western and central North Dakota beginning Wednesday, November 5th, and lasting into Friday, November 7th. Winter storm warnings and blizzard warnings were posted well in advance of the storm. Warning lead time averaged nearly 27 hours. The warnings encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, though not all counties had events or reached warning criteria. Counties in the Williston area and the Jamestown area were basically missed by the storm. Blizzard conditions, or significant snow with near blizzard conditions, forced many schools and businesses to close and stranded travelers. Numerous roads were closed or no travel was advised due to the conditions. Storm total snowfall ranged from one to three inches around Williston and Jamestown, to six to twelve inches southwest through central, to a maximum of twenty inches in McHenry County. The strong wind resulted in blowing and drifting snow and so amounts had to be estimated. Snow drifts were four to six feet deep.

January 29, 2008: Extreme Cold / Wind Chill - Wind chills of 40 to 45 below zero with wind speeds of 30 to 45 mph persisted for over 24 hours. The lowest wind chill recorded was 44 below zero at Bismarck.

March 30, 2007: Ice Storm - One quarter to one half inch of freezing rain fell across Burleigh County, creating ice covered and dangerous roadways. A few brief power outages occurred in the Bismarck area due to broken tree limbs falling onto power lines (newspaper). No travel was advised for various county, state, and federal highways as a result.

March 2, 2007: Blizzard - Winds of 30 to 45 mph were recorded across central North Dakota for much of Friday. These winds, in combination with recent snowfall of 5 to 12 inches, created widespread areas of significant blowing and drifting snow with near zero visibilities. Conditions

were much worse in the open country than they were within urban areas, as numerous rural roadways became impassable due to large snow drifts. As a result, no travel was advised for much of central North Dakota, along with several highways being closed including Interstate 94 from Bismarck to Fargo.

February 28, 2007: Winter Storm - The heaviest snow (9 to 12 inches) fell over far south central and southeastern North Dakota. In addition to the heavy snow, light freezing rain and sleet also fell Wednesday afternoon and night over the central and eastern counties of the Bismarck County Warning Area.

January 24, 2007: Winter Storm - Low pressure over the central Rockies intensified into a major winter storm impacting North Dakota on the weekend of January 24th and 25th. A persistent snow event produced 6 to 12 inches of snow over most of western and central North Dakota. The heaviest band of snow fell from the northwest through central North Dakota where snowfall amounts ranged from 9 to 12 inches. The storm began as freezing rain and sleet over north central North Dakota before turning over to all snow. Gusty winds of 15 to 25 mph accompanied the storm resulting in considerable blowing and drifting snow and wind chills to 30 below zero. Travel throughout the region was impacted due to reduced visibilities and blocked roads.

January 4, 2007: Extreme Cold/ Wind Chill - Temperatures reached 20 to 30 below zero Sunday night and remained between 10 and 20 below zero on Monday. West winds of 10 to 25 mph combined with the subzero temperatures created wind chills ranging from 45 to 58 below zero over western and central North Dakota. The winds also created low visibilities in blowing snow in many areas of the region. Some roads were closed due to the blowing and drifting snow over parts of northern North Dakota. The frigid temperatures lead to power outages and water line breaks in several areas.

December 30, 2006: Heavy Snow - The highest snow totals, in excess of 10 inches, were from Bismarck, to Hazelton, Wishek, and Ashley, and through parts of Stutsman and Foster counties. These were the most significant snow amounts in these areas, from a single storm, in about seven winter seasons. There were many accidents and vehicles in ditches, at least 41 in the Bismarck area and more than 50 in the Jamestown area alone.

February 16, 2006: Wind Chill - Temperatures were in the 15 to 25 degree below zero range with wind speeds of 15 to 25 mph resulting in wind chills mainly in the 40s below.

January 20, 2006: Winter Weather - Around two inches of snow fell over Morton and Burleigh counties this morning. It was enough to cause slippery roads and traffic induced snow fog. Numerous accidents were reported in the two counties.

December 29, 2005: Winter Weather - Snow amounts totaled three to five inches over the area and a snow advisory was in effect. Several accidents were reported in Mandan, Morton County, and about 40 accidents were reported in Bismarck, Burleigh County. Two people were injured (indirect) in one of the Bismarck accidents.

January 13, 2005: Extreme Cold / Wind Chill - An arctic high pressure system dropped southeast out of central Canada on the evening of the 13th of January. The system brought bitter cold temperatures to western and central North Dakota the night of the 13th. The air temperatures overnight dropped between 20 to 35 below zero with daytime temperatures ranging 10 to 20 below zero. The subzero temperatures lasted through the morning of the 15th.

Northwest winds up to 20 mph accompanied the cold air producing extreme wind chills of 40 to 60 below zero across the region.

March 10, 2004: Blizzard - The high wind event of March 10th brought afternoon and evening snow showers to central North Dakota. The snow combined with the high wind reduced visibilities to less and one quarter mile (1/4 mile) and in some areas visibilities lowered to near zero at times causing blizzard conditions. The North Dakota Highway Patrol and Department of Transportation closed down portions of highway 83 between Minot and Bismarck due to the extremely hazardous conditions caused by the snow and blowing snow. No travel was advised for the secondary roads in central North Dakota due to the snow, blowing snow and reduced visibilities.

February 10, 2004: Blizzard - The winter storm warning for western and central North Dakota was upgraded to a blizzard warning in the afternoon of the 10th. Strong winds of 50 mph combined with snow had reduced visibilities to zero at times by the late afternoon hours and remained at or near zero through the night.

January 27, 2004: Extreme Cold/Wind Chill - Ambient temperatures ranging 20 to 35 below zero combined with northwest winds to 30 mph resulted in widespread wind chill factors of 40 to 65 below zero.

December 17, 2002: Winter Storm - In the far west and far south central North Dakota 3 to 5 inch snowfall was common. After a relatively mild autumn, it was the first major arrival of winter weather to affect the region.

December 15, 2000: Blizzard - A strong low pressure system moved rapidly across southern Canada ushering frigid arctic air and strong northwest winds across western and central North Dakota. Wind gust to 60 mph were common throughout the region. The frigid arctic air kept daytime temperatures 5 to 10 below zero. The cold temperatures coupled with the high winds brought dangerous wind chills to 75 below zero. Snowfall was light, around an inch total, however existing snow on the ground created near zero visibilities in blowing and drifting snow for an extended period of time. This prompted the closing of many roads throughout western and central North Dakota.

November 7, 2000: Winter Storm – Heavy snow fell across western and central North Dakota with accumulations of 6 to 18 inches reported.

March 8, 2000: Winter Storm - Snow amounts ranged between 3 to 6 inches with the heaviest falling over south central North Dakota. Winds during the storm ranged between 40 to 50 mph which created dangerous winter conditions.

February 26, 2000: Winter Storm - A wide band of heavy wet snow fell from south central North Dakota through portions of extreme north central North Dakota along the Canadian border. Scattered areas of 8 to 12 inches of wet snow fell over this area with numerous reports of 3 to 6 inches within this band. Winds with this storm generally ranged between 30 to 45 mph which caused some blowing and drifting snow.

April 3, 1999: Winter Storm - The storm brought an area of heavy snow over western and central North Dakota. Snowfall ranged from 4 to 8 inches. The heaviest snow fell over the north central area.

April 1, 1999: Blizzard - Gusty northwest winds caused low visibilities in blowing and drifting snow over a wide area of western and central North Dakota. Six to fifteen inches of snow fell over the warned area.

January 1, 1999: Winter Storm - Heavy snow fell with 6 to 8 inches of snowfall during the day. Northwest winds to 40 mph brought bitter cold wind chills to 65 below zero and low visibilities in blowing snow west of the surface trough. Two fatalities were contributed to the storm. In south-central North Dakota at Bismarck a man (age unknown) died from a heart attack while shoveling snow. In north-central North Dakota near Rolette poor visibility stranded a vehicle which an elderly woman left to seek help and died from exposure to the cold. She came within 75 feet of a farm house but was unable to see it.

November 18, 1998: Winter Storm - Snowfall ranged 6 to 15 inches over central and east central North Dakota. The heaviest band of snow of 12 to 14 inches fell over the central and north-central counties.

November 9, 1998: Heavy Snow - A band of heavy wet snow extended from the southwest through much of central North Dakota ending early in the afternoon on the 10th. Amounts ranged from 6 to 9 inches in the southwest and south central to 9 to 13 inches north central.

April 4, 1997: Blizzard - Warm weather the first three days of April lead much of North Dakota to believe that spring had arrived with temperatures in the 60s and 70s. Mother Nature had other plans. A very strong area of low pressure moved out of the Colorado area into the northern plains. Warm moist air ahead of the low collided with cold air coming down from Canada. The result was the worst blizzard of the season for North Dakota, bringing much of the state to a complete halt. The precipitation began to fall during the afternoon of the 4th (Friday), as rain in the east and freezing rain or sleet in the west. By Friday evening the freezing rain and sleet had changed over to all snow in the west. By Saturday afternoon the heavy snow moved into the central part of the state, reaching the eastern part of North Dakota later that night. Snow accumulations were on average 1.5 to 2 inches an hour with 50 to 60 mph winds as well. The blizzard ended in the west on the morning of the 6th (Sunday), but continued into the evening across the east. **The additional snow at Bismarck brought the season snowfall total to 101.4 inches, which set an all-time record.** The old record was 91.8 inches. Many power poles fell from the weight of the ice and snow combined with the strong winds. It's estimated that over 300 wooden poles had to be replaced, with one power company reporting about 100 steel towers damaged or destroyed with over 200 miles of transmission line down. An estimated 75,000 homes were without power for some time over the weekend, with a few houses having to wait 4-5 days before power was fully restored. The state's electrical grid was in such patch work condition that the governor requested that people conserve as much energy as possible for fear of overtaxing the system and creating a widespread brownout. National Guard helicopters were used to help power companies assess the damage done to power poles and lines. With the widespread power outages, many people had to resort to burning wood or running gas powered generators to keep their homes warm. This lead to a few reports of carbon monoxide poisoning. Numerous vehicles were stranded in and out of towns, as well as people. I-94, I-29, and all other major highways in the state were closed for the weekend. **On the 7th(Monday), President Clinton declared North Dakota a disaster area for the 2nd time this winter**, freeing up grants and making low interest loans possible.

March 12, 1997: Winter Storm - The snow was mainly confined in a band from the northwest part of the state to the south-central (7 inches at Bismarck). I-94 was again closed from Bismarck to Fargo.

January 9, 1997: Blizzard - The second blizzard in less than 1 week brought North Dakota to a virtual standstill. This blizzard didn't bring as much snow as the first storm, but the winds gusted from the northwest as high at 40 mph and they lasted for 3 days. Snowfall amounts from this storm varied from 1-2 inches in the southwest to 2-4 inches in the central. But the strong winds combined with this snow as well as the snow from the blizzard a few days earlier created widespread whiteout conditions that lasted for 3 days. There were reports of people getting stranded in vehicles for up to 40 hours. Those that stayed with the vehicle survived, but those that didn't either perished or suffered 2nd and 3rd degree burns over 70-90 percent of their body. As the storm was winding down on the 11th and 12th, bitter cold air moved in, and with the strong northwest winds still blowing, wind chills plummeted to 85-90 below with actual air temperatures 20-30 below. In Elgin (Grant Co), the water tower froze and broke open due to the cold temperatures. With the amount of suffering and hardship going on, Gov. Schafer of North Dakota declared the state a disaster area. This was followed on the 12th with President Clinton approving the 1st ever request to declare a major statewide disaster. The National Guard was called in to help with snow removal as many communities had already spent their snow removal money before this storm.

January 4, 1997: Blizzard - The first blizzard of 1997 hit east-central North Dakota on the morning of the 4th. The blizzard was preceded by freezing rain that lasted most of the day before switching over to snow. The snow became so heavy that the highway department pulled the plows off of the roads the evening of the 4th and all day on the 5th. It was during the evening of the 4th that the northwest winds began to blow. Winds of 25 to 35 mph were common. Although the snow was not as heavy in the western part of North Dakota, the freezing rain made travel very hazardous. This would turn out to be the first of 4 major snow events that would hit western and central North Dakota during January.

December 25, 1996: Extreme Cold - The blizzard of the 16th-18th left in its wake very cold air. Williston set a new state record low of 32 below the morning of the 25th, and Bismarck set a new record low high temperature for the date, with the mercury struggling to 10 below for a high. Lows across the state that morning varied from 20 to 30 below with highs from 10 to 20 below.

December 16, 1996: Blizzard - A strong low pressure center moved southeast out of Canada into the northern plains bringing with it blizzard conditions. The blizzard lasted for 3 days in North Dakota. The blizzard began in the western part of the state the morning of Monday, December 16 and didn't exit the eastern part of the state until the evening of Wednesday, December 18th. This was the first 3 day blizzard since the winter of 1980-81. Snowfall amounts varied from around 2 inches in the Dickinson area...3-4 inches in Williston and Bismarck to 6-8 inches in the Jamestown area. The light snow combined with north winds gusting to 50 mph to produce massive blowing and drifting of snow. Temperatures also plummeted down to 20 below creating wind chills from 40 to 60 below. Visibilities were so poor that the ND Highway dept. pulled the plows off roads the evening of the 16th and didn't allow them to return to the roads until the afternoon of the 18th. Snow drifts as high as 10 feet were common. All of I-29 in North Dakota and I-94 from Bismarck to Fargo were closed, stranding hundreds of travelers.

November 23, 1996: Winter Storm - For the 2nd time is less than 1 week, more snow fell on parts of western and central North Dakota. Again, the lack of wind made the storm more bearable than what it could have been. Bismarck received almost 9 inches of snow. Bitter cold air also accompanied the storm system.

November 19, 1996: Winter Storm - Another winter storm hit North Dakota bringing more unwanted snow to the state. Although there wasn't enough wind associated with the storm system to qualify the storm as a blizzard, the 10 to 20 mph winds were enough to create some blowing and drifting snow in open areas. Bismarck received from 6-8 inches of snow.

November 5, 1996: Winter Storm - Although at first the storm appeared to be warm enough to only produce rain, once snow began to fall on the morning of the 5th, dynamic cooling lead to an all snow event across south-central and east central North Dakota. Snowfall totals include 6 inches at Bismarck.

March 23, 1996: Winter Storm - An early spring snow storm moved up out of the 4-corners region of the country to bring another round of severe winter weather to the northern plains. Snowfall totals include Bismarck with 13 inches. I-94 in Morton county was reported to have 6 foot snow drifts blocking lanes...and I-94 was closed from Saturday morning to Monday morning. Many travelers ended up being stranded for the weekend in North Dakota. Due to the warm weather received a few days before...roadways were warm. When the storm began...strong northeast to east winds blew the snow across the road...leaving the roadway wet. When the temperature began to fall, roadways became extremely icy. There were numerous reports of vehicles in the ditch, and a few roll-overs were also reported.

February 26, 1996: Blizzard - A strong low pressure system moving east out of the central Rockies brought another blizzard to North Dakota. Winds of 20-30 mph combined with the snow to produce white-out conditions. Snowfall totals include 11 inches at Bismarck, 10 inches at Grand Forks, 6.5 inches at Fargo, and 4-5 inches at Dickinson and Jamestown.

February 1, 1996: Extreme Cold / Wind Chill - Dangerously cold weather once again hit North Dakota. Many places reported lows from 35 to 45 below. Daytime highs faired no better, as Bismarck reached a high of 26 below. Northwest winds up to 30 mph created wind chills to **100 below**. Electric companies reported peak loads, while natural gas companies had trouble keeping gas flowing through pipelines. Numerous schools closed and many water main breaks occurred. There were also shortages of #1 diesel fuel.

January 29, 1996: Extreme Cold / Wind Chill - A 57 year old Bismarck man died from a heart attack while operating a snow blower. The day before the man died, the Bismarck area received 5 inches of snow. On the day he died, high temperatures were in the teens below zero with wind chills from 40 to 60 below.

January 17, 1996: Blizzard - A strong low pressure center located over the central plains combined with strong arctic high pressure moving south out of Canada to bring blizzard conditions to North Dakota. Snowfall amounts range from 8 inches at Williston in the northwest to 20 inches at Wahpeton in the southeast. Fargo and Bismarck set new records for 24 hr. snowfall, receiving 18 and 7.9 inches respectively. Winds gusting to 55 mph created 3 to 5 foot drifts in the central, while drifts up to 10 feet were found in the east. Law enforcement officials advised no travel and closed I-29 in North Dakota, I-94 from Bismarck to Fargo, and US Highway 2 from Grand Forks to Devils Lake. Many people who did not heed the travel warnings got stranded for several hours on the interstate and state highways. Fortunately no deaths were reported. With temperatures dropping to 10 to 20 degrees below zero, wind chills varied from 60 to 80 below zero, snow removal was hampered with hydraulic and cooling systems freezing on snow plows.

February 9, 1995: Blowing Snow - Strong northerly winds combined with recently fallen snow created near zero visibilities in parts of northwest, central, and eastern North Dakota. Along with the blowing snow were wind chills 40 to 60 below zero. Several counties advised no travel, many schools were cancelled; parts of Interstate 29 and parts of Interstate 94 were closed for the second time in as many days. Among the many problems caused by the weather was a serious accident at 1730 CST on the 10th, 15 miles west of Mandan on Interstate 94. Zero visibility caused several vehicles to slow or stop on the interstate. Other cars, 23 in all, continued travel causing a chain reaction of accidents resulting in 1 death and 13 injuries. In addition to the injuries from the accident, several rescue workers suffered frostbite in their rescue efforts.

November 26, 1994: Heavy Snow - Six to ten inches of snow fell in central North Dakota. In addition to the snow, freezing drizzle fell in the south central. The North Dakota Highway Patrol advised no travel in much of the central part of the state.

April 25, 1994: Heavy Snow / Blizzard - A late season winter storm came a few days after temperatures of 80 degrees. Parts of southern North Dakota received almost a foot of heavy wet snow. Some thunder occurred with the snowfall. Winds of 25 to 45 mph caused blizzard conditions at times, and snow drifts three feet high. This late storm brought record seasonal snowfall to many parts of the state. Snowfall for the winter season topped 100 inches in some places. The storm closed schools and businesses, and shut down travel.

March 22, 1994: Heavy Snow - Up to 14 inches of heavy wet snow fell over much of southern North Dakota. The snow began in southwest and south-central North Dakota the night of the 22nd, persisted throughout the day on the 23rd, then ended that evening. In southeast North Dakota, the snow began later on the 23rd and lasted late into the night. The heaviest snowfall occurred in the southwest and south-central sections, near the South Dakota border. Twelve inches of snow was reported in Bowman, in the southwest corner of the state. About eight inches of snow fell in the cities of Bismarck and Fargo.

November 22, 1993: Heavy Snow - A slow moving and enormous storm over North America brought record single-storm snowfall to much of North Dakota. Over two feet of snow fell over a large part of central and southeast North Dakota, and most of North Dakota had over a foot of snow from this storm. The greatest snowfall amount was reported at Oakes, in Dickey County in southeast North Dakota, 31 inches. At the National Weather Service office in Bismarck, 28.3 inches of snow was measured during the 108-hour snow event. This amount set a new single-storm record for snow in Bismarck. The snow began the evening of the 22nd and did not end until the morning of the 27th. Except for about six hours during the day on the 26th, the snow was continuous through this period. The snowfall was intermittent over most of North Dakota during this lengthy event. Fortunately, the wind was only 10 to 25 MPH during this storm, so it was well below blizzard conditions and blowing and drifting of snow was not a problem. The storm occurred during the week of Thanksgiving, so many travelers were stranded. The prolonged snowfall kept snow removal crews working around the clock, and a few motorists crashed into the snowplows. Out in the rural areas, some farm buildings collapsed in the heavy snow.

October 27, 1991 – Snow and ice storm
October 23, 1991 – Snow storm
December 19, 1990 – Extreme cold
November 7, 1986 – Blizzard, heavy snow, and ice storm
April 13, 1986 – Blizzard, heavy snow, ice storm

February 1, 1986 – Fog and freezing drizzle
December 23, 1983 – Extreme cold
March 4, 1983 – Severe storm with snow
January 5, 1980 – Blizzard
April 11, 1979 – Heavy snow
March 18, 1979 – Winter storm
February 22, 1979 – Winter storm
February 14, 1979 – Winter storm
January 24, 1978 – Blizzard
December 16, 1977 – Ice storm and wind
December 6, 1977 – Winter storm with one fatality
November 18, 1977 – Blizzard, wind, and snow
January 1, 1976 – Snow and blizzard
December 30, 1975 – Snowstorm
March 26, 1975 – Blizzard
January 10, 1975 – Blizzard
July 4, 1972 – Frost
June 20, 1972 – Frost
February 23, 1969 – Severe snow and ice storm
January 22, 1969 – Blizzard
December 22, 1968 – Snow and blizzard
April 29, 1967 – Ice storm
April 16, 1967 – Ice storm and blizzard
February 23, 1967 – Blizzard
April 25, 1966 – Rain, freezing rain, and heavy snow

March 2, 1966 – Blizzard Worst Blizzard in state history happened in 1966: KFYR TV Article: https://www.kfyrtv.com/content/news/Worst-blizzard-in-state-history-happened-in-1966-475786173.html	

December 15, 1964 – Blizzard
December 6, 1963 – Blizzard
April 23, 1961 – Blizzard
March 28, 1960 – Blizzard with heavy snow
March 16, 1960 – Glaze with 3 injuries
January 1, 1960 – Cold wave and blizzard

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Risk Assessment

Risk: the potential for damage, loss, or other impacts created by the interaction of hazards with community assets.

Risk Assessment: product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.

Hazard Identification
Many hazards have the potential to affect Bismarck, from regional or global events to isolated, localized events. To provide a framework for the risk assessment, hazards were identified for inclusion in this plan based on previous occurrences as well as hazards addressed in the Bismarck Emergency Operations Plan, the previous 2020 Bismarck Multi-Hazard Mitigation Plan, and review of the 2024-29 State of North Dakota Enhanced Mitigation Plan. As an outcome of the plan update kick-off meeting, three additional hazards are addressed in the plan update: Space Weather, Cyberattack, and Terrorism or Nation-State Attack. One hazard, "Shortage or Outage of Critical Infstrasture or Materials" was removed. The rationale for removing this hazard is explained on page 6 of this section.

Hazards excluded from the plan are noted on page 6.

Hazards were ranked as **"High," "Moderate," or "Low"** as part of the plan update process throughout 2025. Considerations for hazard ranking include the status of existing hazard mitigation, opportunities and capability to mitigate, as well as emergency response capabilities related to each hazard.

The results of the hazard-specific mitigation planning team meetings are reviewed by the MHMP Steering Committee for final evaluation and consensus prior to submitting to ND Department of Emergency Services and the Federal Emergency Management Agency for approval.

Integration of Threat/Hazard Identification and Risk Assessment (THIRA) methodologies:
The THIRA risk assessment methodology is applied to each of the hazards within this section. THIRA ratings were based on consensus of each hazard-specific planning teams as a result of initial plan development and plan updates. THIRA was applied to various scenarios within each hazard to better illustrate the full range of likelihood and impact per hazard. The THIRA ratings support the decision-making process, but do NOT dictate the hazard ranking of "High, Moderate, or Low."

***Hazard Ranking**

	Natural Hazards	Technological or Human Caused
High	Winter Storm Tornado	Cyberattack
Moderate	Severe Summer Weather Flood Infectious Disease	Hazardous Materials Release Train Derailment Active Threat Civil Disturbance
Low	Pest Infestation Drought Geologic Hazard Wildland Fire Space Weather	Fire Dam Failure Aircraft Accident Terrorist or Nation State Attack

*The purpose of ranking hazards, per planning requirements established by the Federal Emergency Management Agency, is to aid in prioritizing mitigation efforts and funding. However, it's understood that all approved mitigation action items are important, and may be addressed based on opportunities and required resources as available.

<u>The following factors were considered while ranking hazards:</u>

- Likelihood of Occurrence (Risk/Probability).
- Potential Impact
  - to Life, Property, Environment, Economy, Psychological, and Continuity of Essential Functions.
- Mitigation Status: Existing Mitigation Capabilities and completed mitigation projects
  - If already mitigated, a hazard may be of lower priority or lower concern.
- New Mitigation Actions
  - A hazard may rank higher if it's NOT mitigated, and there's a high need and/or good opportunity to mitigate.
- Response Capabilities
  - Mitigating a hazard may be more important if response capabilities are lower compared to other hazards.

Threat/Hazard Identification and Risk Assessment (THIRA)

Each hazard profile within Section 9 directs the reader to reference this section, Section 10, for the Risk Assessment. This section includes Threat and Hazard Identification and Risk Assessment (THIRA) ratings which are summarized in the chart below. The THIRA ratings for each hazard are based on consensus of each hazard-specific planning team in 2020 and updated in 2025. The THIRA ratings/scores facilitate the decision-making process regarding the hazard ranking, but do not dictate the hazard ranking of "High, Moderate, or Low." Additional considerations for hazard ranking include the status of existing hazard mitigation capabilities as well as response capabilities related to each hazard. The next two pages include THIRA terms and definitions as well as the scoring of the hazards as noted within the table.

	Score	Very Likely	Likely	Possible	Unlikely	Improbable
		5	4	3	2	1
Catastrophic	5			Infectious Disease (Pandemic)	Dam Failure *(Garrison Dam)* Tornado *(EF4-EF5)* Terrorism or Nation-State Attack	
Significant	4		Cyberattack	Train Derailment *(involving hazmat/fire)* Aircraft as Weapon Aircraft Accident		
Moderate	3	Winter Storm	Hazmat Release: *Transportation*	Tornado (EF2-EF3) Hazmat Release: *Pipeline or Fixed Facility*	Fire: Conflagration Flood: 500-Year	
Minor	2	Severe Summer WX Fire: Residential Flood: Urban Flooding	Pest Infestation *(ie: DED or EAB)* Infectious Disease *(Foodborne Illness)*	Space Weather Tornado (EF0-EF1) Drought (D4 rating) Flood: Ice Jam Active Threat Geologic Hazard		
None / Negligible	1	Wildland Fire *(WUI)*				

Threat and Hazard Identification and Risk Assessment (THIRA) Terminology and Definitions

Frequency				
Very Likely (5)	Likely (4)	Possible (3)	Unlikely (2)	Improbable (1)
The potential for impact is very probable (near 100%) in the next year.	The potential for impact is between 10% and 100% within the next year, or there is at least one chance of occurrence within the next 10 years.	The potential for impact is between 1% and 10% within the next year, or there is at least one chance of occurrence within the next 100 years.	The potential for impact is less than 1% in the next 100 years.	The potential for impact can safely be ruled out because it either does not exist (e.g. hurricane) and/or the potential for it to occur in the next 100 years is so low it can safely be called 0%.
Human Consequence				
None/Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Catastrophic (5)
0 fatalities < 10 injuries is most likely	< 10 fatalities and/or < 50 injuries is most likely	10-25 fatalities and/or < 100 injuries is most likely	25-100 fatalities and/or 100 – 500 injuries is most likely	> 100 fatalities and/or > 500 injuries is most likely
Economic Consequence				
None/Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Catastrophic (5)
< $500K losses or damages is most likely	> $500K to <$1 Million losses or damages is most likely	>$1 Million to $50 Million losses or damages is most likely	>$50 Million to <$100 Million losses or damages is most likely	>$100 Million losses or damages is most likely
Psychological Consequence				
None/Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Catastrophic (5)
Event most likely creates minimal population behavior change or effects on social functioning	Event most likely creates occasional or minor loss of nonessential social functions	Event most likely creates a loss of many nonessential social functions	Event most likely creates dysfunctional behavior and disruption of important social functions	Event most likely creates a loss in belief of government and some institutions
Government Consequence				
None/Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Catastrophic (5)
Event most likely creates no measureable change in the accomplishment of government functions/missions	Event most likely creates only minor changes in the accomplishment of government functions/missions	Event most likely creates a moderate interruption or change in the ability to sustain government functions/missions	Event most likely creates a widespread and significant change in ability to sustain government functions/missions	Event most likely creates a widespread and sustained loss of ability to sustain government functions/missions

Threat and Hazard Risk Assessment

Hazard Name and Scenario	Frequency	IMPACT				*THIRA Score
		Human	Economic	Psychological	Government	
Winter Storm	Very Likely 5	Minor 2	Moderate 3	Significant 4	Minor 2	**7.75**
Infectious Disease: Pandemic	Possible 3	Catastrophic 5	Catastrophic 5	Significant 4	Significant 4	**7.50**
Aircraft as Weapon	Possible 3	Catastrophic 5	Catastrophic 5	Significant 4	Moderate 3	**7.25**
Severe Summer Weather	Very Likely 5	Minor 2	Moderate 3	Minor 2	Minor 2	**7.25**
Fire: Residential	Very Likely 5	Minor 2	Moderate 3	Minor 2	None/Negligible 1	**7.00**
Dam Failure – Catastrophic (Adversarial)	Unlikely 2	Catastrophic 5	Catastrophic 5	Significant 4	Catastrophic 5	**6.75**
Train Derailment (ie: hazmat/fire)	Possible 3	Significant 4	Significant 4	Significant 4	Moderate 3	**6.75**
Hazmat Release: Transportation	Likely 4	Moderate 3	Moderate 3	Minor 2	Moderate 3	**6.75**
Aircraft Accident	Possible 3	Catastrophic 5	Catastrophic 5	Moderate 3	Minor 2	**6.75**
Flood: Urban Flooding	Very Likely 5	None/Negligible 1	Minor 2	Minor 2	Minor 2	**6.75**
Tornado EF4/5	Unlikely 2	Catastrophic 5	Catastrophic 5	Significant 4	Significant 4	**6.50**
Wildland Fire	Very Likely 5	Minor 2	None/Negligible 1	None/Negligible 1	None/Negligible 1	**6.25**
Hazmat Release: Pipeline	Possible 3	Significant 4	Significant 4	Minor 2	Minor 2	**6.00**
Tornado EF2/3	Possible 3	Significant 4	Moderate 3	Minor 2	Moderate 3	**6.00**
Cyber Attack	Very Likely 4	Minor 1	Moderate 3	Minor 2	Minor 2	**6.00**
Infectious Disease: Foodborne Illness	Likely 4	Minor 2	Minor 2	Minor 2	None/Negligible 1	**5.75**
Hazmat Release - Fixed Facility	Possible 3	Moderate 3	Moderate 3	Minor 2	Minor 2	**5.50**
Pest Infestation	Likely 4	None/Negligible 1	Moderate 3	None/Negligible 1	None/Negligible 1	**5.50**
Fire: Conflagration	Unlikely 2	Moderate 3	Catastrophic 5	Moderate 3	Minor 2	**5.25**
Flood: Ice Jam	Possible 3	Minor 2	Minor 2	Minor 2	Moderate 3	**5.25**
Space Weather	Possible 3	Catastrophic 2	Catastrophic 2	Significant 2	Significant 3	**5.25**
Terrorism or Nation-State Attack	Possible 3	Catastrophic 3	Catastrophic 2	Significant 2	Moderate 2	**5.25**
Flood: 500-Year	Unlikely 2	Moderate 3	Moderate 3	Moderate 3	Moderate 3	**5.00**
Active Threat	Possible 3	Minor 2	None/Negligible 1	Moderate 3	Minor 2	**5.00**
Drought - D4	Possible 3	None/Negligible 1	Moderate 3	Minor 2	None/Negligible 1	**4.75**
Tornado EF0/1	Possible 3	Minor 2	Minor 2	None/Negligible 1	Minor 2	**4.75**
Geologic Hazard	Possible 3	None/Negligible 1	Minor 2	Minor 2	Minor 2	**4.75**

*THIRA Score = Frequency + Average of Impact Ratings

Hazards Excluded from this Plan Natural Hazards Excluded from this Bismarck Multi-Hazard Mitigation Plan are consistent with natural hazards excluded from the ND Department of Emergency Services Multi-Hazard Mitigation Plan.	
Hazard	**Why Excluded/Where Addressed**
Avalanche	Avalanches generally require long stretches of slopes of 25-55 degrees; North Dakota has few areas that meet this criteria. North Dakota is not covered by a National Avalanche Center. North Dakota does not have a history of any declared state or federal avalanche disasters.
Coastal Erosion	North Dakota does not have an ocean coastline.
Coastal Storm	North Dakota does not have an ocean coastline.
Hurricane	North Dakota does not have an ocean coastline, nor is it located in a potential hurricane impact area.
Transportation Incidents	However, Train Derailment, Aircraft Accident, and Hazardous Materials are each addressed in the plan specifically. General transportation accidents are not addressed in this plan, but are addressed by law enforcement entities at the local and state level.
Tsunami	North Dakota does not have an ocean coastline.
Volcano	Volcanic ashfall can occur over North Dakota, but the frequency is relatively rare and the potential impacts are not expected to exceed local capabilities. North Dakota does not have a history of any declared state or federal volcano disasters.

The previous plan included “Shortage or Outage of Critical Infrastructure or Materials” as a hazard. This hazard was removed from this updated plan and the relevant content such as vulnerabilities and mitigation action items were integrated into the Winter Storm, Terrorism or Nation-State Attack, and Space Weather hazards. Rather than identifying Shortage or Outage of Critical Infrastructure or Materials” as a hazard, the outage was considered an impact or effect of other hazards. The primary issues and related mitigation action items were associated with power outages.

Plan Maintenance

Hazard mitigation planning is an on-going process. Bismarck Emergency Management coordinates with stakeholders to ensure this plan remains effective and relevant for the city of Bismarck.

This plan section establishes the method and schedule for monitoring, evaluating, and updating the Hazard Mitigation Plan during a five-year plan-update cycle. This section also identifies how Bismarck will maintain community involvement in the plan.

Plan Monitoring
The plan will be jointly monitored by Bismarck Emergency Management and all city departments assigned to complete mitigation actions or conduct ongoing mitigation projects. At a minimum, the plan is reviewed after each disaster or annually. Emergency Management and all departments will monitor the progress of their assigned mitigation projects and maintain their own list of projects completed to be noted in plan updates.

The plan will be reviewed annually throughout the 5-year planning cycle for updates based on any actual incidents or additional mitigation planning needs identified as a result of ongoing input from the public, city departments, or stakeholders.

Plan Evaluation and Updating
Evaluation and updating of the plan are coordinated by Bismarck Emergency Management in cooperation with the city departments and applicable stakeholders. Significant disaster or emergency incidents will be evaluated for mitigation recommendations that should be added to the plan. New stakeholders and interested parties are identified and invited to participate in the implementation and update process.

Public Participation
The Bismarck Multi-Hazard Mitigation Plan is posted to the Bismarck Emergency Management website. The website will invite and provide opportunity for ongoing public input regarding the mitigation plan. Bismarck Emergency Management will also promote awareness of the mitigation plan and make it available for public review during various public forums including public education emergency preparedness presentations and on-site or community group-specific settings.

Annual Reporting
The City of Bismarck participates in the Community Rating System (CRS) program. To comply with the requirements of CRS participation, a flood mitigation action item progress report is communicated to the city commission and city residents via the city website and/or a scheduled city commission meeting. This activity supports updating and maintaining the Multi-Hazard Mitigation Plan.

Plan Update Process

When updating this Multi-Hazard Mitigation Plan within the 5-year cycle, Bismarck Emergency Management will serve as the lead coordinator for the planning activities and must document the planning process for inclusion within the plan (See Section 12). The planning process requires participation by city departments, especially those designated with mitigation responsibilities, as well as any departments that provide subject matter expertise, experience, or other capabilities to contribute to identification of hazards, potential impacts, vulnerabilities, mitigation ideas, or other components of the plan. Providing opportunity for public input and involving community partners and stakeholders is also necessary.

An approved mitigation plan ensures the City of Bismarck remains eligible for applicable mitigation grant funding. Both the ND Department of Emergency Services and the Federal Emergency Management Agency review local mitigation plans for plan approval. Plan approval is contingent upon meeting planning process and other requirements outlined by FEMAs Local Mitigation Planning Policy Guide. The Bismarck City Commission adopts the Multi-Hazard Mitigation Plan after the plan is approved at both the state and federal levels.

The plan update process should begin about one year prior to the plan expiration date to allow adequate time to accomplish the various plan review and update needs and planning process requirements.

Schedule of Plan Review and Updates

Plan Section/Content	Post-Disaster	Annually	Every 5 Years
Adoption Documentation			X
Executive Summary and Introduction Sections			X
Mitigation Strategy	X		X
Hazard Vulnerability & Mitigation Actions Summary	X		X
Mitigation Implementation Action Plan	X	X	X
Mitigation Actions – Prioritizing	X		X
Integration of Plans/Programs & Mitigation Capabilities Inventory			X
Community Profile			X
Community Assets		X	X
Risk Assessment Summary			X
Hazard Identification	X		X
Hazard Profiles	X	Update per incidents	X
Planning Process	X	X	X
Plan Maintenance		X	X

Planning Process & Public Input

The City of Bismarck recognizes that the planning process is as important as the plan document. Involvement in the planning process enhances understanding and awareness of the hazards, the associated risks and vulnerabilities, as well as mitigation opportunities to minimize potential impact.

The Bismarck Multi-Hazard Mitigation Plan is a combined effort among city departments and various stakeholders including the public and private sectors, volunteer organizations, private citizens, and local, state and federal agencies. Bismarck Emergency Management coordinated the plan update efforts and facilitated the plan update meetings.

The initial community specific Multi-Hazard Mitigation was developed and approved in 2015, and subsequently updated in 2020 and approved in January of 2021. This plan update was conducted throughout 2025, and approved by FEMA and the ND Department of Emergency Services as of DATE, 2026.

This section illustrates the extensive involvement in the planning process and outlines the opportunities provided for participation in the plan update process. The overall planning process for the update of the Bismarck Multi-Hazard Mitigation Plan (MHMP) included the following activities:

Event	Timeframe	Activity	Participants
MHMP Kick-Off Meeting	February 19, 2025	Hazard Identification, Identify MHMP Goals and Priorities, Identify Lead Planners per Hazard, Review Planning Process.	MHMP Steering Committee made up of City Administration, Emergency Management, and City Department Representatives
Public Input Survey (online)	March 20 through April 10, 2025	Invite Public Input to identify hazards of concern and provide input regarding community vulnerabilities and mitigation ideas.	Bismarck and Burleigh Residents and neighboring jurisdictions
Public Input Survey targeted invites	March 20 through April 10, 2025	Same As above.	Distributed the public input survey invite directly (via email) to representatives of underserved and other vulnerable populations.
Hazard Profiles Updating	March through October, 2025	Coordinate efforts with Lead Planners and subject matter experts to create draft updates of all hazard profile content (section 9), and develop hazard profiles for additional hazards to be included.	Lead Planners, Emergency Management, Subject Matter Experts
Hazard Profiles developed for additional hazards identified to be included in the plan.	March through October, 2025	Coordinate efforts with Lead Planners to establish new hazard profiles for additional hazards including Space Weather, Cyberattack, and Terrorism or Nation-State Attack.	Lead Planners, Emergency Management, Subject Matter experts

Event	Timeframe	Activity	Participants
Community Partners Stakeholder Survey	July 31 through August 15, 2025	Provide Opportunity for Participation in the Bismarck MHMP Plan Update Process. Invite input regarding preferred methods of involvement in the plan update process such as plan review, meeting participation, or individualized input relating to specific elements of the plan.	Neighboring Jurisdictions invited. Community Partners/Stakeholders such as public, private, and volunteer organizations, as well as state and federal level agencies.
Community Profile Updating (Section 7)	May 2025 through October 2025.	Identify overall Community Changes (since 2020) and updates to community characteristics.	City Department and Divisions Staff including Planning, Building Inspections, Engineering Dept, GIS
Hazard-Specific Meeting Invitations	September & October 2025	Send meeting invitations to the Hazard-Specific Plan update meetings to be held at the Emergency Operations Center.	Lead Planners, and community partners based on Stakeholder Survey responses, and required or suggested participants based on expertise.
Provide Draft Hazard Profile and Mitigation Strategy content Materials for each of the 5 Hazard-Specific Plan Update meetings.	September & October 2025	Share the Draft Hazard Profiles and Section 3 Content with required and interested meeting participants. Provided one week prior to each meeting to allow time for review.	Lead Planners, and community partners based on Stakeholder Survey responses, and required or suggested participants based on expertise.
Hazard-Specific Planning Team Meeting: Geologic Hazard, Space Weather, Hazardous Materials and Train Derailment Hazards	October 6, 2025	Identify vulnerabilities or other areas of concern as well as identification or revision of suggested mitigation ideas. Evaluate public input per hazard for inclusion where applicable. Obtain feedback from the team for further revision.	Lead Planners per Hazard (City Staff), Community Partner/Stakeholder participants (non-city staff including private, public, volunteer, state and federal level agencies).
Hazard-Specific Planning Team Meeting: Wildland Fire, Fire, Drought, Flood	October 8, 2025		
Hazard-Specific Planning Team Meeting: Active Threat, Civil Disturbance, Terrorism or Nation-State Attack, Cyberattack	October 13, 2025		
Hazard-Specific Planning Team Meeting: Winter Storm, Severe Summer Weather &	October 16, 2025		

Event	Timeframe	Activity	Participants
Tornado, and Pest Infestation			
Hazard-Specific Planning Team Meeting: Dam Failure, Infectious Disease, Aircraft Accident	October 23, 2025		
Strategic Plan Updated	2025 Approved in November.	Align MHMP goals and priorities with the updated Strategic Plan. Identify additional mitigation action items based on Strategic Plan.	City Administration Emergency Management
Steering Committee MHMP plan review for preliminary approval	Date of meeting through Date	Emergency Management provided for an overview of the plan updates including updates to goals, risk and vulnerability assessments, as well mitigation action items and assignments. The Steering Committee was provided opportunity to review the plan in its entirety for any recommended changes.	The invite includes the same city department representation as the original Kick-Off Meeting.
Public Comment Period	DATEs	Notes	Notes

The City of Bismarck **Multi-Hazard Mitigation Plan Update Kick-Off Meeting** was held on February 19, 2025. Below is the agenda and summary. The hazard-specific planning teams identified on pages 6-7 were discussed as one of the kick-off meeting agenda items and finalized in follow-up communications with City Administration.

Bismarck Mitigation Plan Update Kick-Off Meeting
February 19, 2025: Emergency Operations Center

Agenda

- Overview
  - Mitigation Defined, Purpose of the Mitigation Plan, Planning Process and Requirements
- Hazard Identification – Review and Update
- Mitigation Goals – Review and Update
- Overview of Mitigation Plan Sections
- Deliverables:
  - Hazard Identification, Goals of the Mitigation Plan, Identify Lead Planners specific to each hazard, Identifying Planning Team Members
  - Establish planning process and plan requirements awareness
  - Provide Awareness of plan update informational needs

Meeting Summary
Bismarck Mitigation Plan Update Kick-Off Meeting
February 19, 2025: Emergency Operations Center

Gary Stockert, Emergency Manager, provided an overview of planning requirements, including public input opportunity and participation requirements, as it relates to plan approval by ND Department of Emergency Services and the Federal Emergency Management Agency. Participants were informed of the current plan's expiration date as well as a general timeline for plan completion and submittal. The intent is to submit the plan for approval by mid November.

As a result of reviewing the hazards identified within the existing plan, three additional hazards were discussed for potential inclusion in the plan: Cyber Attack, Space Weather, and Terrorist or Nation-State Attack. It was decided to include Cyber Attack and Space Weather during the kick-off meeting, and tentatively include Terrorist or Nation-State attack pending further review by the Assistant City Administrator and the Emergency Manager. (The subsequent decision was to add Terrorist or Nation-State Attack). Lead Planners for both Space Weather hazard, and IT would serve as lead planner for the Cyber Attack hazard. Emergency Management will coordinate to identify the Lead Planner for the Terrorist or Nation State Attack hazard. Cyber Attack was noted as "high" for hazard priority. Space Weather as "low." The biological attack (intentional) hazard was discussed, including a mitigation capability at the postal sorting facility. Participants were informed that additional planning team members may be added from various community stakeholder agencies or even individuals who may express interest though public input opportunities.

The existing mitigation goals (strategy) and purpose of the plan were reviewed – no changes were made. Lead planners (per hazard) and planning team participants were discussed and tentatively identified noting the Emergency Manager would follow up with city departments to identify specific participants. Participants were informed that additional planning team members may be added from various community stakeholder agencies or even individuals who may express interest in specific elements of the mitigation plan.

Emergency Management reviewed each of the sections of the existing plan to provide for awareness (refresher training) regarding the purpose of each plan section, along with an overview of the updates needed per plan section in order to meet planning requirements, and to establish a quality plan document.

Bismarck Mitigation Plan Update Kick-Off Meeting
February 19, 2025

Bismarck Mitigation Plan Update Kick-Off Meeting Invite List (City Departments)			
Name	**Department or Division**	**Name**	**Department or Division**
Jason Tomanek	Administration	Tory Otto	Public Works
Doug Wiles	Administration	Kurt Ohnell	Public Works
Kalen Ost	Administration	Mike Dannenfelzer	CenCom
Ben Ehreth	Community Development	Joel Boespflug	Fire
Brady Blaskowski	Community Development	Chad Gee	Fire
Gabe Schell	Engineering	Brooks Martin	Fire
Michelle Klose	Public Works	Dave Draovitch	Police
Michael Mart	Public Works	Randy Ziegler	Police
Terry Halstengard	Public Works	Jason Stugelmeyer	Police
Steve Salwei	Public Works	Gregory Haug	Airport
Jim Kershaw	Public Works	Matthew Remynse	Airport
Christy Ames-Davis	Forestry	Tandra Kraft	Information Technology
Renae Moch	Public Health	Dmitriy Chernyak	Finance
Theresa Schmidt	Public Health	Leanne Schmidt	Human Resources
Crystalynn Kuntz	Public Health	Jami Wangler	GIS
Daniel Emery	GIS	Jared Auch	GIS

Kick-Off Meeting Participant Roster
On Site (left) / MS Teams (Right)

SIGN IN
Bismarck Multi-Hazard Mitigation Plan Update Kick-Off Meeting
February 19, 2025 – Emergency Operations Center

Name	Position Title	Department - Bismarck
Doug Wiles	Assistant City Administrator	Admin
Kalen Ost	Comms Strategist	Admin
Steve Salwei	Service Operations Director	PW
Keith Glass	~~PWorks~~ Superintendent	PWorks
Chad Schlosser	Roads & Streets Superintendent	PWorks
CHRISTY AMES-DAVIS	City FORESTER	P WORKS
Mike Dannenfelzer	Comms Director	CenCom
Michael Mart	Utility Ops Director	PW
Chad Gee	B:S Fire Deputy Chief	Fire
Toby Otto	Building Maint Mngr	Building Maint
Dave Draovitch	~~Deputy~~ Chief	BPD
Gary Stricherz	Emergency Manager	Admin / EM

Tandra Kraft, IT
Daniel Emery, GIS
Jared Auch, GIS
Jami Wangler, GIS
Renae Moch, Public Health
Crystalynn Kuntz, Public Health
Theresa Schmidt, Public Health
Leanne Schmidt, Human Resources
Jim Kershaw, Public Works
Matthew Remynse, Airport
Dmitriy Chernyak, Finance

Hazard-Specific Mitigation Plan Update Teams

Hazard Planning Teams were established to support the update or development of the hazards as noted within the tables shown below. Bold letters within the second table below indicate the **Lead Planner** for plan updates specific to each hazard. Lead Planners are identified on page 7.

Team A	Team B	Team C	Team D	Team E
Fire	HazMat Release	Tornado	Active Threat	Dam Failure
Wildland Fire	Train Derail	Severe Summer Weather	Civil Disturbance	Aircraft Accident
Flood	Geological Hazard	**Biological Infestation	Terrorist- Nation State Attack	*Outage of Critical Material
Drought	Space Weather	Winter Storm	Cyberattack	**Communicable Disease

* Outage of Critical Material was ultimately discontinued as a result of input provided at subsequent planning meetings. The relevant content was integrated into other hazards.
** These hazards were ultimately renamed as a result of input provided at subsequent planning meetings. Biological Infestation was changed to Pest Infestation and Communicable Disease was changed to Infectious Disease.

City Departments *Hazard Planning Teams Participation*	Active Threat	Aircraft Accident	Pest Infestation	Civil Disturbance	Infectious Disease	Cyberattack	Dam Failure	Drought	Fire	Flood	Geological Hazard	HazMat Release	Severe Summer Wx	Tornado	Space Weather	Terrorist - NS Attack	Train Derailment	Wildland Fire (WUI)	Winter Storm
Administration		E			E		**E**												
Airport		**E**			E		E												
Building Inspections								A	A	A								A	
CenCom	D			D		D										D			
Emerg Mgmt	All teams: facilitate and/or participate. Lead on Tornado and Severe Summer Wx.																		
Engineering										**A**	**B**	B			B		B		
GIS	Provided mapping support for all hazard teams upon request.																		
IT	D			D		**D**										D			
Fire			C					A	**A**	A	B	**B**	C	C	B		**B**	**A**	C
Police	**D**			**D**		D										**D**			
Public Health		E			**E**		E												
Env Health		E	C		E		E						C	C					C
Planning								A	A	A								A	
Public Works Service Ops			C		E			A	A	A			C	C	**B**			A	**C**
Forestry			**C**										C	C					C
Public Works Utility Ops		E					E	**A**	A	A					A			A	

Lead Planners Identified Per Hazard

Hazard	Lead Planner	Department or Division
Active Threat	Noah Lindelow	Police Department
Aircraft Accident	Matthew Remynse	Airport Administration
Civil Disturbance	Noah Lindelow	Police Department
Cyberattack	Drew Sagsveen	Information Technology
Dam Failure	Gary Stockert	Administration/Emergency Management
Drought	Michael Mart Jim Kershaw	Public Works – Utility Operations
Fire (Urban Fire)	Brooks Martin Dale Hurt	Fire
Flood	Waylon Erdman	Engineering
Geologic Hazard	Michael Greer	Engineering
Hazardous Materials Release	Brooks Martin Donavan Voeller	Fire
Pest Infestation	Christy Ames-Davis	Forestry
Severe Summer Weather	Gary Stockert	Administration/Emergency Management
Space Weather	Tory Otto	Public Works – Facilities Management
Terrorism or Nation-State Attack	Noah Lindelow	Police Department
Tornado	Gary Stockert *Co-Lead*	Administration/Emergency Management Fire Staff
Train Derailment	Brooks Martin Donavan Voeller	Fire
Wildland Fire (Wildland Urban Interface)	Brooks Martin Dale Hurt	Fire
Winter Storm	Steve Salwei, Keith Glass, and Chad Schiermeister	Public Works Service Operations

Role of the Lead Planner

Lead Planners coordinated with Bismarck Emergency Management to review and update the existing hazard profile data by conducting research and reaching out to other organizations for input as necessary. The updates to the hazard profiles as well as summaries of vulnerabilities, mitigation capabilities, and mitigation action items served as drafts for review during the hazard-specific meetings held in October. Lead planners were also key participants in the hazard-specific planning meetings conducted in October.

The agenda below applies to each of the five hazard-specific plan update meetings.

Multi-Hazard Mitigation Plan Update Meeting

- October 6, 2025
  - Hazards: Space Weather, Geologic Hazard, Train Derailment, Hazardous Materials Release
- October 8, 2025
  - Hazards: Active Threat, Civil Disturbance, Terrorism or Nation-State Attack, Cyberattack
- October 13, 2025
  - Hazards: Wildland Fire, Fire, Drought, Flood
- October 16, 2025
  - Hazards: Winter Storm, Severe Summer Weather, Tornado, and Biological Infestation
- October 23, 2025
  - Hazards: Dam Failure, Communicable Disease, Aircraft Accident, Outage/Shortage of Critical Material

Agenda:

1. Introductions
2. Overview of the Bismarck Multi-Hazard Mitigation Plan
3. Defining “Mitigation”
4. Review of Existing Mitigation Measures
5. Vulnerabilities of people, built environment, or natural environment
   a. Community-wide or specific area or population
   b. Review vulnerabilities currently identified and Community Changes
6. Hazard Profiles Review: Description of the Hazard and applicable hazard-specific data

7. Identify Additional Mitigation Opportunities for consideration:
   a. Brainstorm/discuss
   b. Review ideas per public input survey
   c. Recommend mitigation measures (for further evaluation and approval)
   d. Determine potential assignments (lead department or other entity) for any new mitigation measures
   e. Estimated Cost to Implement

Meetings Summary Overview (all Hazard Specific Meetings):
As a result of the planning meeting and follow-up input including additional data and guidance, Bismarck Emergency Management updated each Hazard Profile as well as vulnerability statements and mitigation action items for further review. Based on meeting participant input, a brief summary of increase and/or decrease in vulnerability was added to all hazard profiles. It was determined that completed mitigation action items be identified as mitigation capabilities within Section 3 of the plan document. The public input received via the public input survey was shared with each planning team to inform discussion on Agenda Item #7. Each of the agenda items above were discussed at each meeting.

Additional notes specific to each meeting are included within the next five pages.

Multi-Hazard Mitigation Plan Update Meeting #1.
Team B Participation

City of Bismarck – Mitigation Planning Meeting
Hazards: Geologic Hazard, Space Weather, Hazardous Materials & Train Derailment
Emergency Operations Center
October 6, 2025

Name	Agency	Position Title
Brooks Martin	BFD	DC
Donavan Voeller	BFD	BC
Hope Brighton	NDDES- HSEM	Lead Mitigation & recovery Planner
Jeff Savadel	NOAA - NWS	Meteorologist in Charge
Chris Maike	DMR - NDGS	Geologist
Mike Wald	Bismarck Parks	Facilities & Programs Director
Katie Leitch	NDDES- HSEM	Planning Specialist
Mike Green	Engineering	Design & Const. Engineer
Jory Otto	Facilities Maint	Facilities Mngr

MS Teams Participants:
Paul Hester, Manager of Hazmat Field Operations & Response: BNSF
J. Daniel Schwartz, President/CEO: Nexus Planning & Consulting

Additional Meeting Summary Notes:

- No public input comments were received via the public input survey regarding Space Weather, Train Derailment, or Geologic Hazard.
- Chris Maike discussed new technology to identify or detect changes in slopes or contours (identify Geologic Hazard events).
- Shelter In Place was discussed as an important mitigation action item for public education.
- Regarding Space Weather, discussion revolved around the need to identify trigger points for informing the public of potential impacts. Mitigation action items ideas included EMP shielding for generators and surge protection. Eastern ND is at more risk to Space Weather due geology.
- Some concern was expressed about the being downwind of the refinery (winter months – depends on wind direction). Future, possible, hazmat concerns for ND include nuclear power and AI data centers.
- It was clarified that BNSF owns the bridges (rail-lines) within Bismarck. Inspections are completed by DOT in concert with FRA, and BNSF also does its own inspections.
- It was noted that Train Derailment and Hazardous Materials are closely related and could be combined. However, the Train Derailment hazard profile is extensive and it works well to keep the hazard profiles separate.
- As a result of the planning meeting and follow-up input including additional data, and guidance, Bismarck Emergency Management updated each Hazard Profile as well as vulnerability statements and mitigation action items for further review.

Multi-Hazard Mitigation Plan Update Meeting #2.
Team D Participation

City of Bismarck – Mitigation Planning Meeting
Hazards: Active Threat, Civil Disturbance, Terrorism or Nation-State Attack, Cyberattack
Emergency Operations Center
October 8, 2025

Name	Agency	Position Title
Noah Lindelow	BPD	LT.
Julie Tomsheck	BPRD	Admin Serv. Mgr.
Hope Brighten	NDDES - HSEM	Lead Mitigation + Recovery Planner
Mike Dannenfelser	Cen Com	Comms. Director

MS Teams Participants:
Kirk Hagel, Chief of Operations, ND State and Local Intelligence Center
Katie Leitch, Planning Specialist, ND Department of Emergency Services.

Additional Meeting Summary Notes:

- Public input was received relating to all of the hazards discussed.
- The public input received validates the decision to include Cyberattack as a hazard as well as providing for continued mitigation efforts relating to Active Threat, Civil Disturbance, and Terrorism or Nation-State Attack.
- One of the mitigation ideas suggested was intended to be implemented immediately, to communicate the need for state funding to enhance local capability to respond to Civil Disturbance events.
- Mitigation ideas discussed included CRASE (Civilian Response to Active Shooter Events) as well as an opportunity for facility assessments (available by Bismarck PD and/or NDDES).
- As a result of the planning meeting and follow-up input including additional data and guidance, Bismarck Emergency Management updated each Hazard Profile as well as vulnerability statements and mitigation action items for further review. Also, based on follow-up input, a brief summary of increase and/or decrease in vulnerability was added to all hazard profiles.
- Subsequent to this meeting and upon completion of the updated Strategic Plan for Bismarck, additional mitigation action items were added for Cyberattack as well as one goal relating to cyber security included within the Mitigation Strategy Section of this plan.

Multi-Hazard Mitigation Plan Update Meeting #3.
Team A Participation

City of Bismarck – Mitigation Planning Meeting
Hazards: Wildland Fire, Fire, Drought, Flood
Emergency Operations Center
October 13, 2025

Name	Agency	Position Title
Jim Kershaw	Bismarck Water Plant	Superintendent
Brian Huber	Bismarck Fire	Battalion Chief
Brady Blaskowski	Community Dev	Building Official
Terry Halstensgard	Public Works	Storm Water
Michael Mont	Public Works	Director of Utility Ops
Brooks Martin	Bismarck Fire	Deputy Chief
Mike Wald	Bismarck Parks	Facilities + Programs Director
Waylon Erdmann	City of Bis Engineering Dept	Project Eng.

MS Teams Participants:
Eric Upton, Planning Section Chief, ND Department of Emergency Services
Katie Leitch, Planning Specialist, ND Department of Emergency Services
Jeff Schild, Senior Forecaster, National Weather Service – Bismarck Office

Additional Meeting Summary Notes:

- Meeting participants discussed anticipated changes to the ETA, which will impact the CRS program for both Bismarck and Burleigh County at some point in 2026.
- A south Bismarck flood mitigation project was discussed, noting that City Engineering would be communicating an alternate project for consideration at an upcoming city commission meeting in November. This mitigation action items to be included was identified as a result of the updated floodplain and flood insurance rate map which became effective June of 2024.
- Air Quality monitoring and public education and communications were discussed as a mitigation action item to be added as it relates to Wildland Fire.
- Shelter and Shelter In place were discussed as a mitigation action item, already identified, that would also be relevant for Wildland Fire.
- It was identified that the Fire Departments ISO rating 1 should be added as an existing capability relating to the Fire Hazard.
- Completed mitigation action items relating to flood were noted, to be moved to “capabilities.” A few corrections were made including moving a vulnerability (relating to Jackman Coulee Dam #2) from the flood hazard to the dam failure hazard. Updates to the diagrams illustrating flood mitigation (as existing capability) with the flood hazard profile were identified and source information was shared for the update.
- The public input provided via the public input survey was reviewed. The mitigation action items relating to shelter in place and air quality recommendations relating to the Wildland Fire were both incorporated into the mitigation strategy.

Multi-Hazard Mitigation Plan Update Meeting #4.
Team C Participation

City of Bismarck – Mitigation Planning Meeting
Hazards: Winter Storm, Severe Summer Weather, Tornado, and Biological Infestation
Emergency Operations Center
October 16, 2025

Name	Agency	Position Title
Steve Salwei	Bismarck Public Works	Director SO
Eric Upton	NDDES - HSEM	Planning section Chief
Christy Ames-Davis	Public Works	City Forester
Luke Teagle	Fire	Battalion Chief
Katie Leitch	NDDES-HSEM	Planning Specialist
Chad Schirmenzer	Roads & Streets Division	Supervisor
Keith Claus	Roads & Streets	Supervior
Chauncy Schultz	National Weather Service	Science & Operations Officer
Julie Fornshell	BPRD	Admin Svcs Mgr.
Mike Wald	BPRD	Facilities & Programs Director

MS Teams Participants:
Hope Brighton, Lead Mitigation and Recovery Planner, ND Department of Emergency Services

Additional Meeting Summary Notes:

- For consistency with the state's mitigation plan, it was decided to change "Biological Infestation" to "Pest Infestation." Otherwise, the mitigation action items and hazard profile for Pest Infestation remain relevant.
- A mitigation action item relating to individualized storm/tornado shelters were discussed, including available funding. A recommendation was made to reach out to Fargo to learn about a project that funded by FEMA (for an individual homeowner).
- The mitigation action item relating to downed-power line safety was clarified to apply to Forestry staff. Decision support services provided by the National Weather Service were added to capabilities for the Winter Storm hazard.
- Tornado sheltering (pre-event sheltering) was discussed, including the logistics, safety, and security issues that serve as significant community-wide challenges for establishing the shelters. The need for on-going public education to promote emergency preparedness planning at the individual homeowner level, as well as awareness of the purpose of the outdoor warning sirens was discussed. Also, promoting the NOAA All Hazards Weather radio as an important indoor warning system option was identified as an important public education mitigation action item.
- It was suggested to combine Tornado and Severe Summer Weather hazard profiles. However, due to the significant differences in potential impact, and in discussion with a subject matter expert regarding separate hazard profiles, Tornado will remain its own hazard at this time.
- For public education, it was recommended to reach out to various entities (such as Global Neighbors) that may support getting the message out to underserved or other vulnerable populations.

Multi-Hazard Mitigation Plan Update Meeting #5.
Team E Participation

City of Bismarck – Mitigation Planning Meeting
Hazards: Dam Failure, Communicable Disease, Aircraft Accident, Outage/Shortage of Critical Material
Emergency Operations Center
October 23, 2025

Name	Agency	Position Title
Eric Upton	NDDES	Planning Section Chief
Doug Wiles	COB	Assistant City Administrator
Daniel Schwartz	Nexus	Planner
Steven Featherstone	ARFF	Chief
Scott Mildenhall	Airport	Ops Manager
Matthew Remynse	Airport	Assistant Airport Dir.
Julie Stonehouse	BPRD	Admin Svc Mgr.
Allen Schlag	NWS	Hydrologist
Hal Steingraeber	COB	Storm - Public Works
Crystalynn Kuntz	BBPH	EPR Coordinator
Aaron Sattler	BBPH	Env Health Admin
Daniel Nairn	Bismarck	Planning Director

MS Teams Participants:
Noelle Kroll, Emergency Manager, McLean County
Hope Brighton, Lead Mitigation and Recovery Planner, ND Department of Emergency Services
Katie Leitch, Planning Specialist, ND Department of Emergency Services

Additional Meeting Summary Notes:

- There were no public input comments provided via the public input survey regarding these hazards.
- For consistency with the state's plan, it was decided to change "Communicable Disease" to "Infectious Disease."
- The majority of previous mitigation action items for Infectious Disease were moved to "capabilities" since they are routine practice.
- Discussion regarding the Dam Failure hazard focused on the addition of Heart Butte Dam to the hazard profile as well as future repairs planned for both the Heart Butte Dam and the Garrison Dam over the next few years. Although these planned projects do not suggest new mitigation action items for Bismarck, the importance of flood insurance was discussed as an important public awareness mitigation action item.
- The use of a different siren tone in the event of a dam failure was discussed. However, the use of differing siren tones had been discussed extensively in the past, and determined it would not be practical or effective to spend resources educating the public about how to interpret or remember the meaning of various siren tones.
- It was recommended to remove "Shortage or Outage of Critical Infrastructure or Materials" and incorporate into other hazard profiles, such as Winter Storm, since the impacts occur as the result of other hazards. As follow up to the meeting, the hazard profile content as well as the mitigation action items were transferred to Winter Storm and the Terrorism or Nation-State Attack hazards.

Community Stakeholders – Opportunity to Participate

Prior to conducting hazard-specific planning meetings in October, Bismarck Emergency Management reached out to community partners to determine their level of interest and preferred method of involvement as it relates to the Bismarck Multi-Hazard Mitigation Plan update.

The survey allowed for opportunity to express which hazards were of most interest or concern, as well as preferred method/s and extent of involvement. The survey also provided for opportunity to provide narrative regarding hazard-related concerns or mitigation ideas if the entity or individual preferred to limit their participation to feedback via the survey itself. Of those who responded (9 total), participation in the hazard-specific meetings was the primary method of plan update participation, as well as individualized communications via email with Bismarck Emergency Management.

The intent of the survey was to ensure public and private partners were given an opportunity to have a voice in the development of the city's mitigation plan, including the mitigation strategy.

The following email was sent on July 31, 2025 allowing two weeks to respond to the survey.

Greetings City of Bismarck Multi-Hazard Mitigation Plan community stakeholders:

Bismarck Emergency Management is in the process of coordinating the update of the 2020 City Bismarck Multi-Hazard Mitigation Plan. The plan must identify the natural hazards of concern, identify the local risk and vulnerability applicable to each hazard, and ultimately, identify and evaluate options to mitigate the hazards (minimize risk or vulnerability). The Bismarck Multi-Hazard Mitigation Plan also addresses human-caused and technological hazards.

Throughout the process of plan development, it's important to provide opportunity for the public, including community partners and stakeholders to participate in the planning process. The plan must be updated every five years and must be approved by both the ND Department of Emergency Services and the Federal Emergency Management Agency to ensure the City of Bismarck remains eligible for various hazard mitigation grant opportunities in the future. The current plan expires January 2026.
Bismarck and Burleigh have already provided public input opportunity through a community survey conducted in the spring of 2025, and received 90 responses from area residents.

The intent of this outreach is to invite you and other stakeholders to participate in the planning process. Your level of involvement can be as minimal or extensive as you wish, and may be focused on specific elements of the plan depending on your areas of interest (such as hazards of interest or concern).

If you would have interest in participating in the plan update, please take a few minutes to respond to the brief survey **by August 15.** Your responses will inform me as to how you would prefer to participate (areas of interest).

Link to the Survey: Bismarck Multi-Hazard Mitigation Plan Community Stakeholder Survey.

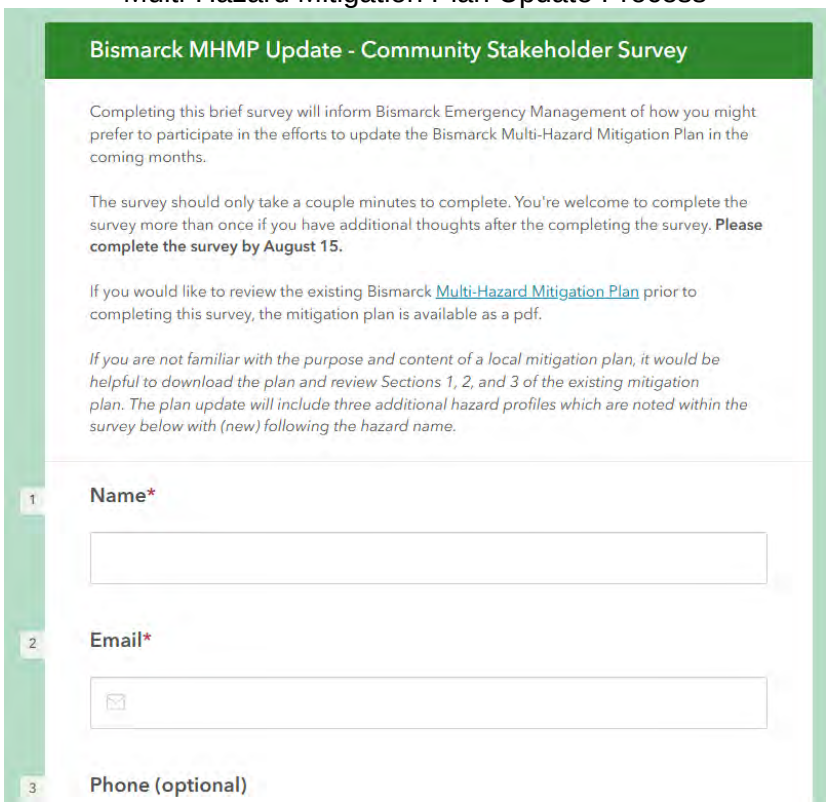
Thank you!

Gary Stockert
City Emergency Manager

The Community Stakeholder Survey was sent to the following points of contact to provide an opportunity to participate in the plan update process, and to communicate their preferred methods and/or level of involvement.

Entity	Point of Contact	Email
ND Department of Emergency Services	Darin Hanson Justin Messner Hope Brighton Katie Leitch Eric Upton	dthanson@nd.gov jmessner@nd.gov hopebrighton@nd.gov katieleitch@nd.gov eupton@nd.gov
Burleigh County	Mary Senger	msenger@nd.gov
Mandan/Morton	Patrick Martin Joel Rostberg Daniel Schwartz, Nexus	patrick.martin@mortonnd.org joel.rostberg@mortonnd.org Dschwartz@nexusplanco.com
City of Lincoln	Admin general email Tonya Wilson, Auditor	lincoln@cityoflincolnnd.com Auditor@cityoflincolnnd.com
Bismarck Parks and Recreation District	Kevin Klipfel Mike Wald Julie Fornshell	Kevin Klipfel <kklipfel@bisparks.org> mwald@bisparks.org jfornshell@bisparks.org
Bismarck Public Schools	Becky LaBella	Becky_Labella@bismarckschools.org
Light of Christ Schools	Daniel Neff, Vice President of Operations and Finance	https://lightofchristschools.org/contact-us dneff@lightofchristschools.org Vice President of Operations and Finance
Metro Area Ambulance	Dan Schafer Joshua Davis	dschaefer@maas-nd.com JDavis@maas-nd.com
Salvation Army	Major Nelson De La Vergne	Nelson.DeLaVergne@USC.salvationarmy.org
Red Cross	Nita Ritzke	Ritzke, Nita <nita.ritzke2@redcross.org>
National Weather Service	Jeffrey Savadel, Meterologist in Charge	Jeffrey.Savadel@noaa.gov
Metro Fire (Airport Fire)	Steven Featherston	steven.featherston@ruralmetrofire.net
Chaplaincy	Greg Carr Paul Herr	crisis.care.chaplaincy@gmail.com pherr@centurybaptist.org
Capital Electric Cooperative	Greg Owen	grego@capitalelec.com
Montana Dakota Utilities	Toby Gross	toby.gross@mdu.com
BNSF	Paul Hester	Paul.Hester@BNSF.com
DMVWW	Jay Bachmeier	jbachmeier@dmvwrr.com
BisMan Transit	Diedre Hughs	DHughes@bismantransit.com
Bismarck Mandan Chamber EDC	Brenda Nagel, President/CEO	info@bmcedc.com bnagel@bmcedc.com
MPO	City Staff	mpo@bismarcknd.gov
Ministry on the Margins	Sister Kathleen Atkinson	ministryonthemargins@gmail.com kathleen@ministryonthemargins.org
United Way	Jenna Gullo	jgullo@msaunitedway.org
MVCHP Missouri Valley Coalition for Homeless People	Jeannie Messal, MVCH Director	mvchp@ndhomelesscoalition.org mvchphomeless101@gmail.com
Abused Adult Resource Center	Lane Hoffer	LaneH@aarcnd.com
CHI / St. Alexius	Jordan Freitag	jordan.freitag@commonspirit.org
Sanford Health	Brad Erickson	Bradley.Erickson@SanfordHealth.org
University of Mary	Paul Podhrasdsky	Umary.edu
Bismarck State College	Michael McMerty	michael.mcmerty@bismarckstate.edu

Community Stakeholder Survey – Providing Opportunity to Participate in the Multi-Hazard Mitigation Plan Update Process



Bismarck MHMP Update - Community Stakeholder Survey

Completing this brief survey will inform Bismarck Emergency Management of how you might prefer to participate in the efforts to update the Bismarck Multi-Hazard Mitigation Plan in the coming months.

The survey should only take a couple minutes to complete. You're welcome to complete the survey more than once if you have additional thoughts after the completing the survey. **Please complete the survey by August 15.**

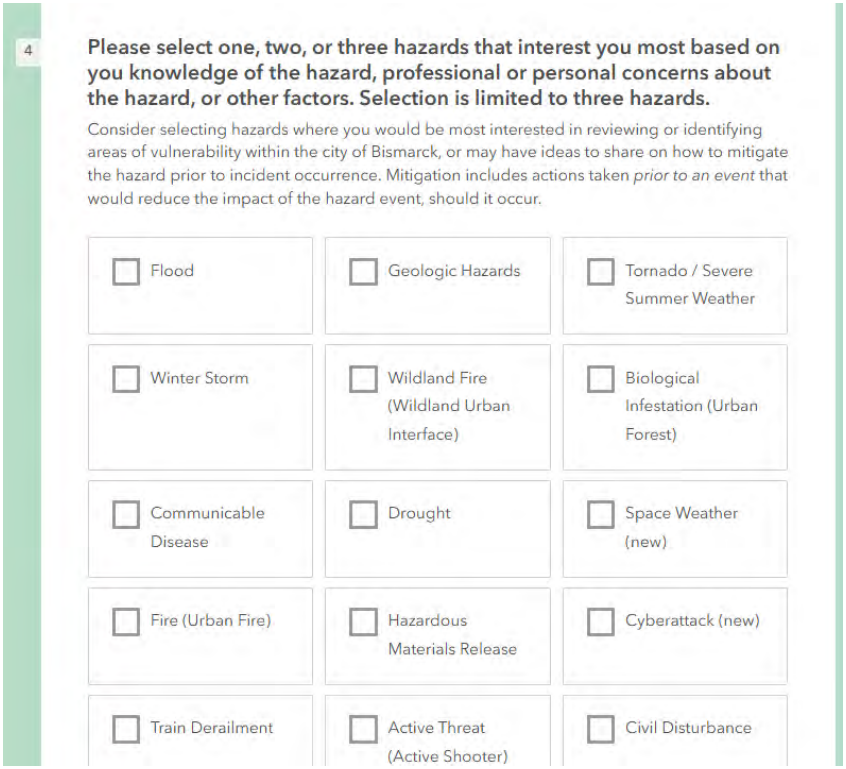
If you would like to review the existing Bismarck Multi-Hazard Mitigation Plan prior to completing this survey, the mitigation plan is available as a pdf.

If you are not familiar with the purpose and content of a local mitigation plan, it would be helpful to download the plan and review Sections 1, 2, and 3 of the existing mitigation plan. The plan update will include three additional hazard profiles which are noted within the survey below with (new) following the hazard name.

1 **Name***

2 **Email***

3 **Phone (optional)**



4 **Please select one, two, or three hazards that interest you most based on you knowledge of the hazard, professional or personal concerns about the hazard, or other factors. Selection is limited to three hazards.**

Consider selecting hazards where you would be most interested in reviewing or identifying areas of vulnerability within the city of Bismarck, or may have ideas to share on how to mitigate the hazard prior to incident occurrence. Mitigation includes actions taken *prior to an event* that would reduce the impact of the hazard event, should it occur.

☐ Flood	☐ Geologic Hazards	☐ Tornado / Severe Summer Weather
☐ Winter Storm	☐ Wildland Fire (Wildland Urban Interface)	☐ Biological Infestation (Urban Forest)
☐ Communicable Disease	☐ Drought	☐ Space Weather (new)
☐ Fire (Urban Fire)	☐ Hazardous Materials Release	☐ Cyberattack (new)
☐ Train Derailment	☐ Active Threat (Active Shooter)	☐ Civil Disturbance

- [ ] Terrorist or Nation State Attack (new)
- [ ] Dam Failure
- [ ] Shortage/Outage of Critical Materials
- [ ] Aircraft Accident
- [ ] Other

5

Check any or all statements below if "yes" - the statement is applicable to you.

You may check as many boxes as applicable. Selecting "other" will allow you to comment if you wish to provide any clarification.

About future Hazard Specific Meetings
Estimated Meeting time: 90 minutes. (dates to be determined).
Format: in person with MS Teams invites as necessary.
Meeting discussion will focus on identification of the more significant vulnerabilities and recommended mitigation actions for consideration.

- [ ] I would like to be invited to participate in hazard specific planning meeting(s) which address those hazards I selected above.
- [ ] I have comments, ideas, or recommendations regarding community vulnerabilities for the hazards I selected above. (Bismarck EM will contact you prior to hazard specific planning meetings - in case you can't make it when scheduled).
- [ ] I have comments, ideas, or recommendations regarding opportunities to mitigate one or more of the hazards I selected above. (Bismarck EM will contact you prior to hazard specific meetings - in case you can't make it when scheduled).
- [ ] Other

6 **If you are aware of community vulnerabilities associated with the hazards you selected above, and prefer to share input now, you may provide narrative below.**

If you wish to review vulnerabilities already identified, you may review the existing mitigation plan (Refer to Sections 3 and 10 of the existing plan.

7 **If you have suggestions regarding opportunities to mitigate the hazards you selected above, and prefer to share those ideas now, you may provide narrative below.**

Mitigation is defined as any action that can reduce the likelihood of impact, or reduce the impact, should the hazard occur. If you wish to review existing mitigation action items, review Section 3 of the existing mitigation plan.

8 **Please provide any narrative (optional) to explain your preferred method of participation in the update of the Bismarck Multi-Hazard Mitigation Plan.**

In case the survey questions and response options don't seem to apply to you, feel free to provide narrative.

9 **If you have questions, comments, or suggestions regarding any portion of the mitigation plan or the plan update process, please provide narrative.**

Submit

Additional Plan Update Contributions

Throughout the planning process, many individuals provided valuable data, insights, or other support. Some of the plan update involves efforts that occurred outside of the plan update activities discussed previously. The table below identifies specific contributions and participation in the plan update process.

Name	Entity	Participation
Greg Gust, Meteorologist, Weather/Climate Lead	ND Department of Emergency Services	Climate Data including specific anticipated future impact relevant to each hazard.
Christopher Maike, Senior Surface Geologist, Landslide Lead	ND Geologic Survey	Provided support in updating the Geologic Hazard data and participated in the hazard-specific planning meeting to support identification of key vulnerabilities and mitigation action items.
Hope Brighton, Lead Mitigation and Recovery Planner	ND Department of Emergency Services	Provided technical assistance and guidance in addition to extensive participation in the hazard-specific mitigation plan update meetings.
Jeff Savadel, Meteorologist in Charge Megan Jones, Meteorologist, Climate Program Leader Jeff Schild, Senior Forecaster, Chauncy Shultz, Science and Operations Officer Allen Schlag, NWS Hydrologist	National Weather Service – Bismarck Office	The NWS staff provided extensive participation in the hazard-specific mitigation plan update meetings and additional support in updating natural hazard data.`
Daniel Nairn, Planning Director Sarah Fricke, Senior Administrative Assistant	Planning Department	Review and Updates to Section 6, Community Capabilities and updates to Section 7, Community Profile.
Darrel Nucech, GIS Developer Jared Auch, GIS Developer Jami Wangler, GIS Analyst	GIS	Provided updated maps, contributing to updated hazard profiles and accurate identification of risk or vulnerability.
Doug Wiles, Assistant City Administrator	City Administration	On-going review of the MHMP progress as well as updates to the goals based on the city's updated Strategic Plan.
Paul Hester, Manager of Hazmat Field Operations & Response	BNSF	Review of mitigation plan data relating to train derailment hazard.
Kirk Hagel, Chief of Operations	ND State and Local Intelligence Center	Review of hazard profiles relating to Civil Disturbance, Active Threat, and Terrorism or Nation-State Attack prior to meetings.
J Daniel Schwartz, J. Daniel Schwartz, President/CEO	Nexus Planning & Consulting	Provided for extensive participation in the hazard-specific mitigation plan update meetings.
Shawn Dahl, SWPC Service Coordinator	Space Weather Prediction Center (NOAA / NWS / SWPC), Boulder CO	Provided assistance with Space Weather hazard data and serves as resource for future communication strategy.
John P Martin, retired	National Weather Service – Bismarck Office	Statistics regarding weather-related events.
Tyler Spomer, National Flood Insurance Program Coordinator	ND Department of Water Resources	Provided updated statistics regarding repetitive loss properties and other flood insurance statistics.
Angie Gray	Angie Gray Photography	Provide permission to use the June 27, 2025 tornado photo for the plan cover and title page.

Place Holder

MHMP Steering Committee
Final Mitigation Planning Meeting
Agenda & Date (TBD)

Meeting Summary (TBD)

Public Input Opportunity

Public Input opportunity remains available 24/7/365 relating to the Bismarck Multi-Hazard Mitigation Plan. This notice of opportunity remains available on the city's website before, during, and after the formal mitigation plan update process.

Annual reminder regarding availability of the Mitigation Plan

As part of the city's participation in the Community Rating System program, Bismarck Emergency Management provides the city commission and the general public with an update regarding progress made relating to flood mitigation action items on an annual basis since becoming a Community Rating System program community in 2017. As part of the presentation, Bismarck Emergency Management invites the public to review the mitigation plan document and provide input relating to the flood hazard or any other hazard, as desired, at any time. The flood mitigation progress report and information regarding the status of Bismarck's participation in the CRS program are shared via the city's website and promoted through local media and social media channels.

Public Input – Plan Influence

Notable mitigation action item ideas expressed by local citizens are integrated into this plan update, although the language to describe the mitigation action item is not identical. Primary examples include the following:

- Collaborate with the state and other community partners to provide necessary resources for the homeless population, especially during extreme weather events.
- Develop a communications strategy for Space Weather events based on trigger points.
- Support the south Bismarck flood protection mitigation project(s) due to recent update to the 100-year floodplain.
- Support the dissemination of Air Quality status and recommended actions provided by ND Department of Environmental Quality.
- Explore partnership/opportunities to share public education with underserved and other vulnerable populations.

In general, the public input provided via the public input survey reinforces or supports the mitigation goals and mitigation strategy identified in this Multi-Hazard Mitigation Plan update.

The public input opportunity communicated at the start of the plan update effort was distributed via local (traditional) media and was also promoted via both the city website and Burleigh County's website, as well as via social media disseminated by both the City of Bismarck and Burleigh County.

Burleigh County

Emergency Management
4200 Coleman St
Bismarck, ND 58503
701.222.6727

Bismarck

NEWS RELEASE
FOR IMMEDIATE RELEASE

Contact: Mary Senger, Burleigh County Emergency Manager, 701-222-6727
Gary Stockert, City of Bismarck Emergency Manager, 701-222-6727

March 20, 2025

Burleigh County and City of Bismarck Seek Community Input on Mitigation Plan Update

Bismarck, ND—Burleigh County and the City of Bismarck want your input regarding how to make our community safer from potential hazards/disasters. We're examining the hazards facing our community as well as strategies to mitigate (reduce or eliminate) their impact. Our current plans have been approved by the Federal Emergency Management Agency and require an update every five years.

Citizens are invited to complete a brief survey by April 10th. The survey is available online at www.burleigh.gov and www.bismarcknd.gov

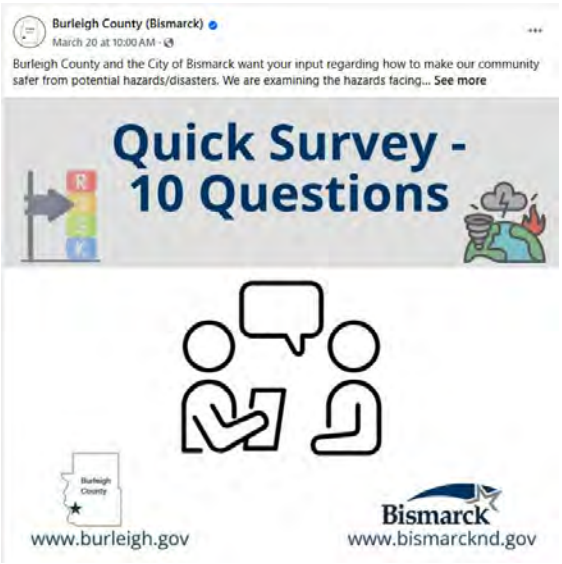
Mitigation is defined by any action taken **before** an incident occurs to reduce loss of life and property.

Mitigation's value to society includes:

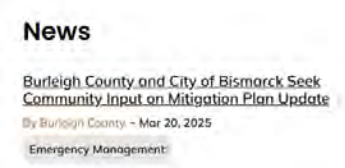
- Creating safer communities by reducing losses of life and property.
- Enabling individuals and communities to recover more rapidly from disasters.
- Lessening the financial impact of disasters on individuals and communities.

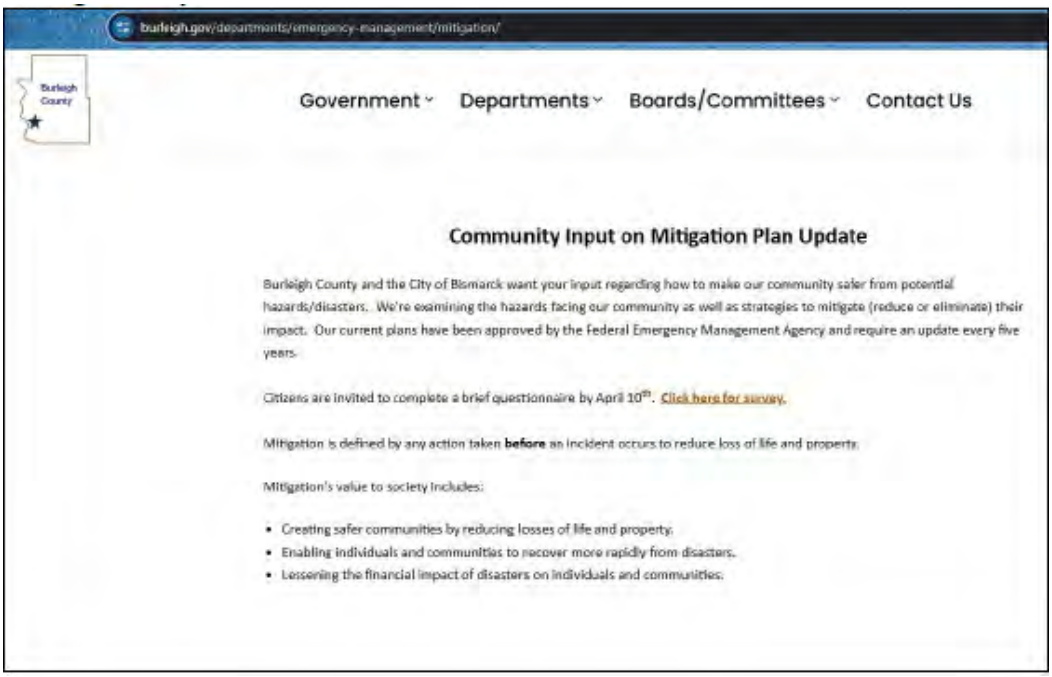
###

Bismarck and Burleigh County Facebook:



Burleigh County Website:





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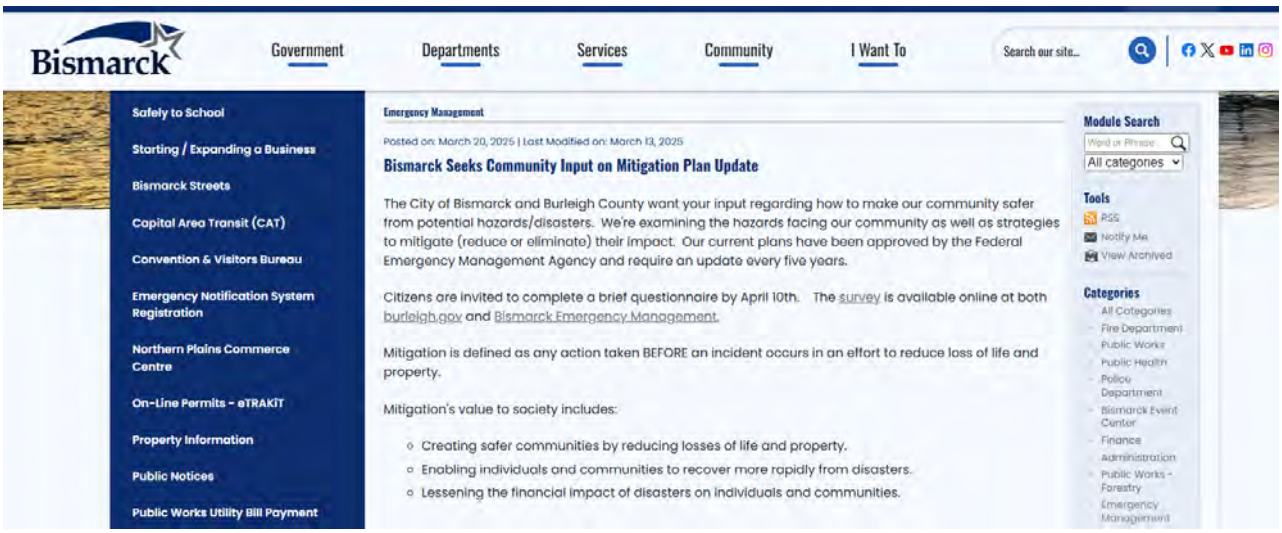
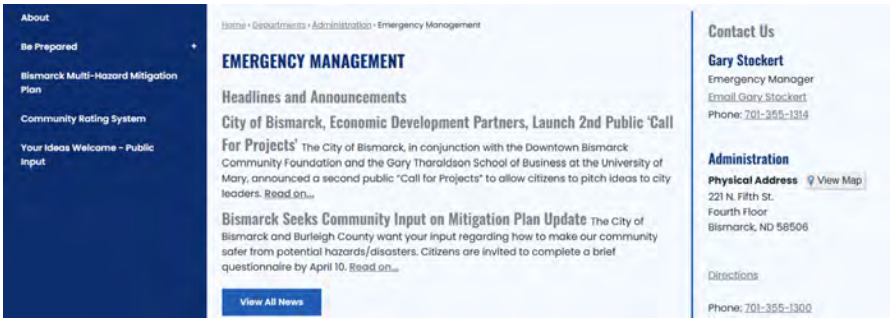




Bismarck Tribune

A4 | FRIDAY, MARCH 21, 2025 DAKOTA BISMARCK TRIBUNE

DAKOTA BRIEFS

Burleigh hosting 3 special meetings

Burleigh County residents will have several opportunities outside of regularly scheduled County Commission meetings to weigh in on a proposal to change the auditor/treasurer position from elected to appointed.

The Commission will host two special public comment meetings in rural communities on Saturday. The first will be at 10 a.m. at Wilton Memorial Hall, 105 Dakota Ave., in Wilton. The second will be at 2 p.m. at the Sterling School, 118 McKenzie St., in Sterling.

Additionally, the Commission will host a special public comment meeting at 10 a.m. Saturday, March 29, in Bismarck. That meeting will be in the Tom Baker Meeting Room in the City/County Building, 221 N. Fifth St., in downtown Bismarck.

The Commission has already hosted public hearings during both regular meetings in March. An additional public hearing will be held during the April 7 regular meeting.

County residents who are unable to attend the public comment meetings can submit written comments on the Burleigh County website at https://bit.ly/4iZmcGD.

Fedorchak to hold telephone town hall

North Dakota's sole member in the U.S. House of Representatives will host a call-in town hall on Tuesday.

Republican U.S. Rep. Julie Fedorchak's office said the call will provide "thousands of North Dakotans the opportunity to engage in a productive discussion about the issues that matter most to them."

Fedorchak is a freshman member of Congress who ran last year for the spot after now-Gov. Kelly Armstrong opted to seek the governorship.

The call will take place at 6:30 p.m. on Tuesday. Residents who want to participate must sign up by 5 p.m. on Monday on Fedorchak's website. To register, go to https://bit.ly/4hpjGIs.

The event will be livestreamed on her official website and Facebook page.

Bismarck, Burleigh residents asked for mitigation plan input

Burleigh County and Bismarck are seeking community input regarding how to make the area safer from potential hazards and disasters.

Plans to mitigate potential hazards are approved by the Federal Emergency Management Agency and require an update every five years.

Area residents are asked to complete a questionnaire by April 10. It is available at https://bit.ly/4kWCh17.

— *Bismarck Tribune staff reports*

Central ND News

Bismarck seeks public feedback for hazard mitigation plan update

GOVERNMENT

By **Central ND News**
Mar 26, 2025

The City of Bismarck, in collaboration with Burleigh County, is seeking community input to enhance safety measures against potential hazards and disasters. The current mitigation plans, approved by the Federal Emergency Management Agency, require updates every five years.

Residents are encouraged to participate by completing a short questionnaire available online at burleigh.gov and Bismarck Emergency Management. The deadline for submission is April 10th.

The initiative aims to create safer communities by reducing loss of life and property, enabling quicker recovery from disasters, and lessening the financial impact on individuals and communities.

Public Input Survey

Burleigh County and City of Bismarck Seek Community Input on Mitigation Plan Update

Public Input is requested to assist in the update of both the Burleigh County and City of Bismarck Mitigation Plans. Mitigation is defined as an action that reduces or eliminates potential impact from hazards identified within the mitigation plans.
2020 Burleigh County Multi-Hazard Mitigation Plan: https://www.burleigh.gov/mitigation
2020 City of Bismarck Multi-Hazard Mitigation Plan: https://www.bismarcknd.gov/2218/Bismarck-Multi-Hazard-Mitigation-Plan

The plans are updated every 5 years and are required to sustain eligibility for various mitigation grant programs.

Questions regarding the survey, or if you would like to discuss more ways you can participate in the update:
Mary Senger, Burleigh County Emergency Manager, msenger@nd.gov, 701-222-6727 or Gary Stockert, City of Bismarck Emergency Manager, gstockert@bismarcknd.gov, 701-222-6767

* Required

1. **Where do you live?** *

- ◯ City of Bismarck
- ◯ City of Lincoln
- ◯ City of Regan
- ◯ City of Wilton
- ◯ City of Wing
- ◯ Unincorporated Burleigh County
- ◯ Other

2. **Select three hazards you feel are the highest threat to your area.** *

Please select at most 3 options.

- ☐ Civil Disturbance
- ☐ Criminal, Terrorist, or Nation/State Attack
- ☐ Cyberattack
- ☐ Dam Failure
- ☐ Drought
- ☐ Fire (including urban fire or and wildland fire)
- ☐ Flood (including riverine, levee failure, ice jam, and flash floods)
- ☐ Geologic Hazards (including landslide, abandoned land mines, expansive/unstable soils, environmental minerals, meteorite falls)
- ☐ Hazardous Materials Release
- ☐ Infectious Disease and Pest Infestations (including human, animal, and plant diseases)
- ☐ Severe Summer Weather (including downbursts, extreme heat, hail, lightning, high wind, and tornado)
- ☐ Severe Winter Weather (including blizzards, extreme cold/wind chill, heavy snow, ice storms, structure collapse)
- ☐ Space Weather
- ☐ Transportation Incident (including vehicular, railway, and aircraft accidents)

3. **What potential impacts concern you most relating to the hazards you selected above?**

Enter your answer

4. **What preventative measure(s) would you recommend for any of the hazards you selected above to minimize or eliminate the potential impacts?**

Enter your answer

5. **If you or a family member are considered an at-risk population (such as a senior citizen, individual with disabilities), what are your concerns during an incident?**

Enter your answer

6. **Is your home located in a floodplain?** *

- ◯ Yes
- ◯ No
- ◯ I don't know

7. **Do you have flood insurance?** *

- ◯ Yes
- ◯ No
- ◯ I don't know

8. **If "No," why not?**

- ◯ Not located in floodplain
- ◯ Too expensive
- ◯ Other

9. **What is the most effective way for you to receive information about how to make your home and area more resistant to hazards?** *

- [ ] Newspaper
- [ ] Television
- [ ] Radio
- [ ] Email
- [ ] Social Media
- [ ] Regular Mail
- [ ] Websites
- [ ] Other

10. **This survey may be submitted anonymously; however, if you provide us with your contact information (name, phone number, email), we will have the ability to follow up with you to learn more about your ideas or concerns (optional):**

Enter your answer

Submit

The Public Input Survey was specifically sent to those who serve populations that may be disproportionately impacted by disaster events. The public input survey was distributed via email on March 28, 2025 to the entities listed below.	
Organization	**Description of Vulnerable or underserved population - description**
BSC Embracing Diversity Committee	General – diverse populations
Burleigh County Housing Authority	Houselessness, Low socioeconomic status, New Americans Renters
CATCH ND	Refugees, New Americans, Immigrants
Dakota Center for Independent Living (DCIL)	Disabilities, Limited mobility, limited transportation, seniors
Dakota Outright	LGTBQ+
DD Council (North Dakota State Council on Developmental Disabilities)	Disabilities, Limited mobility, limited transportation
Designer Genes	Disabilities, Limited mobility, limited transportation
Dream Center	Houselessness, Low socioeconomic status
Global Neighbors	Refugees, New Americans, Translation Services, Immigrants potentially undocumented individuals
Heavens Helpers Soup Café	Houselessness, Low socioeconomic status
Ministry on the Margins	Houselessness, Low socioeconomic status, previously incarcerated
Missouri Valley Coalition for Homeless People	Houselessness, Low socioeconomic status
Native Inc	Tribal Nations
North Dakota Department of Human Services (refugee resettlement)	Refugees, New Americans, Immigrants, possibly undocumented
North Dakota Office of Legal Immigration	Refugees, New Americans, Immigrants,
Protection and Advocacy	Disabilities, Limited mobility, limited transportation
United Way	Houselessness, Low socioeconomic status
Welcome House	Houselessness, Low socioeconomic status
Youth Empowering Social Status (YESS)	Disabilities, Limited mobility, limited transportation
Youthworks	Houselessness, Mental Health Disorders

The survey was also sent directly to the City of Bismarck's Integration Facilitator for direct distribution to populations new to the community.

Burleigh County Emergency Management also sent the same survey to the American Red Cross and The Salvation Army as a direct target audience for public input. Bismarck and Burleigh County shared the same public input survey and survey results.

Public Input Received - March/April 2025

Survey Results

90 Responses

1. **Where do you live?** 	The majority (57 of 90) of those responding were Bismarck residents.
2. **Select three hazards you feel are the highest threat to your area.** 	Natural Hazards of highest concern included Severe Summer and Winter Weather as well as Drought and Flood. Technical or human-caused hazards of higher concern included Fire, Cyberattack, and Civil Disturbance, Criminal, or Terrorism.
3. **What potential impacts concern you most relating to the hazards you selected above?** 74 Responses Latest Responses *"Climate change makes weather more severe. We have lar..."* *"Grassfires and identity theft"* *"Property damage "*	See Public Input Comments Summary on pages 32-36. Applicable Public Input was shared with Lead Planners and meeting participants during the Hazard-Specific Plan update meetings held in October.
4. **What preventative measure(s) would you recommend for any of the hazards you selected above to minimize or eliminate the potential impacts?** 69 Responses Latest Responses *"The army corps the act cautiously."* *"Not sure, quick response to fires."* *"Flood mitigation "*	See Public Input Comments Summary on pages 32-36. Applicable Public Input was shared with Lead Planners and meeting participants during the Hazard-Specific Plan update meetings held in October.

5. **If you or a family member are considered an at-risk population (such as a senior citizen, individual with disabilities), what are your concerns during an incident?** 56 Responses Latest Responses *"We don't have any concerns"* *"Emergency response teams arrival time "*	See Public Input Comments Summary on pages 32-36. Applicable Public Input was shared with Lead Planners and meeting participants during the Hazard-Specific Plan update meetings held in October.
6. **Is your home located in a floodplain?** Yes 15 No 70 I don't know 5 	Promoting flood insurance is identified as a mitigation action item for the Flood and Dam Failure hazards.
7. **Do you have flood insurance?** Yes 8 No 81 I don't know 1 	Promoting flood insurance is identified as a mitigation action item for the Flood and Dam Failure hazards.
8. **If "No," why not?** Not located in floodplain 58 Too expensive 8 Other 12 	Promoting flood insurance is identified as a mitigation action item for the Flood and Dam Failure hazards.
9. **What is the most effective way for you to receive information about how to make your home and area more resistant to hazards?** Newspaper 7 Television 24 Radio 16 Email 37 Social Media 57 Regular Mail 27 Websites 28 Other 8	The top three responses are social media, email, and websites.
10. **This survey may be submitted anonymously; however, if you provide us with your contact information (name, phone number, email), we will have the ability to follow up with you to learn more about your ideas or concerns (optional):**	There were 22 responses to this optional survey question.

The public comments provided via the public input survey were reviewed by Bismarck Emergency Management, the Lead Planners and meeting participants as part of the hazard-specific Multi-Hazard Mitigation Plan update meetings held in October, to aid in the identification of individual mitigation action items supporting the overall goals of the plan.

Public Input Comments

Formatting Note: Comments are applicable to the left-most column.

Hazard	Vulnerability identified	Mitigation Actions Suggested	At risk population comments
Civil Disturbance	Enforcement of property rights	Convenances for all areas of town	
Civil Disturbance	I feel civil disturbances are most likely, given short tempers, lacking security measures and easy access to guns here.	Increased security at schools and public places.	Not an at-risk population ... unless you consider being a government employee when rhetoric is raised against them.
Civil Disturbance	Civil Unrest: Past protests and how they disrupted our city peace	Civil Unrest: Citizen education how to handle harassments, citizens arrest and conceal carry rights/responsibility	
Civil Disturbance	Trump followers attacking those of us who don't wear the red caps. The rule of law is rapidly breaking down. I know people who are eager to start "shooting the libs".	Leaders must emphasize that violence is unacceptable and that if it occurs, it will be dealt with immediately. Law enforcement especially needs to be trained and reminded that they are to enforce the law, not follow the whims of an evil president. Note: I have NEVER worried about our local law enforcement officers but I am worried about the very near future.	
Criminal behavior	Folks intoxicated on drugs breaking in to our houses, vehichles, yards	More city cameras in neighborhoods, more severe penalties	Yrs, I cannot run from them. Also when I called the police a couple years ago when a clearly intoxicated man was trying to break in my back door, repeatedly, he told them a fabricated storg- that I knew him, invited him in, then changed my mind! Good lord, he was clearly high on drugs, I have never called 9q2 before, I sm elderly and he was maybe 24! They said they couldn't take him in!! Bogus!
Criminal, Terrorist or Nation-State Attack	Law enforcement does not have adequate resources to be able to respond and confront any type of coordinated attacks by criminal or terrorist organizations. They may be able to handle single small events but in the case of any type of coordinated multiple dynamic events, they are under staffed, poorly equipped and trained to be able to respond and control these types of issues.	Develop at the state level regional response teams that can be called on short notice to acts of terrorism and or high impact criminal activity. The teams would be trained and equipped for swat and explosive responses. The training requirements on these two disciplines are demanding and cannot be maintained at the "additional duty" status that all departments have. These are perishable skills and are difficult to maintain on the one day a month "maybe" training time allotted by most departments.	
Criminal, Hate Crimes	Attacks against racial, national, gender, sexual preference, protected groups	Declare attacks against protected a hate crime	I identify as transgender , yes I feel threatened here
Cyberattack Severe Weather Events	CYBERATTACK: can reek havoc on ALL systems if power or internet is down; like I'd have to dig to find a radio in our house, we use the internet, phones, computer to get news. I do have a battery operated weather radio, but the current president is laying off all the National Weather Service people that manage the satellites that allow us to have excellent weather forecasting, so how's that gonna help us?		
Cyberattack	Long term loss of power via a cyberattack	education	
Cyberattack	Seem to have highest probability all things considered. I think are city/county have prepared for and have experience with the other options.	Not sure. Al is growing exponentially and it would seem cybersecurity should be paramount.	I am not but know seniors that live alone. Access to food, water, power (electricity or other) and communication (phone or computer).
Cyberattack	Economy and families unable to function	Community education	

Hazard	Vulnerability identified	Mitigation Actions Suggested	At risk population comments
Cyberattack	loss of life, loss of financial, loss of everyday amenities.	Two-factor authentication.	power loss
Cyberattack	Cyberattack which affects the life lines (Safety and Security; Health and Medical; Communications; Hazardous Materials; Food, Water, Shelter; Energy (Power & Fuel); and Transportation) for an extended period of time or during the middle of winter.	increased / enhanced cyber protections, back up power sources, food, medical supplies, and water reserves.	access to medical care
Cyberattack	Shutdown of critical infrastructure for an extended period of time	Investments in cybersecurity tools city/county owned infrastructure.	
Evacuation concern – transportation planning	There are only a handful of roads that go the entire length of town north to south and east to west. If there was ever an event that required a complete evacuation, it would be complete gridlock.		
Fire	we're on the prairie and a ways away from firestation that is staffed by volunteers - so a lightening strike, casual campfire, backyard bonfire or controlled burn can easily get out of hand and cause damage. Esp. of there's high winds or draught and the fuel (ie. grass and fields) is dry.	more PSAs about county burn bans, fireworks, etc (I see my neighbors burning brush when I know there's a county burn ban in effect... grrrr...) Free access to landfill for people in the ETA. Would prevent people from feeling that they have to burn their extra brush and grass clippings because they don't want to pay to take it to the compost site; or that they can throw their old printer or electronics in the dumpster.	
Fire	The WUI presents a danger to the borders of our communities; wildland fires could result in property damage and human and livestock losses.	Firewise Programs and Community Wildfire protection plans.	
Fire	long-term infrastructure damage and residential damage with the need for sheltering.	fuel reduction projects near infrastructure and home (wildland/urban interface areas)	
Flood	Lack of readily response time for emergency services. As an ETA residents I feel city leadership doesn't include us or try to provide adequate services .	Better response times and available resources	I have elderly neighbors, we try to keep roads open in the winter and such in case of an emergency but it's most citizen led efforts. As an ETA residents we are kind of stuck between the city and the county, neither want to except full responsibility of the ETA and the citizens suffer.
Flood	lack of access to/from neighborhood. A flood will close/cover roads leading to our neighborhood, and damage our house due to groundwater seepage (has happened in the past, totally expect it to happen again).		
Flood	Past flood events and how the city responded and assisted communities	Community organization and response plans that dont rely on City only	
Flood	While I don't live in an area that floods, I am hoping mitigation measures planned for south Bismarck will reduce the risk.	Implement flood control measures planned for south Bismarck.	
Flood		Monitor river water levels, Garrison water output.	Senior citizens, as well as adult child with disabilities.
Flood	Concern about overland flooding	Education about special flood zone areas	
Flood	long-term infrastructure damage and residential damage with the need for sheltering.	Flood mitigation projects (like south Bismarck)	
Flood Ice Jam	Missouri River flooding, especially rapid backup due to ice jams.	Monitoring for ice jams and having a plan for breaking them in emergency situations.	We have elderly neighbors. I don't know if they are on any kind of reverse 911 or anything, if we even have that.
Geologic	Concern about expansive soils	Education about expansive soil prevalence in North Bismarck.	
Hazardous Materials		no C02 pipeline.	Senior citizens, as well as adult child with disabilities.
Hazardous Materials	CO2 release from pipeline	Do not allow CO2 pipeline in Burleigh County	no ability to avoid CO2 leak

Hazard	Vulnerability identified	Mitigation Actions Suggested	At risk population comments
Hazardous Materials	The CO2 pipe line is super hazardous	Do not allow CO2 pipeline.	
Hazardous Materials	CO2 or Natural Gas pipelines, wildfires	Tighter regulations, maintenance checks	
Hazardous Materials	CO2 release from pipeline	Do not allow CO2 pipeline in Burleigh County	no ability to avoid CO2 leak
Hazardous Materials	I don't think our community is prepared for an emergency involving hazardous materials whether it involves a railroad accident, truck accident, a terror attack, or accident at a local business. I know we don't have anyway to protect ourselves if we were exposed.	A plan for hazardous material emergencies. Help for senior citizens who don't have family.	We are senior citizens and we don't have family that could help us in an emergency.
Hazmat	High volume of truck hazmat tanker traffic in populated areas and the ability of local responders to be able to contain/control releases and coordinate mitigation responses. There are no full time hazmat response teams in the state.	State supported full time Hazmat response team.	
Infectious Disease	There is an area across the street that is an empty lot/pasture full of mice, gophers, rabbits and who knows what else. They are planning building something there after years of being empty and the neighborhood has complained about the critters to the city and nothing has ever been done by the landowner. We fear that once construction begins, this will become more of a problem with the animals running across the street and becoming more of a nuisance than they are now. We hope that traps, poison or SOMETHING will be done before the dirt is dug up as the mice situation is bad now when they come across the street and get in the garages and try to get in the condos.		
Infectious Disease		No clue since public will not accept health measures if there is another pandemic	My mother is elderly, and i worry about her health
Infectious Disease	Infectious disease	Our city to let public health do their job to mitigate	
Infectious Disease – and homeless populations	Increased risk for these hazards which requires increased preparedness to mitigate impacts.	Increased funding for HHS, refinement of homeless operations, collaboration with state environmental agencies for improved environmental health processes.	Lack of information shared readily with at risk populations
Severe Summer Weather	personal safety during tornado season (what if you dont have a basement?	Better education about personal safety during tornado season (what if you dont have a basement?	
Severe Summer Weather	Severe Summer Weather -- We are seeing more impactful storms these days. It's startling to see how many tennis players disregard sirens when severe weather comes into our area.	I would encourage City Parks and Recreation to issue guidance to heed warnings. Perhaps they could have signs on city tennis courts asking players to seek shelter, if those signs do not already exist.	My husband and I are seniors and worry about moving to a lower level quickly enough.
Severe Summer Weather	Home damage	Insurance--I'm not sure	Not at risk population, but not having a residence
Severe Summer Weather	Severe weather.	More warning and preparedness.	
Severe Summer Weather	Disruption of services	Situation awareness, individual preparedness responsibility	
Severe Winter Weather	Disruption of services	Situation awareness, individual preparedness responsibility	
Severe Winter Weather	Not being able to get to an emergency route	Just put the plows out before the storm is done	The road not being plowed open for at least 2 days
Severe Winter Weather	People injured / dead. Property destroyed	Warming stations / places designed during extreme cold	
Severe Winter Weather	Power failure.	Free power generators for homes	

Hazard	Vulnerability identified	Mitigation Actions Suggested	At risk population comments
Severe Winter Weather	Severe weather.	More warning and preparedness.	
Severe Winter Weather		Do away with that liquid vehicle rusting agent and go back to sanding roads.	
Severe Winter Weather	secondary impacts that occur from severe winter weather such as a lack of ability to travel and loss of power.	an education campaign or potential pre-warning of the public to gather essential items before the winter storm hits could be beneficially. Ice is more of a concern than snow.	Yes. We have concerns about the ability to fill medications before expiration or running out of supplies. As for family members with disabilities, we rely on social support programs such as PRIDE Inc., and when the weather is bad these services are unable to be accessed creating daily challenges.
Severe Winter Weather		Help for senior citizens who don't have family.	We are senior citizens and we don't have family that could help us in an emergency.
Space Weather	Power failure.	Free power generators for homes	
Space Weather	Worst Case Scenario when all communications/electrical go down	Where and how to gather information and actions	
Criminal, Terrorist or Nation-State Attack	Disruption of services	Situation awareness, individual preparedness responsibility	
Train Accident		Routing trains outside or populated areas may be smart but cost prohibitive.	
Tornado	I don't think our community is prepared for a an emergency involving hazardous materials whether it involves a railroad accident, truck accident, a terror attack, or accident at a local business. I know we don't have anyway to protect ourselves if we were exposed.	Public storm shelters. Help for senior citizens who don't have family.	We are senior citizens and we don't have family that could help us in an emergency.
Summer Weather / Sirens – Winter Weather			I live alone and fear what will happen when the sirens go off for bad weather or when a blizzard is forecasted as I have no where else to go in case of an emergency. Will someone come looking for me when there are no family members near me? I have anxiety and PTSD and this gets really bad when I know bad weather (blizzards/thunderstorms/tornados) is here and I have no where to go so that I won't be alone or by myself if there is no electricity.
Wildland Fire	The quickness in which wildfires can start and spread with our property so close to the north boundary of Bismarck.	Clear overgrown undeveloped property of fire fuel(tall dry grass) and possibly controlled burns of areas where that is available.	
Wildland Fire	Area of south bismarck between archery range and waste treatment plant has extreme levels of deadfall and undergrowth that need to be dealt with before it catches fire and threatens the homes in area.	Controlled burns	
Wildland Fire		Monitor tall grasses, deadfalls, open fires.	Senior citizens, as well as adult child with disabilities.
Wildland Fire	Tyler coulee and the Nature Park in northwest Bismarck has potential to create a disaster with a dry fall and decreased snowfall and drought, high winds and a fire.	Simple, control the fuel load created by native grasses. Mowing the area that can be mowed is easy to do and would be very effective in aiding to reduce the fire potential.	
Wildland Fire	The Dry area we live in. Need to keeep "the No fires"on until we get about 3" of rain.	Water and Fire Prevention in every home, garage and car.	
Wildland Fire	Many of these hazards are expected to get worse and droughts lead to fires.	I am located within the city and the hazards are a little diminished there as opposed to being out in the county where there are less	Air quality and water quality are the overall concerns for everyone but for those with other physical disabilities, I am concerned about their ability to get to safety in the event of an emergency.

Hazard	Vulnerability identified	Mitigation Actions Suggested	At risk population comments
		structures to block winds while also less access to resources like water and emergency services.	
Winter	High impact winter events-blizzards or extended periods of heavy winter weather is especially obvious in the grocery stores. Supplies run out quickly during these events. The ability to keep routes open and ensure the ability for freight to get in is a concern. Limited numbers of large snow removal equipment make it a challenge to keep vital supply lines open.	Investments in snow removal equipment as well as vehicles able to traverse extremely challenging terrain should be looked at.	
Winter	loss of utilities, access to roads, downed and falling trees	identifying trees that look susceptible to falling	
Winter	Loss of life for homeless people in the Summer because of heat and in the winter because of cold and the loss of jobs and homes by Donald Trump's cancelling of humanitarian parole status.	A low barrier shelter for homeless and a guest worker program for humanitarian parolees in Bismarck, there are more than 100 individuals in that status	
Winter	travel impact (not being able to travel at all or dangerous travel), property damage	NA	getting to elderly family members who live in a trailer court (less sturdy structure)
Driving Safety	Speeding traffic , red light runners , not enough time for turns in Turning signal on century and state street	Reduce speed limits in residential areas, 19th street is a road race track, add more time for traffic to turn from Century onto state street- lots of red light violations, make curch plant bushes to hide parking lot on east auditorium- this would also help stop some wind, fix the massive potholes and also tar the cracks	Speeding has to stop- I can't even cross my street to get my mail from our cluster box. We have tried to move the box but no prevail.
Driving Safety	People always running red lights	Cameras on stoplights to catch these people.	
Driving Safety	I feel that the drivers in this town/state DO NOT pay enough attention to what they are doing. I'm tired of having people run stop lights and stop signs, talking on the phone or putting on makeup while driving and being in the wrong lane when there are CLEAR signs stating what the lane is for.		

Appendix A: Acronyms

BCA: Benefit Cost Analysis
BCR: Benefit Cost Ratio
BFE: Base Flood Elevation
CDBG: Community Development Block Grant
CDC: US Centers for Disease Control
CenCom: Central Dakota Communications Center
CFS: Cubic Feet per Second
CPC: Climate Prediction Center
COG: Continuum of Government
COOP: Continuity of Operations Plan
CRS: Community Rating System
DES: ND Department of Emergency Services
DFIRM: Digital Flood Insurance Rate Map
DHS: Department of Homeland Security
DR: Disaster
DWR: North Dakota Department of Water Resources
EOC: Emergency Operations Center
EOP: Emergency Operations Plan
ETA: Extraterritorial Area boundary
FEMA: Federal Emergency Management Agency
FIRM: Flood Insurance Rate Map
FIS: Flood Insurance Study
GIS: Geographic Information System
HazMat: Hazardous Materials
HHS: North Dakota Health and Human Services
HMGP: Hazard Mitigation Grant Program
HUD: Housing and Urban Development
IBC: International Building Code
ISO: Insurance Services Office
LEPC: Local Emergency Planning Committee
MHMP: Multi-Hazard Mitigation Plan
MPO: Metropolitan Planning Organization
NCDC: National Climatic Data Center
NDCC: North Dakota Century Code
NFIP: National Flood Insurance Program
NOAA: National Oceanic and Atmospheric Administration
NTSB: National Transportation & Safety Board
NWS: National Weather Service
PMP: Probable Maximum Precipitation
SLIC: State and Local Intelligence Center
STAPLEE: Social, Technical, Administrative, Political, Legal, Economic, and Environmental

SWPC: Space Weather Prediction Center
THIRA: Threat and Hazard Identification Risk Assessment
USACE: United States Army Corps of Engineers
USGS: United Stated Geological Survey
WRD: Water Resource District
WUI: Wildland Urban Interface

Appendix B: Climate

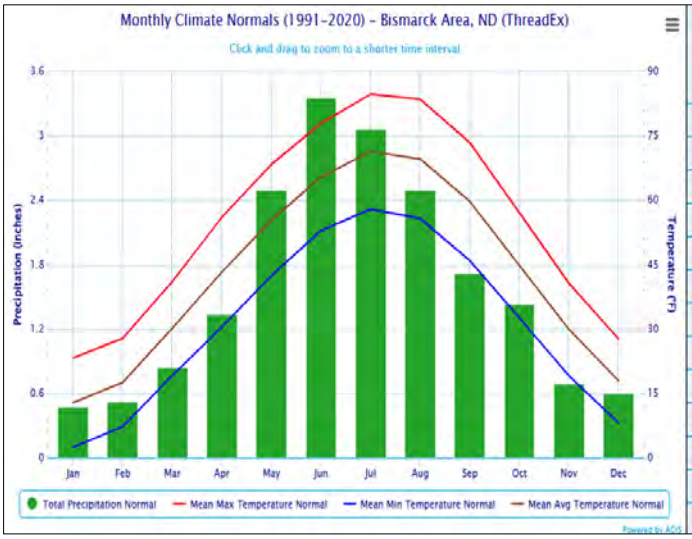
[Basic: Historical, Current Variability, Trends, and Projections]

1. Historical. Historical Climate is derived from documented weather and climate observational data and is usually discussed in terms of its Long-Term mean, or average, and its extremes. Long-Term can refer to the entire Period of Record (POR) or its most current 30-year Climate Normal, a sliding scale that is updated every decade. Short-Term refers to variations in climate that occur over periods of a few years to a decade or more (SUNY/OER, 2025). The most common of these is the oscillation between El Nino and La Nina conditions in the equatorial Pacific Ocean, which often affect the Northern Plains states.

1.1. General Climate Type - Continental. Temperature and precipitation are the two parameters traditionally used to describe general, large-scale climate types.

Temperature. The Northern Great Plains (NGP) region in general and South-central North Dakota (Bismarck area) in particular, has an extreme continental climate characterized by a very high annual variation in temperature (warm summers and cold winters) and a high daily range in temperatures, as compared to maritime climates. These high ranges in temperature are mainly due to the area's location: in the mid-north latitudes (between 45.935° and 49.00 ° N), along the north border of the continental United States, centered in the North American Continent, and far from the modifying effect of oceans.

Precipitation. Moisture is a second key component of climate, with North Dakota effectively straddling "the transition from the moist eastern United States and the semiarid West" (Frankson, 2022). A high daily range in temperature is primarily due to the lower heat capacity of dry air and dry soils as compared to humid air and either moist soils or large bodies of water, so that dryer air and dryer soil will both warm and cool at a faster rate than wetter air or soil (Wikipedia: Climate of ND, 2023).



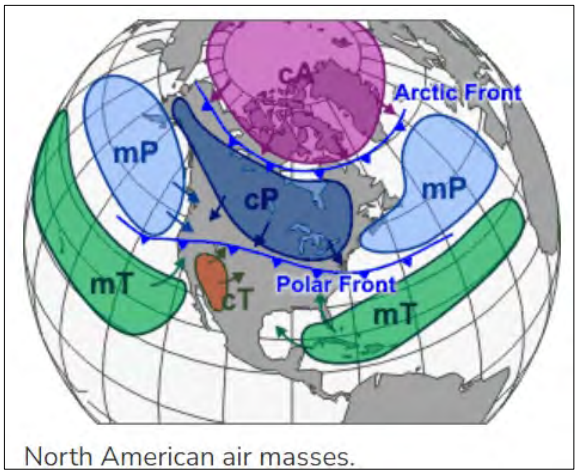
Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	0.48	23.2	2.4	12.8
February	0.52	27.8	7.2	17.5
March	0.84	41.0	19.1	30.1
April	1.34	56.0	30.4	43.2
May	2.50	68.3	42.4	55.3
June	3.36	77.9	52.9	65.4
July	3.07	84.7	57.9	71.3
August	2.50	83.5	55.7	69.6
September	1.72	73.4	45.9	59.7
October	1.43	57.1	32.6	44.8
November	0.69	40.6	19.1	29.9
December	0.60	27.7	8.1	17.9
Annual	19.05	55.1	31.1	43.1

Figure 1.1, above, shows the average monthly precipitation and the range of monthly average high and low temperatures for the Bismarck area during the most recent 30-year climate normal period, 1991-2020 (XM-ACIS, 2025; Climate Toolbox, 2024).

North Dakota's longest running record of daily maximum and minimum temperature and daily precipitation reports are for the Bismarck area, dating from October 1, 1874, through the present (XM-ACIS, 2025). As the city has grown, the official location of these weather observations has varied from the downtown area to the present location at the Bismarck Municipal Airport while their representativeness has remained consistent. The average annual precipitation for Bismarck during the current 30-year climate normal period is around 19.05 inches, about 0.33 inches higher than the statewide average, while the average annual temperatures is around 43.1°F, about 2.1°F warmer than the statewide average.

A composite record of daily temperature and precipitation reports covering most areas of the state dates from 1895 to the present and is used for comparisons throughout this section (NOAA-CAG, 2025).

Figure 1.2. Common Air Mass Types. The dominant airmass types which affect all areas of North Dakota are Continental Polar (**cP**), which originates over the high latitudes of central Canada, and Continental Tropical (**cT**), which originates over the upland areas of the western United States. A third common airmass type is Maritime Polar (**mP**), which originates over the Gulf of Alaska and far-north Pacific Ocean. Note that maritime air from the Pacific Ocean loses most of its moisture in transiting the western mountain ranges. Two other and more extreme airmass types also affect North Dakota, generally over shorter and more variable periods of time. Midwinter will often be impacted by the extreme cold of Continental Arctic (**cA**) air, originating near the North Pole, while the midsummer will often be impacted by very humid Maritime Tropical (**mT**) air, originating over the Gulf of Mexico. Image courtesy of NOAA (NOAA: Airmasses, 2023).



Continental Arctic air is characterized by very cold and dry air, typically well below zero (F), and is responsible for ND's coldest wintertime temperatures. *Continental Tropical* air is typically warm (or hot) and dry and results in ND's highest summertime air temperatures. *Maritime Tropical* air is typically hot and humid, and though the air temperature can be less extreme than with **cT** air, the increased humidity often results in ND's highest Heat Index days. Local, near-surface humidity levels may be reported in terms of either *Relative Humidity* or *Dewpoint Temperature* readings.

Relative Humidity, is the ratio of how much water vapor is in the air compared to how much the air can hold at a given temperature and pressure (AMS Glossary, 2013), and is often referred to as a comfort index. The ideal relative humidity level for humans ranges from 30 to 50 percent, according to a Mayo Clinic report. Where lower levels can result in dry skin, respiratory issues, etc., and higher levels can make it difficult for the human body to cool itself through the evaporation of sweat.

Dewpoint Temperature is a measure of the quantity of moisture in the air. When the Dewpoint equals the Air Temperature, Relative Humidity is maximized at 100 percent, and either dew,

frost, or fog forms (AMS Glossary, 2013). Heat Index is calculated using Air Temperature and either Dewpoint or Relative Humidity.

The record maximum dewpoint for ND was set at 89F near Wahpeton ND, on 19 July 2011. And with a concurrent air temperature of 91F, the maximum Heat Index was 131F. On that same day, the record dewpoints for Minnesota (Moorhead MN: 88F) and for Manitoba (Brandon MB: 82F) were also set. That day, **dewpoint temperatures reaching more than 80F overspread most all of North Dakota along and east-northeast of the Missouri River**, western MN, much of eastern South Dakota, and well into southwestern Manitoba past Canada Hwy 1 (Gust, 2018). The Bismarck Airport (KBIS), southwest of downtown, measured a peak dewpoint that afternoon of 82.0F (Mesowest, 2025), while the Mandan NDAWN station recorded a peak dewpoint of 82.4F (NDAWN, 2025). And with high temperatures that afternoon ranging from 93 to 96.1F, the peak Heat Index (Apparent Temperature) across the Bismarck-Mandan Metro area, ranged from 115 to 124F.

1.2. Sub-climate differences across the NGP region are primarily driven by the range of temperature and precipitation extremes experienced in any given year or over a series of years. Average temperatures are generally cooler across northern ND and points north of the state, and generally warmer in southern ND and points south.

In contrast, conditions are generally wetter and more humid in the somewhat lower elevations of eastern ND and points further eastward towards the Great Lakes. The somewhat higher elevations of far western ND, and the high plains region stretching westward to the Rocky Mountain Front Range, are drier and less humid.

Figure 1.3. Köppen-Geiger Climate Classification

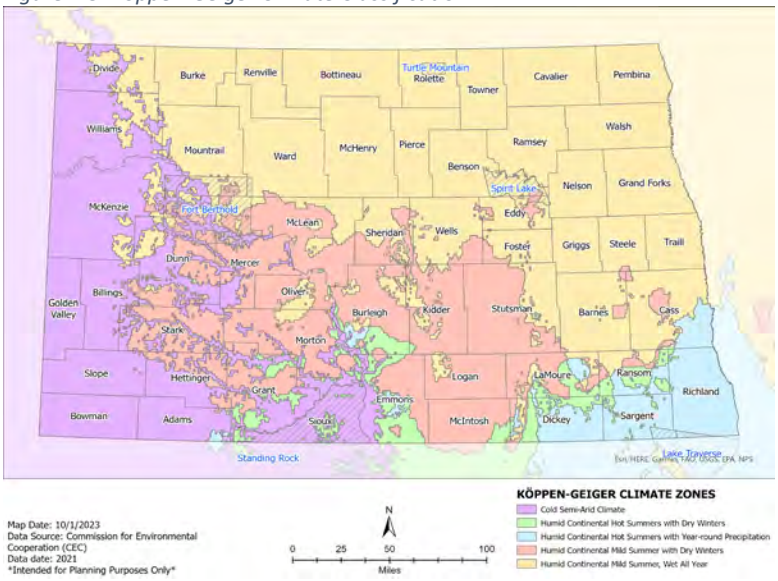


Figure 1.3. (CEC, 2021: at right) shows that most of North Dakota, *including all of Burleigh County,* falls under a **Köppen-Geiger** climate classification, ***Dfb*** (continental: cold/snowy winters, humid, with warm to hot summers). While extreme western North Dakota, *including portions of the Missouri River breaks and points westward, r*esembles more of a Steppe type climate, ***BSk*** (continental: arid/semi-arid, steppe, cold).

For Bismarck, Burleigh County, and North Dakota in general, the *average climate* can be best described as a statistical position between climate extremes (**Wikipedia**: Köppen, Steppe, Semi-Arid, **2013**).

1.3. Micro-Climates in any county, tribal land or community depend on a variety of factors such as soil type, land-use/land-cover, slope, elevation, drainage, and wind/exposure.

Soil Type. Burleigh County is in the glaciated Missouri Plateau Section, with the northeast corner of the county in the Missouri Coteau District and the remainder in the Coteau Slope District (Kume and Hansen, 1965; Stout, 1974). According to Omodt et al. (1961), Bismarck center city and points to the north, northwest, and west are primarily the gently rolling, fertile, chestnut brown Williams Series soils of a semiarid grassland, common to the well-drained glacial till of the Missouri Coteau District. South central Bismarck into the middle and upper Apple Creek drainage is the slightly different Savage-Wade-Farland Series soils, which more of a dark greyish brown, silty clay loam, with medium permeability and fertility. The steeper slopes west of downtown into the River Road, and northwest to far north of the city are the steeply rolling and/or sloping chestnut brown soils of the Williams-Zahl Series, which extend through much of the lower Burdt Creek drainage. The lower elevations southeast of downtown and along the Missouri River bottomlands are alluvial loams and sandy loams of the Havre-Banks Series.

Land-Use. The primary landscape of Burleigh County, 73%, is equally split between rolling pasturelands and croplands, with less than 7 percent developed as residential or commercial property. The remaining 20% is composed of rolling prairie, wetlands, small lakes, and federal or state wildlife management areas (USDA, 2022; Stout, 1974). Woodlands make up less than 1 percent of the landscape in the county, primarily as homestead shelterbelts or urban plantings (Claeys, 2020).

Slope and Drainage. Central and southern Burleigh County have a primary but subtle slope gradient from east to west and a secondary slope gradient from north to south, with a general west-southwest drainage towards Apple Creek and the Missouri River (Stout, 1974). Northeast Burleigh County is replete with sloughs and prairie potholes (NDDWR, 2011), and the northern third, roughly along and north of SR36 has a subtle slope and drainage towards the west along the Painted Woods Creek, and to the Missouri River. Part of east-central Burleigh County is drained by Burnt Creek, then into the Missouri River north of Bismarck. The Bismarck area drains from its highland areas in the north-northwest, either directly westward towards the Missouri River, to the northwest and the Burnt Creek drainage, or towards the south-southwest into the Apple Creek (Google Earth, 2024). In general, far western Burleigh County has a general westward and sharp drainage towards the Missouri River.

Elevation. The highest elevations in Burleigh County range up to 2250 ft MSL, across the northwest corner of the county in central Ecklund Township, about 4 miles WSW of Winton (Peakbagger, 2004). Lowest elevations of around 1615 ft MSL are located along the Missouri River at the Oahe Wildlife Management Area, in the southwest corner of Burleigh County, north and east from Huff. (Google Earth, 2024; Stout, 1974). Elevations in the Bismarck-Mandan area range from a low of around 1625 ft MSL along the Missouri River near the Apple Creek outlet, to high points of around 1950 ft MSL in the hills/bluffs of north-northwest Bismarck and northwest Mandan.

Short-term micro-climates can form within a county or community under a variety of conditions. For example, areas which receive significantly more rainfall or snowfall than other areas, typically through spotty convective rain or snow showers, can develop temporary warm or cool zones. In the winter season, areas with heavier and/or fresher snowfall may cool more sharply overnight due to increased insulation from any lingering soil heat, or warm less quickly the following day due to increased reflection of solar energy off the fresh snow surface. A township sized area that is largely snow-free may warm by 10-20F over a similar sized areas covered with fresh snow, with greater temperature differences occurring when winds speeds and mixing are low.

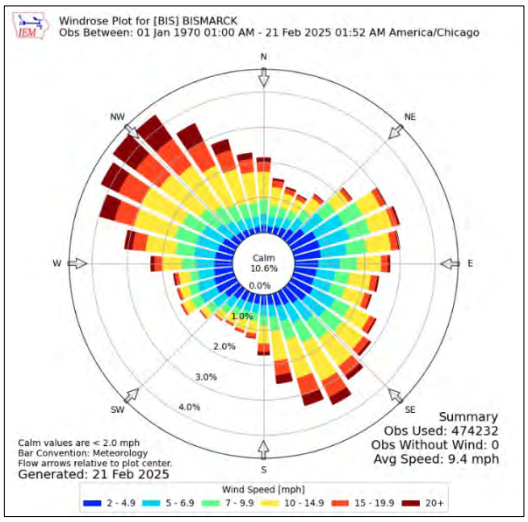
During the summer months, a township sized area with recently wetted soils will generally remain a bit cooler than surrounding dry areas during the day, due to the solar energy used to evaporate moisture from the soil, and stay a bit warmer during the night, due to the higher retained heat in the near surface moist air and the moist soil (Trenberth, 2003, p.1212). These small-scale temperature differentials often persist during periods of calm or light winds and dissipate quite quickly under high wind conditions.

1.4. Importance of Wind Direction and Speed. Changes in windspeed and/or direction often indicate the passage of airmass boundaries, cold fronts or warm fronts, and related changes in weather. Winds vary significantly with height above the terrain and are often much stronger some tens to hundreds of feet above the terrain where the frictional forces of surface roughness, structures, and trees diminish.

In current weather observation practice, windspeed and direction are measured at most automated and manual weather stations, but not necessarily at climate reporting stations. An "instantaneous windspeed" is measured at 3-second intervals. **Sustained winds** reflect the highest windspeed average over any 2-minute period within the 10 minutes preceding the observation time. **Wind gusts** are the highest 3-second measurement during that same 10-minute period. **Peak wind** is the maximum 3-second gust measured *at any time* during the hour (FCM-H1, 2019, pp.28-30).

Gradient winds are those sustained winds at various atmospheric levels and produced by larger scale pressure differences in the atmosphere. Daytime warming of the terrain by sunshine gives rise to convective mixing of the lower atmosphere, which can then mix higher gradient windspeeds down to the surface, often in the form of buffeting wind gusts.

According to Gust (2022), the standard height for measuring surface winds for aviation purposes is at 10 meters (32.8 ft.) Above Ground Level (AGL), with wind speed measurements available at most airports around the state. Wind measurements for agricultural purposes (example NDAWN: North Dakota Agricultural Weather Network) are often as low as 3 meters (9.8 ft.) and for fire-weather monitoring purposes (example RAWS: Remote Automated Weather Stations) at around 6 meters (19.7 ft.) AGL.
Multi-source/composite wind energy estimates indicate that derived winds across Burleigh County average near 11.7 mph, at 10 meters AGL, and near 18.6 mph at 100 meters AGL (Global Wind Atlas, 2023), with strongest winds most often from the northwest, with winds from the south-southeast coming in at second place, and winds from the east-northeast coming in at third.
These estimates are consistent with a wind rose from the **Bismarck Airport (KBIS)**, shown in *Figure 1.4* at right**.** The airport is located roughly 2 miles southeast of downtown Bismarck, and slightly lower in elevation than the surrounding terrain. Seasonal wind roses for the KBIS location show that during the winter months (DJF), winds are predominately from the northwest. During the summer months (JJA), winds are balanced between the northwest and south-



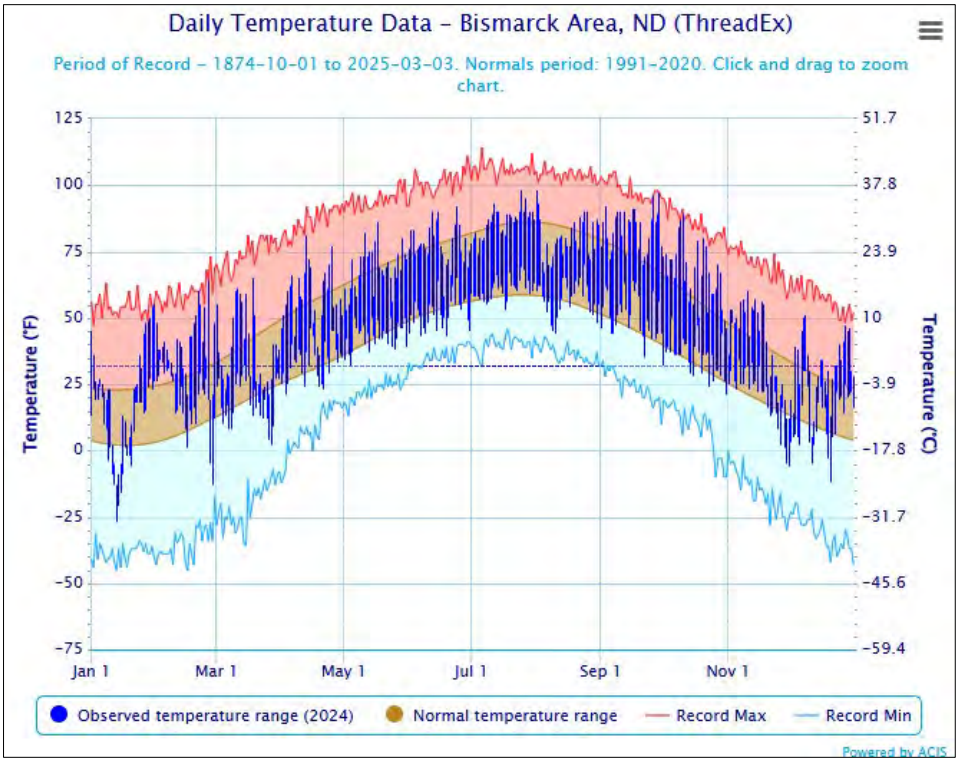
southeast. Easterly winds are somewhat common in the spring (MAM) and fall (SON) months (IEM, 2023).

The **highest non-tornadic wind record of 100 mph for Burleigh County** was estimated based on wind damage produced along a line from southwest of Sterling to south-southeast of Sterling in the early evening hours of August 28, 2024 (NWS BIS, 2025). Reports show that sunflower fields were flattened, trees were uprooted, railcars were tipped, a large grain bin was dislodged, and power poles were broken on both sides of US Highway 83 (NOAA/StormData, 2025). These extreme downburst wind damage events occurred as part of a larger thunderstorm squall line which produced widespread hail and wind damage across much of the southcentral and central portions of the state, and at least one or more tornado or funnel cloud sighting among the several counties involved.

Of the **8 tornadoes** which have struck **within 8 miles of downtown Bismarck**, from 1950 through 2024, and affecting part of the current Bismarck-Mandan Metro area, **the 25 May 1978 event was rated EF3** (NOAA Tornado Tracks, 2025; StormData, 2025). This tornado mainly affected Mandan, with property damages their estimated at $250k in 1978, which is over $1.2M in 2025 dollars (Alioth Finance, 2025). Likewise, the Fort Rice F5 Tornado of 29 May 1953, which tracked from far southeast Morton County into far northwest Emmons County, ending just shy of the Burleigh County line, or 20 miles southeast of downtown Bismarck, produced an estimated $500k in 1953 dollars, which is over $5.9M in 2025 dollars.

2. North Dakota Extreme Climate Variability. Located at the geographical center of the North American Continent and furthest from the modifying effects of oceans or seas, Bismarck, North Dakota, epitomizes the concept of extreme continentality. It has some of the highest degree in day-to-day, week-to-week, month-to-month, year-to-year, and multi-decadal variability in both temperature and precipitation of anywhere on the continent (Franksen et al., 2023).

Figure 2.1 below. **Bismarck ND, Extreme Daily through Annual Variability.** The graph below contrasts the range in daily temperatures with their recent 30-year climate normal period, and the extreme range in temperature that's occurred over the entire Period of Record for the Bismarck area (XM-ACIS, 2025).



The dark blue line indicates the daily maximum and minimum temperatures from January 1 through December 31, 2024. Note that day-to-day and week-to-week temperatures are highly variable.

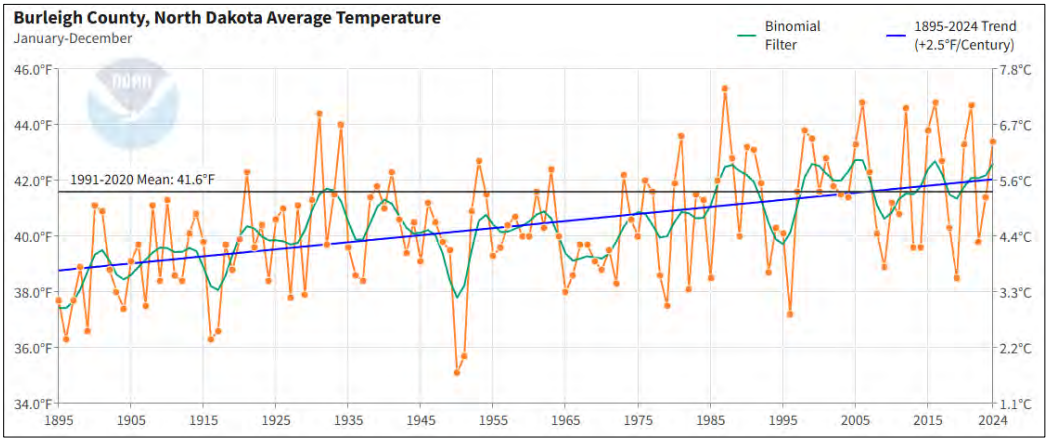
The golden band represents the range of daily average maximum and minimum temperatures, based on the recent 1991-2020 period. The red line indicates the daily record high temperatures for the entire Period-of-Record while the light blue line indicates the daily record low temperature (XM-ACIS, 2025). Note that at Bismarck, the *all-time* record high temperature was 114F, set on 6 July 1936, while the *all-time* record low temperature was -45F, set on 16 February 1936 (also 13 Jan 1916).

The statewide extremes of 121F (Steele ND) and -60F (Parshall ND) were set during those same time periods, on 6 July 1936 and 15 February 1936, respectively. No doubt, the protracted dry conditions of the Great Plains Dust Bowl era led to the dramatically cold winter and dramatically hot summer conditions experienced statewide, and throughout that period.

ND's range of extremes in heat and cold are only exceeded by two other states, those being the intermountain states of Montana and Utah (Statewide Extremes, 2023). These two states have markedly larger variations in elevation which likely led to the markedly colder minimum temperatures recorded at locations several thousand feet higher in elevation than that of the record cold ND location.

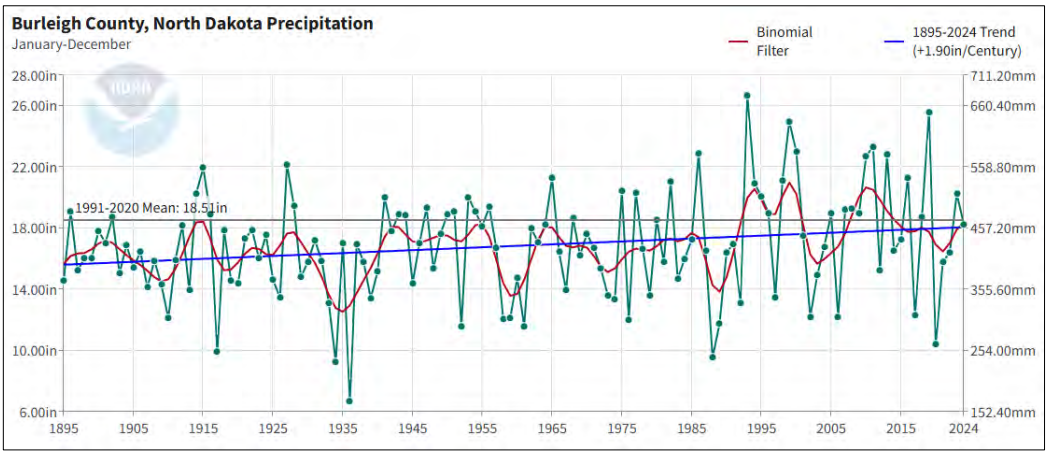
Figure 2.2 below. **Burleigh Co. ND Extreme Interannual to Multi-Decadal Variability in Temperature.**

The graph below shows the **annual temperature** pattern for Burleigh County, and covers the long-term Period-of-Record, which extends back through 1885 and includes all available climate data from stations located within or near the county (NOAA/CAG, 2025).



Note the frequent changes from warmer to colder years, with patterns of changes that occur over a period of a few years to decades, and the subtle but steady warming trend of around 2.5F per century. The average temperature of 41.6F for Burleigh County ND is about 0.6F warmer than the statewide average, while the rate of increase (trend) is a tenth of a degree Fahrenheit per century slower than the statewide average. As noted in Figure 1.1, Bismarck's average temperature is roughly 1.5F warmer than the Burleigh County average, in part due to its more sheltered, treed, and populated exposure.

Figure 2.3 below. **Burleigh Co. ND Extreme Interannual to Multi-Decadal Variability in Precipitation.** The graph below shows the **annual precipitation** pattern for Burleigh County, and covers the long-term Period-of-Record, which extends back through 1885 and includes all available climate data from stations located within or near the county (NOAA/CAG, 2025).



Again, one can see the frequent changes from much drier to much wetter years, the patterns of changes that occur over a period of a few years to decades, and the subtle but steady trend for increasing precipitation at around 1.90 inches per century. The current 30-year average precipitation of 18.44 inches for Burleigh County is about 0.27 inches lower than the statewide average, while the rate of increase (trend) is about 0.74 inches per century faster than the statewide average. As noted in Figure 1.1, Bismarck's average annual precipitation is roughly 0.6 inches above the Burleigh County average.

3. Future Conditions in North Dakota (Climate Variability, Trends, and Projections).

As of April 2023, the Federal Emergency Management Agency (FEMA) requires the inclusion of information regarding the effects of short-term climate variability, long-term climate trends, and future climate projections on identified hazards and their potential impacts in both state and local hazard mitigation plans. The 2025 Bismarck, ND, Multi-Hazard Mitigation Plan incorporates this information in coordination with state and federal guidance.

3.1. Primary Sources. Information for this section was extracted from the 2022 North Dakota State Climate Summary, the Fifth National Climate Assessment (2023), the 2024-2029 N.D. Enhanced Mitigation Mission Area Operations Plan (MAOP), related research as identified by these sources, and by various regional and local experts identified and contacted throughout the plan development process.

- 2022 North Dakota State Climate Summary.
Prepared and updated by the NOAA National Centers for Environmental Information (NCEI) and select regional and state climate experts, the 2022 ND State Climate Summary contains detailed information regarding the state's extremely variable climate and recent climate trends, as evidenced by the historical climate record, along with a summary of computer model-based projections of its potential future climate (Frankson, 2022).

- Fifth National Climate Assessment (NCA5).
Developed by the U.S. Global Change Research Program (USGCRP)*, NCA5* is a synthesis of climate knowledge, impacts, and trends across regions and sectors of the United States to help inform decision-making concerning a changing climate.
Chapter 25 of the NCA5 focuses on the Northern Great Plains, and explores specific trends and impacts in more detail, while discussing uncertainties that exist in the underlying science, the modelling process, the analysis of climate model results, and their potential impacts. This synthesis helps planners to ascribe levels of confidence and likelihood to potential impacts and to identify resilience-building activities that can be incorporated locally through mitigation planning (Knapp, 2023).

- 2024-2029 North Dakota Enhanced Mitigation Mission Area Operations Plan (MAOP).
Developed by the ND State Hazard Mitigation Team, the 2024 MAOP builds on the 2018 Enhanced MAOP and incorporates updated information as provided by team members, analysts and consultants, and guidance as provided by federal law; FEMA's state, tribal, and local mitigation planning policy guides; and mitigation planning experts at local, state, and federal levels (ND eMAOP, 2024).

3.2. Current belief regarding ND climate variability, trend, and potential change. North Dakota has the highest degree of day-to-day, week-to-week, month-to-month, and year-to-year variability in both temperature and precipitation in the nation. This **variability has increased in either frequency or magnitude over the past century and is likely to continue increasing over time**. According to Frankson et al. (2022), through the end of this century: North Dakota's extreme climate variability will likely continue to be the primary influencer or signal within each of the natural hazards which directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales, *and* the much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability beyond that which has previously been documented in the historical record.
As discussed in section B.2., temperatures across North Dakota, the Northern Great Plains Region, and across much of the globe have been increasing at a slow but quite variable rate throughout the 20th century and the beginning of the 21st century. National and global rates of increase are similar at roughly 1.60F (0.89C) per century. However, northern latitudes in general, and particularly North Dakota and the Northern Great Plains are seeing markedly higher rates of change.

At 2.6F (1.44C) per century, North Dakota's statewide average *rate of* annual temperature increase is *one of* the fastest *(tied for 6th highest)* in the contiguous United States and is driven primarily by warming winter temperatures - *especially by warming wintertime low temperatures*. And the Bismarck/Burleigh County area has a similarly rapid rate of increase, while all of the state is prone to such extremes. Given the relatively flat, low-relief nature of the terrain in North Dakota, most areas in the state have a similar high degree of variability in temperature and precipitation, with only a slight difference in average value from one climate division, county, and/or community to the next.

Figure 3.1. **Observed and Projected Temperature Change Across North Dakota.** According to the 2022 North Dakota State Climate Summary, the statewide average annual temperature has increased by over 2.6F in the past 122 years (since 1901), and projections indicate the potential for an additional 1 to 9F (0.6-5.0C) increase above the current 1991-2020 average through mid-century. This amounts to a projected 2.5 to 10.5F (1.4 to 5.8C) increase above the 1901-1960 average, as indicated in the image below. *Source at https://statesummaries.ncics.org/chapter/nd/.*

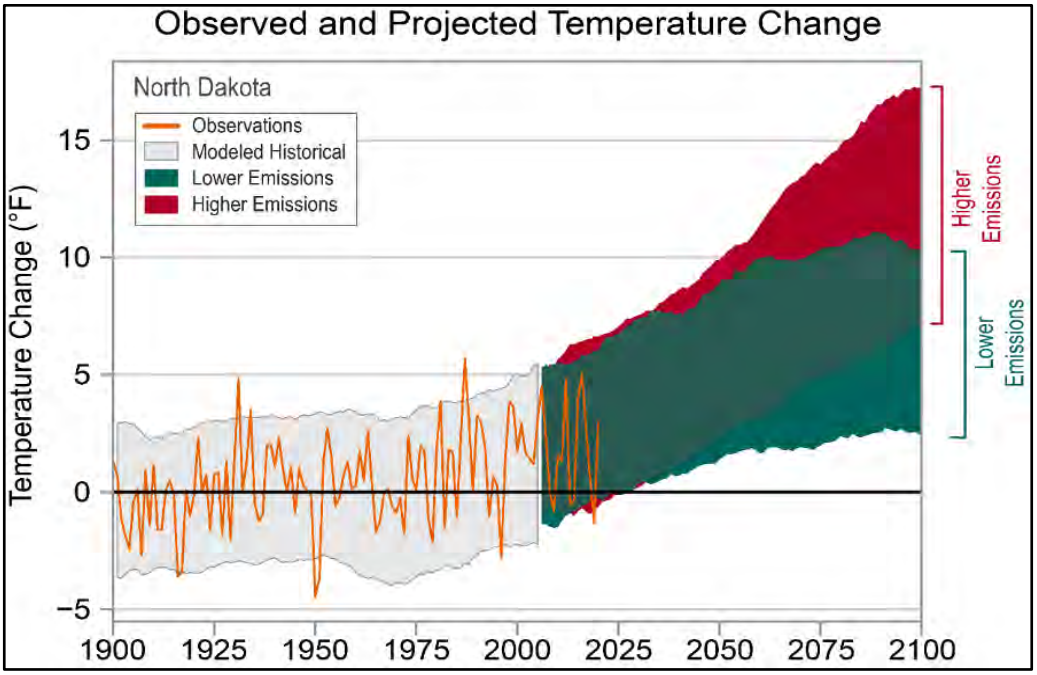


Figure 3.1: Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for North Dakota. Observed data are for 1900–2020. Projected changes for 2006–2100 are from global climate models for two possible futures, one with emissions increasing at a higher rate (RCP8.5) and one with emissions increasing at a slower rate (RCP4.5). As of 2022, temperatures in North Dakota (orange line) have risen more than 2.6°F since the beginning of the 20th century. Shading indicates the range of annual temperatures from the set of climate models (CMIP5). Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Sources: CISESS and NOAA NCEI.

3.3. General Climate Pattern Changes. Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding. Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall high climate variability.

According to the NCA*5* and information included in the 2024-2029 ND Enhanced Mitigation Mission Area Operations Plan (eMAOP) chapter on *ND Extreme Climate Variability and Potential Climate Change,* the state of North Dakota will *likely* experience the following changes in climate patterns across the state:

- More days with precipitation over a half inch.
- Longer dry spells (consecutive days without precipitation).

- Summer days with maximum temperatures over 95 degrees Fahrenheit will increase, as well as summer nights with minimum temperatures over 65 degrees Fahrenheit.
- Increase in cool season precipitation - late fall, winter, and early spring.
- Warming winters.

3.4. Anticipated Future Climate Impacts on Natural Hazards and Man-Made Threats.

A highly variable and/or changing climate will affect more than just temperatures and precipitation levels. An increase in the frequency and severity of extreme heat events and severe summer weather will adversely affect public health, water resources, and the production of agriculture (crops and livestock). A changing climate will increase the incidence of warm wintertime temperatures while simultaneously increasing the frequency and severity of extreme cold and severe winter weather episodes, adversely impacting public health, water resources, and essential services. The average length of the growing season could increase by up to 12 days per century in North Dakota.
According to the 2024-2029 ND Enhanced Mitigation Mission Area Operations Plan (MAOP), the expected impact of climate change on the 15 natural hazards and man-made threats detailed in this plan are outlined below.

1. **Flood Hazard.** Future climate conditions are expected to produce increased precipitation across North Dakota, with winter and early spring precipitation expected to see the greatest increase, along with an increased risk of rainfall occurring during the traditional spring snowmelt period. In addition to increased precipitation during the cool/cold season, the number of days with strong thunderstorms and heavy rainfall is expected to increase by mid-century, especially in the eastern half of the state. Increased rainfall rates typically result in increased runoff rates and an increase in flash flooding, overland flooding, and/or riverine flooding in any season. However, rain occurring when the ground is frozen produces even more and faster runoff and is most likely to exacerbate the flood threat.

2. **Fire (Wildland/Urban) Hazard.** Droughts are projected to increase in size, frequency, and duration. The expected increases in temperatures and frequency of droughts translate into an increase in the size, frequency, and intensity of both wildland and urban fires, with an added risk due to increasing development in the Wildland-Urban Interface. Also, water supplies used for fire suppression may become compromised during drought conditions. Total acres burned have markedly increased over the past 10-15 years, while rural fire departments across ND are largely staffed by volunteers. As the frequency and intensity of wildfires are projected to increase, volunteer fire departments are projected to lose personnel strength due to general rural population declines and/or staff retirements. These trends will likely stress unit resources and increase fire response times.

3. **Drought Hazard.** Through the end of this century, expect larger and more intense droughts, with increasing frequency and/or longer duration of drought periods in North Dakota. Potential impacts include more episodes of extreme heat/heat index with increased human, animal, and crop stress; more rapid onset of drought conditions or flash drought; more drought related (both wind and rapid rainfall runoff) erosion, riverbank destabilization, etc.; reductions in overall agricultural economy. Drought impacts on vulnerable water users, such as the agriculture industry and municipal systems, will likely be exacerbated.

4. **Cyberattack Hazard.** There is no known direct connection between cyberattacks and future climate conditions, though attackers may take advantage of inclement weather periods and other social, infrastructure, or economic stressors to mask or otherwise facilitate their attacks.

5. **Severe Winter Weather**. Through the end of this century in North Dakota, expect larger, more frequent, and more intense periods of heavy wet snow, mixed precipitation or ice storms, and freezing drizzle or mist, with somewhat warmer temperatures. Potential Impacts include a likely increase in winter season precipitation, overall, along with more periods of heavy snowfall and/or freezing rain/ice events. Warmer winter season temperatures will support a higher incidence of mixed precipitation (sleet), freezing rain, or ice storms, which will likely impact transportation, power transmission, roof loading, critical facilities, and infrastructure, along with general health and safety. Human health impacts include an increased incidence of heart, back, and/or muscle related injuries from shoveling snow or falling on ice.

6. **Severe Summer Weather**. Through the end of this century in North Dakota, expect more frequent, larger, and longer duration storms with an increase in intense rain and flooding, and an increase in large hail. Potential Impacts include an expected increase (high confidence) in heavy precipitation events overall, higher in NC and NE ND and somewhat lesser in SW ND, with a likely increase in areal and/or flash flooding but less certain impacts on summertime riverine flooding. Hail size, frequency of large hail, and length of the hail season should increase (medium confidence) with a commensurate increase in the frequency and intensity of lightning and damaging downburst winds which are tied to hail production. Expected increases in temperature are likely to lead to an increase in days with a high Heat Index and the potential for lost workhours during such periods.

7. **Tornadoes.** Through the end of this century in North Dakota, expect more frequent, larger, and longer duration thunderstorms with an increase in intense rain and flooding, and an increase in relative size (areal coverage) of the impact areas of any corresponding tornadoes. Not necessarily more intense tornadoes, but tornadoes with a larger damage footprint.

8. **Infectious Disease and Pest Infestation**. North Dakota should expect larger, more frequent, and more intense outbreaks of certain infectious diseases and pests, though some human and animal diseases may also decrease in occurrence. As a result of slightly warmer and longer summers, more pests and invasive weeds will be able to thrive and spread, contributing to increases in insect populations such as *Emerald Ash Borers* and *Elm Bark Beetles*, or certain vector-borne diseases such as *Dutch Elm Disease Spores* or *West Nile Disease*. Somewhat shorter and less cold winter seasons could also lead to decreased incidents of certain infectious diseases among both human and animal populations during this period, depending on how and where population growth (or withdrawal) and development occur.

9. **Dam Failure Hazard.** The expected increase in size, intensity, and frequency of both drought and heavy precipitation episodes, or an increased frequency in change between drought and flood intervals may put more dams at risk of scenarios that exceed the original design criteria of each respective dam. Aging dams are most at risk for this expected impact.

10. **Space Weather**. Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of space weather events, though indirectly the Extent, Intensity, and Frequency of hazard related impacts could potentially be increased. Indirectly, if extreme climate variability and/or climate change begin to stress area power grids, satellite and terrestrial communications infrastructure, and other critical facilities then there is a potential for increased (compounding) impacts from any concurrent Space Weather Hazard phenomena in these and related areas.

11. **Hazardous Material Release**. Although this hazard is largely human-caused, future climate conditions may cause both direct and indirect impacts. Warmer temperatures may directly result in the expansion of gases, increases in biologic agents, or other such actions that could put hazardous material storage containers, transporters, applicators (i.e., anhydrous), or facilities at an increased risk. Increased summer and winter storms, wildfires, floods, transportation incidents, etc. could indirectly put hazardous material containers, transports, applicators (i.e., anhydrous), or facilities at an increased risk.

12. **Geologic Hazard**. Through the end of this century in North Dakota, expect more frequent, larger, and more intense geologic hazards, such as landslides, riverbank collapse, sink holes, and expansive (clay) soils. Both Drought and Heavy Precipitation events are projected to occur more frequently, which is expected to contribute to an increased frequency of expansive soils alternately cracking and swelling, landslides where steep slopes are present, or to riverbank collapse where undercutting due to subsoil flow and/or antecedent flooding is possible. Both extremes also increase the potential for wind and water erosion. Increased development pressure and the impacts of future climate conditions may increase the risk to a variety of state infrastructure and assets if constructed or situated in areas prone to geologic hazards.

13. **Criminal, Terrorist or Nation-State Attack Hazard (Active Threat).** There is no known direct connection between future climate conditions and the location, extent, intensity, or duration of specific adversarial threats, though indirect connections are possible. For instance, future climate would not necessarily promote or prevent a specific threat, while a specific weather episode may help to delay or advance such actions. And Increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage increased criminal and/or adversarial threats.

14. **Civil Disturbance.** There is no known direct connection between future climate conditions and civil disturbance, though some research links the effects of climate change anxiety to an increasing intensity of civil disturbance in a variety of developing and developed countries. And research shows that increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage general civil unrest. Likewise, there is an increased risk of civil disturbances targeted toward the oil and gas industry in North Dakota from growing public concern over potential impacts of climate change.

B.3.3. Other Potential Impacts

In addition to the above identified direct and indirect impacts of future climate conditions on the identified major hazards areas, there are other potential societal impacts which include:

- Increase in demand for energy during the summer (air conditioning).
- Decrease in demand for energy during the winter (heating).
- Decrease in culturally significant animal and plant life in tribal communities.

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