WEBSTER COUNTY

HAZARD MITIGATION PLAN



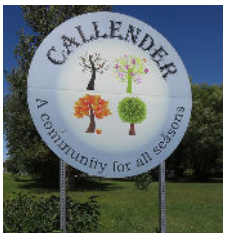


2026























Webster County
Hazard Mitigation Plan 2026

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List of Acronyms

ACS – American Community Survey
BRIC – Building Resilient Infrastructure and Communities
CBRNE – Chemical, Biological, Radioactive, Nuclear or Explosive materials
CDC – Centers for Disease Control and Prevention
CF – Cubic Feet
CFR – Code of Federal Regulations
CRS – Community Rating System
CWPP – Community Wildfire Protection Plans
DMA 2000 – Disaster Mitigation Act of 2000
EAB – Emerald Ash Borer
EAP – Emergency Action Plan
EMA – Emergency Management Agency
EPA – Environmental Protection Agency
ESL – English as a Second Language
FBI – Federal Bureau of Investigation
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
FMA – Flood Mitigation Assistance Program
FR – FEMA's Final Rule
GIS – Geographic Information Systems
HMA – Hazard Mitigation Assistance
HMGP – Hazard Mitigation Grant Program
HMP – Hazard Mitigation Plan
HPRCC – High Plains Regional Climate Center
HSEMD – Iowa Department of Homeland Security and Emergency Management
IDALS – Iowa Department of Agriculture & Land Stewardship
IDNR – Iowa Department of Natural Resources
HUD – Housing and Urban Development
JEO – JEO Consulting Group, Inc.
LGA – Liquid Gallons
NCEI – National Centers for Environmental Information
NDMC – National Drought Mitigation Center
NFIP – National Flood Insurance Program
NOAA – National Oceanic and Atmospheric Administration
NRC – National Response Center
NWS – National Weather Service
PDSI – Palmer Drought Severity Index
PHMSA – U.S. Pipeline and Hazardous Material Safety Administration
PPE – Personal Protective Equipment
Risk MAP – Risk Mapping, Assessment, and Planning
RMA – Risk Management Agency
SBA – Small Business Administration
SPIA – Sperry-Piltz Ice Accumulation Index
START – National Consortium for the Study of Terrorism and Responses to Terrorism
TORRO – Tornado and Storm Research Organization
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USGS – United States Geological Survey
WHO – World Health Organization
WMD – Weapons of Mass Destruction
WUI – Wildland Urban Interface

Executive Summary

Introduction

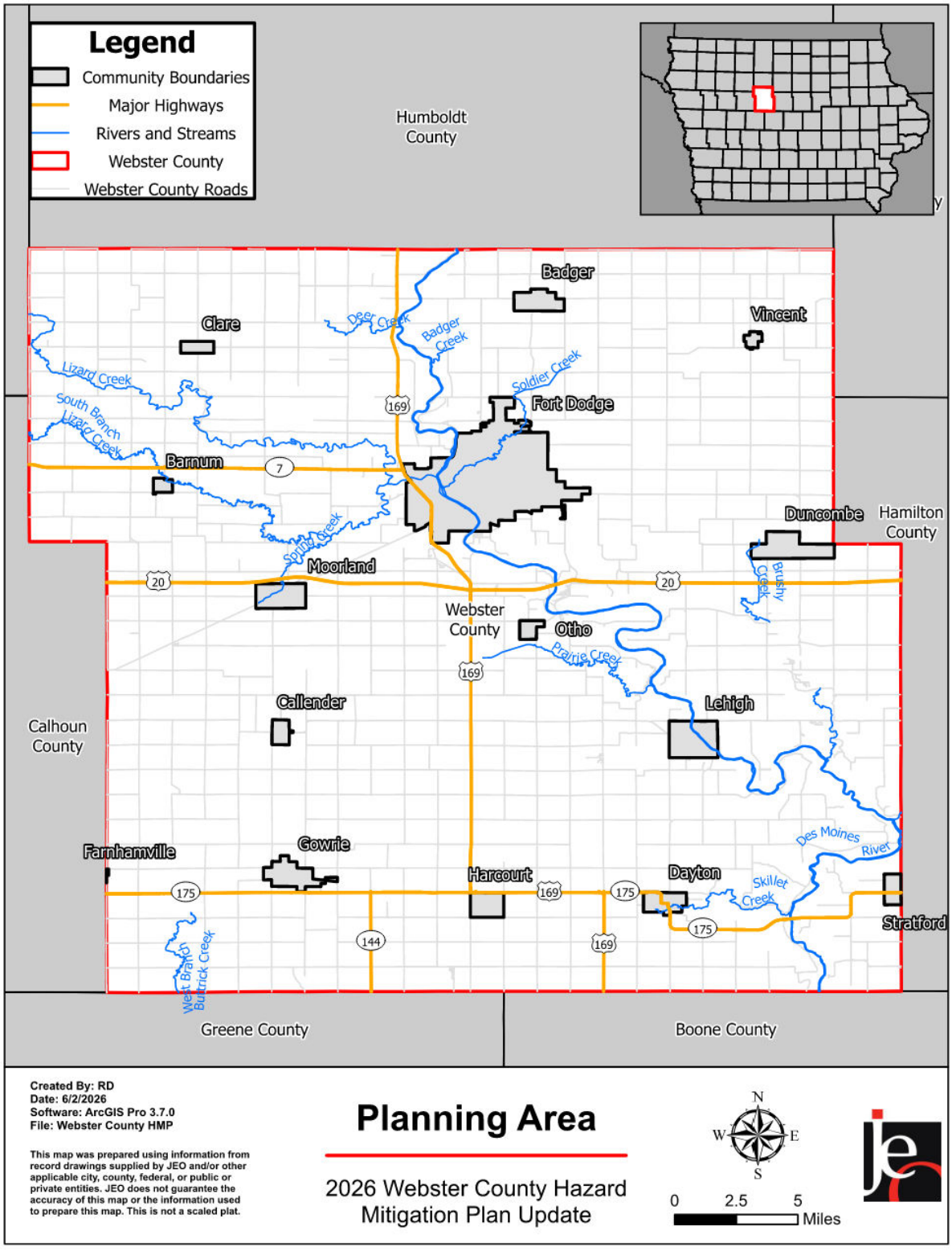
This plan is an update to the Webster County Hazard Mitigation Plan (HMP) approved in 2020. The plan update was developed in compliance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000).

Hazard mitigation planning is a process in which hazards are identified and profiled; people and facilities at-risk are identified and assessed for threats and potential vulnerabilities; and strategies and mitigation measures are identified. Hazard mitigation planning increases the ability of communities to effectively function in the face of natural and human-caused disasters. The goal of the process is to reduce risk and vulnerability, in order to lessen impacts to life, the economy, and infrastructure. Plan participants are listed in the following table and illustrated in the following planning area map.

Table 1: Participating Jurisdictions

Participating Jurisdictions	
Webster County	City of Fort Dodge
City of Badger	City of Gowrie
City of Barnum	City of Harcourt
City of Callender	City of Lehigh
City of Clare	City of Moorland
City of Dayton	City of Otho
City of Duncombe	City of Vincent
Special Districts	
Fort Dodge Community School District	Southwest Valley Community School District
Iowa Central Community College	

Figure 1: Project Area



Goals

The potential for disaster losses and the probability of occurrence of natural and human-caused hazards present a significant concern for the jurisdictions participating in this plan. The driving motivation behind this hazard mitigation plan is to reduce vulnerability and the likelihood of impacts to the health, safety, and welfare of all citizens in the planning area. To this end, the Hazard Mitigation Planning Team reviewed and approved goals which helped guide the process of identifying both broad-based and community-specific mitigation strategies and projects that will, if implemented, reduce their vulnerability and help build stronger, more resilient communities.

Goals from the 2020 HMP were reviewed and consolidated to primary themes which best represented the current priorities of the Emergency Management Commission and participating jurisdictions. Jurisdictions that participated in this plan update agreed that the goals identified by the Commission would be utilized for the 2026 plan.

The goals for this plan update are as follows:

Goal 1: Protect Health and Safety of Residents
Goal 2: Protect Infrastructure
Goal 3: Improve Emergency Management and Response Capacity
Goal 4: Increase Awareness and Education of Hazards
Goal 5: Reduce Future Hazard Risk through Planning and Implementation

Summary of Changes

The 2026 Webster County Hazard Mitigation Plan underwent numerous changes during the plan update from 2020 to best accommodate the planning area, local capacity, and updated regulatory requirements at both state and federal levels. Changes to the 2020 HMP and planning process were discussed at planning team meetings throughout the process (Kick-off, Round 1, and Round 2) and were based on currently available data where applicable. A summary of changes included, but were not limited to, the following:

- **Updated HMP Goals**
- **Hazard Identification**
  - Removal of following hazards: Earthquake, Expansive Soils, Pandemic Human Disease, Infrastructure Failure, and Transportation Incident
  - Addition of Sinkholes and Extreme Temperatures (previously only Extreme Heat)
- **Risk Assessment** – separation between natural and man-made hazards in risk assessment and in jurisdiction specific profiles
- **Mitigation Strategy** – updated strategies to be specific to each hazard identified in HMP
- **Plan Overall** – updated HMP outline and structure to provide regional overview and risk assessment (Upfront) and community specific profiles of capabilities, data, risks, and strategies

This update also works to unify the various planning mechanisms in place throughout the participating communities (i.e., comprehensive plans, local emergency operation plans, zoning ordinances, building codes, etc.) to ensure that the goals and objectives identified in those planning mechanisms are consistent with the strategies and projects included in this plan. Additional changes and a summary of the planning process are described in *Section Two: Planning Process*.

Mitigation Strategies and Plan Implementation

There are a wide variety of strategies that can be used to reduce the impacts of hazards for the built environment and planning area residents. *Section Five: Mitigation Strategy* shows the mitigation and strategic actions chosen by the participating jurisdictions to assist in preventing future losses. To build upon prior successes and continue implementation of mitigation and strategic projects, despite limited resources, communities will need to continue relying upon multi-agency coordination as a means of leveraging resources. Communities across the region have been able to work with a range of entities to complete projects; potential partners for future project implementation include but are not limited to: Iowa Department of Homeland Security and Emergency Management (HSEMD), Iowa Department of Transportation (IDOT), Iowa Department of Natural Resources (IDNR), United States Department of Agriculture (USDA), and United States Army Corps of Engineers (USACE).

Hazard Profiles

The hazard mitigation plan includes a description of the hazards considered, including a risk and vulnerability assessment. Data considered during the risk assessment process included: historic occurrences and recurrence intervals; historic losses (physical and monetary); impacts to the built environment (including privately-owned structures as well as community lifelines); and the local risk assessment. The following tables provide an overview of the risk assessment for each hazard profiled and the losses associated with each hazard. See *Section Four: Risk Assessment* for further discussion of counts, probabilities, and likely extent.

Natural Hazards	Other / Man-Made Hazards
Drought	**Animal/Crop/Plant Disease**
Extreme Temperatures	**Dam Failure**
Flooding (Flash and Riverine)	**Hazardous Materials**
Grass Fire or Wildland Fire	**Terrorism / Cyberattack**
Severe Winter Storms	
Sinkholes	
Thunderstorms: Lightning & Hail	
Tornado/Windstorm	

Table 2: Regional Risk Assessment

Hazard	Previous Occurrences	Approximate Annual Probability*	Likely Extent
Drought	464 out of 1,577 months	464/1,577 = 29.4%	D1-D4
Extreme Temperatures	Cold: Avg 7 days/year	98%	Max Temp ≤10°F
	Heat: Avg 1 day/year	34%	Max Temp ≥100°F
Flooding	157	80%	Some inundation of structures. Some evacuations of people may be necessary.
Grass/Wildland Fire	55	83%	Average approximately 4.2 acres among records with size information Some homes and structures threatened or at risk
Severe Winter Storms	95	100%	Between 1-11” snow
Sinkholes	Unknown	Unable to determine	-
Thunderstorms: Lightning & Hail	480	30/30= 100%	>0.5” rainfall; >1”hail Avg 59 mph winds
Tornado and Windstorm	Tornadoes: 45	50%	Mode: EF1 Range: EF0-EF/F3
	Windstorms: 47	80%	Avg: 48 mph Range 45-52 mph
Animal/Crop/Plant Disease	Plant: 23; Animal: unavailable	Plant: 100%; Animal: unavailable	
Dam Failure	0	< 1%	Varies by structure
Hazardous Materials Release	Fixed Site Spill: 361	97%	Avg Liquid Spill: 61 gal. Avg Gas Spill: 1,718 lbs.
	Transportation Spill: 41	81%	Average liquid spill: 515 gal.
Terrorism/Cyberattack	Unknown	Unable to determine	-

** Annual Probability = Total Years with an Event Occurrence / Total Years of Record*

The following table provides loss estimates for hazards with sufficient data. Descriptions of major events are included in *Section Four: Risk Assessment.*

Table 3: Hazard Loss Estimates for the Planning Area

Hazard Type		Count	Property	Crop
Drought		464 out of 1,577 months	N/A	$70,215,077
Extreme Temperatures	Extreme Cold	Avg 7 days per year	$0	$84,678
	Extreme Heat	Avg 1 days per year	$135,000	$1,415,662
Flooding	Flash Flood	56	$4,500,000	$390,402
	Flood	101	$6,163,570	
Grass Fire or Wildland Fire		55	225.4 acres burned	$0
Severe Winter Storms	Blizzard	27	$525,000	$1,224,312
	Heavy Snow	26	$181,000	
	Ice Storm	11	$1,168,330	
	Winter Storm	30	$509,900	
	Winter Weather	1	$0	
Sinkholes		N/A	N/A	N/A
Thunderstorms	Hail	202	$1,978,700	$10,349,700
	Heavy Rain	111	$100,000	$42,981,937
	Lightning	3	$108,000	N/A
	Thunderstorm Wind	164	$2,698,000	N/A
Tornadoes & Windstorms	Tornado	45	$1,244,200	$13,000
	Windstorm	47	$1,871,110	$1,123,995
Animal/Crop/Plant Disease		23	N/A	$160,452
Dam Failure		N/A	N/A	N/A
Hazardous Materials	Fixed Site[3]	361	$139,000	N/A
	Transportation[4]	41	$73,501	N/A
Terrorism/Cyberattack		Unknown	Not available	N/A
Totals		**1,301**	**$21,395,311**	**$127,946,215**

N/A: Data not available
1 - NCEI, Jan 1996-May 2026
2 - USDA RMA, 2000-2025
3 - NRC, 1990-May 2026
4 - PHMSA, 1971-2025
5 - Association of State Dam Safety Officials, 1800-2025
6 - NIFC, 2020-2025
7 - High Plains Regional Climate Center, 1893-2025

Events like severe thunderstorms and severe winter storms will occur annually. Other hazards like dam failure, sinkholes, and terrorism will occur less often. The scope of events and how they will manifest themselves locally is not known regarding hazard occurrences. Historically, drought, flooding, severe thunderstorms, severe winter storms, and tornadoes/windstorms have resulted in the most significant damages within the planning area. Current trends show an increase in event magnitude and a higher number of occurrences for several hazards, as will be explained in *Section Four: Risk Assessment*.

Section One: Introduction

Hazard Mitigation Planning

Severe weather and hazardous events are occurring more frequently in our daily lives. Pursuing mitigation strategies reduces these risks and is socially and economically responsible to prevent long-term risks from natural and human-caused hazard events.

Natural hazards, such as severe winter storms, high winds and tornadoes, severe thunderstorms, flooding, extreme heat, drought, agriculture diseases, and wildfires are part of the world around us. **Human-caused (man-made) hazards** are a product of society and can occur with significant impacts to communities. Human-caused hazards occur as a part of normal operation or as a result of human error.

FEMA definition of Hazard Mitigation

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from [natural] hazards."

For the purpose of this Hazard Mitigation Plan the profiled hazards are divided as such:

- Natural Hazards: Drought, Extreme Temperatures, Flooding, Grass Fire or Wildland Fire, Severe Winter Storms, Sinkholes, Thunderstorms (Lightning & Hail), and Tornado/Windstorm
- Man-made Hazards: Animal/Crop/Plant Disease, Dam Failure, Hazardous Materials, Terrorism/Cyberattack

All jurisdictions participating in this planning process are vulnerable to a wide range of natural and human-caused hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property, cause environmental degradation, and disrupt the local economy and overall quality of life.

Webster County has prepared this multi-jurisdictional hazard mitigation plan in an effort to reduce impacts from natural and human-caused hazards and to better protect the people and property of the region from the effects of these hazards. This plan demonstrates a regional commitment to reducing risks from hazards and serves as a tool to help decision makers establish mitigation activities and resources. Further, this plan was developed to ensure the county and participating jurisdictions are eligible for federal Hazard Mitigation Assistance (HMA) programs and to accomplish the following objectives:

- Minimize the disruption to each jurisdiction following a disaster.
- Establish actions to reduce or eliminate future damage to efficiently recover from disasters.
- Investigate, review, and implement activities or actions to ensure disaster related hazards are addressed by the most efficient and appropriate solution.
- Educate citizens about potential hazards.

Disaster Mitigation Act of 2000

The U.S. Congress passed the Disaster Mitigation Act 2000 to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act[1]. Section 322 of the DMA 2000 requires that state and local governments develop, adopt, and routinely update a hazard mitigation plan to remain eligible for pre- and post-disaster mitigation funding.[2] These funds currently include the Hazard Mitigation Grant Program (HMGP)[3], Building Resilient Infrastructure and Communities (BRIC)[4], and the Flood Mitigation Assistance Program (FMA)[5]. The Federal Emergency Management Agency (FEMA) administers these programs under the Department of Homeland Security.[6]

This plan was developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The plan shall be monitored and updated on a routine basis to maintain compliance with the legislation – Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the DMA 2000 (P.L. 106-390)[7] and by FEMA's Final Rule (FR)[8] published in the Federal Register on November 30, 2007, at 44 Code of Federal Regulations (CFR) Part 201.

Hazard Mitigation Assistance

On June 1, 2009, FEMA initiated the Hazard Mitigation Assistance (HMA) program integration, which aligned certain policies and timelines of the various mitigation programs. These HMA programs present a critical opportunity to minimize the risk to individuals and property from hazards while simultaneously reducing the reliance on federal disaster funds.

Each HMA program was authorized by separate legislative actions, and as such, each program differs slightly in scope and intent.

Mitigation is the cornerstone of emergency management. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation lessens the impact disasters have on people's lives and property through damage prevention, appropriate development standards, and affordable flood insurance. Through measures such as avoiding building in damage-prone areas, stringent building codes, and floodplain management regulations, the impact on lives and communities is lessened.
- FEMA Mitigation Directorate

1 Federal Emergency Management Agency, Public Law 106-390. 2000. "Disaster Mitigation Act of 2000." https://www.fema.gov/sites/default/files/2020-11/fema_disaster-mitigation-act-of-2000_10-30-2000.pdf.
2 Federal Emergency Management Agency. 2021. "Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities." Federal Emergency Management Agency 592: 22. Sec. 322. Mitigation Planning (42 U.S.C. 5165). https://www.fema.gov/sites/default/files/documents/fema_stafford_act_2021_vol1.pdf.
3 Federal Emergency Management Agency. "Hazard Mitigation Grant Program." Last modified August 6, 2021. https://www.fema.gov/grants/mitigation/hazard-mitigation.
4 Federal Emergency Management Agency. "Building Resilient Infrastructure and Communities." Last modified December 1, 2021. https://fema.gov/bric.
5 Federal Emergency Management Agency. "Flood Mitigation Assistance Grant Program." Last modified August 6, 2021. https://www.fema.gov/flood-mitigation-assistance-grant-program.
6 Federal Emergency Management Agency. "Hazard Mitigation Assistance." Last modified September 30, 2021. https://www.fema.gov/grants/mitigation.
7 Federal Emergency Management Agency: Federal Register. 2002. "Section 104 of Disaster Mitigation Act 2000: 44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." https://www.fema.gov/pdf/help/fr02-4321.pdf.
8 Federal Emergency Management Agency: Federal Register. 2002. "44 CFR Parts 201 and 206: Hazard Mitigation Planning and Hazard Mitigation Grant Programs; Interim Final Rule." https://www.fema.gov/pdf/help/fr02-4321.pdf.

- **HMGP:** To qualify for post-disaster mitigation funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA. HMGP provides funds to states, territories, Indian tribal governments, local governments, and eligible private non-profits following a presidential disaster declaration. The DMA 2000 authorizes up to seven percent of HMGP funds available to a state after a disaster to be used for the development of state, tribal, and local mitigation plans.

- **FMA:** This program provides grant funds to implement projects such as acquisition or elevation of flood-prone homes. Jurisdictions must be participating communities in the National Flood Insurance Program (NFIP) to qualify for this grant. The goal of FMA is to reduce or eliminate claims under the NFIP.

- **BRIC:** This program replaced the Pre-Disaster Mitigation Program beginning in 2020 and provides funds on a semi-annual allocation basis to local jurisdictions for implementing programs and projects to improve resiliency and local capacity before disaster events.

- **PDM – Congressionally Directed Spending:** The PDM grant program makes federal funds available to state, local, tribal, and territorial governments to plan for and implement sustainable cost-effective measures. These mitigation efforts are designed to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding from future disasters.

- **FMAG:** Section 404 of the Stafford Act allows FEMA to provide HMGP grants to any area that received a Fire Management Assistance Grant declaration even if no major Presidential declaration was made. FMAG aids communities in implementing long-term mitigation measures after a wildfire event.

For more information about these grant programs and other funding opportunities to help implement identified mitigation actions see *Hazard Mitigation Project Funding Guidebook* appendix.

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Section Two: Planning Process

Introduction

The process utilized to develop a hazard mitigation plan is often as important as the final planning document. For this planning process, Webster County adopted the four-step hazard mitigation planning process outlined by FEMA to fit the needs of the participating jurisdictions. The following pages will outline how local Hazard Mitigation Planning Teams were established; critical project meetings and community representatives; outreach efforts to the general public; key stakeholders and neighboring jurisdictions; general information relative to the risk assessment process; general information relative to local/regional capabilities; plan review and adoption; and ongoing plan maintenance.

Requirement §201.6(b): Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

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

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

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

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

Multi-Jurisdictional Approach

According to FEMA, “A multi-jurisdictional hazard mitigation plan is a plan jointly prepared by more than one jurisdiction.” The term ‘jurisdiction’ means ‘local government.’ Title 44 Part 201, Mitigation Planning in the CFR, defines a ‘local government’ as “any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, any rural community, unincorporated town or village, or other public entity.” For the purposes of this plan, a ‘taxing authority’ was utilized as the qualifier for jurisdictional participation. FEMA recommends the multi-jurisdictional approach under the DMA 2000 for the following reasons.

- It provides a comprehensive approach to the mitigation of hazards that affect multiple jurisdictions.
- It allows economies of scale by leveraging individual capabilities and sharing cost and resources.

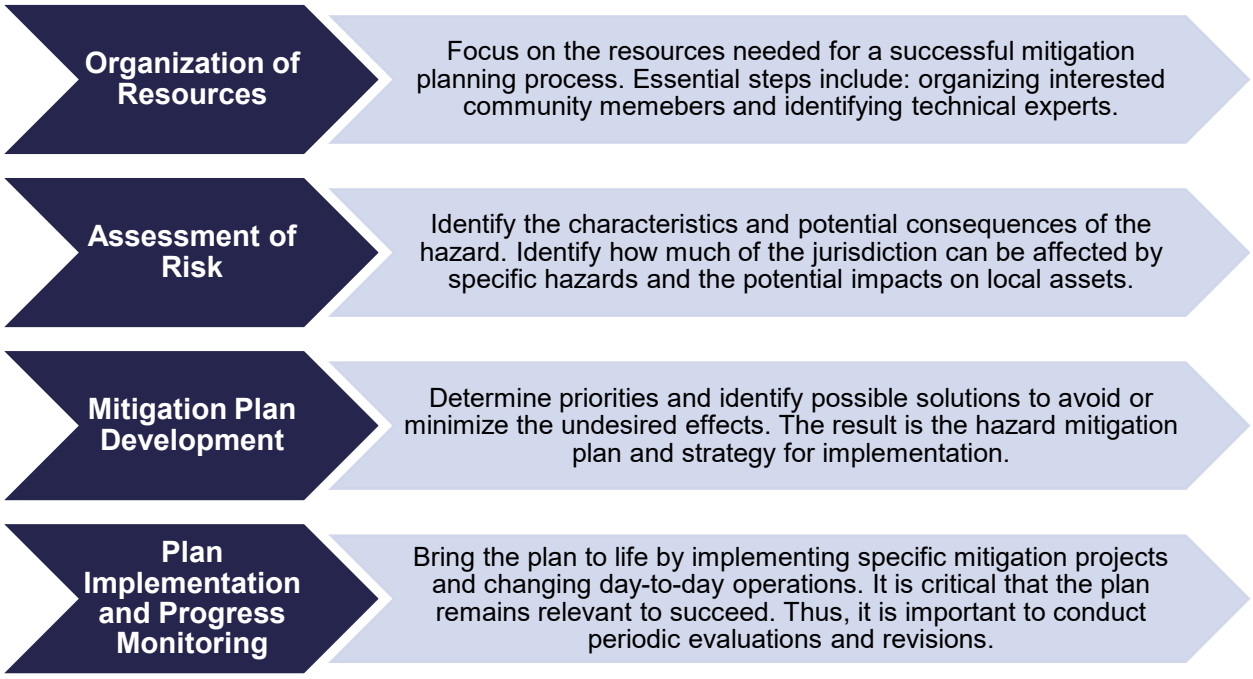
- It avoids duplication of efforts.
- It imposes an external discipline on the process.

For the Webster County Hazard Mitigation Plan, participants included the county, all incorporated cities within the county, educational institutions including the local community college and community school districts with facilities within the county, and local rural volunteer fire districts (non-community funded fire departments).

Both FEMA and HSEMD recommend this multi-jurisdictional approach through the cooperation of counties and regional emergency management. Webster County utilized the multi-jurisdiction planning process recommended by FEMA (Local Mitigation Planning Policy Guide[9], Local Mitigation Planning Handbook[10], and Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards[11]) to develop this plan.

Hazard Mitigation Planning Process

The hazard mitigation planning process as outlined by FEMA has four general steps which are detailed below. The mitigation planning process is rarely a linear process. It's common that ideas developed during the initial risk assessment may need revision later in the process, or that additional information may be identified while developing the mitigation plan or during plan implementation that results in new goals or additional risk assessments.



9 Federal Emergency Management Agency. April 19, 2022. "Local Mitigation Planning Policy Guide." https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf.

10 Federal Emergency Management Agency. May 2023. "Local Mitigation Planning Handbook." https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-handbook_052023.pdf..

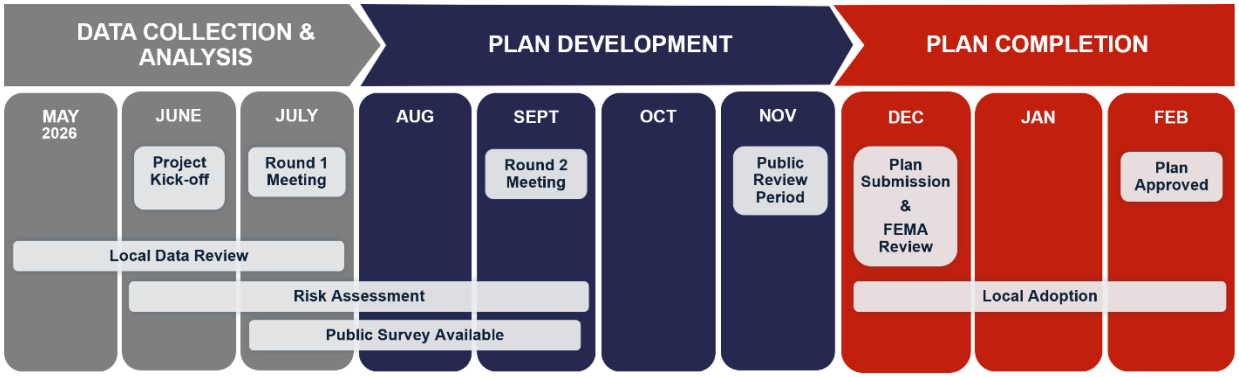
11 Federal Emergency Management Agency. 2013. "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards." https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf.

Participant Engagement and Involvement

Plan Update Process

The Webster County Emergency Management Agency funded this planning effort through an award from the FEMA Hazard Mitigation Grant Program. JEO Consulting Group, Inc. (JEO) was contracted to guide and facilitate the planning process and write and assemble the multi-jurisdictional hazard mitigation plan. For the planning area, Dylan Hagen with Webster County EMA led the development of the plan and served as the primary point of contact throughout the project. A clear timeline of this plan update process is provided below.

Figure 2: Project Timeline



Plan Engagement

Plan participants play a key role in identifying hazards, providing a record of historical disaster occurrences and localized impacts, identifying and prioritizing potential mitigation projects and strategies, and developing plan maintenance procedures. A plan participant is defined as a jurisdiction that fulfills the following requirements: have at least one representative present at the Round 1 and Round 2 meetings (or attend a follow-up meeting with a JEO planner); assist in data collection by completing worksheets; identify mitigation actions, review plan drafts; and adopt the plan by resolution.

Some jurisdictions sent multiple representatives to meetings. For jurisdictions who had only one representative, they were encouraged to bring meeting materials back to their governing bodies, to collect diverse input on their jurisdiction's meeting documents. Sign-in sheets from all public meetings can be found in *Appendix A*. Jurisdictions that were unable to attend the scheduled public meetings were able to watch a recording of the meetings or request a meeting with JEO staff to satisfy the meeting attendance requirements. This effort enabled jurisdictions which could not attend a scheduled public meeting to participate in the planning process.

Outreach to eligible jurisdictions included notification prior to all public meetings, phone calls and email reminders of upcoming meetings, and reminders to complete worksheets required for the planning process. The tables below provide a summary of participant outreach activities utilized in this process.

Table 4: Outreach Activity Summary

Action	Intent
Project Website	Informed the public and local/planning team members of past, current, and future activities (https://jeo.com/webster-county-ia-hazard-mitigation-plan/).
Press Release	Shared with Hazard Mitigation Planning Team and sent to local media outlets for dispersal.

Action	Intent
Round 1 Meeting Letters and Emails (30-day notification)	Sent to participants, stakeholders, and neighboring jurisdictions to discuss the agenda/dates/times/locations of the first round of public meetings.
Round 2 Meeting Letters and Emails (30-day notification)	Sent to participants to discuss the agenda/dates/times/locations of the second round of public meetings.
Follow-up Emails and Phone Calls	Correspondence was provided to remind and assist participating jurisdictions with the collection and submission of required local data.
Project Flyer	Flyers were posted about the Webster County HMP and how to get involved. Flyers were shared with all Hazard Mitigation Planning team members to distribute.
Word-of-Mouth	Staff discussed the plan with jurisdictions throughout the planning process.
Social Media	Social media posts were shared by participating jurisdictions to notify community members of the plan update and project survey to provide input.

Notifying and engaging the public was conducted throughout the plan drafting process. All meeting dates, times, and locations were posted online on the project website. A press release about the process was shared on local social media sites and to local news outlets. Project flyers were shared with local planning team representatives and were posted at community hubs including local post offices, city hall buildings, local libraries, and coffee shops. Participating jurisdictions also discussed and reviewed HMP materials at local council meetings which are open to the public.

Kick-off Meeting

At the beginning of the planning process, Webster County Emergency Management and JEO staff held a HMP Kick-off Meeting with identified decision makers across eligible jurisdictions including the Emergency Management Agency Commission members, community leaders, and local EMS representatives. Preliminary discussion was held over hazards to be included in this plan, changes to be incorporated since the last plan, goals, identification of key stakeholders to include in the planning process, and a general schedule for the plan update. This meeting also assisted in clarifying the role and responsibilities of the Hazard Mitigation Planning Team and strategies for public engagement throughout the planning process.

Table 5: Kick-off Meeting Location and Time

Location and Time	Agenda Items
Fort Dodge, Iowa June 18, 2026 6:00 PM	-Consultant, sponsor, and planning team responsibilities -Overview of plan update process and changes from 2020 HMP -Review and adoption of goals -Plan goals -Hazard identification -Engagement strategies -Project schedule and dates/locations for public meetings

Table 6: Kick-off Meeting Attendees

Name	Title	Jurisdiction
Austin Hayek	County Board Supervisor	Webster County
Brian Hitchcock	Director of Communication	Webster County
Bruce Towne	Mayor	Gowrie
Carol Etzel	Citizen	Fort Dodge

Name	Title	Jurisdiction
Christy Bower	City Clerk	Barnum & Clare
Denny Stuhrenberg	Councilman	Clare
Dylan Hagen	EMA Director	Webster County
Mateo Luna	Mayor	Callender
Michael Devine	Messenger Newspaper	Fort Dodge
Sara Pieper	City Clerk	Dayton
Shawn George	Fire Chief	Callender
Teresa Larsan-White	Council Member	Badger
Becky Appleford	Senior Planner	JEO Consulting Group, Inc.

Round 1 Meeting

At the Round 1 meeting, jurisdictional representatives (i.e., the local planning teams) reviewed draft profiles including key information such as:

- overview of local capabilities and resources,
- critical facility/community lifeline updates,
- community specific hazard risk and vulnerability summaries, and
- updates to prior mitigation and resiliency actions.

Table 7: Round 1 Meeting Date and Location

Agenda Items	
General overview of the HMP update process, discuss participation requirements, begin the process of risk assessment and impact reporting, update critical facilities, capabilities assessment, and status update on current mitigation and strategic projects	
Location and Time	**Date**
Iowa Central EAST Campus 2031 Quail Ave Fort Dodge IA 50501	Thursday, July 23rd at 6:00pm

The intent of this meeting was to familiarize local planning team members with the plan update process, expected actions for the coming months, the responsibilities of being a participant, and to collect preliminary information to update the HMP. The following tables show the attendees for each jurisdiction who attended a Round 1 meeting.

Table 8: Round 1 Meeting Attendees

Name	Title	Jurisdiction
Bob Thode	County Supervisor	Webster County
Bruce Towne	Mayor	Gowrie
Carol Etzel	Stakeholder	Fort Dodge
Christy Bower*	City Clerk	Barnum & Clare
Dennis Quinn	Chief of Police	Fort Dodge
Denny Stuhrenberg	Councilman	Clare
Dylan Hagen	EMA Director	Webster County
Jenny Stuhrenberg	Councilman	Clare
Jordan Frakes	Mayor	Vincent
Lynda Law	City Clerk	Duncombe
Mateo Luna	Mayor	Callender
Matt Price*	Fire Chief	Fort Dodge
Mauren Hainzinger	City Council	Dayton
Mike McFarland	Fire Chief/Councilman	Clare
Myles Askvig	Asst. Fire Chief	Vincent

Name	Title	Jurisdiction
Ryan Boge	Fire Chief	Harcourt
Sara Pieper	City Clerk	Dayton
Shawn George	Fire Chief	Callender
Teresa Larsan-White	Council Member	Badger
Travis Roach	City Council	Otho
Zach Trent	Mayor	Duncombe
Becky Appleford	Senior Planner	JEO Consulting Group, Inc.
Ryan Durst	Planner	JEO Consulting Group, Inc.

**Attended virtually or watched the recording.*

Round 2 Meeting

At the Round 2 meeting, jurisdictional representatives (i.e., the local planning teams) reviewed draft profiles including key information such as:

- review previously collected information for accuracy;
- detail future development plans;
- detail plan maintenance strategies;
- review and integrate applicable plans, studies, or ordinances; and
- identification of new or expanded mitigation strategies.

Table 9: Round 2 Meeting Date and Location

Agenda Items	
Identify new mitigation and strategic actions, future development trends, plans and studies integration, review of local data and community profile, discuss review process, and discuss available grants and eligibility.	
Location and Time	**Date**
Iowa Central EAST Campus 2031 Quail Ave Fort Dodge IA 50501	Thursday, September 10th, at 6:00pm

There was also a brief discussion about the planning process, when the plan would be available for public review and comment, annual review of the plan, and the approval and grant opportunities available once the plan was approved. As with the Round 1 meeting, any jurisdictions unable to attend were given the opportunity to have a one-on-one phone conference with the consultant or view a recording of the meeting in order to meet plan participation requirements and complete required information.

Table 10: Round 2 Meeting Attendees

Name	Title	Jurisdiction
Bob Thode	County Supervisor	Webster County
Bruce Towne	Mayor	Gowrie
Christy Bower*	City Clerk	Barnum & Clare
Dennis Quinn	Chief of Police	Dodge
Denny Stuhrenberg	Councilman	Clare
Dylan Hagen	EMA Director	Webster County
Glenda Rasmussen	City Clerk	Webster County
Jordan Frakes	Mayor	Vincent
Lisa Klatt	Mayor	Harcourt
Lynda Law	City Clerk	Duncombe
Mateo Luna	Mayor	Callender
Matt Price*	Fire Chief	Fort Dodge

Name	Title	Jurisdiction
Michael Krog	Fire Fighter	Vincent
Mike McFarland	Fire Chief/Councilman	Clare
Shawn George	Fire Chief	Callender
Travis Roach	City Council	Otho
Tyler Johnson*	Director of Student Safety	Southeast Valley Schools
Corey Rutherford	City Council	Vincent
Kim Leeds*	Clerk	Stratford
Becky Appleford	Senior Planner	JEO Consulting Group, Inc.
Samantha Huebner*	Community Engagement Specialist	JEO Consulting Group, Inc.

**Attended virtually or watched the recording.*

Public Involvement and Outreach

To notify and engage the public in the planning process, a wide range of stakeholder groups were also contacted and encouraged to participate. Any comments these stakeholders provided were incorporated into the appropriate sections throughout the HMP upfront and community profiles as appropriate. (see *Section Seven*).

The table below categorizes the stakeholders who were invited to participate in the planning process, how they were invited, whether they participated, and if they provided information for the hazard mitigation plan update.

Table 11: Stakeholder Participation

Stakeholder		Category	Invitation Method	Participated?
Local Organizations	Fort Dodge Regional Airport	Airport	Email	Invited – no response
	Webster County Health Department	Public Health Agency	Email	Invited – no response
	St. Edmond Catholic School	Private School	Email	Invited – no response
	Community Christian School	Private School	Email	Invited – no response
	St. Paul Lutheran School	Private School	Email	Invited – no response
State/Regional Organizations	UnityPoint Health – Trinity Regional Medical Center	Hospital	Email	Invited – no response
	Community Health Center of Fort Dodge	Community Health Center	Email	Invited – no response
Private/Employers	The Messenger	Newspaper	Email	Attended meetings
	Marian Home & Village	Senior Living and Long-Term Care Facility	Email	Invited – no response
	Friendship Haven	Senior Living and Long-Term Care Facility	Email	Invited – no response
	Bickford of Fort Dodge	Senior Living Facility	Email	Invited – no response
Non-Profi	Habitat for Humanity of North Central Iowa	Housing Organization	Email	Invited – no response

Stakeholder		Category	Invitation Method	Participated?
	The Salvation Army – Fort Dodge	Emergency Assistance and Social Services Organization	Email	Invited – no response
	United Way of Greater Fort Dodge	Community Support Organization	Email	Invited – no response
	Fort Dodge Community Foundation	Community Foundation	Email	Invited – no response
	American Red Cross – Northwest Iowa Chapter	Disaster Relief Organization	Email	Invited – no response
	Heartland Hope & Homes	Housing Organization	Email	Invited – no response
	Upper Des Moines Opportunity	Community Support Organization	Email	Invited – no response
	Lord's Cupboard Community Pantry	Food Pantry	Email	Invited – no response
Emergency Response Groups	Callender Fire Department	Local Volunteer Fire Department	Email	Attended Meetings
	Badger Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Clare Fire Department	Local Volunteer Fire Department	Email	Attended Meetings
	Dayton Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Duncombe Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Harcourt Fire Department	Local Volunteer Fire Department	Email	Attended Meetings
	Moorland Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Vincent Fire Department	Local Volunteer Fire Department	Email	Attended Meetings
	Otho Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Barnum Fire Department	Local Volunteer Fire Department	Email	Invited – no response
	Stratford Fire Department	Local Volunteer Fire Department	Email	Invited – no response

Neighboring Jurisdictions

Neighboring jurisdictions were notified and invited to take part in the planning process. The following table indicates which neighboring entities were notified of the planning process. Invitation and informational letters were sent to county emergency managers.

Table 12: Notified Neighboring Jurisdictions

Notified Neighboring Jurisdictions	
Boone County Emergency Management	Humboldt County Emergency Management
Calhoun County Emergency Management	Pocahontas County Emergency Management
Greene County Emergency Management	Wright County Emergency Management
Hamilton County Emergency Management	

Public Survey

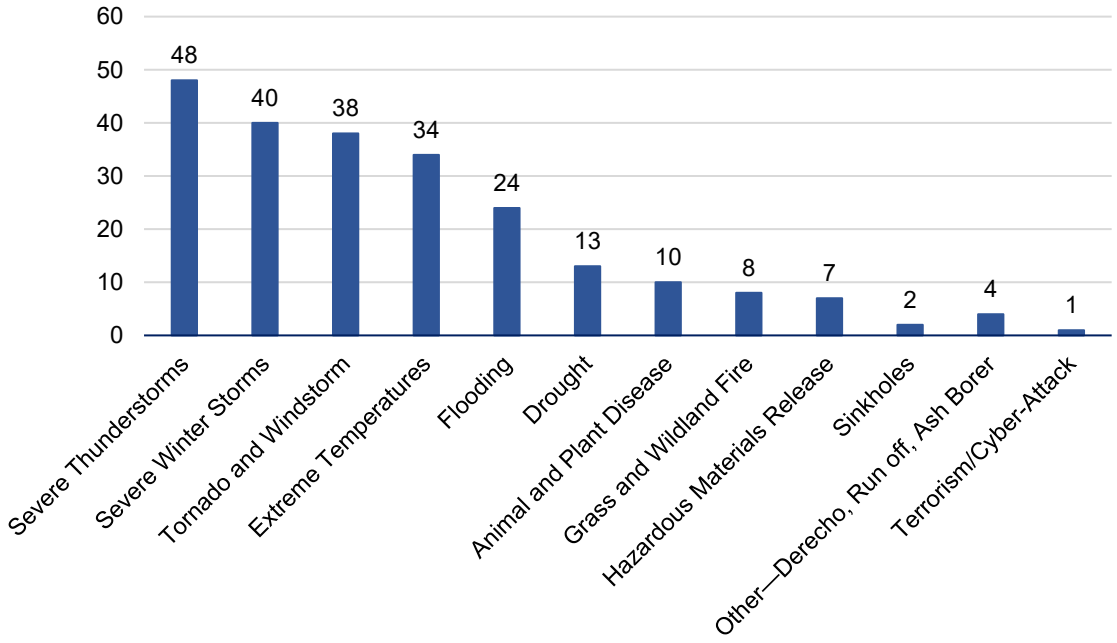
The general public was encouraged to take part in the planning process through a public survey that was available on the project website. The survey was available from June 23rd, 2026 until September 30th, 2026. Questions in the survey covered previous experiences of identified hazards, concern levels for each identified hazard, areas of importance when preparing for a disaster, and what projects could improve risk reduction in communities. There were 50 responses from the survey.

Table 13: Communities Represented in the Public Survey

Represented Communities	
Webster County	City of Badger
City of Callender	City of Dayton
City of Duncombe	City of Fort Dodge
City of Gowrie	City of Harcourt
City of Lehigh	City of Moorland
City of Otho	--

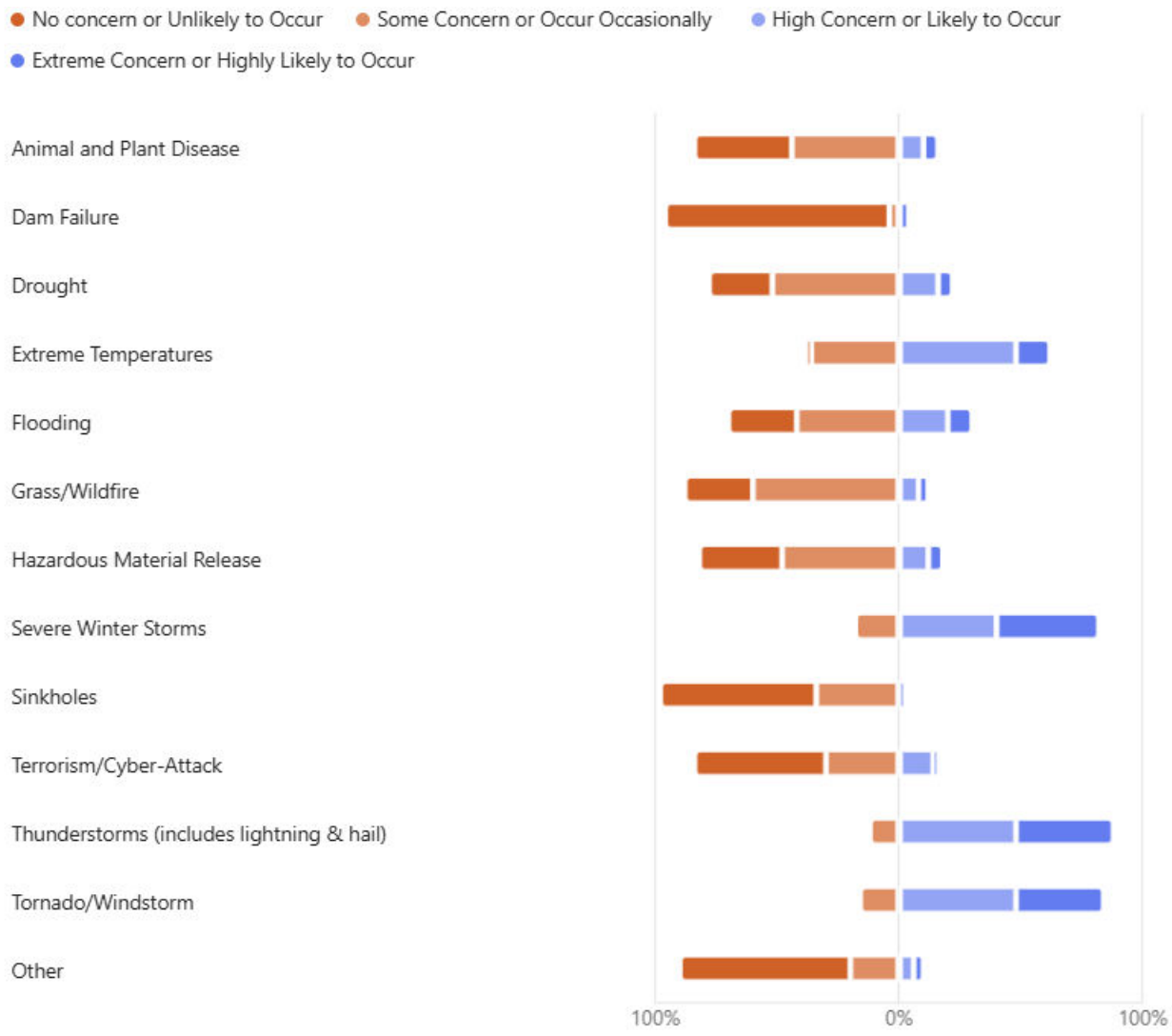
The overall respondent results are summarized below. Specific concerns or comments can be found in the Community Profiles, as appropriate. Based on responses, the most commonly experienced hazard events for residents are Severe Thunderstorms, Severe Winter Storms, and Tornadoes and Windstorms.

Figure 3: Most Common Hazards Experienced



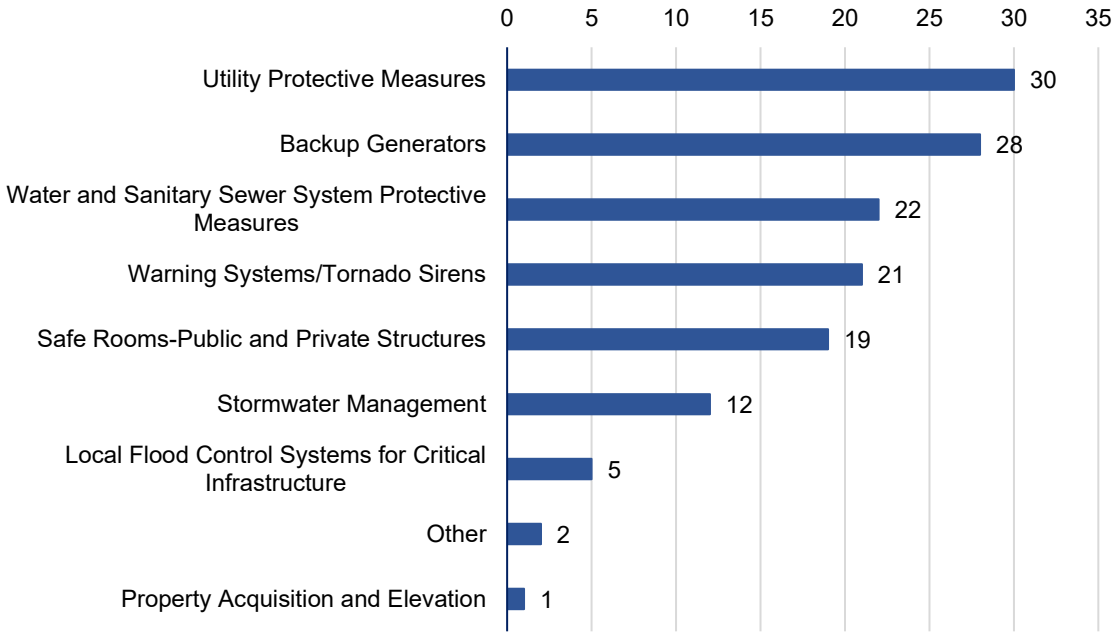
Respondents were also asked to rank their level of concern regarding the hazards listed above in their jurisdiction. The hazard with the most extreme concern was Thunderstorms (including lightning and hail). The hazard with the least amount of concern was Sinkholes.

Figure 4: Level of Concern for Each Hazard



Respondents were asked which projects would be most important for their community to reduce risk and be more resilient. The most important ones identified included utility protective measures, backup generators, and water and sanitary sewer protective measures.

Figure 5: Most Important Mitigation Projects



Lastly, respondents were asked what one thing they would like their community to do to help reduce risk to natural disasters or severe weather events in the future. A common theme in the open-ended responses was the need to update and improve backup power, critical infrastructure, and the various communication and alert systems during hazardous events. For additional survey results and details, see the *Public Survey Results* appendix.

Public Review

Once the HMP draft was completed, a public review period was opened to allow both local planning teams and community members at large to review the plan, provide comments, and request changes.

The public review period was open from November 1st through November 30, 2026. Participating jurisdictions and additional stakeholders were emailed or mailed a letter notifying them of this public review period. A list of the stakeholders notified can be found in Table 14. The draft HMP was also made available on the project website (https://jeo.com/webster-county-ia-hazard-mitigation-plan/) for download. Jurisdictions and the public could provide comments via mail, email, or by using a comment box on the project website.

Communities were encouraged to share or post information about the public review period to local websites and through local news media. A press release about the public review period was also distributed by County Emergency Management to media outlets.

Table 14: Stakeholders Notified about Public Review

Notified Stakeholders		
UnityPoint Health – Trinity Regional Medical Center	Marian Home & Village	UnityPoint Health – Trinity Regional Medical Center
Fort Dodge Regional Airport	Habitat for Humanity of North Central Iowa	Fort Dodge Regional Airport

Catholic Charities	Upper Des Moines Opportunity	Catholic Charities
The Salvation Army – Fort Dodge	United Way of Greater Fort Dodge	The Salvation Army – Fort Dodge
Fort Dodge Community Foundation	St. Edmond Catholic School	Fort Dodge Community Foundation
Community Health Center of Fort Dodge	American Red Cross – Northwest Iowa Chapter	Community Health Center of Fort Dodge
Fort Dodge Community Foundation	Community Christian School	Fort Dodge Community Foundation
Friendship Haven	Webster County Health Department	Friendship Haven
Heartland Hope & Homes	St. Paul Lutheran School	Heartland Hope & Homes
Lord's Cupboard Community Pantry	Bickford of Fort Dodge	Lord's Cupboard Community Pantry

Summary of Public Review Comments

To be completed after public review period.

COMMENT RECEIVED FROM	COMMENT	WAYS ADDRESSED

Plan Adoption and Implementation

Based on FEMA requirements, this multi-jurisdictional hazard mitigation plan must be formally adopted by each participant through approval of a resolution. This approval will create individual ownership of the plan by each participant. Formal adoption provides evidence of a participant's full commitment to implementing the plan's goals and action items. A copy of the resolution draft submitted to participating jurisdictions is located in *Appendix A*. Copies of adoption resolutions may be requested from the HSEMD's State Hazard Mitigation Officer.

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

Hazard mitigation plans are living documents. Once an HMP has been adopted locally, participants are responsible for implementing identified projects, maintaining the plan with relevant information, and fully updating the plan every five years. The plan must be monitored, evaluated, and updated at minimum every five years. Those who participated directly in the planning process would be logical champions during reviews between the five-year cycle update

of the plan. It is critical that the plan be reviewed at regular intervals and when a hazard event occurs that significantly affects the area or individual participants. These reviews are the responsibility of each jurisdiction's local planning team and should be documented and reflected in the plan. Participants are encouraged to work alongside the plan sponsor, Webster County EMA, or the consultant, JEO, to document updates and revise the HMP as needed. See *Section Six: Plan Implementation and Maintenance* for additional information on plan amendments. See the individual participant profiles for additional information on the planning participation.

Summary of Participation

Jurisdiction	Kickoff	Round 1	Round 2	Review Plan Draft	Plan Adoption
Webster County	X	X	X		
City of Badger		X	X		
City of Barnum	X	X	X		
City of Callender	X	X	X		
City of Clare	X	X	X		
City of Dayton	X	X	X		
City of Duncombe		X	X		
City of Fort Dodge	X	X	X		
City of Gowrie	X	X	X		
City of Harcourt		X	X		
City of Lehigh			X		
City of Moorland			X		
City of Otho		X	X		
City of Vincent		X	X		
Fort Dodge Community School District		X	X		
Southeast Valley Community School District		X			
Iowa Central Community College		X			

An X denotes that the participant attended the meeting or reviewed the recording and filled out the appropriate worksheet to participate.

Section Three: County Overview

Introduction

To identify jurisdictional vulnerabilities, it is vitally important to understand the people and built environment of the county. The following section provides a description of the characteristics of the county to create an overall profile. This section highlights high-level county specific data which may apply to all jurisdictions participating in the Webster County Hazard Mitigation Plan.

County Geographic Summary

The project area comprises Webster County, which is located in central Iowa. The county covers 718 square miles. There are 13 incorporated communities in the county, with the City of Fort Dodge being the county seat. Webster County resides entirely within the Des Moines Lobe landform of Iowa (Figure 6).

Webster County lies almost entirely within the Middle Des Moines Watershed and the North Raccoon watershed. The Des Moines River bisects the county from the northernmost border through Fort Dodge and exits the county at the most southeastern corner. The Des Moines River, Dolliver Memorial State Park, and Brushy Creek State Recreation Area are the most dominant natural resource features.

Climate data is helpful in determining if certain events are higher or lower than normal. For example, if the high temperatures in the month of July are running well into the 90s, high heat events may be more likely which could impact vulnerable populations.

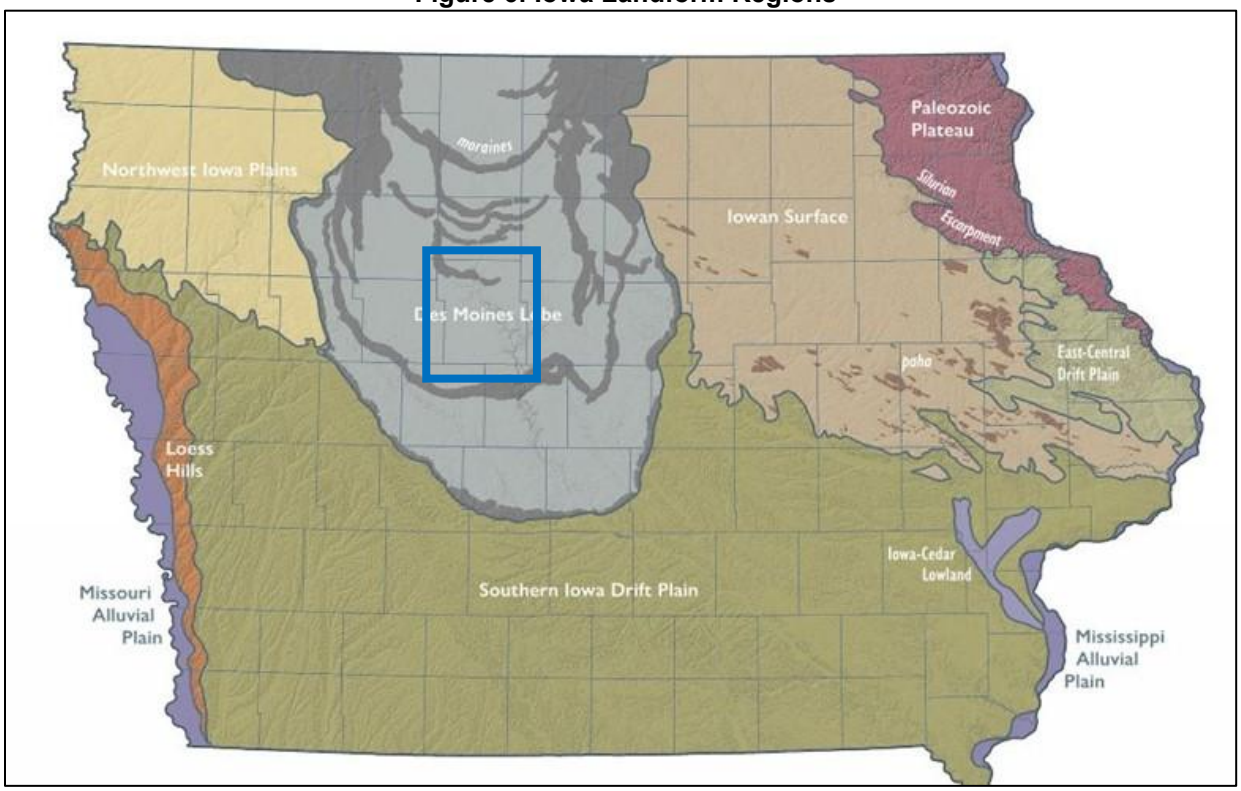
Table 15: Webster County Climate

	Webster County
July Normal High Temp	82.7 °F
January Normal Low Temp	7.4 °F
Annual Normal Precipitation	35 inches
Annual Normal Snowfall	39 inches

Source: NCEI U.S. Climate Normals[12],
Precipitation includes all rain and melted snow and ice.

12 National Centers for Environmental Information. "1991-2020 U.S. Climate Normals." https://www.ncei.noaa.gov/access/us-climate-normals/ .

Figure 6: Iowa Landform Regions



Source: Iowa State University, 2017[13]

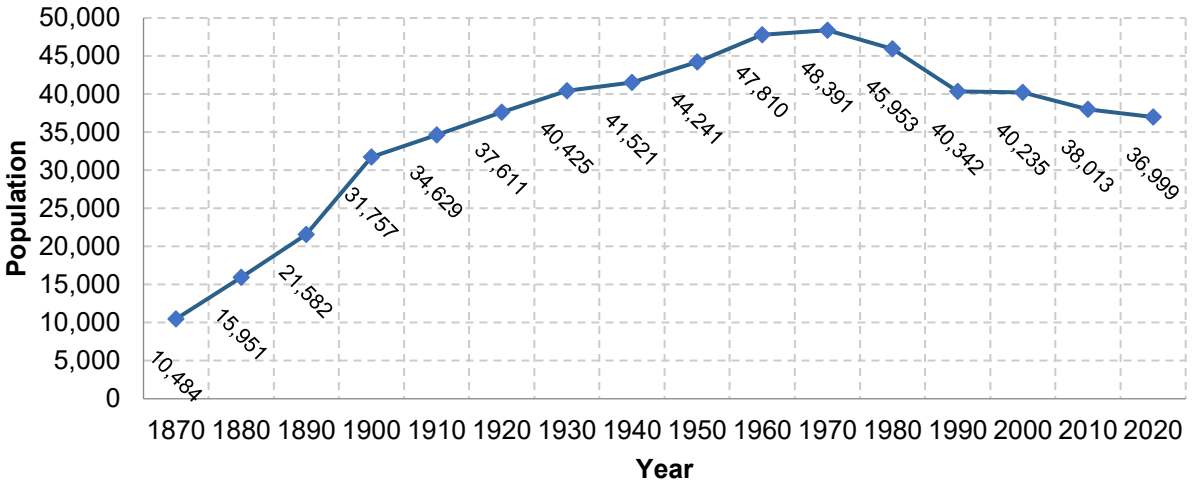
Demographics

Demographic and asset information can be used to determine levels of vulnerability via population and housing, structural inventories and valuations, critical facilities, and other vulnerable areas analysis. This population includes a range of demographic cohorts and persons at risk to natural and man-made disasters. The following figures depict the historical population of the county and the age cohort breakdown.[14]

13 Iowa Geological Survey. 2017. "Landform Regions of Iowa." https://www.iihr.uiowa.edu/igs/publications/uploads/2017-04-27_15-04-11_em44.pdf.

14 United States Census Bureau. "2021 Census Bureau American Community Survey: S0101: Age and Sex." https://data.census.gov.

Figure 7: County Population* 1860-2020



Source: U.S. Census Bureau
*Includes unincorporated Webster County population

Table 16: Population within the County (2020)

Jurisdiction	2010 Population	2020 Population	Percent Change
Badger	561	522	−7.0%
Barnum	191	175	−8.4%
Callender	376	368	−2.1%
Clare	146	136	−6.8%
Dayton	837	772	−7.8%
Duncombe	410	381	−7.1%
Farnhamville*	371	383	+3.2%
Fort Dodge	25,206	24,871	−1.3%
Gowrie	1,037	952	−8.2%
Harcourt	303	264	−12.9%
Lehigh	416	395	−5.0%
Moorland	169	168	−0.6%
Otho	542	429	−20.8%
Stratford*	743	707	−4.8%
Vincent	174	130	−25.3%
Unincorporated Webster County	6,531	6,346	-2.8%
Total	38,013	36,999	−2.7%

*Source: U.S. Census Bureau; *denotes communities not participating in this HMP*

Webster County's population has decreased with each decennial census since its peak of 48,391 residents in 1970, declining to 36,999 residents in 2020, a decrease of 23.5%. Between 2010 and 2020, the county lost 1,014 residents, a decrease of 2.7%, and accounted for approximately 1.16% of Iowa's total population in 2020. During this period, all listed cities experienced population declines except Farnhamville (Calhoun and Webster County), which grew by 3.2%. Vincent and Otho experienced the largest percentage declines, at 25.3% and 20.8%, respectively, while the unincorporated population declined by 2.8%.

A declining population can contribute to vacant or poorly maintained housing, which may be more vulnerable to high winds and other hazards. Population loss may also reduce the local tax base and limit the financial resources available to maintain infrastructure and implement mitigation projects. Communities experiencing population growth may face additional hazard

mitigation and emergency planning needs as development expands, while growth in the tax base may provide resources to support additional mitigation projects.

Economics and Employment

The following table indicates median household income and per capita income for the county is lower than the State of Iowa. Median home value and rent are also both lower than the rest of the state. Areas with relatively low economic indicators may influence a county's level of resilience during hazardous events.

Table 17: Housing and Income

	Webster County	State of Iowa
Median Household Income	$68,975	$75,059
Per Capita Income	$35,947	$40,877
Median Home Value	$153,800	$208,000
Median Rent	$785	$972

Source: U.S. Census Bureau[15,16]

Approximately 50.2% of workers in Webster County who do not work from home travel less than 15 minutes to work, while 18.3% travel 30 minutes or more, indicating that shorter commutes are more common. Major employers in the county include:

- UnityPoint Health – Trinity Regional Medical Center
- Iowa Central Community College
- Nestle Purina PetCare
- United States Gypsum Company
- Elanco
- Decker Truck Line
- County school districts

According to 2024 Business Patterns Census Data, Webster County had 997 business establishments. The following table presents the number of businesses, number of paid employees, and the annual payroll in thousands of dollars.

Table 18: Business in Webster County

	Total Businesses	Number of Paid Employees	Annual Payroll (in thousands)
Total For All Sectors	997	16,146	$197,877

Source: U.S Census Bureau [17]

Agriculture is a main staple of Iowa's economy. Webster County's 907 farms cover 356,141 acres of land, which is about 77% of the county's total area. Crop and livestock production are the visible parts of the agricultural economy, but many related businesses contribute to agriculture by producing, processing, and marketing farm products. These businesses generate income, employment, and economic activity throughout the region.

15 United States Census Bureau. "2024 Census Bureau American Community Survey: DP03: Selected Economic Characteristics." https://data.census.gov/.
16 United States Census Bureau. "2024 Census Bureau American Community Survey: DP04: Selected Housing Characteristics." https://data.census.gov/.
17 United States Census Bureau. "2024 County Business Patterns." https://data.census.gov/.

Table 19: Agricultural Inventory

	Agricultural Inventory
Number of Farms	907
Land in farms (acres)	356,141

Source: USDA Census of Agriculture, 2022 [18]

Built Environment and Structural Inventory

Data related to the built environment is an important component of a hazard mitigation plan. It is essential that during the planning process communities and participating jurisdictions display an understanding of their built environment and work to identify needs that may exist within the county. The United States Census Bureau provides information related to housing units and potential areas of vulnerability. The selected characteristics examined below include lacking complete plumbing facilities; lacking complete kitchen facilities; no telephone service available; housing units that are mobile homes; housing units with no vehicles, and broadband access.

Table 20: Selected Housing Characteristics

Webster County	
Occupied Housing Units	15,375 (90.0%)
Lacking Complete Plumbing Facilities	0.0%
Lacking Complete Kitchen Facilities	0.1%
No Telephone Service Available	0.9%
No Vehicles Available	6.7%
Mobile Homes	2.4%
Broadband Access	87.3%

Source: U.S. Census Bureau[19]

Less than one percent of housing units lack access to telephone service. Cellular telephones are increasingly a primary form of telephone service. However, any lack of access to telephone services represents increased risk to disaster impacts. Today, many Alert or Reverse 911 systems are designed to contact cellphones which ping from towers within set polygon areas. Emergency managers should continue to promote the registration of cell phone numbers with emergency alert systems and utilize systems which automatically ping cellphones by triangulating cell towers.

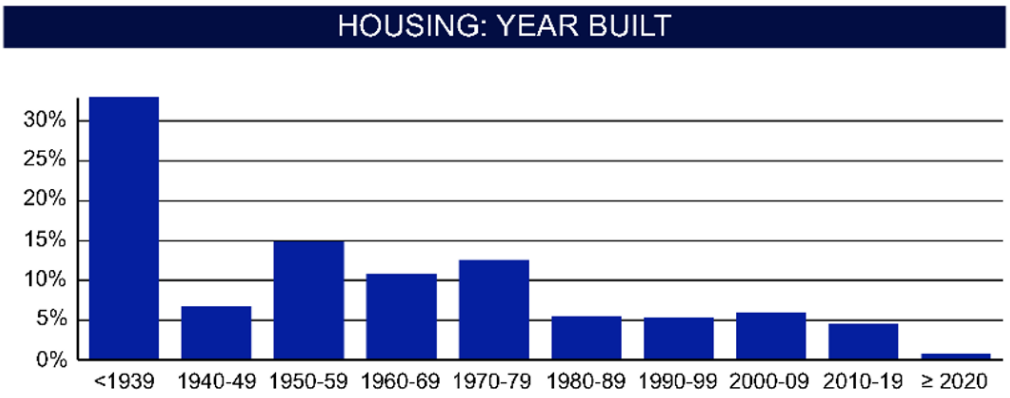
Internet or broadband access—through Wi-Fi or cellphone coverage—is a critical means of sharing and receiving information regarding hazardous events, including storm warnings, evacuation orders, or weather updates. Rural communities often lack adequate internet or broadband access. However, internet access is as vital a utility as electricity, as seen through the COVID-19 pandemic when many people worked or attended school from home. In Webster County 87.3% of households have access to broadband internet. Webster County has a smaller share of households with broadband (87.3%) compared to the state (88.9%).[20]

About 2.4%of housing units in the county are mobile homes. Mobile homes have a higher risk of sustaining damage during high wind events, tornadoes, severe thunderstorms, and severe winter storms. Mobile homes that are either not anchored or are anchored incorrectly can be overturned

18 United States Department of Agriculture. "2017 Census of Agriculture." https://www.nass.usda.gov/Publications/AgCensus/2017/.
19 United States Census Bureau. “2021 Census Bureau American Community Survey: DP04: Selected Housing Characteristics.” https://data.census.gov.
20 United States Census Bureau. 2020–2024 ACS Five-Year Estimates: B28002, Presence and Types of Internet Subscriptions in Household. https://www.census.gov/programs-surveys/acs/data.html

by 60 mph winds. A thunderstorm is classified as severe when wind speeds exceed 58 mph, placing improperly anchored mobile homes at risk. About 10.0% of housing units in the county are vacant. Unoccupied homes may not be maintained as well as occupied housing, thus adding to their vulnerability. Also, about 6.7% of households in the county report no available vehicles. Households without vehicles may have difficulty evacuating during a hazardous event and a reduced ability to access resources in time of need.

About 65.3% of housing units in the county were built prior to 1970, and 32.9% were built prior to 1940. Housing age can serve as an indicator of risk, as structures built prior to state or local building codes being developed may be more vulnerable. According to the Department of Housing and Urban Development (HUD), older homes are at greater risk of poor repair and dilapidation resulting in blighted or substandard properties. Residents living in these homes may be at higher risk to the impacts of high winds, tornadoes, severe winter storms, and thunderstorms.



At-risk Populations

In general, at-risk populations may have difficulty with medical issues, poverty, extremes in age, and communication issues due to language barriers. Several outliers may be considered when discussing potentially at-risk populations, including:

- Not all people who are considered “at-risk” are at risk;
- Outward appearance does not necessarily mark a person as at-risk;
- A hazard event will, in many cases, impact at-risk populations in different ways.

The National Response Framework defines at-risk populations as “…populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care.”[21]

Dependent children under 18 years old are one of the most vulnerable populations to disasters.[22] The majority of people in this age group do not have access to independent financial resources and transportation. They lack practical knowledge necessary to respond appropriately during a disaster. Despite this vulnerability, children are generally overlooked in disaster planning because the presence of a caretaker is assumed. With approximately 25.5% of the planning area’s population younger than 20, children are a key vulnerable group to address in the planning

21 United States Department of Homeland Security. October 2019. “National Response Framework Third Edition.” https://www.fema.gov/media-library/assets/documents/117791.

22 Flanagan, Gregory, Hallisey, Heitgerd, & Lewis. 2011. “A Social Vulnerability Index for Disaster Management.” Journal of Homeland Security and Emergency Management, 8(11): Article 3.

process. Schools house a high number of children within the county during the daytime hours of weekdays, as well as during special events on evenings and weekends. The following table identifies the various schools and public school districts located within the county, and Figure 8 displays a map of the school district boundaries.

Table 21: Public School Inventory

School District	Total Enrollment (2025-2026)	Total Teachers
Southeast Valley	1,014	92
Fort Dodge	3,437	239
Manson Northwest	747	65

Source: Iowa Department of Education[23] [24]

Like minors, seniors (age 65 and greater) are often more significantly impacted by hazards and temperature extremes. During prolonged heat waves or periods of extreme cold, seniors may lack resources to effectively address hazard conditions and as a result may incur injury or potentially death. Prolonged power outages (either standalone events or as the result of other contributing factors) can have significant impacts on any citizen relying on medical devices. One study conducted by the Center for Injury Research and Policy found that increases in vulnerability related to severe winter storms (with significant snow accumulations) begin at age 55.[25] The study found that on average there are 11,500 injuries and 100 deaths annually related to snow removal. Men over the age of 55 are 4.25 times more likely to experience cardiac events during snow removal. On the other hand, women can have a more difficult time during post-disaster recovery than men, often due to sector-specific employment, lower wages, and family care responsibilities.

Residents below the poverty line may lack resources to prepare for, respond to, or recover from hazard events. Residents with limited economic resources will struggle to prioritize the implementation of mitigation measures over more immediate needs. Further, residents with limited economic resources are more likely to live in older, more vulnerable structures. These structures could be mobile homes, located in the floodplain, located near known hazard sites (e.g., chemical storage areas), or older poorly maintained structures. Residents below the poverty line will be more vulnerable to all hazards within the county.

Residents who speak English as a second language (ESL) may struggle with a range of issues before, during, and after hazard events. General vulnerabilities revolve around what could be an inability to effectively communicate with others or an inability to comprehend materials aimed at notification and/or education about a hazard event. When presented with a hazardous situation it is important that all community members be able to receive, decipher, and act on relevant information. An inability to understand warnings and notifications may prevent non-native English speakers from reacting in a timely manner. Further, educational materials related to regional hazards are most often developed in the dominant language for the area, for the county that would be English. Residents who struggle with English in the written form may not have sufficient information related to local concerns to effectively mitigate potential impacts. Residents with limited English proficiency would be at an increased vulnerability to all hazards within the county. Table 22 provides statistics for the county regarding individuals who speak English as a second language and families reported as in poverty in the last 12 months.

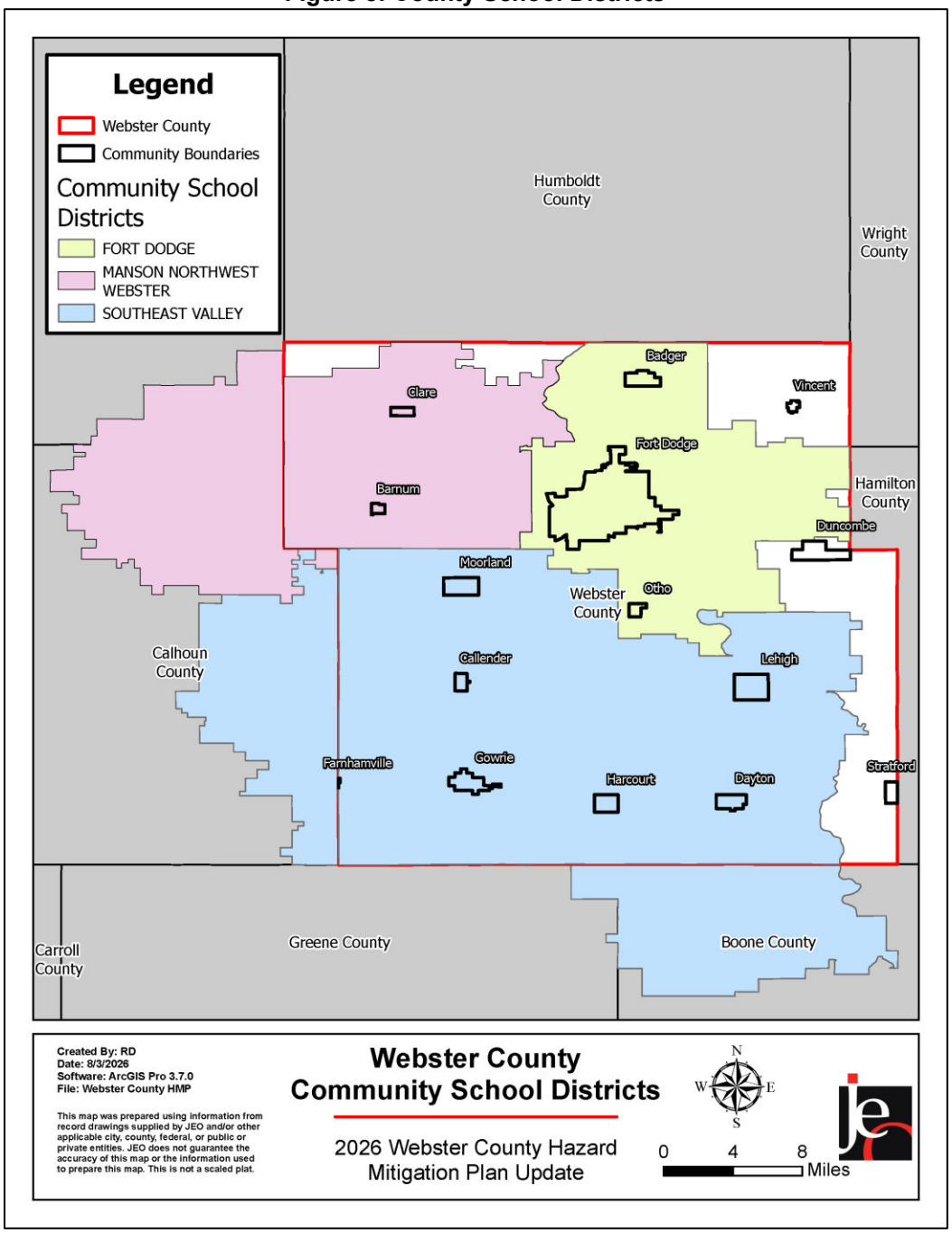
Table 22: ESL and Poverty At-Risk Populations

23 Iowa Department of Education. "Iowa Public School District PreK-12 Enrollments by District, Grade, Race and Gender." https://educateiowa.gov/data-reporting/education-statistics-pk-12.
24 Iowa Department of Education. "2025-2026 Iowa Public School and AEA Teacher and Teacher Leader Information." https://educateiowa.gov/documents/2022-2023-iowa-public-school-and-aea-teacher-and-teacher-leader-information.
25 Center for Injury Research and Policy. January 2011. "Snow Shoveling Safety." http://www.nationwidechildrens.org/cirp-snow-shoveling.

Percent that speak English as second language	People below poverty level
4.9%	12.9%

Source: U.S. Census Bureau[26] [27]

Figure 8: County School Districts



26 United States Census Bureau. "2021 American Community Survey: S1601: Language Spoken at Home." https://data.census.gov/cedsci/.
27 United States Census Bureau. "2021 American Community Survey: DP03: Selected Economic Characteristics." https://data.census.gov/.

Similar to residents below the poverty line, racial minorities tend to have access to fewer financial and systemic resources that would enable them to implement hazard mitigation and strategic projects and to respond and recover from hazard events, including residence in standard housing and possession of financial stability. The county is primarily White, non-Hispanic; however, racial diversity has increased since 2010, which could affect the county's vulnerability to hazards (Table 23).

Table 23: Racial Composition Trends

Race	2010		2024		% Change
	Number	% of Total	Number	% of Total	
White, Not Hispanic	34,613	90.4%	30,940	83.9%	-6.5
Black	1,501	3.9%	1,201	3.3%	-0.7
American Indian and Alaskan Native	0	0.0%	96	0.3%	+0.3
Asian	259	0.7%	455	1.2%	+0.6
Native Hawaiian and Other Pacific Islander	0	0.0%	0	0.0%	0.0
Other Races	195	0.5%	431	1.2%	+0.7
Two or More Races	735	1.9%	2,918	7.9%	+6.0
Total Population	**38,286**	-	**36,886**	-	-

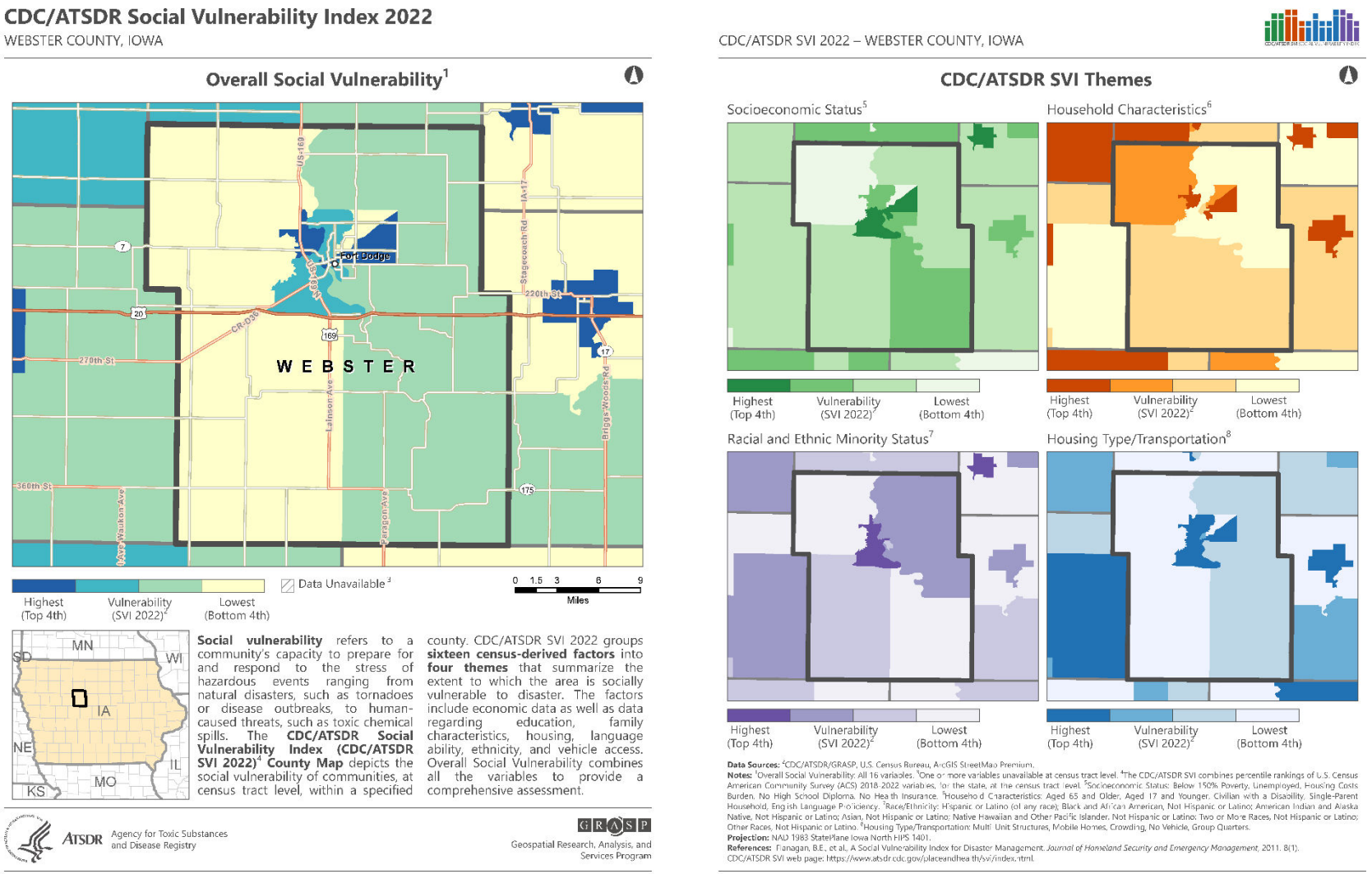
Source: U.S. Census Bureau[28] [29]

Social Vulnerability Index

All communities have some vulnerability to natural and man-made hazard events. Various social conditions such as poverty rates, vehicle access, language, or housing stock contribute to a community's overall social vulnerability. The Centers for Disease Control (CDC) has developed a Social Vulnerability Index to help public health officials and emergency responders identify communities at greater risk before, during, and after major hazardous events. The index evaluates 16 social factors and breaks down vulnerability into four domains: socioeconomic status; household characteristics; racial and ethnic minority status; and housing type and transportation. Figure 9 illustrates the overall Social Vulnerability Index for Webster County.

28 United States Census Bureau. "2010 Census Redistricting Data (Public Law 94-171): P1: Race." https://data.census.gov.
29 United States Census Bureau. "2024 Census Bureau American Community Survey: DP05: ACS Demographic and Housing Estimates." https://data.census.gov/.

Figure 9: Social Vulnerability Index



Source: CDC Social Vulnerability Index, 2022[30]

30 Centers for Disease Control Social Vulnerability Index. 2022. "CDC's Social Vulnerability Index (SVI): County Map" https://svi.cdc.gov/prepared-county-maps.html.

State and Federally Owned Properties

The following table provides an inventory of state and federally owned properties within the county. Note that this list does not include federally or state-owned highway systems or specific buildings within each community.

Table 24: State and Federally Owned Facilities and Lands

Site Name	Nearest Community
Boone Forks Wildlife Area	Lehigh
Brushy Creek State Recreation Area	Lehigh
Deception Hollow	Lehigh
Dolliver Memorial State Park	Lehigh
Lizard Creek Wildlife Area	Fort Dodge

Source: Iowa Department of Natural Resources,[31] [32] U.S National Park Service,[33] U.S. Fish & Wildlife Service[34]

Historic Sites

According to the National Register of Historic Places for Iowa, maintained by the National Park Service, the county has eight historic sites. Structures identified as cultural or historic resources represent assets that are unique to the county and are, in many situations, irreplaceable and have local significance.

Table 25: Historic Sites

Site Name	Date Listed	Nearest Community	In Floodplain?
Corpus Christi Church	10/8/1976	Fort Dodge	No
Vincent House	4/23/1973	Fort Dodge	No
Webster County Courthouse	7/2/1981	Fort Dodge	No
Dolliver Memorial State Park, Entrance Area (Area A)	11/15/1990	Lehigh	No
First National Bank Building	2/27/2003	Fort Dodge	No
Wahkonsa Hotel	5/21/2008	Fort Dodge	No
Fort Dodge Junior High School	6/30/2017	Fort Dodge	No
Fort Dodge Senior High School	6/30/2017	Fort Dodge	No

Source: National Park Service[35]

31 Iowa Department of Natural Resources. 2026. "Wildlife Management Areas." https://www.iowadnr.gov/hunting/places-to-hunt-shoot/wildlife-management-areas#13254117-t---w

32 Iowa Department of Natural Resources. 2023. "State Parks." https://www.iowadnr.gov/Places-to-Go/State-Parks.

33 National Park Service. 2023. "Find a Park: Iowa." https://www.nps.gov/state/ia/index.htm.

34 U.S. Fish & Wildlife Service. 2023. "Iowa Wetland Management District." https://www.fws.gov/refuge/iowa-wetland-management-district.

35 National Park Service. 2023. "National Register of Historic Places: Data Downloads." [datafile]. https://www.nps.gov/subjects/nationalregister/data-downloads.htm.

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Section Four: Risk Assessment

Introduction

The ultimate purpose of this hazard mitigation plan is to minimize the loss of life and property across the county due to natural or human-caused hazards. This section contains a county and local risk assessment including descriptions of potential hazards, vulnerabilities and exposures, probability of future occurrences, and potential impacts and losses. By conducting a risk assessment, participating jurisdictions can develop specific strategies to address areas of concern identified through this process. The following table defines terms that will be used throughout this section of the plan.

Table 26: Term Definitions

Term	Definition
Hazard	A potential source of injury, death, or damages
Asset	People, structures, facilities, and systems that have value to the community
Risk	The potential for damages, loss, or other impacts created by the interaction of hazards and assets
Vulnerability	Susceptibility to injury, death, or damages to a specific hazard
Impact	The consequence or effect of a hazard on the community or assets
Historical Occurrence	The number of hazard events reported during a defined period of time
Extent	The strength or magnitude relative to a specific hazard
Probability	Likelihood of a hazard occurring in the future

Methodology

The risk assessment methodology utilized for this plan follows the same methodology as outlined in the FEMA Local Mitigation Planning Handbook. This process consists of five primary steps:

1. Identify hazards.
2. Describe hazards.
3. Identify community assets.
4. Analyze impacts.
5. Summarize vulnerability.

When identifying and describing the hazard, this plan will examine the following items: previous occurrences of the hazard within the county; locations where the hazard has occurred in the past or is likely to occur in the future; extent of past events and likely extent for future occurrences; and probability of future occurrences. Analysis of regional risk will examine historic impacts and losses and what is possible should the hazard occur in the future. Impact analysis will include both qualitative (i.e., description of historic or potential impacts) and quantitative data (i.e., assigning values and measurements for potential loss of assets). Finally, each hazard identified in the plan will include a summary statement encapsulating the risk and vulnerability information provided during each of the previous steps of the risk assessment process.

For each of the hazards profiled, the best available and most appropriate data available has been considered. Further discussion relative to each hazard is discussed in the hazard profile portion of this section.

Requirement §201.6(c)(2): Risk assessment. The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Requirement §201.6(c)(2)(i): The risk assessment shall include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Requirement §201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. The plan must also address National Flood Insurance Program insured structures that have been repetitively damaged by floods.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

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

Average Annual Damages and Frequency

FEMA *Requirement §201.6(c)(2)(ii) (B)* suggests that when the appropriate data is available, hazard mitigation plans should also provide an estimate of potential dollar losses for structures in vulnerable areas. This risk assessment methodology includes an overview of assets at risk and provides historical average annual dollar losses for all hazards for which historical event data are available. Additional loss estimates are provided separately for those hazards for which sufficient data are available. These estimates can be found within the relevant hazard profiles.

Average annual losses from historical occurrences can be calculated for those hazards which there is a robust historical record and for which monetary damages are recorded. There are three main pieces of data used throughout this formula.

- **Total Damages in Dollars:** This is the total dollar amount of all property damages and crop damages as recorded in federal, state, and local data sources. The limitation of these data sources is that dollar figures are usually estimates and often do not include all damages from every event, but only officially recorded damages from reported events.

- **Total Years of Record:** This is the span of years for which data are available for recorded events. During this planning process, vetted and cleaned NCEI data are available from January 1996 through May 2026. Although some data are available back to 1950, this plan update uses the more current and accurate period identified for each analysis. Other datasets use different periods of record, which are stated in the applicable narrative, table, figure, or source note.

- **Number of Hazard Events:** This shows how often an event occurs. The frequency of a hazard event will affect how a community responds. A thunderstorm may not cause much

damage each time, but multiple storms can have an incremental effect on housing and utilities. In contrast, a rare tornado can have a widespread effect on a community.

An example of the event damage estimate is found below:

$$\textbf{Annual Damages } (\$) = \frac{Total\ Damages\ in\ Dollars\ (\$)}{Total\ Years\ \text{of}\ Record\ (\#)}$$

It should be noted that NCEI data are not all-inclusive, and the database provides limited information on crop losses. To provide a better picture of crop losses associated with hazards in the county, crop loss information from the USDA Risk Management Agency (RMA) was used. The crop-loss analyses use data from 2000 through 2025, a 26-year period. Data are not available for every hazard, so only hazards with an available dataset are included in the loss estimates.

Annual probability can be calculated based on the total years of record and the total number of years in which an event occurred. An example of the annual probability estimate is found below:

$$\textbf{Annual Probability } (\%) = \frac{Total\ Years\ with\ an\ Event\ Occuring\ (\#)}{Total\ Years\ of\ Record\ (\#)}\ x\ 100$$

- **Future Likelihood:** This is the probability that a hazard will occur in the future. Future likelihood considers historical probability, climate change, and future development. It is broken down into the four categories listed below.

Likelihood rating	Expected Recurrence Interval	Historical Annual Probability
Very Unlikely	More than 50 years	Less than 2%
Unlikely	More than 10 years, up to 50 years	2% to less than 10%
Likely	More than 5 years, up to 10 years	10% to less than 20%
Very Likely	Once every 1–5 years	20%–100%

FEMA Standard Economic Values

As part of FEMA's Benefit-Cost Analysis Toolkit, standard economic values were developed to better estimate the avoided loss of services when implementing a hazard mitigation project. These standard economic values can also be used to help estimate potential future economic impacts from a hazard event. Table 27 shows the economic value for traffic delays on roads and bridges, loss of electric services, loss of wastewater services, loss of potable water services, and loss of communications/IT services. The assumed damages do not consider physical damage to utility equipment and infrastructure but do consider the impact on economic activity and impact on residential customers.

Table 27: FEMA Standard Economic Values

Service Lost	Economic Value
Traffic Delays on Roads and Bridges	$36.63/Vehicle/Hour
Loss of Electric Services	$213/Person/Day
Loss of Wastewater Services	$71/Person/Day
Loss of Potable Water Services	$150/Person/Day

Loss of Communications/IT Services	$151/Person/Day

Source: FEMA, 2024[36]

Also included in FEMA's Benefit-Cost Analysis Toolkit are life safety economic values. Life safety is the value of lives saved and injuries prevented resulting from mitigation measures. Table 28 shows the six different severity levels, their economic value, and common injuries associated with each level.

36 FEMA. 2024. "Benefit-Cost Analysis Sustainment and Enhancement". https://www.fema.gov/sites/default/files/documents/fema-standard-economic-values-methodology-report-v13-2024.pdf.pdf.

Table 28: FEMA Life Safety Economic Values (2023 Dollars)

Injury Severity Level	Selected Common Injuries	Economic Value
Minor	Superficial abrasion or laceration of skin; digit sprain; first-degree burn; head trauma with headache or dizziness (no other neurological signs).	$40,000
Moderate	Major abrasion or laceration of skin; cerebral concussion (unconscious less than 15 minutes); finger or toe crush/amputation; closed pelvic fracture with or without dislocation.	$620,000
Serious	Major nerve laceration; multiple rib fracture (but without flail chest); abdominal organ contusion; hand, foot, or arm crush/amputation.	$1,386,000
Severe	Spleen rupture; leg crush; chest-wall perforation; cerebral concussion with other neurological signs (unconscious less than 24 hours).	$3,511,000
Critical	Spinal cord injury (with cord transection); extensive second- or third- degree burns; cerebral concussion with severe neurological signs (unconscious more than 24 hours).	$7,828,000
Un-Survivable	Injuries, which although not fatal within the first 30 days after an accident, ultimately result in death.	$13,200,000

Source: FEMA, Standard Economic Values Methodology Report, Version 13, 2024; values shown in 2023 dollars

FEMA's standard economic values and life safety economic values will not be used to determine average annual damages and average damage per event estimates for each hazard profile. Past hazard events do not list the total number of people or vehicles impacted, and thus it is impossible to retroactively calculate the total economic impact using these values. While injuries and fatalities may be reported it is not known the severity of those injured during the event. The values are provided in this plan so that participants can better estimate potential losses and determine the benefits of potential future mitigation actions.

Hazard Identification

The identification of relevant hazards for the county began with a review of the 2023 State of Iowa Hazard Mitigation Plan. Webster County representatives reviewed, discussed, and determined the list of hazards to be profiled in this HMP update at the Kick-off Meeting. The hazards for which a risk assessment was completed are included in the following table.

Table 29: Hazards Addressed in the Plan

Natural Hazards Addressed in the Plan		Man-Made Hazards Addressed in the Plan
Drought	Extreme Temperatures	Animal/Crop/Plant Disease
Flooding	Grass Fire or Wildland Fire	Dam Failure
Severe Winter Storms	Sinkholes	Hazardous Materials Release
Thunderstorms (Lightning & Hail)	Tornadoes & Windstorms	Terrorism / Cyberattack

Hazard Changes

Omitted hazards from the State HMP include earthquakes, expansive soils, landslides, and levee failure. The remaining hazards from the State HMP are included for the Webster County HMP. However, some were combined due to their similarity of risks, impacts and mitigation strategies. These combined hazards are listed below.

- **Extreme Temperatures:** This hazard includes both Extreme Heat and Extreme Cold. Extreme Cold is included here, rather than with Severe Winter Storms.
- **Hazardous Materials Release:** This includes both Hazardous Materials and Radiological.

Omitted Hazards

The following hazards were omitted from the HMP due to the following reasons:

- **Earthquakes:** There are no documented occurrences of earthquakes in the county.
- **Expansive Soils:** There are no documented occurrences of expansive soils in the county. The State HMP shows Webster County as having little to no swelling clay soil in Section 3.3.5.
- **Landslides:** There are no documented occurrences of landslides in the county. The State HMP shows the county having a low incidence of landslides in Section 3.3.8.
- **Levee Failure:** There are no known levees within the county, according to the National Levee Database.[37]

2023 State Hazards	2020 County Hazards	2026 County Hazards	Reason for Removal
Dam/Levee Failure	Dam – Yes/Levee - No	Dam – Yes/Levee - No	*No levees present within Webster County.*
Drought	Yes	Yes	
Earthquake	Yes	--	*Lack of historical impacts determined negligible hazard risk*
Expansive Soils	Yes	--	*Lack of historical impacts determined negligible hazard risk*
Extreme Heat/Temperatures	Yes (Heat)	Yes (Extreme Temperatures)	*Combined Extreme Heat and Cold into one hazard profile*
Flooding (Flash and Riverine)	Yes	Yes	
Grass Fire or Wildland Fire	Yes	Yes	
Landslide	--	--	*Lack of historical impacts determined negligible hazard risk*
Severe Winter Storms	Yes	Yes	
Sinkholes	--	Yes	*Added as a new hazard of concern*

[37] USACE. "National Levee Database." Accessed August 2026. https://levees.sec.usace.army.mil/.

2023 State Hazards	2020 County Hazards	2026 County Hazards	Reason for Removal
Thunderstorms: Lightning & Hail	Yes	Yes	
Tornado/Windstorm	Yes	Yes	
Man-Made Hazards of Concern:			
• **Animal/Crop/Plant Disease**	Yes	Yes	
• **Hazardous Materials**	Yes	Yes	
• **Pandemic Human Disease**	Yes	--	*Not a priority for Hazard Mitigation Plan and best addressed by other planning mechanisms.*
• **Infrastructure Failure**	Yes	--	*Addressed as a cascading impact from natural hazards, not a natural hazard as a standalone.*
• **Radiological Incident**	Yes	Included under Hazardous Materials	*Integrated within the Hazardous Materials Release profile.*
• **Terrorism/ Cyberattack**	Yes	Yes	
• **Transportation Incident**	Yes	--	*Not a priority for Hazard Mitigation Plan and best addressed by other planning mechanisms.*

FEMA National Risk Index

FEMA's National Risk Index is an online tool that analyzes natural hazard and community risk factors to develop a risk measurement for each county in the United States. Eighteen natural hazards are given a score from very high to very low. The table below gives the National Risk Index ratings for Webster County. Risk Index scores are calculated using an equation that combines scores for expected annual loss, social vulnerability, and community resilience. All values fall between 0 (lowest possible value) and 100 (highest possible value). The national average is 50.02 and the Iowa average is 48.31.

Table 30: National Risk Index

Hazard	Risk Index Rating	Included in HMP?
Avalanche	Not Applicable	No
Coastal Flooding	Not Applicable	No
Cold Wave	Relatively Low (33.94)	Yes – part of Extreme Temps
Drought	Relatively High (95.96)	Yes
Earthquake	Very Low (20.64)	No
Hail	Relatively Moderate (91.6)	Yes – part of Thunderstorms
Heat Wave	Very Low (13.62)	Yes – part of Extreme Temps
Hurricane	Very Low (13.06)	No
Ice Storm	Relatively Low (54.15)	Yes – part of Winter Storms
Inland Flooding	Relatively Low (47.11)	Yes
Landslide	Very Low (61.45)	No
Lightning	Relatively Low (30.38)	Yes – part of Thunderstorms

Hazard	Risk Index Rating	Included in HMP?
Strong Wind	Relatively Moderate (60.62)	Yes
Tornado	Relatively High (92.08)	Yes
Tsunami	Not Applicable	No
Volcanic Activity	Not Applicable	No
Wildfire	Very Low (19.15)	Yes
Winter Weather	Relatively Moderate (78.89)	Yes
Overall Score	Relatively Low (59.99)	-

Source: FEMA National Risk Index, accessed October 2026

Hazard Assessment Summary Tables

The following table provides an overview of the data contained in the hazard profiles. The hazards listed in this table and throughout the section are in alphabetical order. This table is intended to be a quick reference for people using the plan and does not contain source information. Source information and full discussion of individual hazards are included later in this section. Historical frequencies use the hazard-specific periods and units identified in each profile. Detailed descriptions of major events are included in *Section Seven: Community Profiles.*

Hazard	Previous Occurrences	Approximate Annual Probability*	Likely Extent
Drought	464 out of 1,577 months	464/1,577 = 29.4% monthly probability	D1-D4
Extreme Temperatures	Cold: Avg 7 days/year	98%	Max Temp ≤10°F
	Heat: Avg 1 day/year	34%	Max Temp ≥100°F
Flooding	157	80%	Some inundation of structures. Some evacuations of people may be necessary.
Grass/Wildland Fire	55	83%	Average approximately 4.2 acres among records with size information Some homes and structures threatened or at risk
Severe Winter Storms	95	100%	<1-11” snow
Sinkholes	Unknown	Unable to determine	-
Thunderstorms: Lightning & Hail	480	30/30= 100%	>1” rainfall Avg 59 mph winds
Tornado and Windstorm	Tornadoes: 45	50%	Mode: EF1 Range: EF0-EF/F3
	Windstorms: 47	80%	Avg: 48 mph Range 45-52 mph
Animal/Crop/Plant Disease	Plant: 23; Animal: unavailable	Plant: 100%; Animal: unavailable	
Dam Failure	0	< 1%	Varies by structure
Hazardous Materials Release	Fixed Site Spill: 361	97%	Avg Liquid Spill: 61 gal. Avg Gas Spill: 1,718 lbs.
	Transportation Spill: 41	81%	Average liquid spill: 515 gal.

Terrorism/Cyberattack	Unknown	Unable to determine	-

** Annual Probability = Total Years with an Event Occurrence / Total Years of Record*

The following table provides loss estimates for hazards with sufficient data. Descriptions of major events are included in *Section Four: Risk Assessment.*

Hazard Type		Count	Property	Crop
Drought		464 out of 1,577 months	N/A	$70,215,077
Extreme Temperatures	Extreme Cold	Avg 7 days per year	$0	$84,678
	Extreme Heat	Avg 1 days per year	$135,000	$1,415,662
Flooding	Flash Flood	56	$4,500,000	$390,402
	Flood	101	$6,163,570	
Grass Fire or Wildland Fire		55	225.4 acres burned	$0
Severe Winter Storms	Blizzard	27	$525,000	$1,224,312
	Heavy Snow	26	$181,000	
	Ice Storm	11	$1,168,330	
	Winter Storm	30	$509,900	
	Winter Weather	1	$0	
Sinkholes		N/A	N/A	N/A
Thunderstorms	Hail	202	$1,978,700	$10,349,700
	Heavy Rain	111	$100,000	$42,981,937
	Lightning	3	$108,000	N/A
	Thunderstorm Wind	164	$2,698,000	N/A
Tornadoes & Windstorms	Tornado	45	$1,244,200	$0
	Windstorm	47	$1,871,110	$1,123,995
Animal/Crop/Plant Disease		23	N/A	$160,452
Dam Failure		N/A	N/A	N/A
Hazardous Materials	Fixed Site[3]	361	$139,000	N/A
	Transportation[4]	41	$73,501	N/A
Terrorism/Cyberattack		Unknown	Not available	N/A
Totals		**1,301**	**$21,395,311**	**$127,946,215**

not available: Data not available
1 – NCEI, January 1996 – May 2026
2 - USDA RMA, 2000-2025
3 - NRC, 1990-May 2026
4 - PHMSA, 1971–2025
5 - Association of State Dam Safety Officials, 1800-2025
6 - NIFC, 2020-2025
7 - High Plains Regional Climate Center, 1893-2025

Historical Disaster Declarations

The following tables show past disaster declarations that have been granted within the county.

Presidential Disaster Declarations

The presidential disaster declarations involving the county from 1965 to October 2026 are summarized in the following table. Declarations prior to 1962 are not designated by county and are not included.

Table 31: Presidential Disaster Declarations

Disaster Declaration Number	Declaration Date	Title
4642	2/23/2022	SEVERE STORMS, STRAIGHT-LINE WINDS, AND TORNADOES
4483	3/23/2020	COVID-19 PANDEMIC
4421	3/23/2019	SEVERE STORMS AND FLOODING
4386	8/20/2018	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING
4126	7/2/2013	SEVERE STORMS, TORNADOES, AND FLOODING
3480	3/13/2020	COVID-19
3275	3/30/2007	SNOW
3239	9/10/2005	HURRICANE KATRINA EVACUATION
1930	7/29/2010	SEVERE STORMS, FLOODING, AND TORNADOES
1763	5/27/2008	SEVERE STORMS, TORNADOES, AND FLOODING
1727	9/14/2007	SEVERE STORMS AND FLOODING
1518	5/25/2004	SEVERE STORMS, TORNADOES, AND FLOODING
1367	5/2/2001	SEVERE STORMS, TORNADOES AND FLOODING
1230	7/2/1998	SEVERE STORMS, TORNADOES AND FLOODING
996	7/9/1993	SEVERE STORMS & FLOODING
986	4/26/1993	SEVERE STORMS & FLOODING
928	12/26/1991	ICE STORM
868	5/26/1990	SEVERE STORMS & FLOODING
259	4/25/1969	FLOODING
193	4/22/1965	FLOODING

Source: Federal Emergency Management Agency, 1965–2022

Governor's Disaster Proclamations

The governor's disaster proclamations involving the county from 2020 through October 2026 are summarized in the following table.

Table 32: Governor's Disaster Proclamations

Disaster Proclamation Number	Proclamation Date	Title
2020-01	3/09/2020	COVID-19 Virus
2020-02	03/13/2020	Proclamation to Waive Transportation Weight Requirements during COVID-19 Virus
2020-03	03/15/2020	State of Public Health Disaster Emergency for COVID-19 Virus
2020-04	03/17/2020	State of Public Health Disaster Emergency for COVID-19 Virus
2020-05	03/19/2020	Additional State Public Health Emergency Declaration for COVID-19 Virus

Disaster Proclamation Number	Proclamation Date	Title
2020-06	03/22/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-07	03/26/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-08	03/31/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-09	04/02/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-10	04/06/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-11	04/10/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-12	04/16/2020	Continuing State Public Health Emergency Declaration, requiring additional protective measures in RMCC Region 6 for COVID-19 Virus
2020-13	04/24/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-14	04/27/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-15	05/06/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-16	05/13/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-17	05/20/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-18	05/26/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-19	06/10/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-20	06/25/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-23	07/17/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-24	07/24/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-26	08/11/2020	Severe Storm
2020-30	08/21/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-32	09/09/2020	Severe Storm
2020-34	09/18/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-36	10/02/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-37	10/09/2020	Severe Storm Extension
2020-38	10/16/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-39	11/10/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-40	11/16/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-41	11/18/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus

Disaster Proclamation Number	Proclamation Date	Title
2020-42	12/09/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2020-43	12/16/2020	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-01	01/07/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-02	02/05/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-03	03/05/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-04	04/02/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-05	04/30/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-06	05/20/2021	Proclamation preventing fuel supply issues
2021-07	05/27/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-08	06/25/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-12	07/23/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-13	07/29/2021	Proclamation Preventing Fuel Supply Issues
2021-14	08/09/2021	Severe Weather
2021-15	08/19/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-19	09/01/2021	Severe Weather
2021-20	09/17/2021	Harvest Proclamation
2021-21	09/17/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-22	10/15/2021	Continuing Harvest Proclamation
2021-23	10/15/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-24	11/12/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-25	11/12/2021	Continuing Harvest Proclamation
2021-26	12/02/2021	Continuing Harvest Proclamation
2021-27	12/10/2021	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2021-31	12/30/2021	Continuing Harvest Proclamation
2022-01	01/06/2022	Propane Proclamation
2022-02	01/07/2022	Continuing State Public Health Emergency Declaration for COVID-19 Virus
2022-03	02/03/2022	Final Extension - Continuing State Public Health Emergency Declaration for COVID-19 Virus
2022-18	05/11/2022	Planting Proclamation
2022-25	09/01/2022	Harvest Proclamation
2022-26	09/30/2022	Continuing Harvest Proclamation
2022-27	10/28/2022	Continuing Harvest & Fuels Proclamation
2022-29	11/22/2022	Continuing Harvest Proclamation
2022-34	12/21/2022	Continuing Harvest Proclamation

Disaster Proclamation Number	Proclamation Date	Title
2022-35	12/23/2022	Fuels Proclamation
2023-02	01/09/2023	Fuels Proclamation
2023-03	01/20/2023	Continuing Harvest Proclamation
2023-07	04/01/2023	Severe Weather
2023-27	09/11/2023	Harvest Proclamation
2023-28	10/13/2023	Harvest Proclamation Extension
2023-34	11/09/2023	Harvest Proclamation Extension
2023-38	12/11/2023	Harvest Proclamation Extension
2024-02	01/10/2024	Fuels Proclamation
2024-03	01/13/2024	Harvest Proclamation Extension
2024-04	01/24/2024	Fuels Proclamation Extension
2024-06	02/12/2024	Harvest Proclamation Extension
2024-13	05/22/2024	Severe Weather
2024-34	07/15/2024	Disaster Recovery Housing Assistance Program Activation
2024-46	09/09/2024	Harvest Proclamation
2024-47	10/01/2024	Hurricane Helene Response
2024-48	10/09/2024	Harvest Proclamation Extension
2024-49	10/15/2024	Hurricane Helene & Hurricane Milton Response Extension
2024-50	11/08/2024	Harvest Proclamation Extension
2024-51	12/06/2024	Harvest Proclamation Extension
2025-02	01/07/2025	Harvest Proclamation Extension
2025-03	01/07/2025	Fuels Proclamation
2025-05	02/06/2025	Harvest Proclamation Extension
2025-07	02/14/2025	Fuels Proclamation
2025-09	03/08/2025	Harvest Proclamation Extension
2025-14	05/09/2025	Fuels Proclamation
2025-22	09/18/2025	Harvest Proclamation
2025-24	10/18/2025	Harvest Proclamation Extension
2025-25	11/19/2025	Harvest Proclamation Extension
2025-27	12/04/2025	Fuels Proclamation
2026-01	01/15/2026	Fuels Proclamation
2026-06	05/14/2026	Fuels Proclamation
2026-09	05/28/2026	Fuels Proclamation
2026-17	09/10/2026	Harvest Proclamation
2026-20	10/06/2026	On-Road Dyed Diesel Proclamation
2026-21	10/07/2026	Expansion on On-Road Dyed Diesel Proclamation

Source: Iowa Homeland Security and Emergency Management, 2020 – 2026[38]

Climate Adaptation

Long-term climate trends have shifted throughout the 21st century and have created significant changes in precipitation and temperature which have altered the severity and subsequent impacts from severe weather events. Changes in the regional climate are a top concern impacting communities, residents, local economies, and infrastructure throughout the planning area. Discussions on temperature, precipitation, and climate impacts are included below.

The planning area is located in the Midwest region of the United States, which includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The area is well known for

38 Iowa Homeland Security and Emergency Management. October 2026 "Governor's Disaster Declarations.". https://homelandsecurity.iowa.gov/disasters/.

agricultural production. The Midwest has many federal, state, and private forests that provide considerable economic and ecological benefits. The Fifth National Climate Assessment has provided an overview of potential impacts within the planning area.[39]

- **Agriculture:** The Midwest is a major producer of a wide range of food and animal feed for national consumption and international trade. Increases in warm-season absolute humidity and precipitation have eroded soils, created favorable conditions for pests and pathogens, and degraded the quality of stored grain. Projected changes in precipitation, coupled with rising extreme temperatures before mid-century, will reduce Midwest agricultural productivity to levels of the 1980s without major technological advances.

- **Forestry:** Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate are interacting with existing stressors such as invasive species and pests to increase tree mortality and reduce forest productivity. Without adaptive actions, these interactions will result in the loss of economically and culturally important tree species such as paper birch and black ash and are expected to lead to the conversion of some forests to other forest types or even to non-forested ecosystems by the end of the century. Land managers are beginning to manage risk in forests by increasing diversity and selecting for tree species adapted to a range of projected conditions.

- **Biodiversity and Ecosystems:** The ecosystems of the Midwest support a diverse array of native species and provide people with essential services such as water purification, flood control, resource provision, crop pollination, and recreational opportunities. Species and ecosystems, including the important freshwater resources of the Great Lakes, are typically most at risk when climate stressors, like temperature increases, interact with land-use change, habitat loss, pollution, nutrient inputs, and nonnative invasive species. Restoration of natural systems increases in the use of green infrastructure, and targeted conservation efforts, especially of wetland systems, can help protect people and nature from climate change impacts.

- **Human Health:** Climate change is expected to worsen existing health conditions and introduce new health threats by increasing the frequency and intensity of poor air quality days, extreme high temperature events, and heavy rainfalls; extending pollen seasons; and modifying the distribution of disease-carrying pests and insects. By mid-century, the region is projected to experience substantial, yet avoidable, loss of life, worsened health conditions, and economic impacts estimated in the billions of dollars as a result of these changes. Improved basic health services and increased public health measures—including surveillance and monitoring—can prevent or reduce these impacts.

- **Transportation and Infrastructure:** Storm water management systems, transportation networks, and other critical infrastructure are already experiencing impacts from changing precipitation patterns and elevated flood risks. Green infrastructure is reducing some of the negative impacts by using plants and open space to absorb storm water.

39 U.S. Global Change Research Program. 2023. “Fifth National Climate Assessment”. https://toolkit.climate.gov/NCA5.

The annual cost of adapting urban storm water systems to more frequent and severe storms is projected to exceed $500 million for the Midwest by the end of the century.

- **Community Vulnerability and Adaptation:** At-risk communities in the Midwest are becoming more vulnerable to climate change impacts such as flooding, drought, and increases in urban heat islands. Tribal nations are especially vulnerable because of their reliance on threatened natural resources for their cultural, subsistence, and economic needs. Integrating climate adaptation into planning processes offers an opportunity to better manage climate risks now. Developing knowledge for decision-making in cooperation with vulnerable communities and tribal nations will help to build adaptive capacity and increase resilience.

Iowa's Changing Climate

The United States as a whole is experiencing significant changes in temperature, precipitation, and severe weather events resulting from climate change. According to the Iowa Climate Change Impacts Committee's Report to the Governor and Iowa General Assembly, the following changes can be expected for Iowa's future climate:[40]

Increased Precipitation

- Increased frequency of precipitation extremes that lead to flooding.
- Increase of 8% more precipitation from 1873 to 2008.
- A larger increase in precipitation in eastern Iowa than in western Iowa.

Higher Temperatures

- Long-term winter temperatures have increased six times more than summer temperatures.
- Nighttime temperatures have increased more than daytime temperatures since 1970.
- Iowa's humidity has risen substantially, especially in summer, which now has 13% more atmospheric moisture than 35 years ago as indicated by a three to five degree (Fahrenheit) rise in dew-point temperature. This fuels convective thunderstorms that provide more summer precipitation.

Agricultural Challenges

- Climate extremes, not averages, have the greater impact on crop and livestock productivity.
- Increased soil erosion and water runoff.
- Increased challenges associated with manure applications.
- Favorable conditions for survival and spread of many unwanted pests and pathogens.

Habitat Changes

- Plants are leafing out and flowering sooner.
- Birds are arriving earlier in the spring.
- Particular animals are now being sighted farther north than in the past.

40 Iowa Climate Change Impacts Committee. 2010. "Climate Change Impacts on Iowa". https://www.iowadnr.gov/portals/idnr/uploads/air/environment/climatechange/complete_report.pdf?amp;tabid=1077

Future Adaptation and Mitigation

The county will have to adapt to a changing climate and its impacts or experience an increase in economic losses, property damages, agricultural damages, and loss of life. Past events have typically informed HMPs to be more resilient to future events. This HMP includes strategies for the county to address these changes and increase resilience. However, future updates of this HMP should consider including adaptation as a core strategy to be better informed by future projections on the frequency, intensity, and distribution of hazards. Jurisdictions in the county should consider past and future climate changes and impacts when incorporating mitigation actions into local planning processes.

Hazard Profiles

Information from participating jurisdictions was collected and reviewed alongside hazard occurrence, magnitude, and event narratives as provided by local, state, and federal databases. Based on this information, profiled hazards were determined to either have a historical record of occurrence or the potential for occurrence in the future. The following profiles will broadly examine the identified hazards across the region. Hazards of local concern or events which have deviated from the norm are discussed in greater detail in each respective community profile (see *Section Seven* of this plan).

This Hazard Risk Assessment is broken into two sections.

- Natural Hazards, which include risk assessments for Drought, Extreme Temperatures, Flooding, Grass Fire or Wildland Fire, Severe Winter Storms, Sinkholes, Thunderstorms (Lightning & Hail), and Tornado/Windstorm hazards.
- Man-made Hazards which includes risk assessments for Animal/Crop/Plant Disease, Dam Failure, Hazardous Materials, and Terrorism/Cyberattack hazards.

Drought

Natural Hazard

Drought is generally defined as a natural hazard that results from a substantial period of below normal precipitation. Although many erroneously consider it a rare and random event, drought is a normal, recurrent feature of climate. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. A drought often coexists with periods of extreme heat, which together can cause significant social stress, economic losses, and environmental degradation. The planning area is largely rural, which presents an added vulnerability to drought events; drought conditions can significantly and negatively impact the agricultural economic base.

Drought is a slow-onset, creeping phenomenon that can affect a wide range of people, livestock, and industries. While many impacts of these hazards are non-structural, there is the potential that during prolonged drought events structural impacts can occur. Drought normally affects more people than other natural hazards, and its impacts are spread over a larger geographical area. As a result, the detection and early warning signs of drought conditions and assessment of impacts are more difficult to identify than those of quick-onset natural hazards (e.g., flood) that result in more visible impacts. According to the National Drought Mitigation Center (NDMC), droughts are classified into five major types:

> **Drought** is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another.
> ~National Drought Mitigation Center

- **Meteorological Drought** is defined based on the degree of dryness and the duration of the dry period. Meteorological drought is often the first type of drought to be identified and should be defined regionally as precipitation rates and frequencies (norms) vary.

- **Agricultural Drought** occurs when there is deficient moisture that hinders planting germination, leading to low plant population per hectare and a reduction of final yield. Agricultural drought is closely linked with meteorological and hydrological drought, as agricultural water supplies are contingent upon the two sectors.

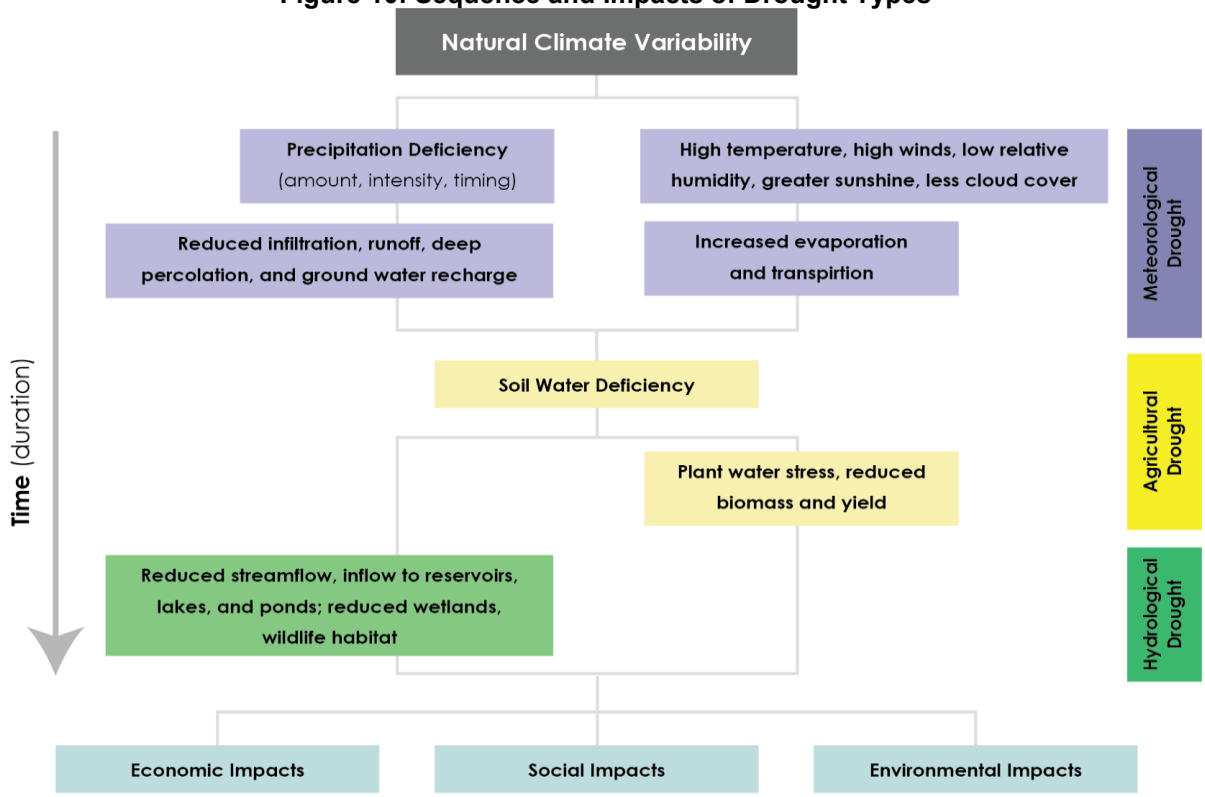
- **Hydrologic Drought** occurs when water available in aquifers, lakes, and reservoirs falls below the statistical average. This situation can arise even when the area of interest receives average precipitation. This is due to the reserves diminishing from increased water usage, usually from agricultural use or high levels of evapotranspiration, resulting from prolonged high temperatures. Hydrological drought often is identified later than meteorological and agricultural drought. Impacts from hydrological drought may manifest themselves in decreased hydropower production and loss of water-based recreation.

- **Socioeconomic Drought** occurs when the demand for an economic good exceeds supply due to a weather-related shortfall in water supply. The supply of many economic goods includes, but are not limited to, water, forage, food grains, fish, and hydroelectric power.

- **Ecological Drought** is a more recent type of drought that is a prolonged and widespread deficit in naturally available water supplies that creates multiple stresses across ecosystems. These changes can occur from changes in natural and managed hydrology systems.[41]

The following figure indicates different types of droughts, their temporal sequence, and the various types of effects they can have on a community.

Figure 10: Sequence and Impacts of Drought Types



Source: National Drought Mitigation Center, University of Nebraska-Lincoln, 2017[42]

Location

The entire county and all participating jurisdictions are susceptible to drought impacts.

Historical Occurrences

The table below indicates that drought conditions occurred during 464 of the 1,577 months of record, or 29.4% of the study period. Mild drought occurred during 166 months (10.5%), moderate drought during 159 months (10.1%), severe drought during 82 months (5.2%), and extreme drought during 57 months (3.6%). Non-drought conditions occurred during the remaining 1,113 months, or 70.6% of the study period. These findings indicate that drought conditions vary in frequency and severity across the planning area. These statistics show that the drought conditions

[41] National Drought Mitigation Center. 2026. "Types of Drought." https://drought.unl.edu/.
[42] National Drought Mitigation Center. 2026. "Types of Drought." https://drought.unl.edu/.

of the planning area are highly variable. The average annual planning area precipitation is approximately 35 inches according to the NCEI.[43]

Table 33: Historical Droughts

Drought Magnitude	Months in Drought	Percent Chance
-1 Magnitude (Mild)	166/1,577	10.5%
-2 Magnitude (Moderate)	159/1,577	10.1%
-3 Magnitude (Severe)	82/1,577	5.2%
-4 Magnitude or Greater (Extreme)	57/1,577	3.6%

Source: NCEI, 1895 - May 2026[44]

Extent

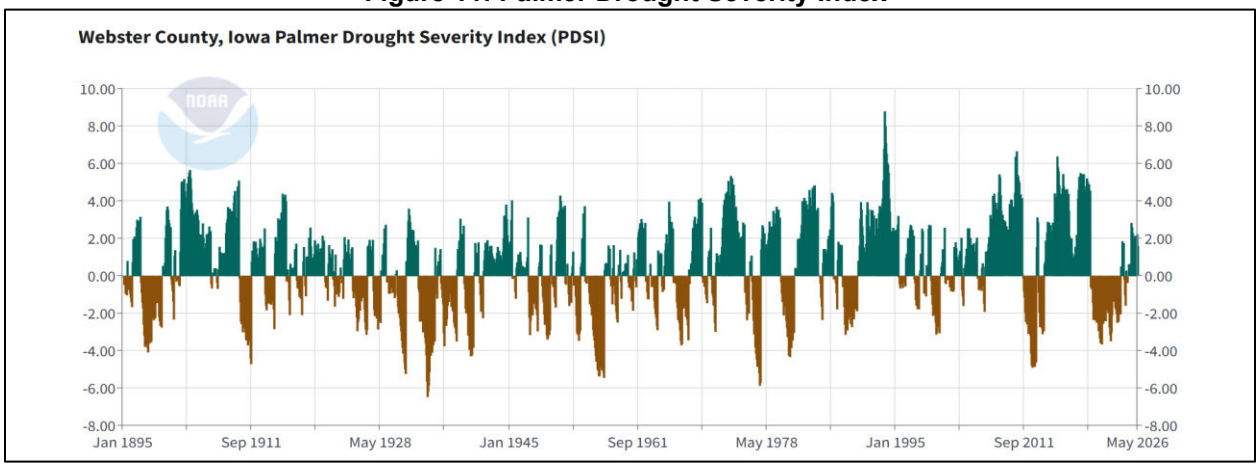
Climatologists utilize the Palmer Drought Severity Index (PDSI) to standardize global long-term drought analysis. The data was collected from Climate Division 5, which includes the planning area, with the period of record beginning in 1895. Table 34 shows the details of the Palmer classifications. Figure 11 shows drought data from this time period. The negative Y axis represents the extent of a drought, for which '-2' indicates a moderate drought, '-3' a severe drought, and '-4' an extreme drought. The planning area has experienced several extreme droughts since 1895 and moderate, severe, and extreme droughts are likely in the future.

Table 34: Palmer Drought Severity Index Classification

Numerical Value	Description	Numerical Value	Description
4.0 or more	Extremely wet	**-0.5 to -0.99**	Incipient dry spell
3.0 to 3.99	Very wet	**-1.0 to -1.99**	Mild drought
2.0 to 2.99	Moderately wet	**-2.0 to -2.99**	Moderate drought
1.0 to 1.99	Slightly wet	**-3.0 to -3.99**	Severe drought
0.5 to 0.99	Incipient wet spell	**-4.0 or less**	Extreme drought
0.49 to -0.49	Near Normal	**--**	--

Source: Climate Prediction Center[45]

Figure 11: Palmer Drought Severity Index



Source: NCEI, 1895 – May 2026[46]

[43] NOAA National Centers for Environmental Information. October 2026. "Data Tools: 1991-2020 Normals." [datafile]. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

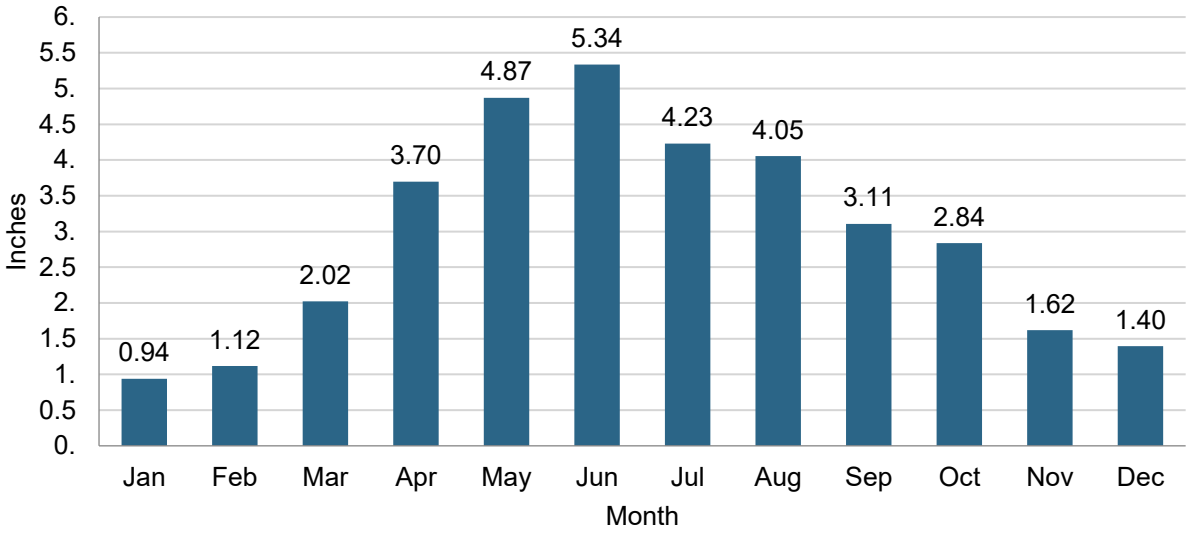
[44] National Centers for Environmental Information. 1895 – May 2026. "Climate at a Glance: Divisional Time Series". Accessed October 2026. https://www.ncdc.noaa.gov/cag/divisional/time-series.

[45] National Weather Service. 2017. "Climate Prediction Center." https://www.cpc.ncep.noaa.gov/.

[46] National Centers for Environmental Information. 1895 – November 2025. "Climate at a Glance: Divisional Time Series". Accessed October 2026. https://www.ncdc.noaa.gov/cag/divisional/time-series.

Figure 12 shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. Prolonged deviation from the norm showcases drought conditions and influences growing conditions for farmers.

Figure 12: Average Monthly Precipitation for the Planning Area



Source: NCEI, 1991-2020[47]

Average Annual Loss

The annual property estimate was determined based upon NCEI Storm Events Database since 1996. The annual crop loss was determined based upon the RMA Cause of Loss Historical Database since 2000. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of drought are difficult to quantify. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of air conditioning or water pumps can overload the electrical systems and damage infrastructure.

Table 35: Loss Estimate for Drought

Hazard Type	Total Property Loss[1]	Average Annual Property Loss[1]	Total Crop Loss[2]	Average Annual Crop Loss[2]
Drought	$0	$0	$70,215,077	$2,700,579

Source: 1 Indicates data is from NCEI (1996-2026); 2 Indicates data is from USDA RMA (2000-2025)

Historical Probability and Future Likelihood

Drought conditions are likely to occur regularly in the planning area. The following table summarizes the magnitude of drought and monthly probability of occurrence.

[47] NOAA National Centers for Environmental Information. "Data Tools: 1991-2020 Normals." [datafile]. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

Table 36: Period of Record in Drought

PDSI Value	Magnitude	Drought Occurrences by Month	Monthly Probability
4 or more to -0.99	No Drought	1,113/1,577	70.6%
-1.0 to -1.99	Mild Drought	166/1,577	10.5%
-2.0 to -2.99	Moderate Drought	159/1,577	10.1%
-3.0 to -3.99	Severe Drought	82/1,577	5.2%
-4.0 or less	Extreme Drought	57/1,577	3.6%

Source: NCEI, 1895 – May 2026[48]

Table 37: Historical Probability & Future Likelihood – Drought

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Drought	29.4% (monthly)	Neither Increase nor Decrease in Frequency. Increase in Exposure.	**Very Likely**

Future Development

Any future developments are likely to increase water demand, increase travel on local transportation routes, and influence continued growth on economic sectors at risk from the impacts of drought. Growing communities will need to adapt and account for increased water demands for residential, commercial, and industrial development.

Regional Vulnerabilities

In Iowa, future droughts are projected to increase in intensity even with an increase in precipitation. An increase in average temperatures will contribute to the rise in the frequency and intensity of hazardous events like extreme heat and drought, which will cause significant economic, social, and environmental impacts on Iowans. Although drought is a natural part of the climate system, increasing temperatures will increase evaporation rates, decrease soil moisture, and lead to more intense droughts in the future, having negative impacts on farming and community water systems.

The Drought Impact Reporter is a database of drought impacts throughout the United States, with data going back to 2000. The Drought Impact Reporter has recorded a total of two drought-related impacts throughout the county. Notable drought impacts are summarized in the following table. This is not a comprehensive list of droughts that may have impacted the planning area.

Table 38: Notable Drought Impacts in Planning Area

Category	Date	Title
Relief Response & Restrictions, Water Supply & Quality	9/10/2026	Drought watch for much of Iowa

Source: NDMC, 2000 – September 2026[49]

The following table provides information related to regional vulnerabilities. For jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 39: Regional Drought Vulnerabilities

[48] National Centers for Environmental Information. Accessed October 2026. https://www.ncdc.noaa.gov/cag/divisional/time-series.
[49] National Drought Mitigation Center. 2023. "U.S. Drought Impact Reporter." Accessed October 2023. http://droughtreporter.unl.edu/map/.

Sector	Vulnerability	Expected Impacts
People	-Insufficient water supply -Loss of jobs in agricultural sector -Residents in poverty if food prices increase	-Reduced availability of potable water, sanitation; water-use restrictions; increased costs for water acquisition; greater health and safety concerns during prolonged shortages. -Reduced household income, increased unemployment, loss of seasonal and permanent agricultural jobs, -Higher household expenses for food, reduced ability to afford other necessities, increased food insecurity, and disproportionate financial impacts on low-income households.
Economic	-Closure of water intensive businesses (carwashes, pools, etc.) -Short-term interruption of business -Loss of tourism dollars -Decrease in cattle prices -Decrease of land prices jeopardizes educational funds	-Lost business revenue, reduced employment, potential permanent business closures, reduced local tax revenue, supply-chain impacts. -Reduced agricultural revenue, lower profitability for ranchers and producers, increased financial stress, and potential reductions in herd size or livestock operations
Built Environment	-Cracking foundations (residential and commercial structures) -Damages to landscapes	-Structural damage, costly repairs, reduced property values, increased insurance or maintenance costs, and potential displacement of residents or businesses if damage becomes severe. -Loss of vegetation, trees, lawns, and agricultural landscaping; increased erosion and dust; degraded appearance of public and private spaces; and increased costs for replacement or restoration.
Infrastructure	-Damages to waterlines below ground -Damages to roadways (prolonged extreme events)	-Waterline breaks and leaks, interruptions in water service, increased repair and maintenance costs, water loss, roadway damage from leaks, and reduced reliability of the water distribution system. -Road and pavement deterioration, increased potholes, reduced road capacity or accessibility, higher maintenance costs, and potential disruptions to emergency response and transportation.
Community Lifelines	-Loss of power and impact on infrastructure	-Disruption of water and wastewater systems, communications, transportation, healthcare, businesses, and other essential services; potential food and water safety concerns; and increased demands on emergency services.
Climate	-Increased risk of wildfire events, damaging buildings and agricultural land	-Increased potential for loss of homes, commercial structures, agricultural facilities, crops, livestock, and natural resources; smoke-related health impacts; evacuation and displacement; loss of income; and substantial recovery and rebuilding costs.

Extreme Temperatures

Natural Hazard

Extreme Heat

Extreme heat is often associated with periods of drought but can also be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulty cooling through the normal method of the evaporation of perspiration. Health risks arise when a person is overexposed to heat. Extreme heat can also cause people to overuse air conditioners, which can lead to power failures. Power outages for prolonged periods increase the risk of heat stroke and subsequent fatalities due to loss of cooling and proper ventilation. The planning area is largely rural, which presents an added vulnerability to extreme heat events; those suffering from an extreme heat event may be farther away from medical resources as compared to those living in an urban setting.

Along with humans, animals also can be affected by high temperatures and humidity. Cattle and other farm animals respond to heat by reducing feed intake, increasing their respiration rate, and increasing their body temperature. These responses assist the animal in cooling itself, but this is usually not sufficient. When animals overheat, they will begin to shut down body processes not vital to survival, such as milk production, reproduction, or muscle building.

Other secondary concerns connected to extreme heat hazards include water shortages brought on by drought-like conditions and high demand. Government authorities report that civil disturbances and riots are more likely to occur during heat waves. In cities, pollution becomes a problem because the heat traps pollutants in densely populated urban areas. Adding pollution to the stresses associated with the heat magnifies the health threat to the urban population.

The National Weather Service (NWS) is responsible for issuing extreme heat outlooks, extreme heat watches, and extreme heat warnings.

- **Heat Advisory** notices are issued for dangerous heat conditions that are not expected to reach warning criteria. Outdoor events should be postponed or rescheduled. Drinking plenty of water and taking frequent breaks in the shade are encouraged.

- **Extreme heat watches** are issued when conditions are favorable for an extreme heat event but its occurrence and timing are uncertain. Major outdoor activities should be suspended. People are encouraged to stay in an air-conditioned space or a cooling shelter.

- **Extreme heat warnings** are issued when extremely dangerous heat conditions are expected or occurring. Outdoor activities should be avoided. Drinking plenty of water and taking frequent breaks in the shade are encouraged if spending time outside. People should spend time indoors in an air-conditioned space, and are encouraged to check on family and neighbors.

Extreme Cold

Prolonged exposure to cold causes the human body to lose heat faster than it can produce it and to use up the body's stored energy. As a result, abnormally low body temperature can lead to hypothermia. Frostbite is another symptom of prolonged cold exposure that causes a loss of feeling and color in affected areas of the body. Frostbite most often affects the nose, ears, cheeks, chin, fingers, or toes and can permanently damage body tissues.

The NWS also issues watches and warnings when dangerous cold or frost conditions are forecast.

- **Cold weather advisories** are issued when seasonably cold wind chill values, but not extremely cold values are expected or occurring.

- **Extreme cold watches** are released when dangerously cold air, with or without wind, is possible.

- **Extreme cold warnings** are issued when dangerously cold air, with or without wind, is expected and conditions could lead to frostbite or hypothermia.

- **Frost Advisory** means areas of frost are expected or occurring, posing a threat to sensitive vegetation.

- **Freeze Watch** is issued when there is a potential for significant, widespread freezing temperatures within the next 24-36 hours. Frost watch is issued in autumn until the end of the growing season and in the spring at the start of the growing season.

- **Freeze Warning** is issued when temperatures are forecast to go below 32 degrees F for a long period. This temperature threshold kills some types of commercial crops and residential plants, while temperatures below 28 degrees F for an extended period can kill most types of commercial crops and residential plants.

Location

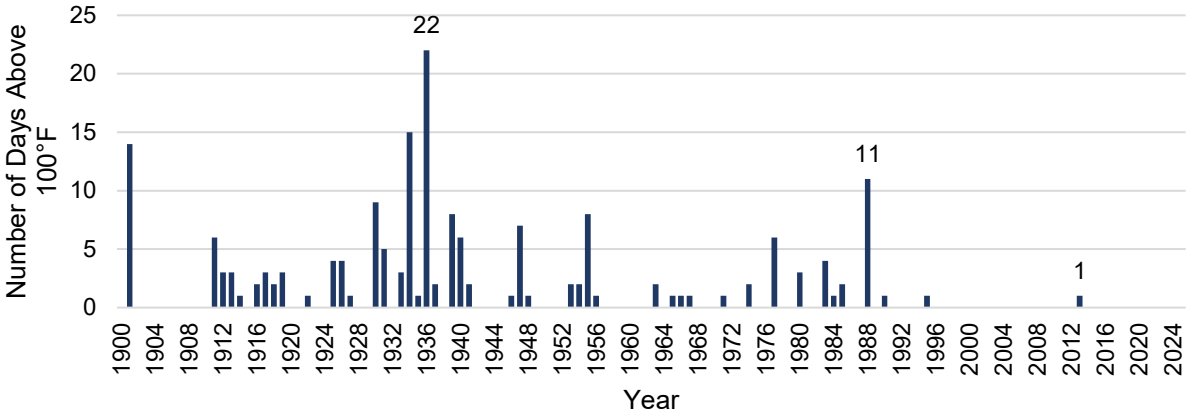
The entire county and all participating jurisdictions are susceptible to extreme heat and cold impacts.

Historical Occurrences

According to the High Plains Regional Climate Center (HPRCC), on average, the county experiences one day above 100°F per year. The county experienced the most days on record above 100°F in 1936 with 22 days (Figure 13). Locally, the local planning team members remarked experiencing more days over 100F in the past five years than reported here; which is consistent with heat impact trends across the Midwest.

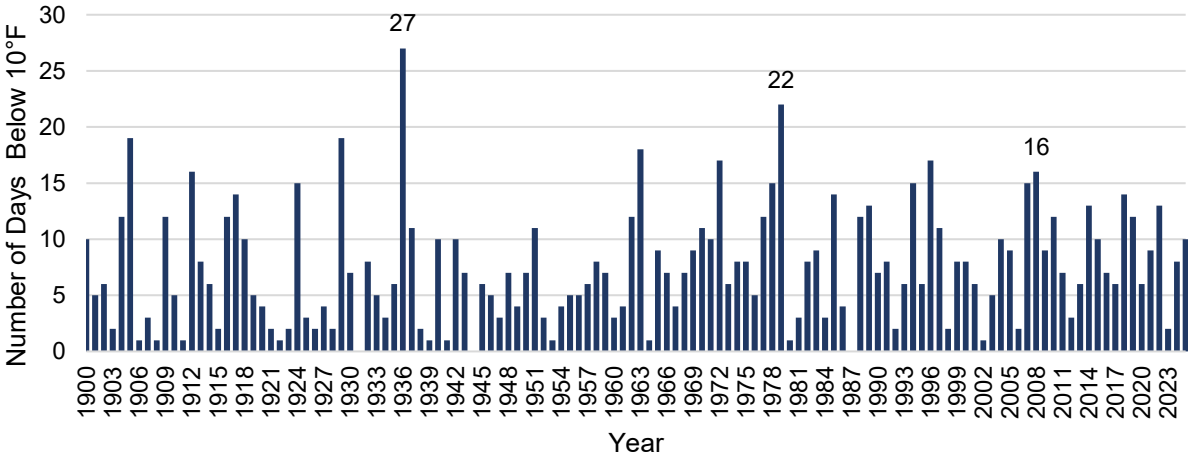
Conversely, the planning area experiences an annual average of seven days with a high of 10°F or below, and recorded its highest annual count in 1936 with 27 days ≤10°F (Figure 14).

Figure 13: Number of Days Above 100°F



Source: HPRCC, 1900 – 2024

Figure 14: Number of Days with High of 10°F or Below



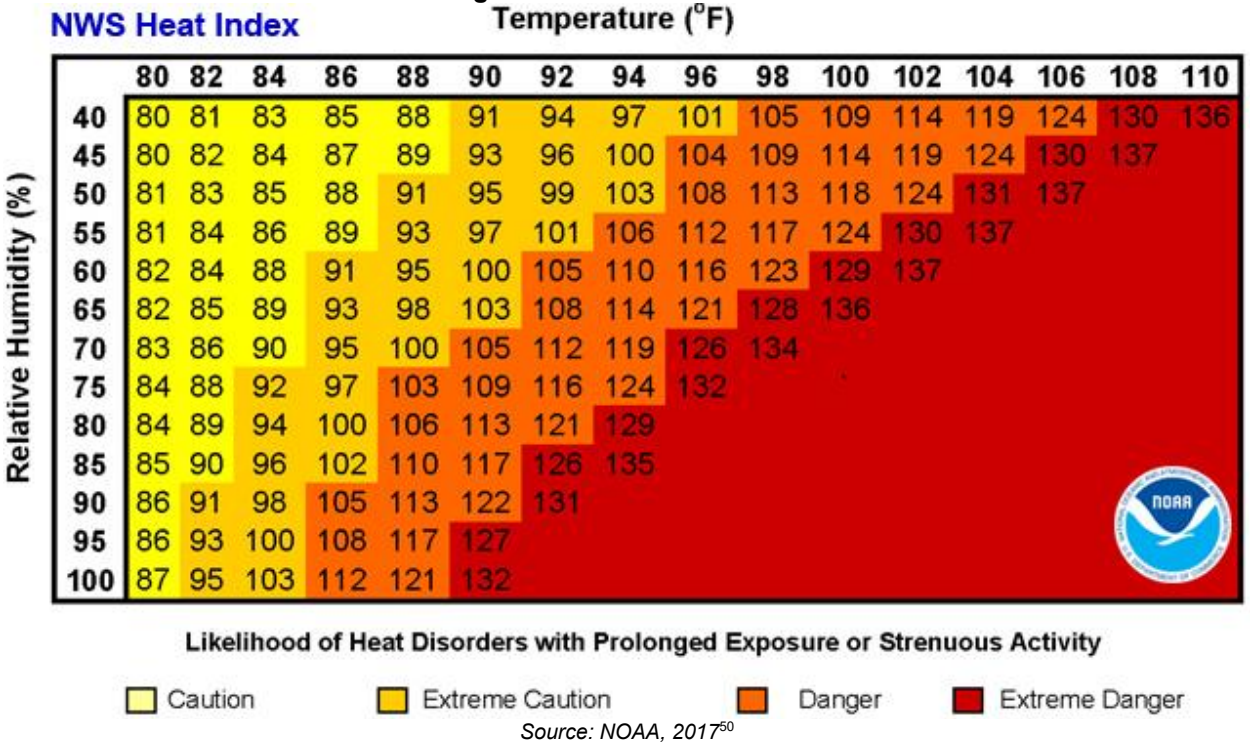
Source: HPRCC, 1900 - 2024

Extent (Extreme Heat)

A key factor to consider regarding extreme heat situations is the humidity level relative to the temperature. As is indicated in the following figure from the National Oceanic and Atmospheric Administration (NOAA), as the relative humidity increases, the temperature needed to cause a dangerous situation decreases. For example, for 100% relative humidity, extreme caution levels of heat begin at 95°F whereas a relative humidity of 50% require 91°F. The combination of relative humidity and temperature results in a heat index as demonstrated below:

$$100\%\ Relative\ Humidity + 86°\mathrm{F} = 112°\mathrm{F}\ Heat\ Index$$

Figure 15: NOAA Heat Index

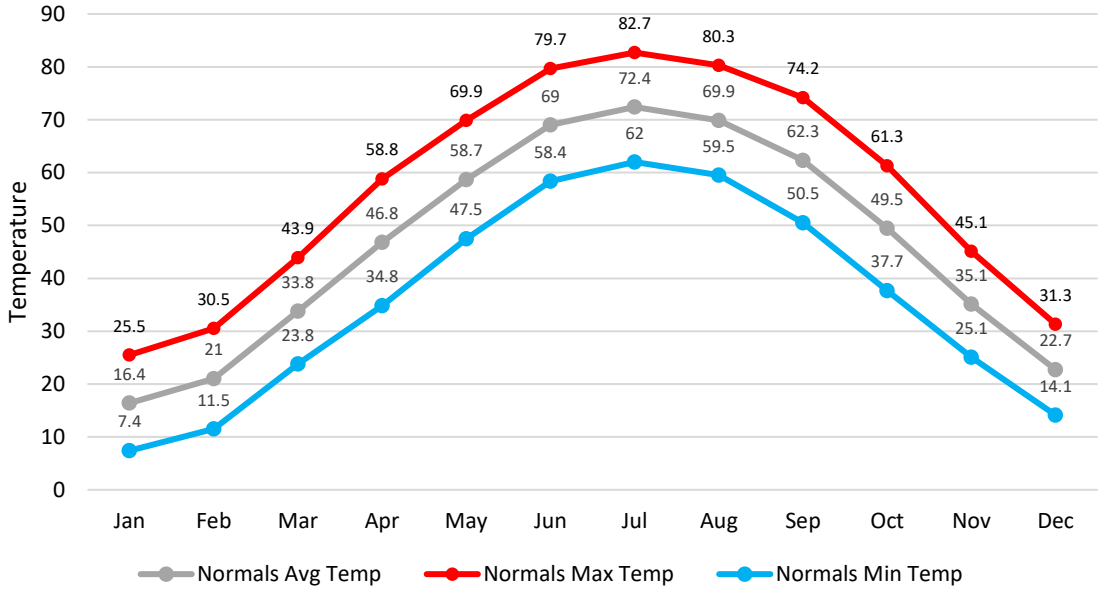


Source: NOAA, 2017[50]

Figure 15 is designed for shady and light wind conditions. Exposure to full sunshine or strong winds can increase hazardous conditions and raise heat index values by up to 15°F. For the purposes of this plan, extreme heat is defined as temperatures of 100°F or greater. In the planning area, the months with the highest temperatures are June, July, and August (Figure 16). The average high for these three months is 80.9°F.[51]

[50] National Weather Service. 2017. "Heat Index." https://www.weather.gov/safety/heat-tools.
[51] NOAA National Centers for Environmental Information. "Data Tools: 1991-2020 Normals." [datafile]. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

Figure 16: Monthly Climate Normals Temperature (1991-2020)



Source: NCEI, 2026

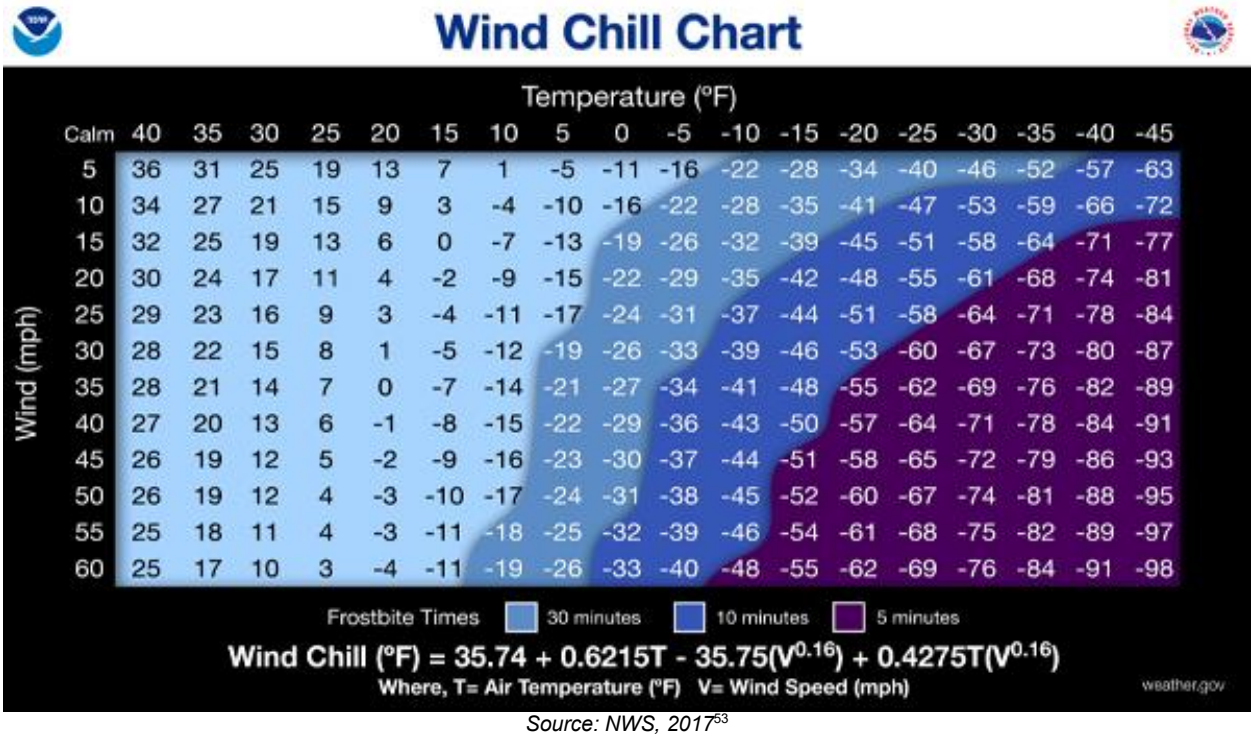
Extent (Extreme Cold)

Along with snow and ice storm events, extreme cold is dangerous to the well-being of people and animals. What constitutes extreme cold varies from region to region but is generally accepted as temperatures that are significantly lower than the region's average low temperature. For this plan, extreme cold is defined as the high temperature being 10°F or below. For the planning area, the coldest months of the year are December, January, and February (Figure 16). The average low for these three months is 11°F.[52]

The NWS developed the Wind Chill Index to determine the decrease in air temperature felt by the body on exposed skin due to wind. The wind chill is always lower than the air temperature and can quicken the effects of hypothermia or frostbite as it gets lower. Figure 17 shows the Wind Chill Index used by the NWS.

[52] NOAA National Centers for Environmental Information. September 2026. "Data Tools: 1991-2020 Normals." [datafile]. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

Figure 17: Wind Chill Index Chart



Source: NWS, 2017[53]

Average Annual Loss

The annual property estimate was determined based upon NCEI Storm Events Database since 1996. The annual crop loss was determined based upon the RMA Cause of Loss Historical Database since 2000. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. The direct and indirect effects of extreme temperatures are difficult to quantify. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of HVAC systems or water pumps can overload the electrical systems and damage infrastructure.

Table 40: Loss Estimate for Extreme Heat

Hazard Type	Avg. Number of Days ≥100°F	Total Property Loss[2]	Average Annual Property Loss[2]	Total Crop Loss[3]	Average Annual Crop Loss[3]
Extreme Heat	1 day	$135,000	$4,500	$1,415,662	$54,448

Source: 1 HPRCC (1893 – 2022); 2 Indicates data is from NCEI (1996 - 2026); 3 Indicates data is from USDA RMA (2000 - 2025)

Table 41: Loss Estimate for Extreme Cold

Hazard Type	Avg. Number of Days with Max Temp ≤10°F[1]	Total Property Loss[2]	Average Annual Property Loss[2]	Total Crop Loss[3]	Average Annual Crop Loss[3]
Extreme Cold	7 days	$0	$0	$84,678	$3,257

Source: 1 HPRCC (1893 – 2025); 2 Indicates data is from NCEI (1996 - 2026); 3 Indicates data is from USDA RMA (2000 - 2025)

[53] National Weather Service. 2001. "Wind Chill Chart." https://www.weather.gov/media/safety/windchillchart3.pdf .

Estimated Loss of Electricity

According to the FEMA Benefit Cost Analysis Reference Guide, if an extreme heat event occurred within the planning area, the following table assumes the event could potentially cause a loss of electricity for 10% of the population at a cost of $213 per person per day.[54] In rural areas, the percent of the population affected, and duration may increase during extreme events. The assumed damages do not take into account physical damages to utility equipment and infrastructure.

Table 42: Loss of Electricity - Assumed Damage

Jurisdiction	2025 Population	Population Affected (Assumed 10%)	Electric Loss of Use Assumed Damage Per Day
Webster County	**36,838**	3,683	$784,479

Historical Probability & Future Likelihood

Extreme temperatures are a regular part of the climate for the planning area. Extreme heat events with days with maximum temperature ≥100°F occurred in 45 out of 126 years. The probability that extreme heat will occur in any given year in the planning area is 36%. Extreme cold events having at least one day with a high at or below 10°F occurred in 123 out of 126 years. The probability that extreme cold will occur in any given year in the planning area is 98%.

Table 43: Historical Probability & Future Likelihood – Extreme Temperatures

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Extreme Heat	36%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**
Extreme Cold	98%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**

Future Development

Any increases in population and development will elevate exposure levels to extreme heat or cold. There are several ways for communities to minimize the impacts of extreme heat. Communities can plant trees and other vegetation to provide more natural shade and make green infrastructure improvements. Many of these options can be required during new development but can also be added to areas that are already developed. Facilities such as nursing homes, hospitals, clinics, and daycares should be designed with access to backup power generation. Public cooling or warming centers should be established across the planning area for residents.

Regional Vulnerabilities

Rising temperatures will also impact air quality. Harmful air pollutants and allergens increase as temperatures increase. More extended periods of warmth contribute to longer pollen seasons that allow plant spores to travel farther and increase exposure to allergens. More prolonged exposure to allergens can increase the risk and severity of asthma attacks and worsen existing allergies in individuals.[55]

[54] FEMA. 2024. "Benefit-Cost Analysis Sustainment and Enhancement". https://www.fema.gov/sites/default/files/documents/fema-standard-economic-values-methodology-report-v13-2024.pdf.pdf.

[55] Asthma and Allergy Foundation of America. 2010. "Extreme Allergies and Climate Change." Accessed 2022. https://www.aafa.org/extreme-allergies-and-climate-change/.

As the number of 100°F days increases, along with warming nights, the stress placed on the energy grid will likely increase and possibly lead to more power outages. Severe weather events also stress emergency production, infrastructure transmission, and transportation. Roads, pipelines, and rail lines are all at risk of damage from flooding, extreme heat, erosion, or added stress from increased residential demands.[56] Critical facilities and vulnerable populations that are not prepared to handle periods of power outages, particularly during heat waves, will be at risk. Extreme heat events have adverse effects on both human and livestock health. Heatwaves may also impact plant health, with negative effects on crops during essential growth stages. Increasing temperatures and drought may reduce the potential for aquifers to recharge, which has long-term implications for the viability of agriculture in Iowa.

The following table provides information related to regional vulnerabilities. For jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 44: Regional Extreme Temperature Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Heat exhaustion -Heat stroke -Hypothermia -Heart Disease -Asthma Vulnerable populations include: -People working outdoors -People without air conditioning or heat -Young children outdoors or without air conditioning or heat -Elderly outdoors or without air conditioning or heat	-Increased risk of heat- or cold-related symptoms, illnesses, and injuries (dehydration, dizziness, fatigue, etc.) -Potential hospitalization or permanent health complications or death -Increased demand for heat or cooling assistance or centers
Economic	-Short-term interruption of business -Loss of power -Agricultural losses	-Reduced productivity, temporary closures, employee absenteeism -Disrupted services, damage to temperature-specific equipment -Revenue loss
Built Environment	-Damage to HVAC systems if overworked	-Increased wear and tear of equipment, increased maintenance costs
Infrastructure	-Damages to roadways (prolonged extreme events) -Stressing electrical systems (brownouts during peak usage) -Stressing water systems	-Pavement deterioration, transportation disruptions -Equipment damage, impacts to businesses and residents -Lower reliability of utilities during extreme heat or cold days
Community Lifelines	-Loss of power	-Service disruption for community lifelines and other essential services
Climate	-Increased risk of wildfire events	-Wildfire risk increases

[56] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp.

Sector	Vulnerability	Expected Impacts
	-Increases in extreme heat conditions are likely, adding stress on livestock, crops, people, and infrastructure -Increases in extreme cold severity are likely, adding stress on electrical systems, people, and infrastructure	-Higher demand for water for agriculture sector on extreme heat -Brown or blackouts during peak electricity usage -Heat- and cold-related injuries and death -Damaged infrastructure

Flooding

Natural Hazard

Flooding can occur on a local level, sometimes affecting only a few streets, but it can also extend throughout an entire district, affecting whole drainage basins and impacting people and property in multiple states. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the day and freezing at night. There are five main types of flooding in Iowa: river flooding, flash flooding, snowmelt, dam breaks/levee failure (discussed earlier), and ice/debris jam flooding.

River Flooding

River flooding, typically slower developing with a moderate to long warning time, is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater are called floodplains. A floodplain or flood risk area is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100-year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin or watershed, which is defined as all the land draining to a river and its tributaries.

Flash Flooding

Flash floods, typically rapidly developing with little to no warning time, result from convective precipitation usually due to intense thunderstorms or sudden releases due to a failure of an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from regular floods by a timescale of fewer than six hours. Flash floods cause the most flood-related deaths because of this shorter timescale. Flooding from excessive rainfall events in Iowa usually occurs between late spring and early fall.

Stormwater Flooding

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage capacity. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as stormwater flooding, is becoming increasingly prevalent as development exceeds the capacity of drainage infrastructure, limiting its ability to convey stormwater. Flooding also occurs due to combined storm and sanitary sewers being overwhelmed by the high flows that often accompany storm events. Typical impacts range from dangerously flooded roads to water backing up into homes or basements, which damages mechanical systems and can create serious public health and safety concerns.

Ice/Debris Jam Flooding

Ice jams occur when ice breaks up in moving waterways, and then stacks on itself where channels narrow, or human-made obstructions constrict the channel. This creates an ice dam, often causing flooding within minutes of the dam formation. Ice formation in streams occurs during periods of cold weather when finely divided colloidal particles called "frazil ice" form. These particles combine to form what is commonly known as “sheet ice.” This type of ice covers the entire river. The thickness of this ice sheet depends upon the degree and duration of cold weather

in the area. This ice sheet can freeze to the bottom of the channel in places. During spring thaw or winter freezing, rivers frequently become clogged with this winter accumulation of ice. Because of relatively low stream banks and channels blocked with ice, rivers overtop existing banks and flow overland. This type of flooding tends to occur more frequently on wide, shallow rivers, although other rivers can be impacted. Debris jams can occur at any time of the year and can cause similar consequences as ice jams.

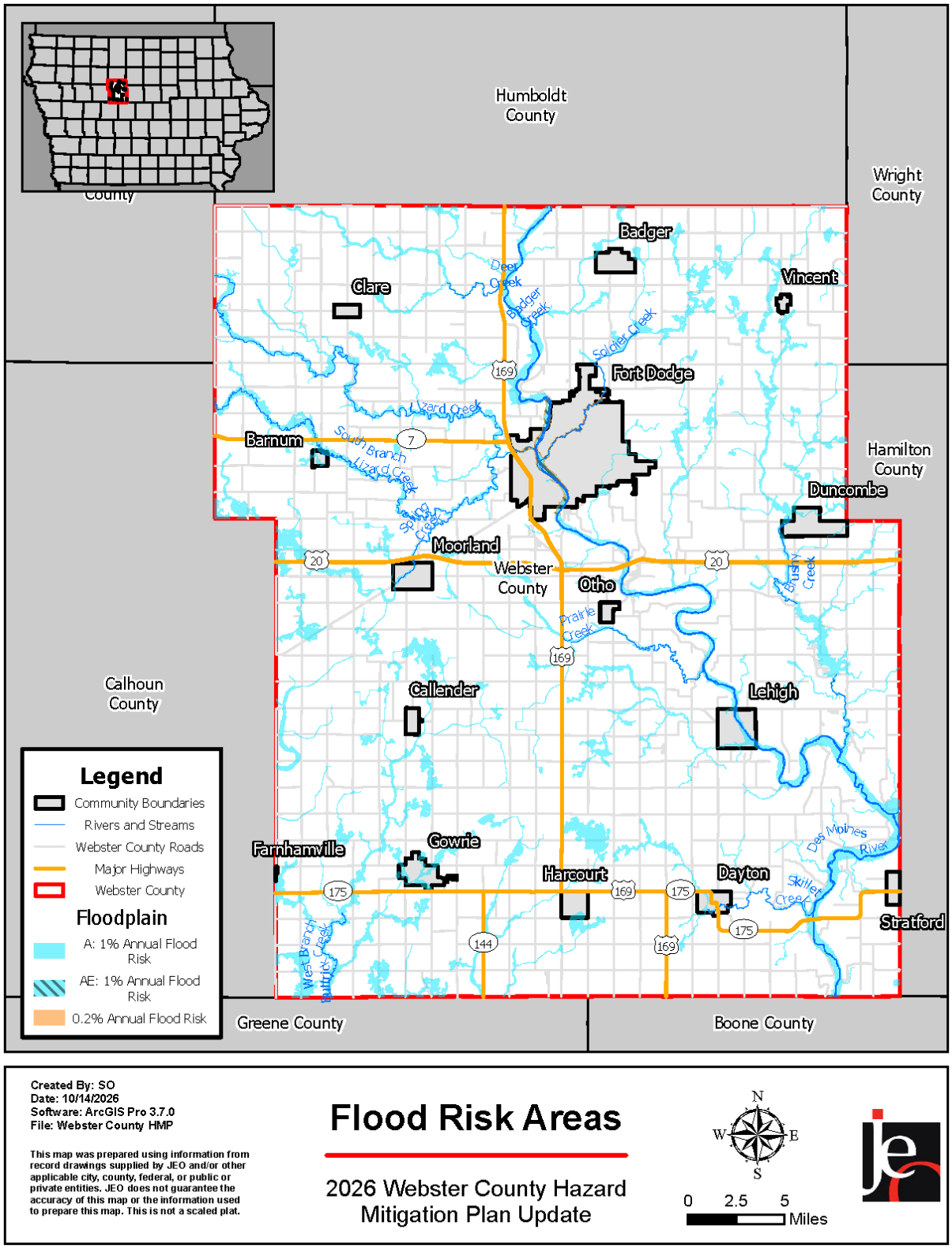
Location

Webster County is located primarily within the Middle Des Moines River watershed. The Des Moines River flows through the center of the county and serves as the primary drainage channel for several tributaries, including Lizard Creek, Soldier Creek, and Gypsum Creek. These waterways, along with their smaller tributaries and associated low-lying areas, are potential locations for riverine and flash flooding.

Webster County has 16 Flood Insurance Rate Map (FIRM) panels according to FEMA. For additional details on localized flood risk such as flood zone types, please refer to the official FIRM available from FEMA's Flood Map Service Center.[57] Figure 18 shows the modeled floodplain for the county. For jurisdiction-specific maps as well as an inventory of structures in the floodplain, please refer to *Section Seven: Community Profiles.*

[57] Federal Emergency Management Agency. "FEMA Flood Map Service Center." Accessed October 2026. http://msc.fema.gov/portal/advanceSearch.

Figure 18: 1% and 0.2% Annual Flood Risk Hazard Areas



Risk Map Products

Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program that provides communities with flood information and additional flood risk data (e.g., flood depth grids, percent chance grids, areas of mitigation interest, etc.) that can be used to enhance their mitigation plans and act to better protect their citizens. There are currently two Risk MAP products or projects in the planning area.[58]

The Iowa Flood Center hosts flood risk maps on an interactive web map that contains tools for analyzing scour-prone areas, flood risk gradients, and flood depths. The interactive flood risk maps can be viewed at: https://ifis.iowafloodcenter.org/ifis/newmaps/risk/map/.

Extent

The NWS has three categories to define the severity of a flood once a river reaches flood stage as indicated in Table 45.

Table 45: Flooding Stages

Flood Stage	Description of Flood Impacts
Minor Flooding	Minimal or no property damage, but possibly some public threat or inconvenience
Moderate Flooding	Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary
Major Flooding	Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations

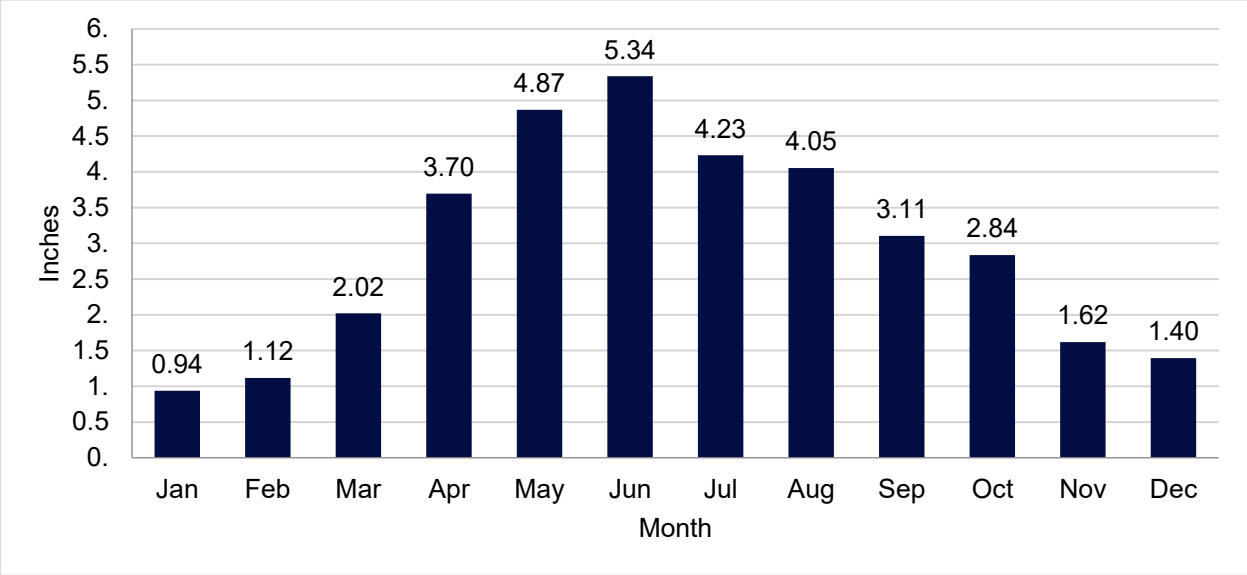
Source: NOAA, 2017[59]

Figure 19 shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. As indicated in Figure 20, the most common months for flooding within the planning area are June and August.

[58] Federal Emergency Management Agency. "FEMA Flood Map Service Center." Accessed October 2026. http://msc.fema.gov/portal/advanceSearch.

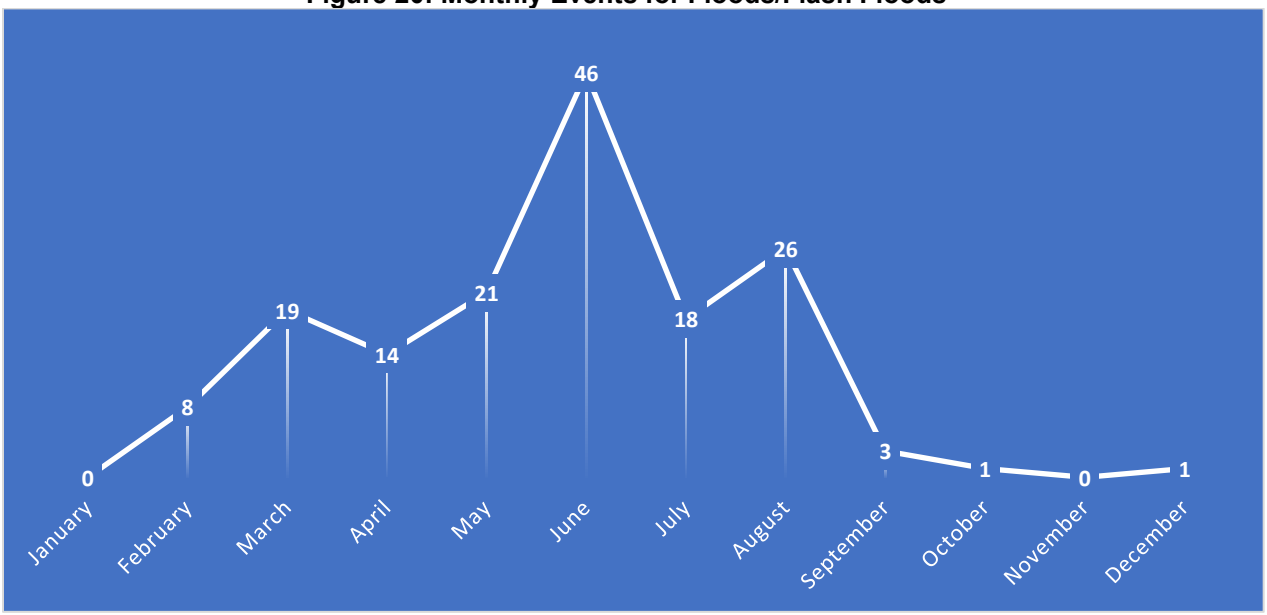
[59] National Weather Service. 2017. "Flood Safety." https://www.weather.gov/safety/flood.

Figure 19: Average Monthly Precipitation for Planning Area



Source: NCEI, 1991-2020[60]

Figure 20: Monthly Events for Floods/Flash Floods



Source: NCEI, 1996-May 2026

National Flood Insurance Program (NFIP)

The NFIP was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where feasible; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the residents of floodplains through flood insurance premiums.

In return for availability of federally backed flood insurance, jurisdictions participating in the NFIP must agree to adopt and enforce floodplain management standards to regulate development in

[60] NOAA National Centers for Environmental Information. April 2026. "Data Tools: 1991-2020 Normals." [datafile]. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

special flood hazard areas as defined by FEMA's flood maps. One of the strengths of the program has been keeping people away from flooding rather than keeping the flooding away from people—through flood control projects. The following tables summarize NFIP participation and active policies within the planning area.

Table 46: NFIP Participants

Jurisdiction	Participate in NFIP	Eligible-Regular Program	Date Current Map	Sanction	Suspension	Rescinded
Webster County	Y	10/1/1985	12/4/2012	-	-	-
Badger	Y	12/4/2012	12/4/2012	-	-	-
Barnum	Y	09/01/96	12/04/12(M)	-	-	-
Dayton	Y	09/01/96	12/04/12(M)	-	-	-
Duncombe	Y	12/4/2012	12/04/12(M)	-	-	-
Fort Dodge	Y	07/01/74	12/4/2012	-	-	-
Gowrie	Y	12/4/2012	12/04/12(M)	-	-	-
Harcourt	Y	12/4/2012	12/04/12(M)	-	-	-
Lehigh	Y	09/04/85	12/04/12(M)	-	-	-
Moorland	Y	09/01/96	12/04/12(M)	-	-	-
Vincent	Y	12/4/2012	12/4/2012	-	-	-

Source: Federal Emergency Management Agency, National Flood Insurance Program, 2026[61]
**(M) indicates no elevation determined – All Zone A, C, and X; (NSFHA) indicates No Special Flood Hazard Area – All Zone C.*

The NFIP Emergency Program allows a community to voluntarily participate in the NFIP if no flood hazard information is available for their area; the community has a Flood Hazard Boundary Map but no FIRM; or the community has been identified as flood-prone for less than a year.

[61] Federal Emergency Management Agency. 2026. "Community Status Book Report." Accessed May 2026. https://www.fema.gov/cis/IA.html

Table 47: NFIP Policies in Force and Total Payments

Jurisdiction	Policies In-force	Total Coverage	Total Premiums	Total Losses	Total Payments
BARNUM	2	$600,000	$1,444	-	$-
FORT DODGE	5	$1,608,000	$5,642	20	$43,677
LEHIGH	-	$-	$-	10	$154,590
WEBSTER COUNTY	17	$4,079,000	$24,478	65	$2,577,759

Source: NFIP HUDEX, September 2026

This plan highly recommends and strongly encourages plan participants to enroll, participate, and remain in good standing with the NFIP. Compliance with the NFIP should remain a top priority for each participant. Jurisdictions are encouraged to initiate activities above the minimum participation requirements, which are described in the Community Rating System (CRS) Coordinator's Manual.[62] Currently no jurisdictions in the planning area participate in the CRS program.

NFIP Repetitive Loss Structures

IDNR was contacted to determine if any existing buildings, infrastructure, or community lifelines are classified as NFIP Repetitive Loss Structures. As of February 2026, there have been nine repetitive losses in the county, with one severe repetitive loss. All properties are considered residential single-family homes. Definitions of a structure identified as an NFIP Repetitive Loss (RL) and Severe Repetitive Loss (SRL) are given below.

NFIP RL: Repetitive Loss Structure refers to a structure covered by a contract for flood insurance under the NFIP that has incurred flood-related damage on two occasions during a 10-year period, each resulting in at least a $1,000 claim payment.

NFIP SRL: Severe Repetitive Loss Properties are defined as single or multifamily residential properties that are covered under an NFIP flood insurance policy and:

(1) That have incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding $5,000, and with the cumulative amount of such claim payments exceeding $20,000; or
(2) For which at least two separate claims payments (building payments only) have been made under such coverage, with cumulative amount of such claims exceeding the market value of the building.
(3) In both instances, at least two of the claims must be within 10 years of each other, and claims made within 10 days of each other will be counted as one claim.

HMA RL: A repetitive loss property is a structure covered by a contract for flood insurance made available under the NFIP that:

(1) Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such food event; and

[62] Federal Emergency Management Agency. 2017. "National Flood Insurance Program Community Rating System: Coordinator's Manual FIA-15/2017." Accessed June 2022. https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf.

(2) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

HMA SRL: A severe repetitive loss property is a structure that:

(1) Is covered under a contract for flood insurance made available under the NFIP.
(2) Has incurred flood related damage –
   (a) For which four or more separate claims payments (includes building and contents) have been made under flood insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claim payments exceeding $20,000; or
   (b) For which at least two separate claims payments (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

Purpose of the HMA definitions: The HMA definitions were allowed by the Biggert-Waters Flood Insurance Reform Act of 2012 to provide an increased federal cost share under the FMA grant when a property meets the HMA definition.

Historical Occurrences

The National Centers for Environmental Information (NCEI) reports flooding events as they occur in individual communities or reporting zones. A single flooding episode can affect multiple communities and areas of Webster County; therefore, a large-scale event may appear as several separate NCEI event records. According to the NCEI data, 56 flash flood events resulted in $4,500,000 in property damage, while 101 flood events resulted in $6,163,570 in property damage. Crop damage totaled approximately $ 390,402. Descriptions of the most damaging flood events reported by the NCEI are provided below:

- **March 14, 2007 – Flash Flood – Fort Dodge:** Unseasonably warm temperatures in the days preceding the event caused rapid snowmelt across snow-covered areas. Rising water and moving river ice created ice jams along the Des Moines River north of Fort Dodge and along Lizard Creek. Flooding and large pieces of ice damaged approximately 20 to 30 homes and several vehicles in the Fort Dodge area. One vehicle was swept from the roadway, requiring the driver to be rescued from the floodwaters. Several roads, including U.S. Highway 169, were closed. The event resulted in an estimated $500,000 in property damage.

- **June 8, 2008 – Flood – Fort Dodge/Countywide:** Heavy rainfall affected much of Iowa, particularly northern and northeastern portions of the state. The rain fell on rivers that were already near flood stage following earlier flooding. These conditions contributed to record flooding across a large portion of Iowa, resulting in widespread damage to property, infrastructure, and agricultural areas. The NCEI event record for Webster County reported an estimated $500,000 in property damage.

- **June 27, 2010 – Flash Flood – Fort Dodge:** Heavy thunderstorms produced significant flash flooding throughout Fort Dodge. Standing water was reported across much of the city, including beneath the U.S. Highway 169 underpass at the railroad bridge. Approximately three feet of water accumulated at Crossroads Mall, and flooding affected First Avenue South, Second Avenue North, North 21st Street, and numerous other locations. The event resulted in an estimated $500,000 in property damage.

- **March 14, 2019 – Flood – Clare/Countywide:** Rising water was reported along the Riverside Trail between Fort Dodge and Otho, threatening nearby residential areas and prompting Webster County to begin evacuating residents. Ice-jam activity was also reported near Lehigh along the Des Moines River. The ice jam flooded numerous homes and other structures in Lehigh and resulted in multiple roadway closures. The event caused an estimated $1,000,000 in property damage.

Average Annual Loss

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and the number of historical occurrences. RMA data was used to determine the average damage for crop loss. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Flooding causes an average of $355,452 in property damages and $15,015 in crop losses per year for the planning area.

Table 48: Flood Loss Estimate

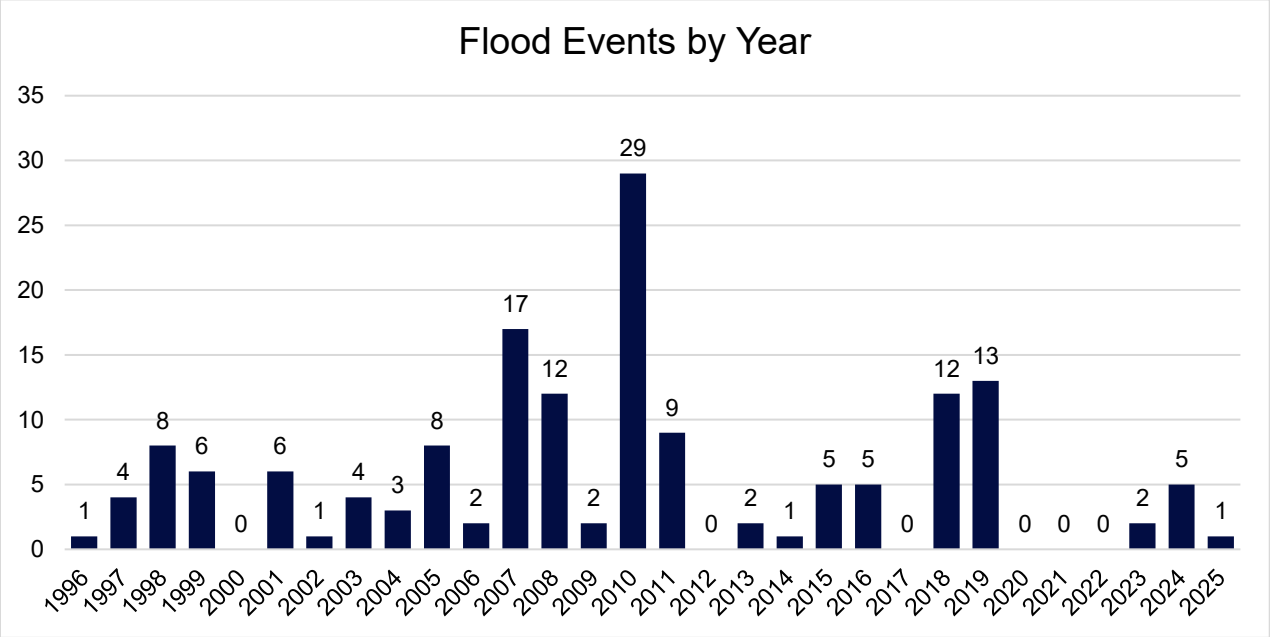
Hazard Type	Number of Events[1]	Average Events Per Year	Total Property Loss[1]	Average Annual Property Loss [1]	Total Crop Loss[2]	Average Annual Crop Loss [2]
Flooding	157	5.2	$10,663,570	$355,452	$390,402	$15,015

Source: 1 Indicates data is from NCEI (1996 to 2026); 2 Indicates data is from USDA RMA (2000 to 2025)

Historical Probability and Future Likelihood

The NCEI reports 101 flooding and 56 flash flooding events for a total of 157 events from 1996 to September 2025. Some years had multiple flooding events. Figure 21 shows the events broken down by year. 24 out of 30 years had at least one flooding event. Based on the historic record and reported incidents by participating communities, the observed annual frequency is 80%.

Figure 21: Yearly Events for Floods/Flash Floods



Source: NCEI, 1996-May 2026

Table 49: Historical Probability & Future Likelihood – Flooding

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Flooding	80%	Increase in Frequency. Increase in Exposure.	**Very Likely**

Future Development

Any future building or development inside of the floodplain should be discouraged to protect future assets. Land-use regulations should be used to limit development in floodplains and other flood prone areas as well as protecting natural flood mitigation features. Buyout programs can be used to eliminate properties located in floodplains, especially properties that have experienced repetitive losses. Communities may also consider incorporating “green infrastructure” to address flooding concerns. Examples of green infrastructure include using permeable surfaces for parking areas, using rainwater retention swales, developing rain gardens, developing green roofs, and establishing greenways. To further reduce future risk to floods, communities can implement stormwater management plans, participate in the National Pollutant Discharge Elimination System program, or participate in the Community Rating System (CRS).

As indicated in Webster County’s Comprehensive Plan, future development should be prohibited or discouraged in the 1% annual chance flood risk area and discourage development in the 0.2% annual chance flood risk area.

Regional Vulnerabilities

Low-income and minority populations are disproportionately vulnerable to flood events.[63] These groups may lack the needed resources to mitigate potential flood events, as well as resources that are necessary for evacuation and response. In addition, low-income residents are more likely to live in areas vulnerable to the threat of flooding but lack the resources necessary to purchase flood insurance. The study found that flash floods are more often responsible for injuries and fatalities than prolonged flood events.

Other groups that may be more vulnerable to floods, specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Elderly residents may suffer from decreased or a complete lack of mobility and be caught in flood-prone areas. Residents in campgrounds or public parks may be more vulnerable to flooding events. Many of these areas exist in natural floodplains and can experience a rapid rise in water levels resulting in injury or death.

Increasing temperatures, shifting precipitation patterns, and extreme weather events impact water quality throughout the state. With the increasing intensity and frequency of extreme precipitation events, impacts on water systems ultimately threaten human health. Events can lead to flooding and stormwater runoff that can carry pollutants across landscapes and threaten human health by contaminating water wells, groundwater, and other bodies of water. Common pollutants include pesticides, bacteria, nutrients, sediment, animal waste, oil, and hazardous waste.

To analyze parcels and populations located in the floodplain, GIS parcel data were acquired from the Webster County Assessor. This data was analyzed for the location, number, and value of property improvements at the parcel level. Property improvements include any built structures such as roads, buildings, and paved lots. The data did not contain the number of structures on each parcel. A summary of the results of this analysis for the entire county (not just unincorporated areas) is provided in the following tables. Specific jurisdictional parcel improvements in the floodplain can be found in the corresponding community profiles in *Section Seven*.

Table 50: County (All) Assessed Parcels and Value in the 1% Annual Flood Risk Area

Total Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	% of Improvements in Floodplain
25,349	$6,831,274,760	332	$29,463,480	1.3%

Source: Webster County Assessor, 2025

Table 51: County (All) Assessed Parcels and Value in the 0.2% Annual Flood Risk Area

Total Number of Improvements	Total Improvement Value	Number of Improvements in Floodplain	Value of Improvements in Floodplain	% of Improvements in Floodplain
25,349	$6,831,274,760	23	$1,473,370	<1%

Source: Webster County Assessor, 2025

In Iowa, Watershed Management Authorities (WMA) are a tool to help cities, counties, Soil and Water Conservation Districts (SWCDs), and stakeholders to work towards watershed planning and management. There are four watershed management authorities that cover a portion of Webster County: Beaver Creek WMA, Boone River WMA, Ioway Creek WMA, and North Raccoon River Watershed Management Coalition. WMAs are directed by a board of directors and may perform activities to reduce flood risk.

[63] Cutter, Susan and Finch, Christina. February 2008. “Temporal and Spatial Changes in Social Vulnerability to Natural Hazards”.

More information on Watershed Management Authorities can be found at the following link: https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Management-Authorities.

The following table is a summary of regional vulnerabilities. For jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles.*

Table 52: Regional Flooding Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Low income and minority populations may lack the resources needed for evacuation, response, or to mitigate the potential for flooding -Elderly or residents with decreased mobility may have trouble evacuating -Residents in low-lying areas, especially campgrounds, are vulnerable during flash flood events -Residents living in the floodplain may need to evacuate for extended periods	-Increased difficulty evacuating -Higher likelihood of injury or death, especially for vulnerable residents, campers, or residents in flood-risk areas -temporary or prolonged displacement, increased demand for shelters and temporary housing
Economic	-Business closures or damages may have significant impacts -Agricultural losses from flooded fields or livestock loss -Closed roads and railways would impact commercial transportation of goods	-Lost revenue, higher maintenance costs for damage repairs, temporary or permanent business closures, job loss -Crop damage or crop failure, livestock injury or death, lower food supply and impacts to food systems -Delays or rerouting of shipments, increased transportation costs, supply-chain disruptions
Built Environment	-Buildings may be damaged	-Increased maintenance and repair costs
Infrastructure	-Damages to roadways and railways	-Transportation delays from closed or damaged roads, increased maintenance and repair costs
Community Lifelines	-Wastewater facilities are at risk, particularly those in the floodplain -Community lifelines, especially those in the floodplain, are at risk to damage (critical facilities are noted within individual community profiles)	-Flood damage can interrupt functions of community lifelines; disruptions could cause secondary impacts to other essential services
Climate	-Changes in seasonal and annual precipitation normals will likely increase frequency and magnitude of flood events	-Increased need for emergency services, flood mitigation efforts, and resilient development practices.

Grass Fire or Wildland Fire

Natural Hazard

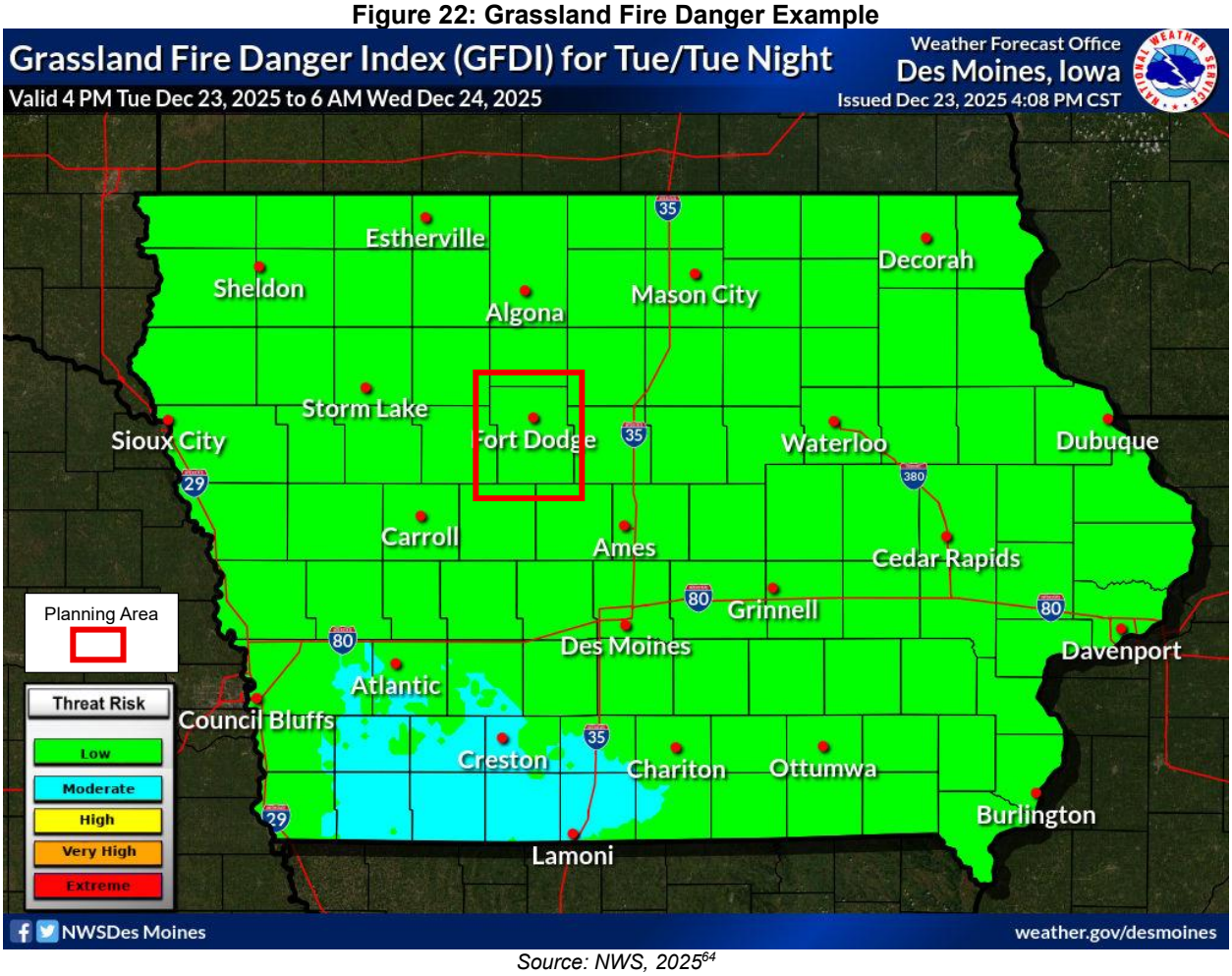
Wildfires, also known as grass fires, brush fires, forest fires, or wildland fires, are uncontrolled fires that occur in the countryside or wildland. Wildland areas may include but are not limited to grasslands, forests, woodlands, agricultural fields, pastures, and other vegetated areas. Wildfires differ from other fires by their potential extensive size, the speed at which they can spread from the original source, their ability to change direction unexpectedly, and to jump gaps (such as roads, rivers, and fire breaks). While some wildfires burn in remote forested and grassland regions, others can cause extensive destruction of homes and other property located in the wildland-urban interface (WUI), the zone of transition between developed areas and undeveloped wilderness.

> Lightning starts approximately 10,000 forest fires each year, yet ninety percent of forest fires are started by humans.
> ~National Park Service

Wildfires are a growing hazard in most regions of the United States, posing a threat to life and property, particularly where native ecosystems meet urban developed areas or where local economies are heavily dependent on open agricultural land. Although fire is a natural and often beneficial process, fire suppression can lead to more severe fires due to the buildup of vegetation, which creates more fuel and increases the intensity and devastation of future fires.

Wildfires are characterized in terms of their geographical characteristics including topography, weather, and fuels; or physical properties such as flame length and propagation. Wildfire behavior is often complex and variably dependent on factors such as fuel type and moisture content, humidity, wind speed, topography, geographic location, and ambient temperature. Fuel is the only one of these factors that humans can control and is the target of most mitigation efforts. The NWS monitors the risk factors including high temperature, high wind speed, fuel moisture (greenness of vegetation), low humidity, and cloud cover in the state on a daily basis (Figure 22). These fire danger predictions are updated regularly and should be reviewed frequently by community leaders and fire department officials.

Figure 22: Grassland Fire Danger Example



Source: NWS, 2025[64]

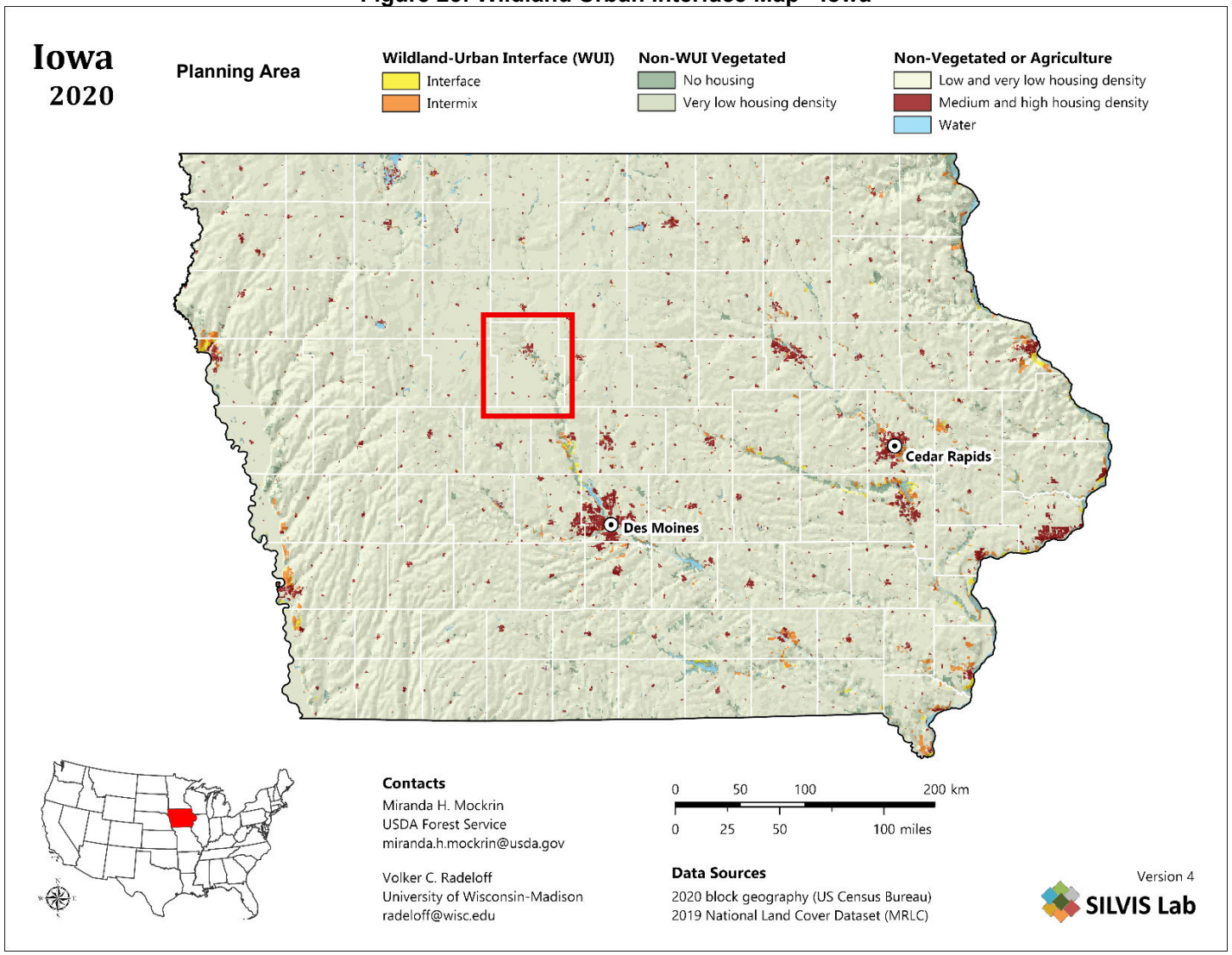
In recent decades, as the population of the United States has decentralized and residents have moved farther away from the center of cities, the WUI has developed significantly, both in terms of population and building stock. The WUI is defined as the zone of transition between developed areas and undeveloped wilderness, where structures and other human development meet wildland. The expansion of the WUI increases the likelihood that wildfires will threaten people and homes, making this area the focus of the majority of wildfire mitigation efforts.

Location

Grass and wildland fires can occur throughout the planning area. The following figure produced by the USDA Forest Service displays the State of Iowa's WUI conditions as of 2020. The approximate location of the planning area is indicated by the red outline. According to this WUI map (Figure 23), intermix areas (orange) are primarily near Fort Dodge, and along the Des Moines River. The rest of the planning area is primarily non-WUI vegetated designated areas, with no or low-density housing. There are some areas of non-vegetated or agricultural land that primarily make up the incorporated communities within the county. An interactive version of this map is available online at the following location: https://silvis.forest.wisc.edu/data/wui-change/. Figure 24 shows a WUI map for Webster County.

[64] National Weather Service. 2025. "Iowa Grassland Fire Danger Index." https://www.weather.gov/dmx/fire.

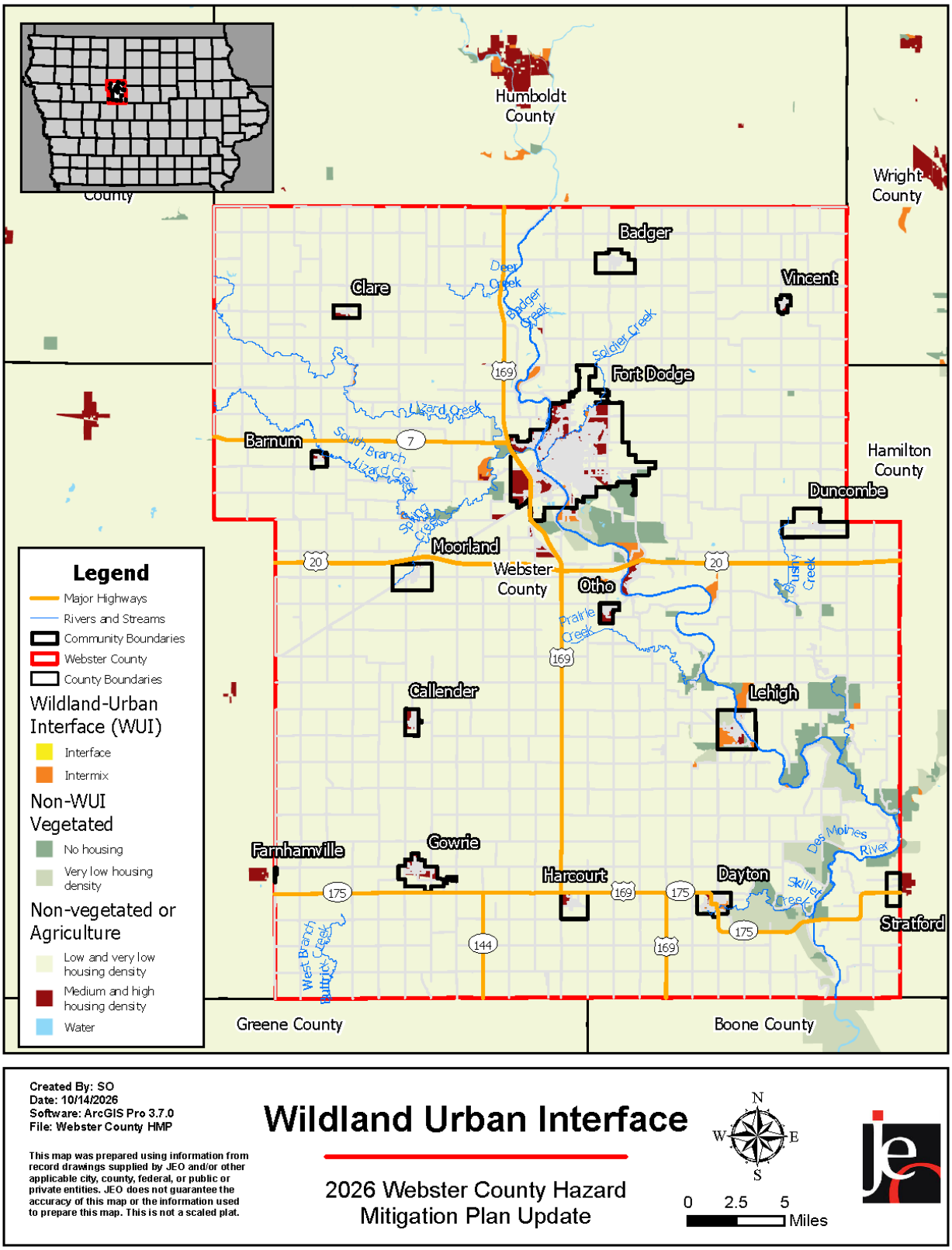
Figure 23: Wildland Urban Interface Map - Iowa



Source: University of Wisconsin-Madison, 2025[65]

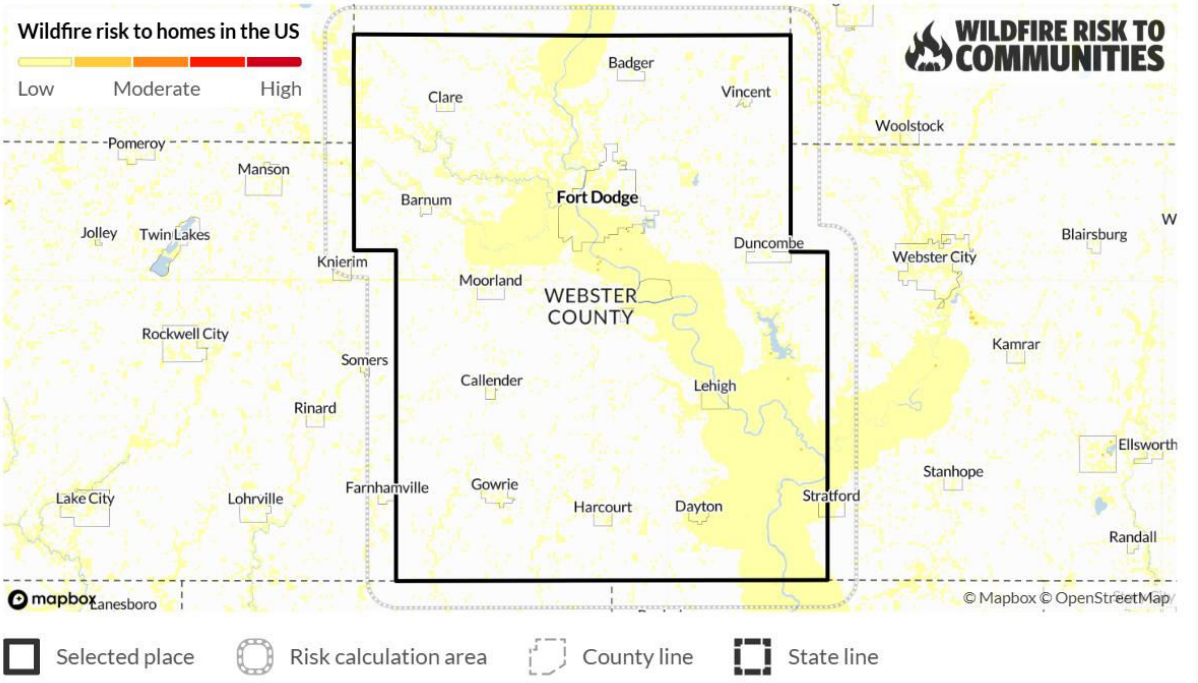
[65] USDA Forest Service, University of Wisconsin-Madison: SILVIS Lab. 2025. "Wildland-Urban Interface (WUI) Change 1990-2020." https://silvis.forest.wisc.edu/data/wui-change/.

Figure 24: Wildland Urban Interface Map – Webster County



The United States Department of Agriculture Forest Service created the interactive web resource, *Wildfire Risk to Communities,* to help communities and jurisdictions understand, explore, and reduce wildfire risk.
Figure 25 displays wildfire risk to homes in Webster County, as of December 2025.

Figure 25: Wildfire Risk to Homes - Webster County



Source: Wildfire Risk to Communities[66]

Table 53: Wildfire Vulnerabilities

County	Risk to Homes (compared to Iowa Counties)	Exposure Type*	Wildfire Likelihood (compared to Iowa Counties)
Webster	9%	Minimal Exposure (65%) Directly Exposed (33%) Indirectly Exposed (3%)	8%

Source: Wildfire Risk to Communities, 2026[67]
* Exposure is defined as the intersection of wildfire likelihood and intensity with communities.

Table 54: Wildfire Vulnerable Populations

County	Families in Poverty	People with Disabilities	People over 65	Difficulty with English	Households with no Vehicle	Mobile Homes
Webster	13.1%	10.7%	21.1%	1%	6.7%	1.7%

Source: Wildfire Risk to Communities, 2026[68]

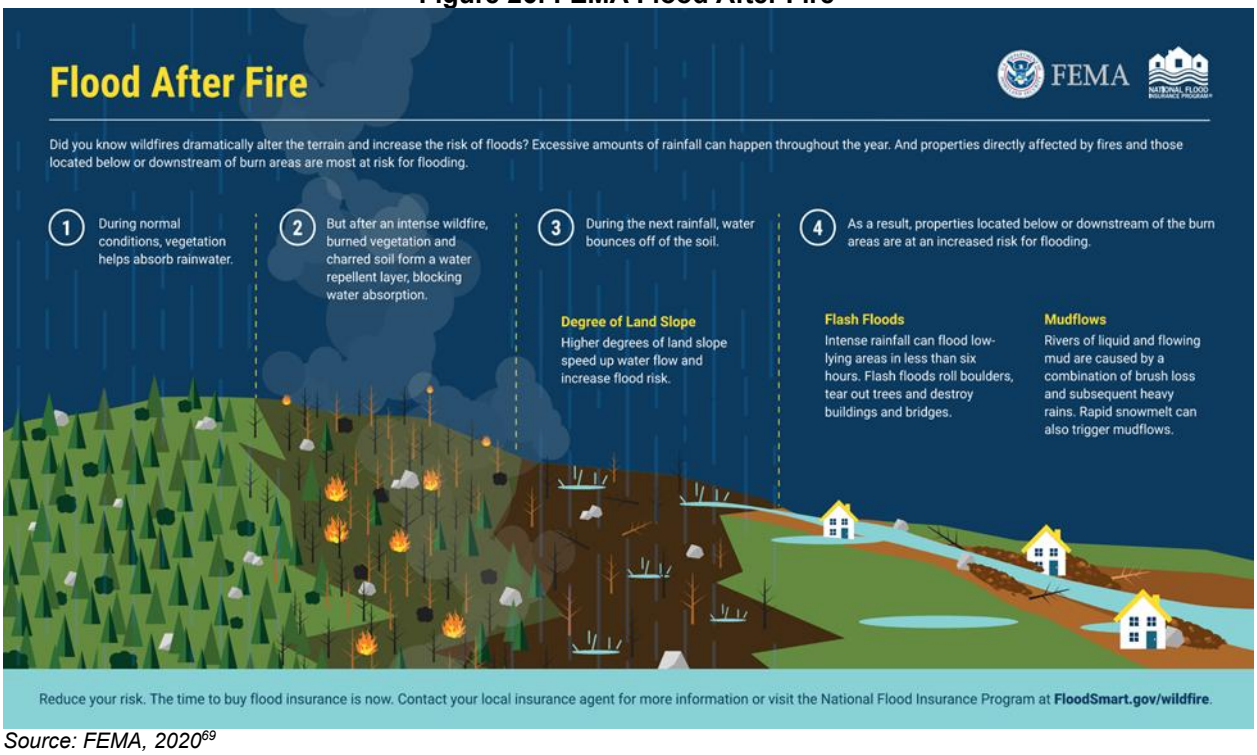
[66] United States Department of Agriculture, United States Forest Service. 2026. "Wildfire Risk to Communities." Accessed September 2026. https://wildfirerisk.org/.
[67] United States Department of Agriculture, United States Forest Service. 2026. "Wildfire Risk to Communities." https://wildfirerisk.org/.
[68] United States Department of Agriculture, United States Forest Service. 2025. "Wildfire Risk to Communities." https://wildfirerisk.org/.

Extent

Wildfires are a threat throughout the planning area and have burned over 225 acres of land. In total, there were 55 reported wildfires in the planning area. Of these, two fires burned 20 acres or more, with one of those fires burning 30 acres in March of 2025.

Wildfire also contributes to an increased risk from other hazard events, compounding damages and straining resources. FEMA has provided additional information in recent years detailing the relationship between wildfire and flooding (Figure 26). Wildfire events remove vegetation and harden soil, reducing infiltration capabilities during heavy rain events. Subsequent severe storms that bring heavy precipitation can then escalate into flash flooding, dealing additional damage to jurisdictions.

Figure 26: FEMA Flood After Fire



Source: FEMA, 2020[69]

Historical Occurrences

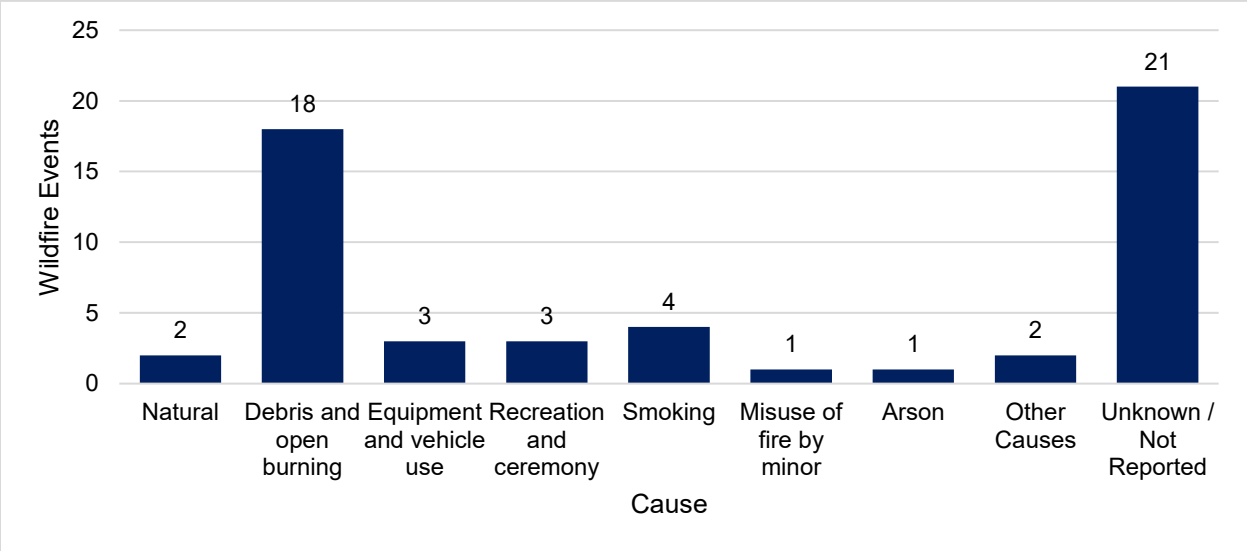
According to the National Interagency Fire Center, fire report data for Webster County is available from 2020 to 2025. A total of 55 wildfires were recorded during that time. The most fires occurred in 2025, with 36 events. The total reported events burned over 225 acres.

The leading identified cause of fires in the planning area is debris and open burning (33%), with smoking as the second leading identified cause (7%). The cause was not recorded for 38% of events. Figure 18 illustrates the leading causes of fires in Webster County. Reported fires in the

[69] FEMA and NFIP. 2023. "Flood After Fire." Accessed October 2023. https://agents.floodsmart.gov/sites/default/files/FEMA-FAF-Infographic-ENG-web_508_01152021.pdf.

planning area burned a total of 225.4 acres and ranged from less than one to 40 acres, with an average event burning approximately 4.2 acres among records with size information.

Figure 27: Wildfires by Cause in the Planning Area



Source: NIFC, 2020-2025

Average Annual Loss

No monetary damages were reported by NCEI or from NIFC, so it is not possible to calculate the average annual damages for wildfire. Damages caused by wildfires extend past the loss of building stock, recreation areas, timber, forage, wildlife habitat, and scenic views. Secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, all increase due to the exposure of bare ground and loss of vegetative cover following a wildfire, and can often be more disastrous than the fire itself in long-term recovery efforts.

Table 55: Wildfire Loss Estimation

Hazard Type	Number of Events	Events Per Year	Total Property Loss	Total Crop Loss[2]
Wildfires	55	9.2	225.4 acres	$0

Source: 1 Indicates data is from NIFC (2020-2025); 2 Indicates data is from USDA RMA (2020-2025)

Historical Probability and Future Likelihood

The probability of wildfire occurrence is based on the historical record provided by the National Interagency Fire Center and reported potential by participating jurisdictions. With a grass/wildfire occurring in 5 out of 6 recorded years from 2020 to 2025, there is an 83% annual historical probability of grass/wildfires occurring in the county. However, grass and wildland fires could be more common than presented, but may have simply not been reported in past years.

Table 56: Historical Probability & Future Likelihood – Grass/Wildfire

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Grass/Wildfire	83%	Neither Increase nor Decrease in Frequency. Increase in Exposure.	**Very Likely**

Future Development

Development across the planning area would be located within the WUI. Of most concern would be development on the edges of communities or other areas that encroach on wildland or natural areas. Local officials can adopt codes and ordinances that can guide growth in ways to mitigate potential losses from wildfires, but more likely for the planning area the onus falls on private landowners to ensure their properties mitigate fuels and minimize wildfire risk. Problems can arise if new development increases without coordinated fuels reduction and the creation of defensible space around homes. Other notable vulnerabilities exist for fire departments which serve rural areas, as many fire districts lack adequate staff to respond to multi-fire complexes or multiple fire events occurring simultaneously in separate areas. The utilization and development of mutual aid agreements or memoranda of understanding are an important tool for districts to share resources and/or coverage.

Regional Vulnerabilities

Periods of drought can occur throughout the year while extreme heat conditions during summer months greatly increase the potential for and magnitude of wildland fires. Drought has a high probability of occurring in the planning area and the planning area sees, on average, one day above 100°F each year (Figure 13). During a severe drought, dry conditions, and/or windy conditions, large wildfires can more easily spread.

Wildfire poses a threat to a range of demographic groups. Wildfire, wildfire within the WUI, and urban fire could result in major evacuations of residents in impacted and threatened areas. Groups and individuals lacking reliable transportation could be trapped in dangerous locations. Lack of transportation is common among the elderly, low-income individuals, and racial minorities, including on tribal reservation lands. Wildfires can cause extensive damage to both urban and rural building stock and properties including community lifelines and infrastructure, as well as agricultural producers which support the local industry and economy. Damaged homes can reduce available housing stock for residents, causing them to leave the area. Additionally, fire events threaten the health and safety of residents and emergency response personnel. Recreation areas, timber and grazing land, wildlife habitat, and scenic views can also be threatened by wildfires.

Development across the planning area may be located within the WUI, particularly in larger municipalities such as the City of Fort Dodge, with a larger amount of intermix overlap. Local officials can adopt codes and ordinances that can guide growth in ways to mitigate potential losses from wildfires. These may include more stringent building code standards, setback requirements, or zoning regulations. Other notable vulnerabilities exist for fire departments that service both urban and rural areas, as some fire districts lack adequate staff to respond to multi-fire complexes or events in separate areas. The utilization and development of mutual aid agreements or memoranda of understanding are important tools for districts to share resources and/or coverage.

An increase in air pollutants can occur from the increased number of grass/wildfires. The public can be exposed to harmful particulate matter from smoke and ash that can cause various health issues. Depending on the length of exposure, age, and individual susceptibility, effects from wildfire smoke can range from eye and respiratory irritation to severe disorders like bronchitis, asthma, and aggravation of pre-existing respiratory and cardiovascular diseases.[70]

[70] AirNow. 2019. “Wildfire Smoke: A Guide for Healthcare Professionals.” Accessed 2022. https://www.airnow.gov/wildfire-smoke-guide-publications/

Rising temperatures will likely increase the frequency and intensity of grass/wildfires. Warmer temperatures cause snow to melt sooner and create drier soils and forests, which act as kindling to ignite fires. Dry and dead trees will increase fuel loads causing fires to spread much quicker. Additionally, warmer nighttime temperatures contribute to the continued spread of wildfires over multiple days.[71]

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles.*

Table 57: Regional Wildfire Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Risk of injury or death for residents and firefighting personnel -Displacement of people and loss of homes -Lack of transportation poses risk to low-income individuals, families, and elderly -Transportation routes may be blocked by fire, preventing evacuation efforts	-Greater exposure and risk of injury or death -More temporary or long-term shelters and housing assistance -Financial and mental hardship from loss of homes and other structures -Road closures and limited accessibility
Economic	-Damages to buildings and property can cause significant losses to business owners -Loss of businesses	-Inventory losses, increased maintenance and repair costs, prolonged interruptions to operations, increased insurance costs
Built Environment	-Property damages	-Increase in maintenance and repair costs -Rebuilding can create substantial financial and administrative demands
Infrastructure	-Damage to power lines and utility structures -Potential loss of firefighting equipment and resources	-Power outages, disruptions to communications, water systems, and other essential functions -Potential strain of mutual-aid resources
Community Lifelines	-Risk of damages	-Interruption of essential services
Climate	-Changes in seasonal temperature and precipitation normals can increase frequency and severity of wildfire events -Changes in climate can help spread invasive species, changing potential fuel loads in wildland areas	-Changes in frequency of wildfires from changes in climate and environment -Higher difficulty maintaining potential fuel loads

[71] NASA Global Climate Change. September 2019. "Satellite Data Record Shows Climate Change's Impact on Fires." Accessed 2021. https://climate.nasa.gov/news/2912/satellite-data-record-shows-climate-changes-impact-on-fires/.

Severe Winter Storms

Natural Hazard

Severe winter storms are an annual occurrence in Iowa. Winter storms can bring extreme cold, freezing rain, heavy or drifting snow, and blizzards. Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions which greatly inhibit vehicular traffic. Generally, winter storms occur between the months of November and March but may occur as early as October and as late as April. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction by hindering transportation, knocking down tree limbs and utility lines, and structurally damaging buildings.

Freezing Rain

Along with snow events, winter storms also have the potential to deposit significant amounts of ice. Ice buildup on tree limbs and power lines can cause them to collapse. This is most likely to occur when rain falls that freezes upon contact, especially in the presence of wind. Freezing rain is the name given to rain that falls when surface temperatures are below freezing. Unlike a mixture of rain and snow, ice pellets or hail, freezing rain is made entirely of liquid droplets. Freezing rain can also lead to many problems on the roads, as it makes them slick, causing automobile accidents, and making vehicle travel difficult.

Blizzards

A blizzard can be defined as “blowing and/or falling snow with winds of at least 35 mph, reducing visibilities to a quarter of a mile or less for at least three hours”.[72] Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions, which greatly inhibit vehicular traffic. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction for several days by hindering transportation, knocking down tree limbs and utility lines, structurally damaging buildings, and injuring or killing crops and livestock.

Location

The entire county is at risk of severe winter storms.

Extent

The NWS developed the Sperry-Piltz Ice Accumulation Index (SPIA) to predict the accumulation of ice and resulting damages. The SPIA assesses total precipitation, wind, and temperatures to predict the intensity of ice storms. Figure 28 shows the SPIA index. Based on NCEI data, recorded events of ice storms mentioned ice accumulation ranging from 0.2 to an inch in the planning area. However, ice accumulation is typically less than 0.5 inches. Average wind speeds were not documented for all events, but any sustained wind of 15 – 25 mph can lead to a SPIA ranging between 1 to 5, depending on the amount of ice. The most likely SPIA index for an ice storm in the County would be 1-2, but it is important to note that the county can experience all levels of the SPIA Index damage levels during severe winter weather events.

[72] National Weather Service. 2022. “Winter Weather Safety.” https://www.weather.gov/dmx/wintersafety.

Figure 28: SPIA Index

ICE DAMAGE INDEX	*AVERAGE ICE AMOUNT (in inches) Revised: Oct. 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	<0.25	<15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 – 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	>15	
2	0.10 – 0.25	25 – 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 – 25	
	0.50 – 0.75	>15	
3	0.10 – 0.25	> – 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 – 35	
	0.50 – 0.75	15 – 25	
	0.75 –1.00	>15	
4	0.25 – 0.50	> – 35	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 – 35	
	0.75 –1.00	15 – 25	
	1.00 –1.50	>15	
5	0.50 – 0.75	> – 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeeks in some areas. Shelters needed.
	0.75 –1.00	> – 25	
	1.00 –1.50	> – 15	
	> 1.50	Any	

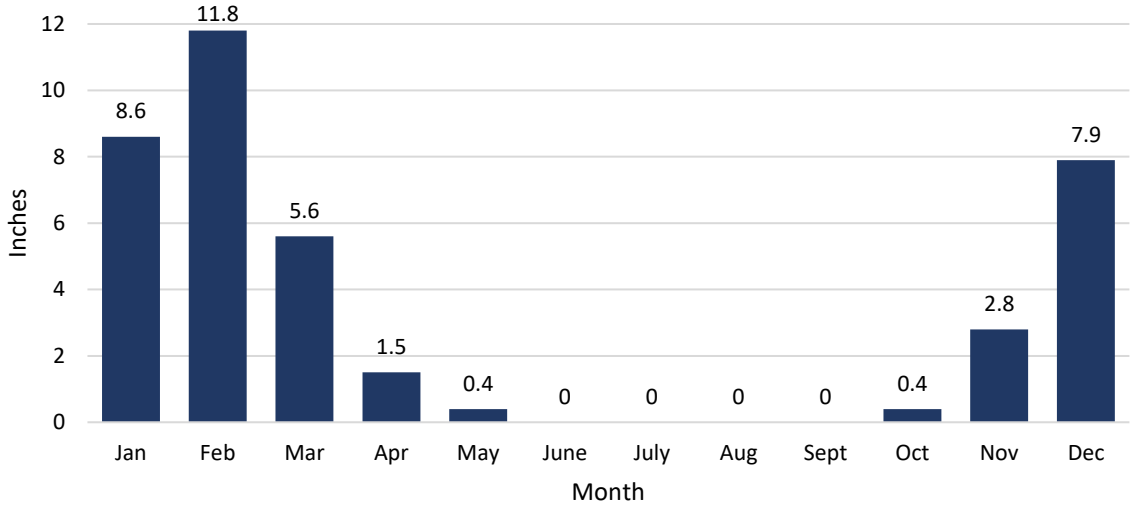
(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Source: SPIA-Index, 2017[73]

Average monthly snowfall for the planning area is shown in (Figure 29), which shows the snowiest months are between December and March. A common snow event (likely to occur annually) will result in accumulation totals between one and eleven inches. Often these snow events are accompanied by high winds. It is reasonable to expect wind speeds of 25 to 35 mph with gusts reaching 50 mph or higher. Strong winds and low temperatures can combine to produce extreme wind chills of 20°F to 40°F below zero.

[73] SPIA-Index. 2009. "Sperry-Piltz Ice Accumulation Index." Accessed December 2025. http://www.spia-index.com/index.php.

Figure 29: Monthly Snowfall Normals in Inches (1991-2020)



Source: NOAA, 2025

Historical Occurrences

Due to the regional scale of severe winter storms, a single storm may affect multiple jurisdictions and be recorded by the NCEI as separate events. From 1996 to 2025, the NCEI recorded 95 severe winter storm events in the planning area, including 27 blizzards, 26 heavy snow events, 11 ice storms, 30 winter storms, and one winter weather event. These events resulted in $2,384,230 in reported property damages and $1,224,312 in reported crop damages. Ice storms caused the greatest reported property damages, totaling $1,168,330. Additional information about these events, drawn from NCEI and community reports, is provided in *Section Seven: Community Profiles*.

Average Annual Loss

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and includes aggregated calculations for each of the five types of winter weather as provided in the database. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Severe winter storms have caused an average of $79,474 per year in property damage and $47,089 per year in crop damage for the planning area.

Table 58: Severe Winter Storm Loss Estimate

Hazard Type	Number of Events[1]	Average Events Per Year[1]	Total Property Loss[1]	Average Annual Property Loss [1]	Total Crop Loss[2]	Average Annual Crop Loss [2]
Blizzard	27	0.9	$525,000	$17,500	$1,224,312	$47,089
Heavy Snow	26	0.86	$181,000	$6,033		
Ice Storm	11	0.36	$1,168,330	$38,944		
Winter Storm	30	1	$509,900	$16,996		
Winter Weather	1	.03	$0	$0		
Total	**95**	**3.2**	**$2,384,230**	**$79,474**	**$1,224,312**	**$47,089**

Source: 1 Indicates data is from NCEI (1996-2026); 2 Indicates data is from USDA RMA (2000-2025)

Historical Probability & Future Likelihood

Based on historical records and reported events, severe winter storm events are likely to occur on an annual basis. The NCEI reported a severe winter storm event in all 30 years, resulting in a 100% chance annually for severe winter storms.

Table 59: Historical Probability & Future Likelihood – Severe Winter Storms

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Severe Winter Storms	100%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**

Future Development

All future development will be affected by winter storms. More buildings and infrastructure in the county create a higher probability of damage to occur from winter weather as more property is exposed to risk. The ability to withstand impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction.

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 60: Regional Severe Winter Storm Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Elderly citizens are at higher risk to injury or death, especially during extreme cold and heavy snow accumulations -Citizens without adequate heat and shelter at higher risk of injury or death	-Higher chances of frostbite, falls, hypothermia, and other winter-related injuries
Economic	-Closed roads and power outages can cripple a region for days, leading to significant revenue loss and loss of income for workers	-Business closures, supply-chain disruption, damage to equipment and systems, reduced economic activity
Built Environment	-Heavy snow loads can cause roofs to collapse -Significant tree damage possible, downing power lines and blocking roads	-Structural damage, costly repairs or permanent closure of structure(s)
Infrastructure	-Heavy snow and ice accumulation can lead to downed power lines and prolonged power outages -Transportation may be difficult or impossible during blizzards, heavy snow, and ice events	-Power loss, loss or reduction of other utility systems -Limited accessibility due to closed roads, which could delay emergency response and extend recovery efforts
Community Lifelines	-Emergency response and recovery operations, communications, water treatment plants, and others are at risk to power outages, impassable roads, and other damages	-Delayed response and recovery due to road closures or power loss
Climate	-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of severe winter storm events	-Changes in frequency and intensity of severe winter storms could result in more severe storms and damages

Sinkholes

Natural Hazard

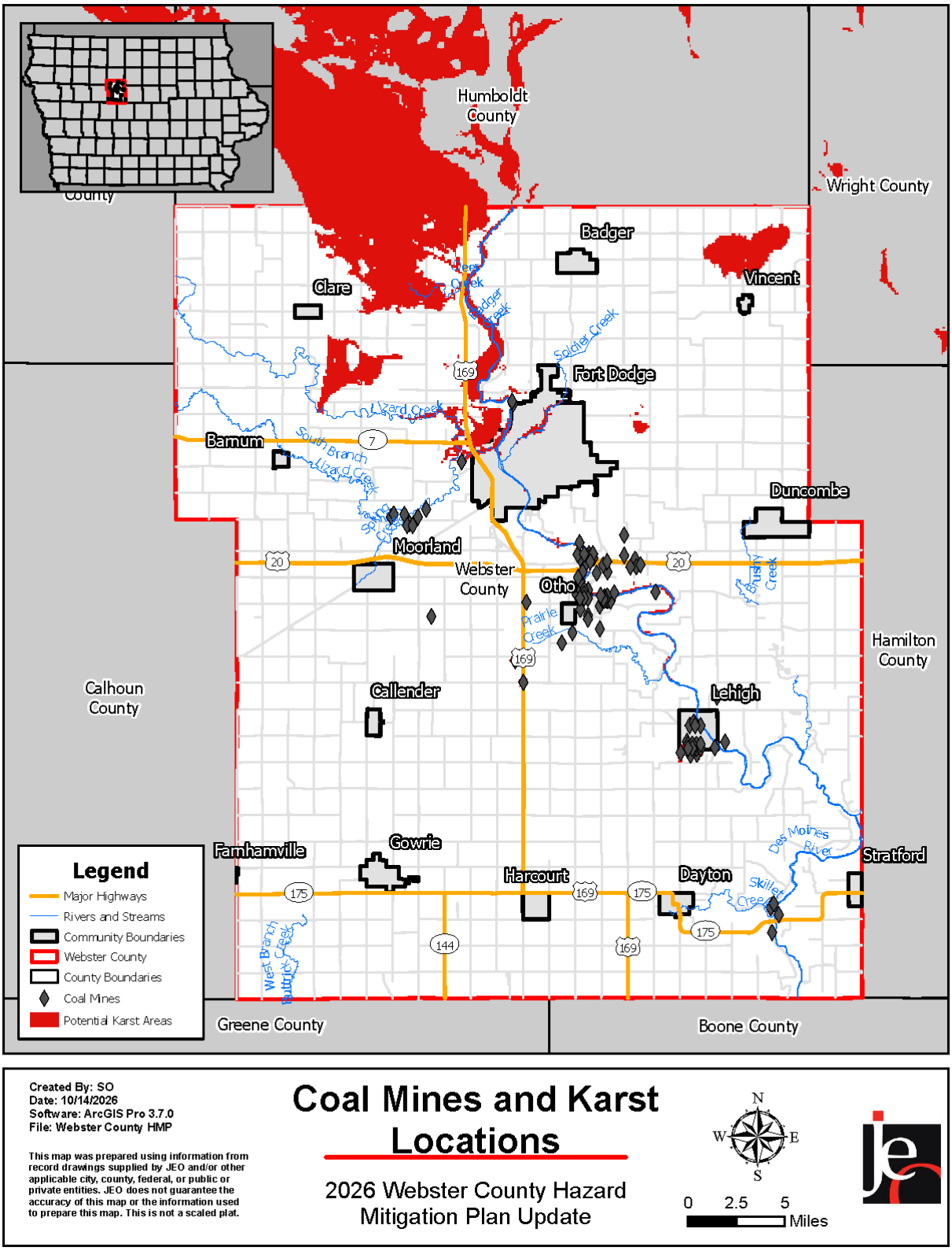
A sinkhole is a loss of surface elevation caused by the removal or failure of subsurface support. Sinkholes can develop gradually as broad depressions or occur suddenly as localized collapses. They may result from natural dissolution of soluble bedrock, commonly called karst, or from human activities such as underground mining, groundwater withdrawal, excavation, and the failure of buried drainage or utility infrastructure.

In Iowa, karst-related sinkholes are concentrated primarily in the northeastern and eastern portions of the state. Subsidence can also occur above abandoned underground mines. The 2023 Iowa Hazard Mitigation Plan identifies Webster County as one of several counties with developed land located above multiple abandoned mines. Although mine-related sinkholes are uncommon, sudden ground collapse can damage buildings, streets, utilities, and other infrastructure and may create an immediate threat to public safety.

Location

Sinkhole risk in Webster County is not uniform. Areas underlain by abandoned underground mines and locations with weakened or failed buried infrastructure have the greatest potential for localized subsidence. The Iowa Hazard Mitigation Plan identifies developed areas of Webster County above several abandoned mines.

Figure 30: Abandoned Mines and Potential Karst Locations in Webster County

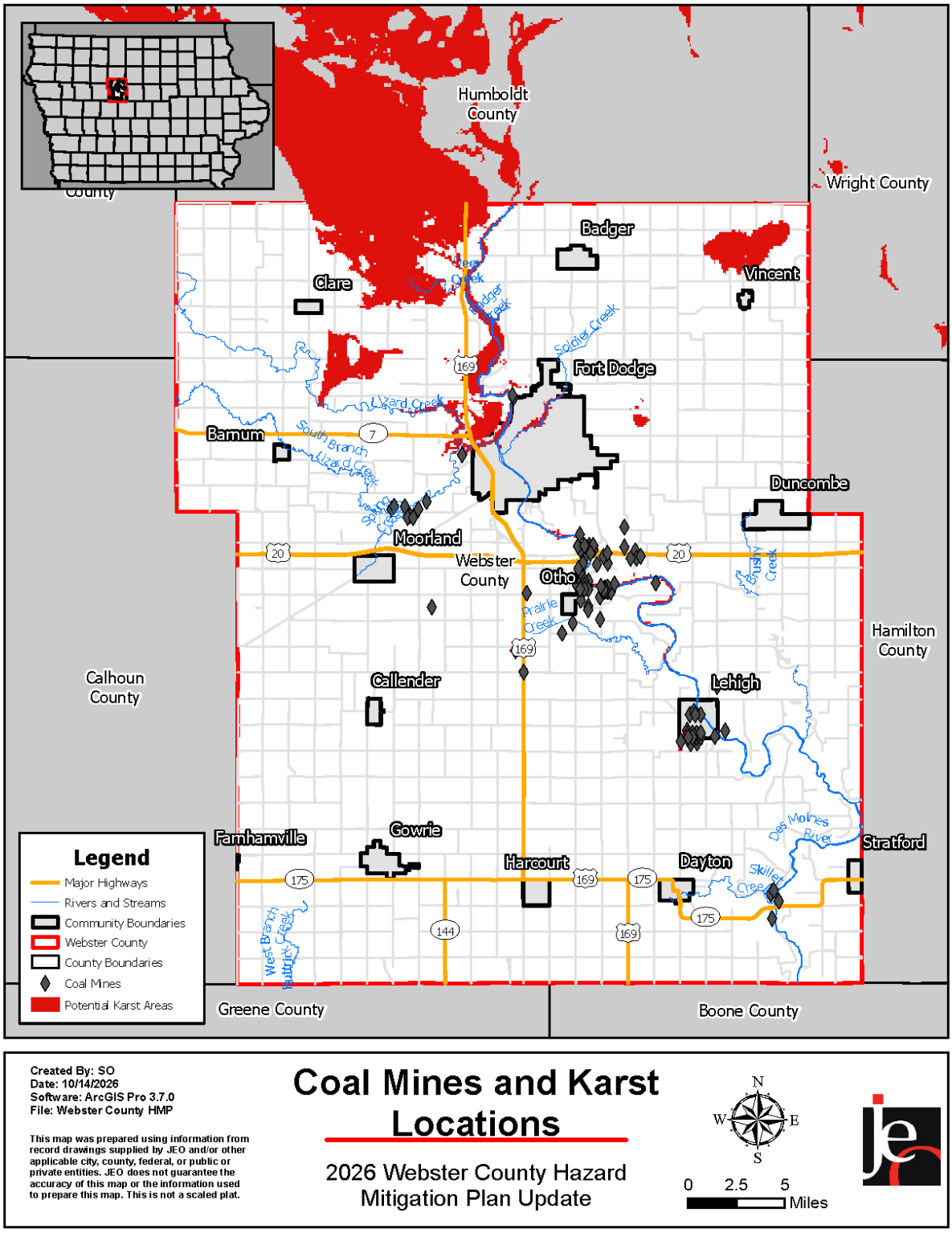


Extent

There is no standard statewide scale for measuring sinkhole severity. The extent of an event is generally described by the size and depth of the collapse, the rate at which it develops, the land use above and near the void, and the degree of damage to structures, roads, utilities, or drainage systems. A small depression in an undeveloped area may have limited consequences, while a sudden collapse beneath a roadway, building, or utility corridor could cause substantial localized damage and disrupt emergency access or essential services.

The Iowa Hazard Mitigation Plan notes that Iowa does not maintain a comprehensive statewide inventory of sinkhole occurrences or damages. The Iowa Geological Survey estimates that as many as 6,000 underground coal mines may exist in 38 Iowa counties and may underlie approximately 80,000 acres. The Iowa Department of Agriculture and Land Stewardship estimates that approximately two to three mine-related sinkholes occur statewide each year; however, the location and consequences of future events cannot be predicted reliably from this statewide estimate.

Potential karst areas should also be considered when evaluating sinkhole susceptibility. The Iowa Department of Natural Resources maps potential karst areas based on proximity to known sinkholes and the presence of carbonate bedrock within 50 feet of the ground surface. These areas indicate conditions that may support karst development but do not necessarily represent documented sinkholes. Figure 21 identifies mapped potential karst areas and abandoned mines within Webster County.



Source: Iowa Department of Natural Resources: Iowa Coal Mines[74]

[74] Iowa Department of Natural Resources: Iowa Coal Mines https://programs.iowadnr.gov/maps/coalmines/

Historical Occurrences

A comprehensive record of sinkhole events is not available for Webster County. Statewide records indicate that mine-related sinkholes occur infrequently, and the Iowa Hazard Mitigation Plan does not provide a complete county-level occurrence history or loss total. Consequently, local reports and municipal engineering records are important sources for documenting past events.

Average Annual Loss

Available state and local records are insufficient to calculate an average annual loss for sinkholes in Webster County. The statewide plan does not provide a county-level estimate, and reported losses may not capture damage to private property, buried utilities, transportation systems, emergency response, business interruption, or temporary loss of service.

Historical Probability & Future Likelihood

Historical probability cannot be calculated reliably because Webster County does not have a comprehensive, consistently dated inventory of sinkholes. Available information indicates that occurrences are infrequent but may develop with little warning and cause serious localized consequences. Future likelihood is therefore classified as uncertain until local and state records can be consolidated into a countywide inventory.

Table 61: Historical Probability & Future Likelihood – Sinkholes

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Sinkholes	Unknown	Neither Increase nor Decrease in Frequency. Increase in Exposure	Effect on frequency uncertain.

Future Development

Future development in mapped potential karst areas, near historic mines and abandoned mine shafts, or in areas with aging buried infrastructure may be more susceptible to sinkhole impacts. Considering these conditions during development review and conducting site-specific geotechnical evaluations where warranted can help identify subsurface instability and reduce future vulnerability.

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 62: Regional Sinkholes Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	- Motorists, pedestrians, occupants, responders, and utility workers. Evacuations may be necessary near unstable ground.	- Injuries or fatalities from sudden ground collapse. - Temporary evacuation or displacement from unsafe areas. - Delayed emergency access.
Economic	- Road closures, utility interruptions, property damage, engineering investigations, excavation, and stabilization can create direct costs and disrupt nearby businesses.	- Costs for repairs, investigations, and ground stabilization. - Business closures, lost revenue, and interrupted operations. - Increased travel costs from detours.

Sector	Vulnerability	Expected Impacts
Built Environment	- Buildings, foundations, yards, parking areas, streets, and other improvements may crack, settle, or collapse where subsurface support fails.	- Structural damage or collapse of buildings and foundations. - Loss of use of affected properties. - Damage to parking areas, yards, and other improvements.
Infrastructure	- Roads, bridges and approaches, storm sewers, sanitary sewers, water lines, gas lines, communications, and other buried systems may be damaged or may contribute to subsidence when they fail.	- Road closures and damage to bridges or approaches. - Broken utility lines and interrupted services. - Water leaks, sewage releases, or gas leaks that require emergency repairs.
Community Lifelines	- Transportation, water, wastewater, communications, emergency services, and access to critical facilities may be disrupted by collapse or precautionary closures.	- Interruptions to drinking water, wastewater, power, and communications. - Reduced access to healthcare, emergency services, and critical facilities. - Longer response times and temporary service relocations.
Climate	- Sinkholes can alter drainage, accelerate erosion, and create a pathway for contaminants to enter groundwater or connected subsurface systems.	- Changes in surface drainage and increased localized erosion. - Contamination of groundwater from pollutants entering subsurface openings. - Damage to nearby soil, vegetation, and aquatic resources.

Thunderstorms
(Includes Hail and Lightning)

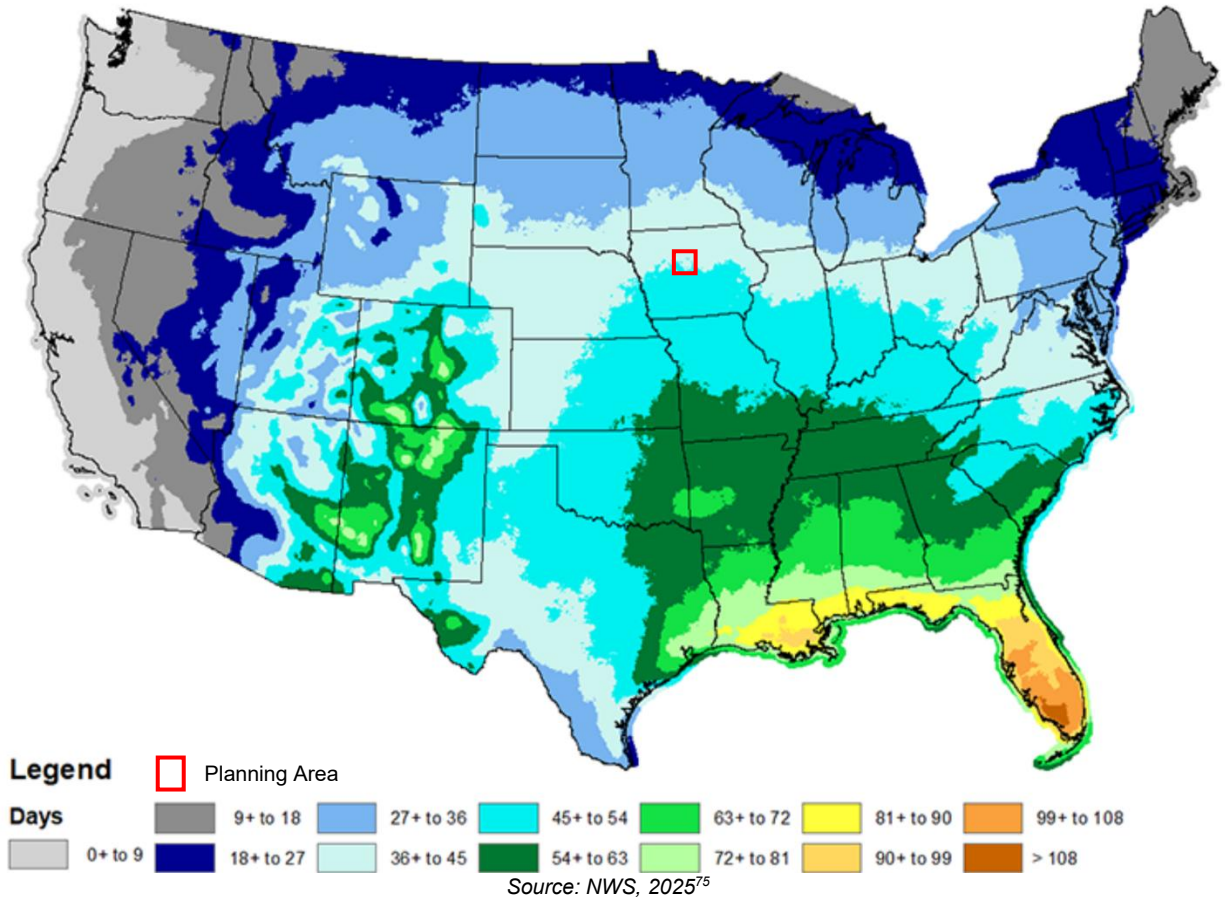
Natural Hazard

Severe thunderstorms are common and unpredictable seasonal events throughout Iowa. A thunderstorm is defined as a storm that contains lightning and thunder, which is caused by unstable atmospheric conditions. When the cold upper air sinks and the warm, moist air rises, storm clouds or “thunderheads” develop, resulting in thunderstorms. This can occur singularly, in clusters, or in lines.

Thunderstorms can develop in fewer than 30 minutes and can grow to an elevation of eight miles into the atmosphere. Lightning, by definition, is present in all thunderstorms and can cause harm to humans and animals, fires to buildings and agricultural lands, and electrical outages in municipal electrical systems. Lightning can strike up to 10 miles from the portion of the storm depositing precipitation. There are three primary types of lightning: intra-cloud, inter-cloud, and cloud to ground. While intra and inter-cloud lightning are more common, communities are potentially impacted when lightning comes in contact with the ground. Lightning generally occurs when warm air mixes with colder air masses resulting in atmospheric disturbances necessary for polarizing the atmosphere. Severe thunderstorms usually occur in the evening during the spring and summer months.

Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support Iowa’s largest industry, agriculture. The majority of thunderstorms do not cause damage, but when they escalate to severe storms, the potential for damages increases. Damages can include crop losses from wind; property losses due to building and automobile damages from high wind, flash flooding, and death or injury to humans and animals from lightning, drowning, or getting struck by falling or flying debris. **Figure 31** displays the average number of days with thunderstorms across the country each year. The planning area experiences an average of 36 to 54 thunderstorms over the course of one year.

Figure 31: Average Number of Thunderstorms (1993-2018)



Source: NWS, 2025[75]

Location

The entire county is at risk of severe thunderstorms and associated damages from heavy rain, lightning, hail, and thunderstorm level wind.

Extent

The geographic extent of a severe thunderstorm event may be large enough to impact the entire planning area (such as in the case of a squall line, derecho, or long-lived supercell) or just a few square miles, in the case of a single cell that marginally meets severe criteria.

The NWS defines a thunderstorm as severe if it contains hail that is one inch in diameter or capable of wind gusts of 58 mph or higher. The Tornado and Storm Research Organization (TORRO) scale is used to classify hailstones and provides some detail related to the potential impacts from hail.

[75] National Weather Service. 2017. "Introduction to Thunderstorms." http://www.srh.noaa.gov/jetstream/tstorms/tstorms_intro.html.

Table 63: TORRO Hail Scale

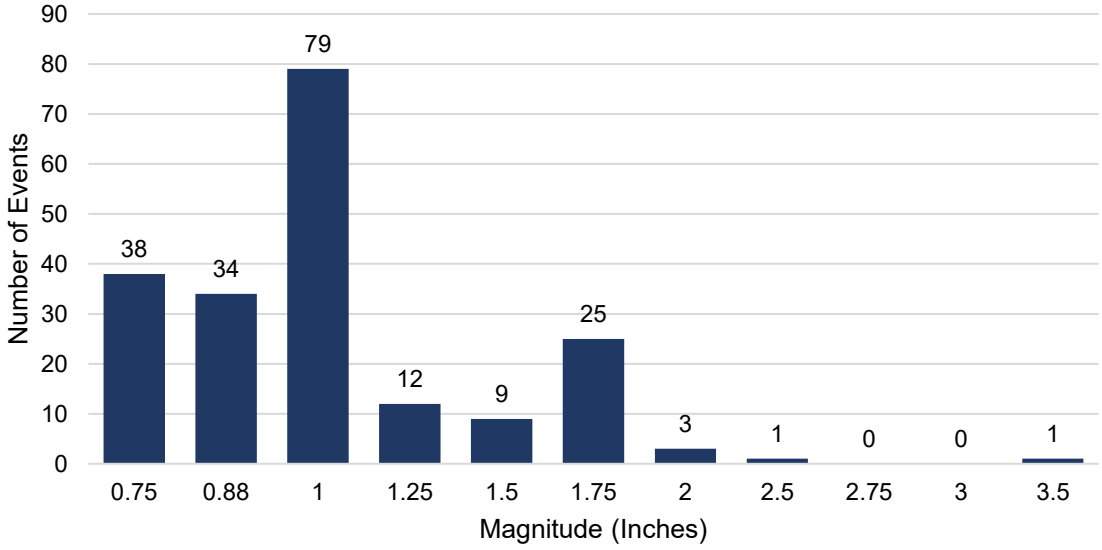
TORRO Classification / Intensity	Typical Hail Diameter	Typical Damage Impacts
H0: Hard Hail	5 mm; (Pea size); 0.2 in	No damage
H1: Potentially Damaging	5 -15 mm (Marble) 0.2 – 0.6 in	Slight general damage to plants and crops
H2: Significant	10 -20 mm (Grape) 0.4 – 0.8 in.	Significant damage to fruit, crops, and vegetation
H3: Severe	25 -30 mm (Walnut) 0.8 – 1.2 in	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4: Severe	25 -40 mm (Squash Ball) 1.2 – 1.6 in	Widespread damage to glass, vehicle bodywork damaged
H5: Destructive	40 – 50 mm (Golf ball) 1.6 – 2.0 in.	Wholesale destruction of glass, damage to tiled roofs; significant risk of injury
H6: Destructive	50 – 60 mm (Chicken Egg) 2.0 – 2.4 in	Grounded aircrafts damaged; brick walls pitted; significant risk of injury
H7: Destructive	50 – 75 mm (Tennis Ball) 2.4 – 3.0 in	Severe roof damage; risk of serious injuries
H8: Destructive	60 – 90 mm (Large Orange) 3.0 – 3.5 in.	Severe damage to structures, vehicles, aircrafts; risk of serious injuries
H9: Super Hail	90 – 100 mm (Grapefruit) 3.5 – 4.0 in	Extensive structural damage; risk of severe or even fatal injuries to persons outdoors
H10: Super Hail	>100mm (Melon); >4.0 in	Extensive structural damage; risk of severe or even fatal injuries to persons outdoors

Source: TORRO, 2019[76]

Of the 202 hail events reported for the planning area, the average hailstone size was 1.13 inches. Events of this magnitude correlate to an H3 classification. It is reasonable to expect H3 classified events to occur several times in a year throughout the county. In addition, it is reasonable, based on the number of occurrences, to expect larger hailstones to occur in the county annually. The county has endured one H7 hail event (2.4 – 3.0 inches) during the period of record. The table below shows hail events based on the size of the hail.

[76] Tornado and Storm Research Organization. 2019. "Hail Scale." https://www.torro.org.uk/research/hail/hscale.

Figure 32: Hail Events by Magnitude

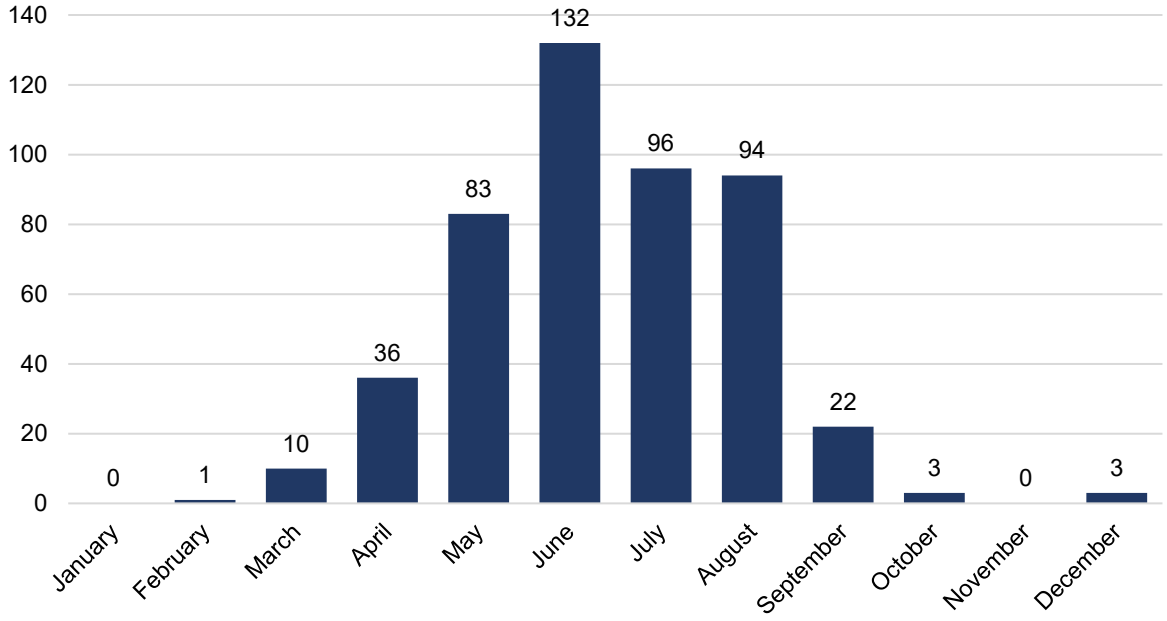


Source: NCEI, 1996-2026

Historical Occurrences

Severe thunderstorms in the planning area usually occur in the afternoon and evening from April through August.

Figure 33: Severe Thunderstorm Events by Month



Source: NCEI, 1996-2026

The NCEI reports events as they occur in each community. A single severe thunderstorm event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is that a single thunderstorm event covering the entire region could be reported by the NCEI as several events.

The NCEI reported 202 hail events, 111 heavy rain events, three lightning events, and 164 thunderstorm wind events in the planning area from 1996 through 2025. Together, these 480 severe thunderstorm events caused $4,884,700 in reported property damage. USDA Risk Management Agency data reported $53,331,637 in crop losses, including $10,349,700 attributed to hail and $42,981,937 attributed to heavy rain.

Average Annual Loss

Average annual losses were calculated using 30 years of property damage records from the NCEI Storm Events Database and 26 years of crop loss records from USDA RMA. These estimates do not include losses from displacement, functional downtime, economic disruption, injury, or loss of life. Severe thunderstorms caused an average of $162,823 per year in reported property damages and $2,051,217 per year in crop losses.

Table 64: Severe Thunderstorms Loss Estimate

Hazard Type	Number of Events[1]	Average Events Per Year	Total Property Loss[1]	Average Annual Property Loss	Total Crop Loss[2]	Average Annual Crop Loss
Hail	202	6.7	$1,978,700	$65,957	$53,331,637	$2,051,217
Heavy Rain	111	3.7	$100,000	$3,333		
Lightning	3	0.1	$108,000	$3,600		
Thunderstorm Wind	164	5.5	$2,698,000	$89,933		
Total	**480**	**16**	**$4,884,700**	**$162,823**	$53,331,637	$2,051,217

Source: 1 Indicates data is from NCEI (1996 to 2026); 2 Indicates data is from USDA RMA (2000 to 2025)

Historical Probability & Future Likelihood

Based on historical records and reported events, severe thunderstorm events are likely to occur on an annual basis. The NCEI reported a severe thunderstorm 30 out of 30 years, resulting in a 100% chance for severe thunderstorms to occur annually.

Table 65: Historical Probability & Future Likelihood – Severe Thunderstorms

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Severe Thunderstorms	100%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**

Future Development

All future development could be impacted by severe thunderstorms including from lightning and hail. The ability to withstand major damage lies in sound land use practices and consistent enforcement of building codes and regulations for new construction. Municipalities that have adopted the current International Building Codes have a lower risk of damage as the code has sections designed to deal with the impacts of hail events. Lightning rods, protected rooftop utilities, and surge protectors, are possible steps new developments can take to reduce impacts from lightning and severe thunderstorms.

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 66: Regional Thunderstorm Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Elderly citizens with decreased mobility may have trouble evacuating or seeking shelter -Mobile home residents are at risk of injury and damage to their property if the mobile home is not anchored properly -Injuries can occur from not seeking shelter, standing near windows, and shattered windshields in vehicles	-Delay in evacuation -Greater exposure to injury or death -Property damage, displacement of residents in mobile homes
Economic	-Damages to buildings and property can cause significant losses to business owners and employees	- Increased maintenance, repair, and insurance costs business closures, revenue loss, reduced employment and wages
Built Environment	-Buildings are at risk to hail damage -Downed trees and tree limbs -Roofs, siding, windows, gutters, HVAC systems, etc. can incur damage	-Increased maintenance and repair costs -Debris can block transportation and accessibility
Infrastructure	-High winds and lightning can cause power outages and down power lines -Roads may wash out from heavy rains and become blocked from downed tree limbs	-Power loss and damage to power and utility lines, causing secondary disruptions to the built environment and people
Community Lifelines	-Power outages are possible -Community lifelines may sustain damage from hail, lightning, and wind	-Disruptions of essential services and systems, reduced ability to respond to needs after a disaster
Climate	-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of severe storm events	-Changes in frequency and intensity of severe thunderstorms could result in more severe storms and damages

Tornado and Windstorm

Natural Hazard

A tornado is typically associated with a supercell thunderstorm. For a rotation to be classified as a tornado, three characteristics must be met:

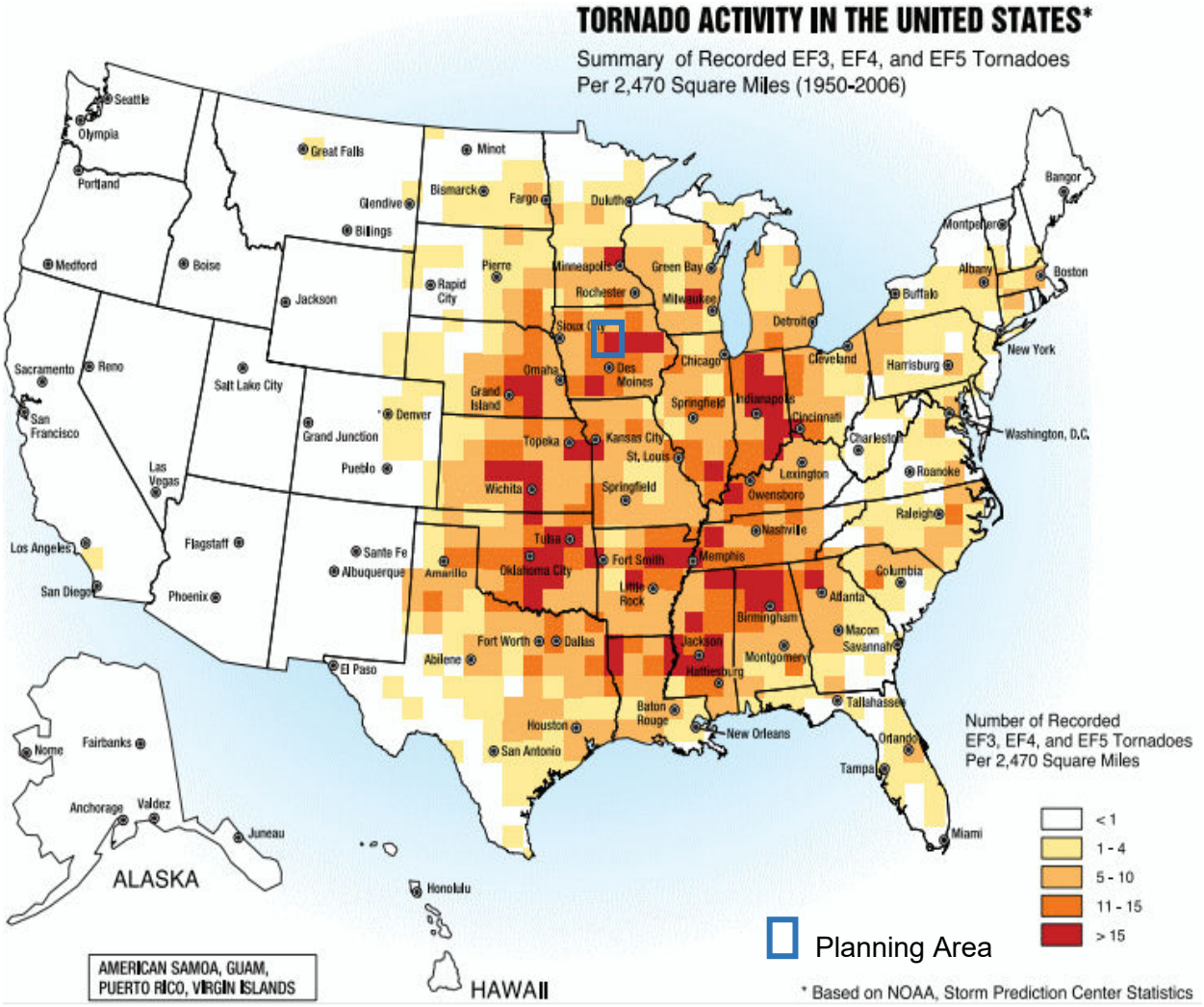
- There must be a microscale rotating area of wind, ranging in size from a few feet to a few miles wide;
- The rotating wind, or vortex, must be attached to a convective cloud base and must be in contact with the ground; and,
- The spinning vortex of air must have caused enough damage to be classified by the Fujita Scale as a tornado.

Once tornadoes are formed, they can be extremely violent and destructive. They have been recorded all over the world but are most prevalent in the American Midwest and South, in an area known as “Tornado Alley.” Approximately 1,250 tornadoes are reported annually in the contiguous United States. Tornadoes can travel distances of over 100 miles and reach over 11 miles above ground. Tornadoes usually stay on the ground for no more than 20 minutes. Nationally, the tornado season typically occurs between May and July. On average, 80% of tornadoes occur between noon and midnight. In Iowa, 64% of all tornadoes occur in the months of May, June, and July.

Iowa is ranked eighth in the nation for tornado frequency with an annual average of 55 tornadoes between 1995 and 2024.[77] Figure 48 shows the tornado activity in the United States as a summary of recorded EF3, EF4, and EF5 tornadoes per 2,470 square miles from 1950 through 2006.

[77] NOAA. “U.S. Annual Averages: Tornadoes by State (1995-2024)”. https://www.spc.noaa.gov/wcm/ustormaps/1985-2014-stateavgtornadoes.png

Figure 34: Tornado Activity in the United States



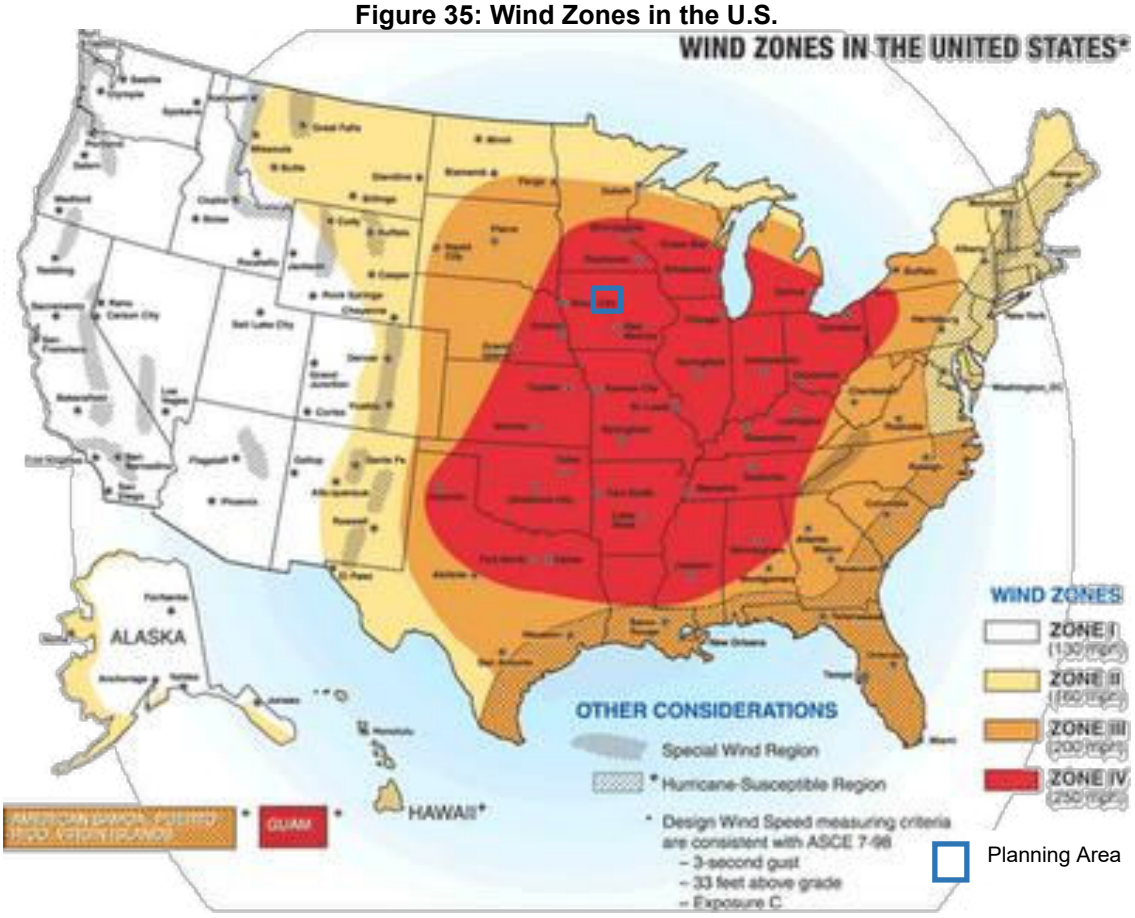
Source: FEMA, 2008[78]

Windstorms typically accompany severe thunderstorms, severe winter storms, tornadoes, and other large low-pressure systems, which can cause significant crop damage, downed power lines, loss of electricity, traffic flow obstructions, and significant property damage including to trees and center-pivot irrigation systems.

The National Weather Service (NWS) defines high winds as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.[79] The NWS issues High Wind Advisories when there are sustained winds of 31 to 39 mph for an hour or more and/or gusts up to 57 mph. Figure 35 shows the wind zones in the United States. The wind zones are based on the maximum wind speeds that can occur from a tornado or hurricane event. The planning area is located in Zone IV which has maximum winds of 250 mph, equivalent to an EF5 tornado.

[78] Federal Emergency Management Agency. August 2008. "Taking Shelter From the Storm: Building a Safe Room for Your Home or Small Business, 3rd edition."
[79] National Weather Service. 2017. "Glossary." http://w1.weather.gov/glossary/index.php?letter=h.

Figure 35: Wind Zones in the U.S.

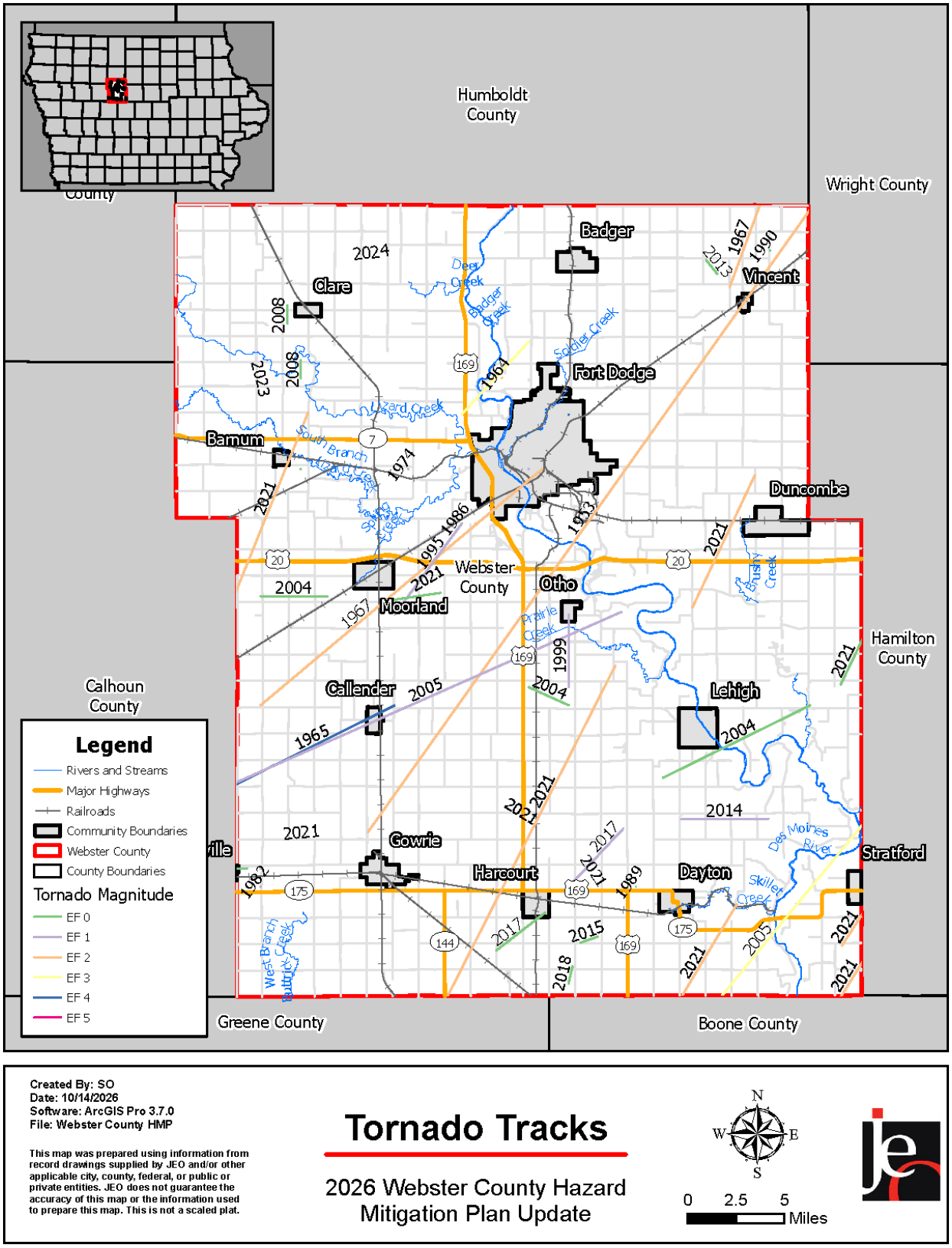


Source: FEMA, 2016

Location

Windstorms commonly occur throughout Webster County and tornadoes can take place anywhere in the county. The impacts would likely be greater in more densely populated areas, such as the City of Fort Dodge. Figure 36 shows the historical track locations across the region according to FEMA (1950-2024). A few significant tornado events have directly impacted communities located in the planning area between 1960 and 2025.

Figure 36: Historical Tornado Tracks



Extent

The Beaufort Wind Scale can be used to classify wind strength, while the magnitude of tornadoes is measured by the Enhanced Fujita Scale. Table 67 outlines the Beaufort scale, provides wind speed ranking, range of wind speeds per ranking, and a brief description of conditions for each ranking.

Table 67: Beaufort Wind Ranking

Beaufort Wind Force Ranking	Range of Wind	Conditions
0	<1 mph	Smoke rises vertically
1	1 – 3 mph	Direction shown by smoke but not wind vanes
2	4 – 7 mph	Wind felt on face; leaves rustle; wind vanes move
3	8 – 12 mph	Leaves and small twigs in constant motion
4	13 – 18 mph	Raises dust and loose paper; small branches move
5	19 – 24 mph	Small trees in leaf begin to move
6	25 – 31 mph	Large branches in motion; umbrellas used with difficulty
7	32 – 38 mph	Whole trees in motion; inconvenience felt when walking against the wind
8	39 – 46 mph	Breaks twigs off trees; generally impedes progress
9	47 – 54 mph	Slight structural damage; chimneypots and slates removed
10	55 – 63 mph	Trees uprooted; considerable structural damages; improperly anchored or tied down mobile homes overturned
11	>63 mph	Widespread damages; very rarely experienced

Source: Storm Prediction Center, 2017[80]

Based on NCEI-reported events, the most common high-wind event in the planning area was classified as Level 9 on the Beaufort Wind Scale, representing wind speeds of 47 to 54 mph. Of the 47 recorded events, 45 included wind-speed information and two did not. Individual event wind speeds ranged from Level 7 (32 to 38 mph) to Level 11 (greater than 63 mph). The average reported wind speed was approximately 48 mph.

The Enhanced Fujita Scale replaced the original Fujita Scale in 2007. Rather than classifying tornadoes according to their size or width, the Enhanced Fujita Scale assigns ratings based on observed damage to buildings, trees, and other structures. Tornadoes are classified from EF0 to EF5 using 28 damage indicators representing different types of structures and vegetation. Meteorologists and engineers assign ratings by examining damage, analyzing ground-swirl patterns, reviewing photographs and videos, and considering other available documentation. The final rating reflects the most severe damage supported by the available evidence.

The following tables summarize the Enhanced Fujita Scale and its associated damage indicators. However, it should be noted that damage alone is not a prerequisite for identifying a tornado. According to the National Institute of Standards and Technology's investigation of the 2011 Joplin tornado, approximately 96% of tornadoes are rated EF3 or lower.[81]

[80] Storm Prediction Center: National Oceanic and Atmospheric Administration. 1805. "Beaufort Wind Scale." http://www.spc.noaa.gov/faq/tornado/beaufort.html.

[81] Kuligowski, E.D., Lombardo, F.T., Phan, L.T., Levitan, M.L., & Jorgensen, D.P. March 2014. "Final Report National Institute of Standards and Technology (NIST) Technical Investigation of the May 22, 2011, Tornado in Joplin, Missouri."

Table 68: Enhanced Fujita Scale

Storm Category	3 Second Gust (mph)	Damage Level	Damage Description
EF0	65-85 mph	Gale	Some damages to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	86-110 mph	Weak	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed.
EF2	111-135 mph	Strong	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	136-165 mph	Severe	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	166-200 mph	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown, and large missiles generated.
EF5	>200 mph	Incredible	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel-reinforced concrete structures badly damaged.

Source: NOAA; FEMA

Table 69: Enhanced Fujita Scale Damage Indicator

Number	Damage Indicator	Number	Damage Indicator
1	Small barns, farm outbuildings	**15**	School - 1-story elementary (interior or exterior halls)
2	One- or two-family residences	**16**	School - Junior or Senior high school
3	Single-wide mobile home (MHSW)	**17**	Low-rise (1-4 story) bldg.
4	Double-wide mobile home	**18**	Mid-rise (5-20 story) bldg.
5	Apartment, condo, townhouse (3 stories or less)	**19**	High-rise (over 20 stories)
6	Motel	**20**	Institutional bldg. (hospital, govt. or university)
7	Masonry apartment or motel	**21**	Metal building system
8	Small retail building. (fast food)	**22**	Service station canopy
9	Small professional (doctor's office, branch bank)	**23**	Warehouse (tilt-up walls or heavy timber)
10	Strip mall	**24**	Transmission line tower
11	Large shopping mall	**25**	Free-standing tower
12	Large, isolated ("big box") retail bldg.	**26**	Free standing pole (light, flag, luminary)
13	Automobile showroom	**27**	Tree - hardwood
14	Automotive service building	**28**	Tree - softwood

Source: NOAA; FEMA

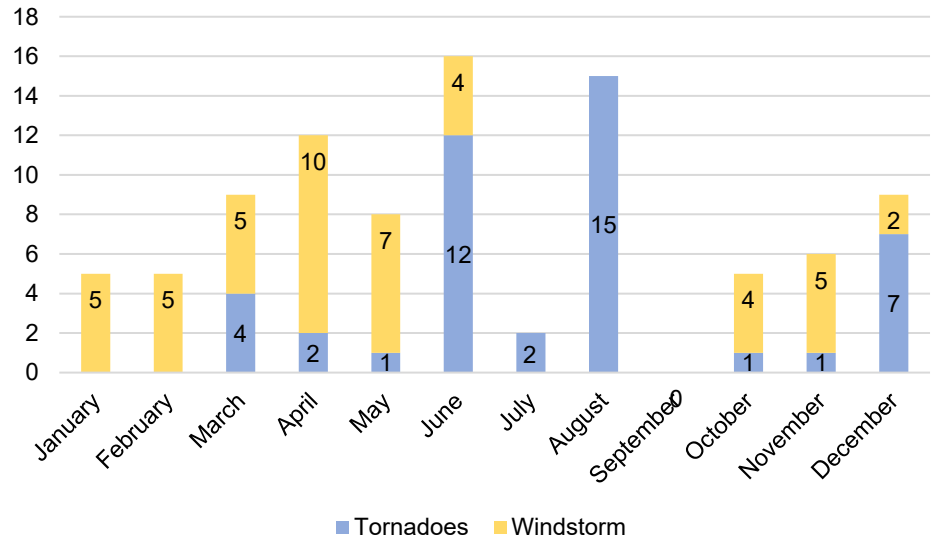
Historical Occurrences

From 1996 through 2025, the NCEI recorded 47 high-wind events and 45 tornadoes in the planning area. The tornadoes ranged in intensity from F0/EF0 to F3/EF3. High-wind events resulted in $1,871,110 in reported property damage, while USDA RMA data reported $1,123,995

in associated crop losses. No deaths were reported, although four injuries were associated with tornado events.

The most damaging tornado occurred on November 12, 2005, causing $450,000 in property damages in Webster County. The F2 tornado moved into the county from Boone County and traveled northeast into Hamilton County, damaging homes and destroying outbuildings, including a machine shed and much of its contents. This tornado was part of an outbreak that affected several communities across central Iowa. Based on historical records, the majority of windstorm events occur in the spring and winter months, while most tornado events occur in the summer.

Figure 37: Tornado and Windstorm Events by Month



Source: NCEI, 1996-2026

Event descriptions summarized from NCEI for the most damaging events are provided below. These events each caused at least $100,000 in combined reported property and crop losses in Webster County.

- **11/10/1998 Windstorm –** *A powerful low-pressure system brought prolonged high winds across Iowa, with sustained winds of 35 to 50 mph and frequent gusts of 65 to 75 mph reported across much of the state. Widespread damage included downed trees and power lines, damaged roofs and outbuildings, and overturned semi-trucks. Approximately $300,000 in property damage and $5,100 in crop damage were reported in Webster County.*
- **6/11/2004 Tornado –** *An F0 tornado touched down south of Otho and caused extensive damage to two farmsteads. One farmstead was nearly destroyed, including significant damage to the house. Approximately $100,000 in property damage and $5,000 in crop damage were reported from this event.*
- **11/12/2005 Tornado –** *An F2 tornado moved into Webster County from Boone County and tracked northeast into Hamilton County. Near the Boone–Webster county line, a*

home was heavily damaged and a large outbuilding was destroyed. After crossing the Des Moines River, the tornado struck another farm near 370th Street and Washington Avenue, damaging the residence and destroying a machine shed and much of its contents. Approximately $450,000 in property damage was reported for the Webster County portion of the tornado.

- **6/10/2010 Windstorm –** *Strong southeast winds developed behind a weakening thunderstorm complex as a wake low moved across Iowa. Wind gusts reached 60 mph or greater in Webster County and several surrounding counties. Scattered damage was reported across the affected area, primarily to tree branches, with winds also blowing small objects around. Approximately $100,000 in property damage was reported in Webster County.*
- **6/26/2011 Windstorm –** *A wake low associated with a large thunderstorm complex produced strong easterly winds across the area. The strongest winds occurred near Callender in Webster County, where winds of 80 to 90 mph knocked down mailbox posts, blew trees onto houses, and carried a swing set through a house window. Tree and power line damage was widespread across the affected region. Approximately $500,000 in property damage was reported in Webster County.*
- **8/31/2014 Tornado –** *An EF1 tornado formed just over three miles north of Dayton and tracked nearly due east. The tornado destroyed a hog confinement building and left a pronounced damage path through multiple cornfields. Although it weakened midway through its track, it continued to damage cornfields and caused minor tree damage near the end of its path. Approximately $200,000 in property damage and $7,000 in crop damage were reported from this event.*
- **12/15/2021 Tornado –** *An EF2 tornado moved into Webster County from Greene County, entering southwest of Lanyon. It passed just west of Harcourt and continued northeast before dissipating between Lehigh and Otho. Along its path, the tornado snapped several large utility poles and destroyed several outbuildings. Approximately $200,000 in property damage was reported for the Webster County portion of the tornado.*

Average Annual Loss

The average annual damage estimates were determined based upon historical property and crop losses and their respective periods of record. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. It is estimated that windstorm events can cause an average of $62,370 per year in property damages and $43,230 per year in crop damages. Tornadoes have caused an average of $41,473 per year in property damages, with no reported crop damages from RMA. However, the NCEI reported crop damages separately for a total of $13,000 in crop damages from tornado events. Damages from tornadoes vary greatly depending on the severity or magnitude of each event.

Table 70: Tornado and Windstorm Loss Estimate

Hazard Type	Number of Events[1]	Average Events Per Year	Total Property Loss[1]	Average Annual Property Loss[1]	Total Crop Loss[2]	Average Annual Crop Loss[2]
Tornado	45	1.5	$1,244,200	$41,473	$13,000[1]	$433

Hazard Type	Number of Events[1]	Average Events Per Year	Total Property Loss[1]	Average Annual Property Loss[1]	Total Crop Loss[2]	Average Annual Crop Loss[2]
Windstorm	47	1.6	$1,871,110	$62,370	$1,123,995	$43,230

Source: 1 Indicates data is from NCEI (1996 to 2026); 2 Indicates data is from USDA RMA (2000 to 2025)

Historical Probability & Future Likelihood

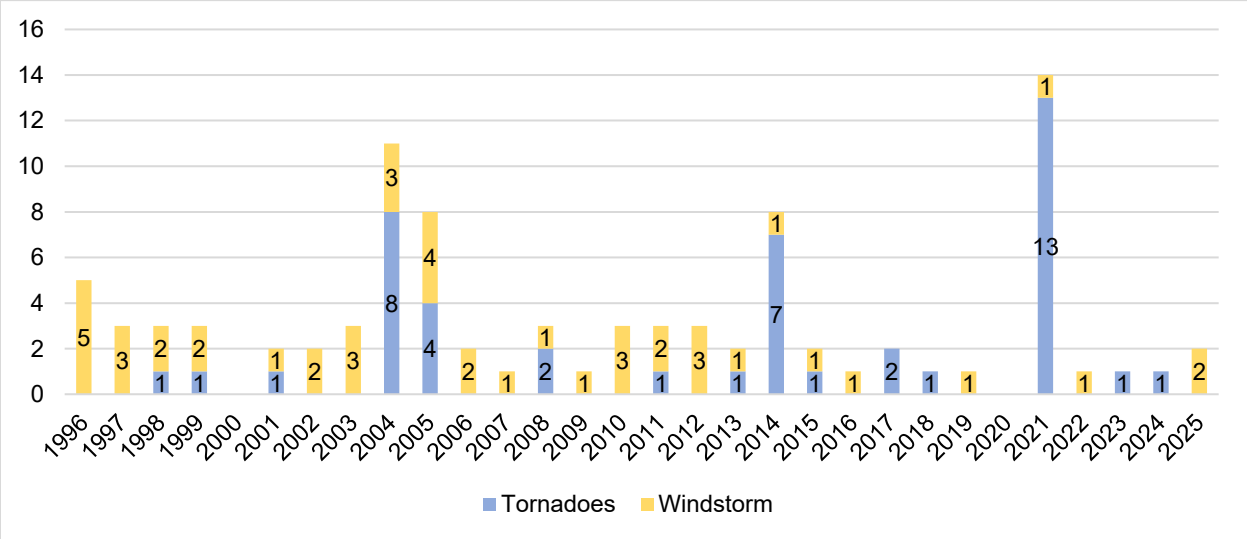
Given the historic record of occurrence for windstorms (24 out of 30 years with reported events), for the purposes of this plan, the annual probability of windstorm occurrence is 80%.

Given the historic record of occurrence for tornado events (15 out of 30 years with reported events), the annual probability of tornado occurrence is 50%. However, it is worth noting that the period of record for data utilized during this analysis is from 1996-2025.

Table 71: Historical Probability & Future Likelihood – Tornadoes and Windstorm

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Tornadoes	50%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**
Windstorm	80%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**

Figure 38: Tornado and Windstorm Events Per Year



Source: NCEI, 1996-2026

Future Development

Any future development and population growth elevates exposure of property and people to the impacts of tornadoes and high winds. Future development should take steps to reduce potential damage from these events. Building codes for new structures can be strengthened, requiring increased rebar in foundations, enhanced nailing patterns for wall sheathing, the use of Simpson Strong Ties and Straps, and require the use of anchors and tie-downs of mobile homes. Additionally, individuals can choose to build to an optional Code Plus Standard, such as Fortified for Safer Living or construct a tornado shelter on their property. The installation of public shelters to protect residents caught outside or in vulnerable areas, such as mobile home parks, can

increase safety of residents in those areas. Development regulations that require safe rooms, basements, warning sirens, or other structures that reduce risk to people would also help decrease vulnerability.

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 72: Regional Tornado and Windstorm Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Vulnerable populations include those living in mobile homes (especially if they are not anchored properly), nursing homes, and/or schools -People outdoors during events -Citizens without access to shelter below ground or in safe rooms -Elderly with decreased mobility or poor hearing may be higher risk -Lack of multiple ways of receiving weather warnings, especially at night	-Increased injuries and death for vulnerable residents who lack adequate shelter or equipment, or who have mobility limitations
Economic	-Agricultural losses to both crops and livestock -Damages to businesses and prolonged power outages can cause significant impacts to the local economy, especially with EF3 tornadoes or greater	-Food chain disruption from damaged crops and livestock loss -Disruption to commercial services, lost revenue and employee income, supply-chain interruptions, and increased recovery costs
Built Environment	-All building stock is at risk of significant damages	-Increased maintenance and repair costs, limited accessibility to structures
Infrastructure	-Downed power lines and power outages -All above ground infrastructure at risk to damages -Impassable roads due to debris blocking roadways	-Loss of power, disruption of services and utility systems -Limited accessibility due to roads being blocked from debris/damage
Community Lifelines	-All community lifelines are at risk to damages and power outages	-Debris and power loss could negatively impact operations of essential services and access to community lifelines
Climate	-Changes in seasonal precipitation and temperature normals can increase frequency and magnitude of severe storm events	-Changes in frequency of tornadoes and windstorms and alter exposure to these hazards over time; may call for additional services and mitigation efforts

Animal/Crop/Plant Disease

Man-made Hazard

Animal, crop, and plant diseases can reduce agricultural productivity, disrupt farm operations, and affect income and market access. Infectious animal diseases may cause illness or mortality, restrict animal movement, and require treatment, quarantine, or removal of affected animals. Crop and plant diseases may reduce yields and product quality or require additional management and replanting. Effects can extend beyond individual farms to agricultural suppliers, processors, transportation services, and other businesses that depend on agricultural production. The severity and duration of an event depend on the pathogen, the susceptible population, and the extent of spread.

Location

Animal, crop, and plant disease exposure extends throughout Webster County, particularly to cropland, livestock operations, and other locations where susceptible animals or plants are present. The 2022 Census of Agriculture reported 907 farms and 356,141 acres of land in farms, with an average farm size of 393 acres. Cropland accounted for 335,107 acres. Corn for grain was the leading crop by harvested acreage at 174,658 acres, followed by soybeans at 136,515 acres. Together, these crops accounted for approximately 98.8% of harvested cropland.

Extent

The extent of this hazard can range from disease affecting a single field or livestock operation to a widespread event involving multiple farms and agricultural markets. Potential impacts include animal mortality, reduced crop yields, production interruptions, treatment and disposal costs, and restrictions on sales or movement. Agricultural sales indicate the scale of economic exposure, rather than an estimate of losses from a disease event.

Webster County agricultural products sold totaled $456,685,000 in 2022, including $327,080,000 in crops and $129,605,000 in livestock, poultry, and their products. Crops represented approximately 72% of agricultural sales, and livestock-related products represented approximately 28%. Hogs and pigs accounted for $108,368,000 in sales, making swine production a substantial component of the county's livestock economy.

The December 31, 2022 livestock inventory included 163,062 hogs and pigs, 10,380 cattle and calves, 882 sheep and lambs, 314 goats, and 463 horses and ponies. These inventories identify assets potentially susceptible to disease and do not indicate that the animals were diseased.

Historical Occurrences

Plant Disease

According to the Crop Protection Network's Crop Lookout Archive, the Iowa-context evidence includes two tar spot reports and three southern corn rust reports; these are Iowa-context occurrences, not confirmed county occurrences.. These reports document disease presence rather than distinct outbreaks and do not provide countywide estimates of affected acreage, yield losses, or economic damages. The following table summarizes the reported observations within the planning area.

Table 73: Crop/Plant Disease

Bulletin Date	Disease or Issue	Reported Location and Findings
6/19/2026	Tar spot	New observations included Iowa; individual Iowa counties were not named.
7/10/2026	Bacterial leaf streak, northern corn leaf blight, and gray leaf spot	Iowa observations included bacterial leaf streak in five counties and the other two diseases in two counties each; county names were not provided.
7/28/2026	Southern corn rust	Iowa was among five states with reported observations; Iowa counties were not named.
8/5/2026	Tar spot and southern corn rust	Iowa was included in a multistate summary; the bulletin did not assign each disease to specific Iowa counties.
8/10/2026	Southern corn rust	Observations from August 6–7 included Iowa; individual Iowa counties were not named.

Source: Crop Protection Network cropprotectionnetwork.org 2020 - 2026

Animal Disease

According to the Iowa Department of Natural Resources and the Iowa Department of Agriculture and Land Stewardship, tracked animal disease statistics are not publicly available. The supplied Iowa DNR animal feeding operations data identify 273,127 swine, 6,735 beef cattle, and 70 horses at active facilities in Webster County[82]. These figures describe the agricultural assets potentially exposed to animal disease and do not indicate documented disease occurrences or a complete countywide livestock inventory. The concentration of swine production highlights the potential for an outbreak to disrupt agricultural operations through animal illness or mortality, quarantine, movement restrictions, and associated economic losses.

Average Annual Damages

There have been 23 reported plant disease events in the planning area, averaging 0.88 events per year. These events resulted in $160,452 in reported crop losses, with an average annual crop loss of $6,171. Property loss estimates were not available. These figures do not capture the full economic impacts of disease, including uninsured losses, treatment costs, production interruptions, and restrictions on agricultural sales or animal movement.

Table 74: Animal/Crop/Plant Disease Loss Estimate

Hazard Type	Number of Events	Average Events Per Year	Total Property Loss	Average Annual Property Loss	Total Crop Loss	Average Annual Crop Loss
Animal/Crop/Plant Disease	23	0.88	-	-	$160,452	$6,171

Source: USDA RMA (2000 to 2025)

Historical Probability & Future Likelihood

Webster County's extensive cropland and livestock inventories provide continuing exposure to animal, crop, and plant disease. Future occurrence will depend on the pathogens present, susceptible hosts, environmental conditions, and disease-prevention practices. Animal occurrence data are unavailable.

[82] Iowa Department of Natural Resources. October 2026. Iowa https://programs.iowadnr.gov/maps

Table 75: Historical Probability & Future Likelihood – Animal/Crop/Plant Disease

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Animal/Crop/Plant Disease	88%	Neither Increase nor Decrease in Frequency. Increase in Exposure	**Very Likely**

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 76: Regional Animal/Plant/Crop Disease Vulnerabilities

Sector	Vulnerability
People	- Workers handling infected animals may be exposed to disease. - Agricultural losses may cause financial hardship and stress. - Smaller farms may have fewer resources to prevent and recover from outbreaks.
Economic	- Crop diseases may reduce yields and quality. - Livestock diseases may cause animal losses and restrict sales. - Disease control and recovery may increase costs. - Agricultural losses may affect related businesses.
Built Environment	- Facilities and equipment may require cleaning and disinfection. - Infected trees and vegetation may require removal. - Tree losses may reduce shade, wind protection, and property appeal.
Infrastructure	- Quarantines may disrupt agricultural transportation and processing. - Large outbreaks may strain animal disposal capacity. - Diseased trees may threaten roads and utilities.
Community Lifelines	- Outbreaks may disrupt food production and distribution. - Demand for veterinary and testing services may increase. - Improper disposal may threaten water quality and sanitation.
Climate	- Changing temperatures and precipitation may affect disease and pest activity. - Humidity may favor crop diseases, while drought and extreme temperatures may increase susceptibility. - Longer growing seasons may allow pests and diseases to spread longer.

Dam Failure

Man-made Hazard

A dam is defined as a barrier constructed across a water course for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine failings. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, affecting both life and property. Structural failure can occur during extreme conditions, which include, but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area
- Earthquakes
- Vandalism
- Terrorism

The effective height of a dam is defined as the difference in elevation in feet between the natural bed of the stream or watercourse measured at the downstream toe (or from the lowest elevation of the outside limit of the barrier if it is not across stream) to the auxiliary spillway crest. The effective storage is defined as the total storage volume in acre-feet in the reservoir below the elevation of the crest of the auxiliary spillway. If the dam does not have an auxiliary spillway, the effective height and effective storage should be measured at the top of dam elevation.

The thresholds for state-regulated dams are outlined in Iowa Administrative Code 567-73.3. They are listed below.

- A dam with a height of at least 25 feet and a storage of 15 acre-feet or more at the top of the dam elevation.
- A dam with a storage of 50 acre-feet or more at the top of the dam elevation and a height of at least 6 feet.
- A dam that is assigned a hazard potential of high hazard.

Exceptions include:

- Road embankments or driveways with culverts are exempt unless such structure serves, either primarily or secondarily, a purpose commonly associated with dams, such as the temporary storage of water for flood control.

The State of Iowa assigns existing and proposed dams a hazard potential classification based on future land and impoundment use. Changes in downstream land use, development, impoundment, or critical hydraulic structures to a dam require a reevaluation of the hazard potential. The Iowa Department of Natural Resources periodically performs inspections of dams

posing a significant risk to downstream life and property. The three hazard potential classifications are low hazard, significant hazard, and high hazard and are defined below.

Table 77: Dam Hazard Classification

Hazard Type	Definition
Low	A dam shall be classified as “low hazard” if failure of the dam would result in no probable loss of human life, low economic losses, and low public damages.
Significant	A dam shall be classified as “significant hazard” if failure of the dam would result in no probable loss of human life but may damage residential structures or industrial, commercial, or public buildings; may negatively impact important public utilities or moderately traveled roads or railroads; or may result in significant economic losses or significant public damages.
High	A dam shall be classified as “high hazard” if located in an area where failure would result in probable loss of human life.

Location

According to USACE’s National Inventory of Dams, there are 15 dams located within the county, 13 classified as being low hazard, 1 significant hazard, and 1 high hazard dam. Figure 39 maps the location of dams in the county.

Figure 39: Dam Locations

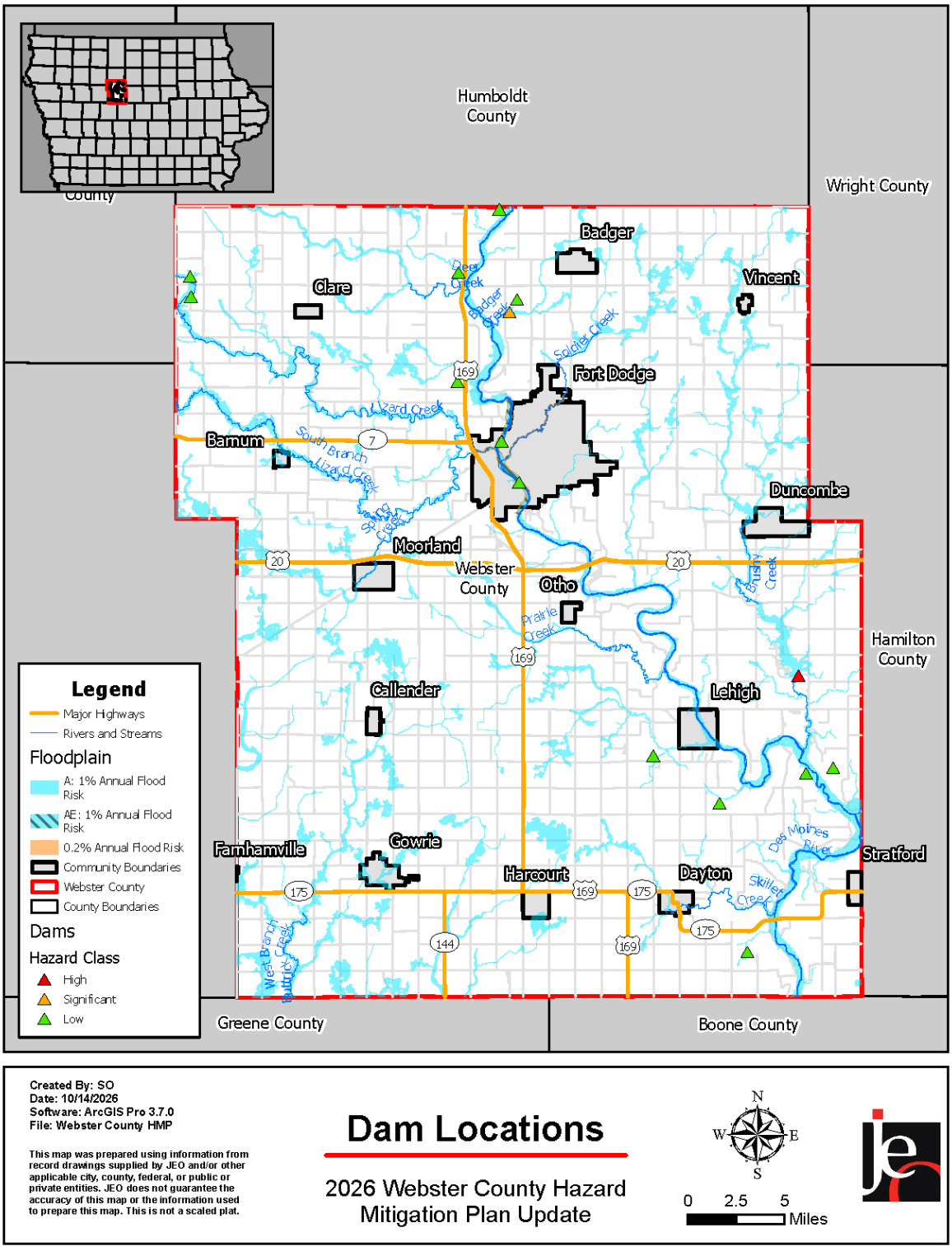


Table 78: Dams in the County according to National Inventory of Dams

Low Hazard	Significant Hazard	High Hazard
13	1	1

Source: USACE, 2025[83]

The Iowa DNR inventory lists 15 dams in the county.[84] One dam was classified as a high-hazard dam according to the USACE. Dams classified with high hazard potential require the creation of an Emergency Action Plan (EAP). The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the structural integrity of the dam within sufficient time to take mitigating actions and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam.

Upstream Dams Outside the Planning Area

There are no high-hazard potential dams upstream of Webster County.

Extent

Areas directly downstream of dams (e.g., agricultural land, out buildings, county roads, and communities) are at greatest risk in the case of dam failure. The extent of dam failure is indicated by its hazard classification and location. Note that hazard classification does not indicate the likelihood of a dam failure event to occur, but rather the extent of potential damages that may occur in case of a failure.

Historical Occurrences

According to both IDNR and the Association of State Dam Safety Dam Incident Database, there are no reported dam failures within the planning area.[85]

Average Annual Loss

There are no recorded instances of dam failure in the planning area; therefore, the average annual losses are thusly $0.

Historical Probability and Future Likelihood

For the purpose of this plan, the probability of dam failure will be stated at less than one percent annually as no dams have failed in the planning area.

Table 79: Historical Probability & Future Likelihood – Dam Failure

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Dam Failure	< 1%	Neither Increase nor Decrease in Frequency. Increase in Exposure.	Very Unlikely

Future Development

Any future growth in dam inundation areas increases the impacts from these events. Additionally, any increase in development downstream of any existing dams may elevate these dams to a high

[83] United States Army Corps of Engineers. May 2023. "National Inventory of Dams." https://nid.sec.usace.army.mil/nid/#/dams/search/sy=@countyState:Webster,%20Iowa&viewType=map&resultsType=dams&advanced=false&hideList=false&eventSystem=false.

[84] Iowa Department of Natural Resources. December 2025. "Iowa DNR Dam Inventory." https://iowadnr.knack.com/dams#public/?view_136_filters=%5B%7B%22value%22%3A%22Existing%22%2C%22operator%22%3A%22is%22%2C%22field%22%3A%22field_431%22%7D%5D.

[85] Association of State Dam Safety Officials. "Dam Incident Database Search". Accessed December 2025. https://damsafety.org/incidents

hazard rating. As many dam inundation areas are also identified floodplain locations, developing outside these areas will reduce vulnerability to this hazard. Closer to the dam the breach inundation zone is frequently larger than the identified floodplain, so caution should be used when developing areas just downstream of a dam. Communities could implement requirements for any new development or substantial improvements in dam inundation areas like floodplain ordinances to minimize the number of people and property impacted during a failure event.

Regional Vulnerabilities

The following table provides information related to regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 80: Regional Dam Failure Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Those living downstream of high hazard dams -Those at recreational sites situated near high hazard dams -Evacuation needs likely with high hazard dam failure events -Hospitals, nursing homes, and the elderly at greater risk due to low mobility	-Loss of life or serious injury from floodwater inundation -Difficulty of low-mobility residents evacuating if dam failure occurs -Communities trapped by floodwaters
Economic	-Loss of downstream agricultural land -Businesses or recreation sites located in inundation areas would be impacted and closed for an extended period of time -Employees of closed businesses may be out of work for an extended period of time	-Loss of income or revenue for residents and businesses -Decline in the local economy, especially the agricultural sector
Built Environment	-Damage to facilities, recreation areas, and roads	-Facility closures or limited access -Low or no access to certain areas of the county due to impacts from roads
Infrastructure	-Transportation routes could be closed for extended period of time	-Low or no access to some areas of the county
Community Lifelines	-Any community lifelines in inundation areas are vulnerable to damages	-Potential disruption of community lifeline functions
Climate	-Increased annual precipitation contributes to sustained stress on systems -Changes in water availability and supply can constrain energy production and reservoir stores	-Unusually low or high water levels in the reservoir -Dam failure and rapid inundation could cause secondary hazards such as soil erosion, landslides, and ground subsidence

Hazardous Materials Release

Man-made Hazard

The following description for hazardous materials is provided by the Federal Emergency Management Agency (FEMA):

> *Chemicals are found everywhere. They purify drinking water, are used in agriculture and industrial production, fuel our vehicles and machines, and simplify household chores. But chemicals also can be hazardous to humans or the environment if used or released improperly. Hazards can occur during production, storage, transportation, use, or disposal. The community is at risk if a chemical is used unsafely or released in harmful amounts.*

Hazardous materials in various forms can cause fatalities, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products containing hazardous chemicals are used and stored in homes routinely. Chemicals posing a health hazard include carcinogens, toxic agents, reproductive toxins, irritants, and many other substances that can harm human organs or vital biological processes.

Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites. Varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States—from major industrial plants to local dry-cleaning establishments or gardening supply stores.

Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. Hazardous material incidents are technological (meaning non-natural hazards created or influenced by humans) events that involve large-scale releases of chemical, biological or radiological materials. Hazardous materials incidents generally involve releases at fixed-site facilities that manufacture, store, process or otherwise handle hazardous materials or along transportation routes such as major highways, railways, navigable waterways and pipelines.

Fixed sites are those that involve chemical manufacturing sites and stationary storage facilities. The Environmental Protection Agency (EPA) requires the submission of the types and locations of hazardous chemicals being stored at any facility within the state over the previous calendar year. This is completed by submitting a Tier II form to the EPA as a requirement of the Emergency Planning and Community Right-to-Know Act of 1986. Likewise, the U.S. Department of Transportation, through the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA), has broad jurisdiction to regulate the transportation of hazardous materials, including the discretion to decide which materials shall be classified as hazardous. These materials are placed into one of nine hazard classes based on their chemical and physical properties. The hazard schedules may be further subdivided into divisions based on their characteristics. Because the properties and characteristics of materials are crucial in understanding the dynamics of a spill during a transportation incident, it is important for response personnel to understand the hazard classes and their divisions.

The transportation of hazardous materials is defined by PHMSA as "…a substance that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce…" According to PHMSA, hazardous materials traffic in the U.S. now exceeds1.2 million shipments per day. Nationally, the U.S. had 67 fatalities associated with the transport of hazardous materials fro 2015 through 2025. While such fatalities are a low probability risk, even one event can harm many people.

Table 81 demonstrates the nine classes of hazardous material according to the 2024 Emergency Response Guidebook.

Table 81: Hazardous Material Classes

Class	Type of Material	Divisions
1	Explosives	Division 1.1 – Explosives which have a mass explosion hazard Division 1.2 – Explosives which have a projection hazard but not a mass explosion hazard Division 1.3 – Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard Division 1.4 – Explosives which present no significant hazard Division 1.5 – Very insensitive explosives with a mass explosion hazard Division 1.6 – Extremely insensitive articles which do not have a mass explosion hazard
2	Gases	Division 2.1 – Flammable gases Division 2.2 – Non-flammable, non-toxic gases Division 2.3 – Toxic gases
3	Flammable liquids (and Combustible liquids)	
4	Flammable solids; Substances liable to spontaneous combustion; Substances which, on contact with water, emit flammable gases	Division 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives Division 4.2 – Substances liable to spontaneous combustion Division 4.3 – Substances which in contact with water emit flammable gases
5	Oxidizing substances and Organic peroxides	Division 5.1 – Oxidizing substances Division 5.2 – Organic peroxides
6	Toxic Substances and infectious substances	Division 6.1 – Toxic substances Division 6.2 – Infectious substances
7	Radioactive materials	-
8	Corrosive substances	-
9	Miscellaneous hazardous materials/dangerous goods and articles	-

Source: Emergency Response Guidebook, 2024[86]

[86] U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. 2025. "2024 Emergency Response Guidebook." https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg.

Location

Iowa has approximately 4,324 facilities across the state that house hazardous materials according to the Tier II reports submitted to the Iowa Department of Natural Resources. Of those, 31 locations are located in the planning area. These locations are shown in the following figure. A listing of hazardous material storage sites can be found in *Section Seven: Community Profiles* for each jurisdiction.

Hazardous material releases during transportation primarily occur on major transportation routes as identified in (Figure 40). Railroads providing service through the planning area have developed plans to respond to chemical releases along rail routes. A large number of spills also typically occur during the loading and unloading of chemicals for highway and pipeline chemical transport. Transportation corridors in the planning area are primarily US Routes and State Routes.

According to PHMSA, there are several gas transmission and hazardous liquid pipelines located in the planning area. A map of the pipelines from PHMSA for Webster County can be seen below (Figure 41).[87] According to the U.S. Energy Information Administration (EIA) there are multiple natural gas pipelines, two petroleum product pipelines, and no crude oil trunk pipelines that run through the county.[88]

[87] Pipeline and Hazardous Materials Safety Administration. 2023. "National Pipeline Mapping System." https://www.npms.phmsa.dot.gov/ .

[88] U.S. Energy Information Administration. 2025. "Maps – Crude Oil Trunk Pipelines, Natural Gas Interstate and Intrastate Pipelines, Petroleum Products Pipelines." https://www.arcgis.com/home/user.html?user=Federal_User_Community.

Figure 40: Fixed Chemical Sites in the County

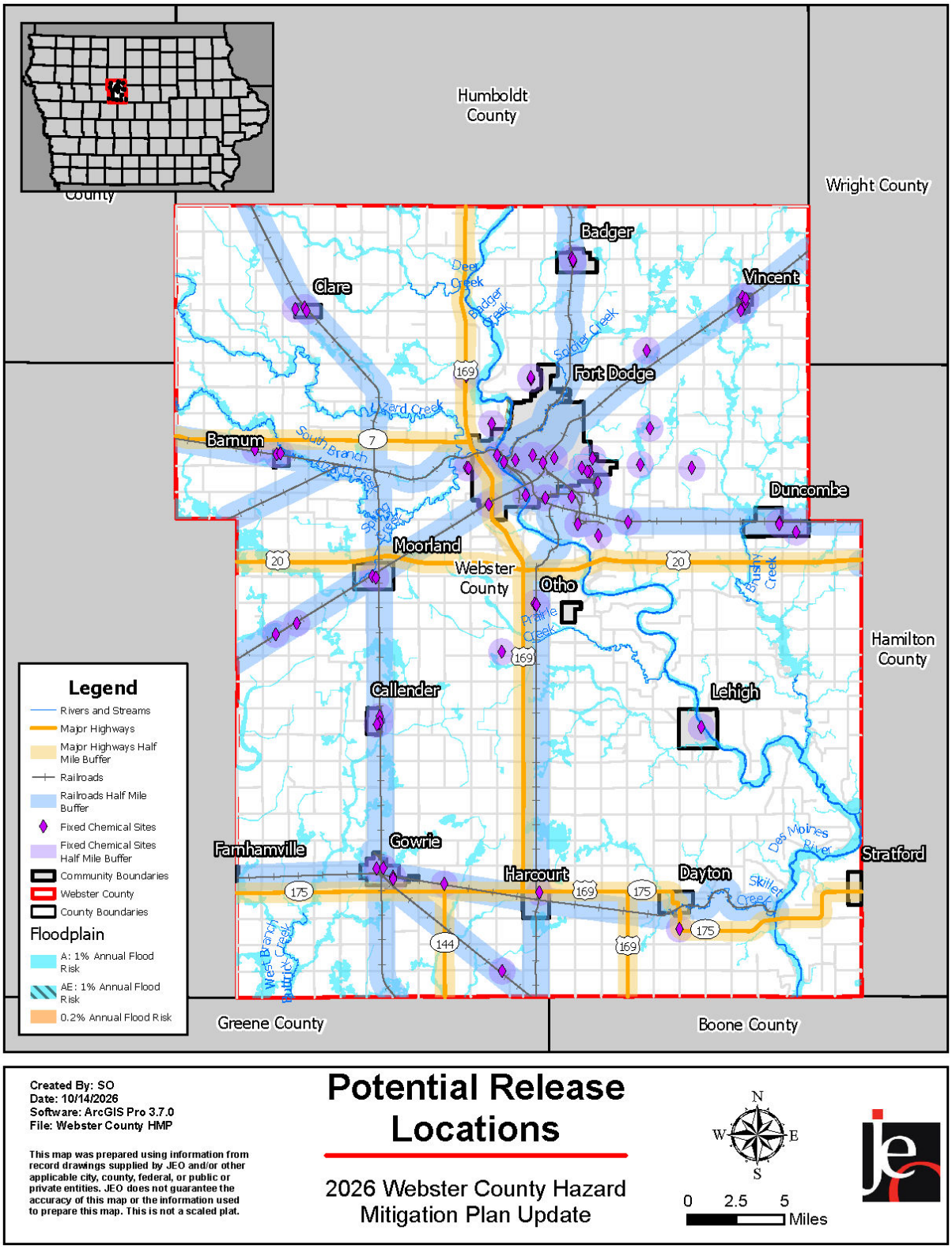
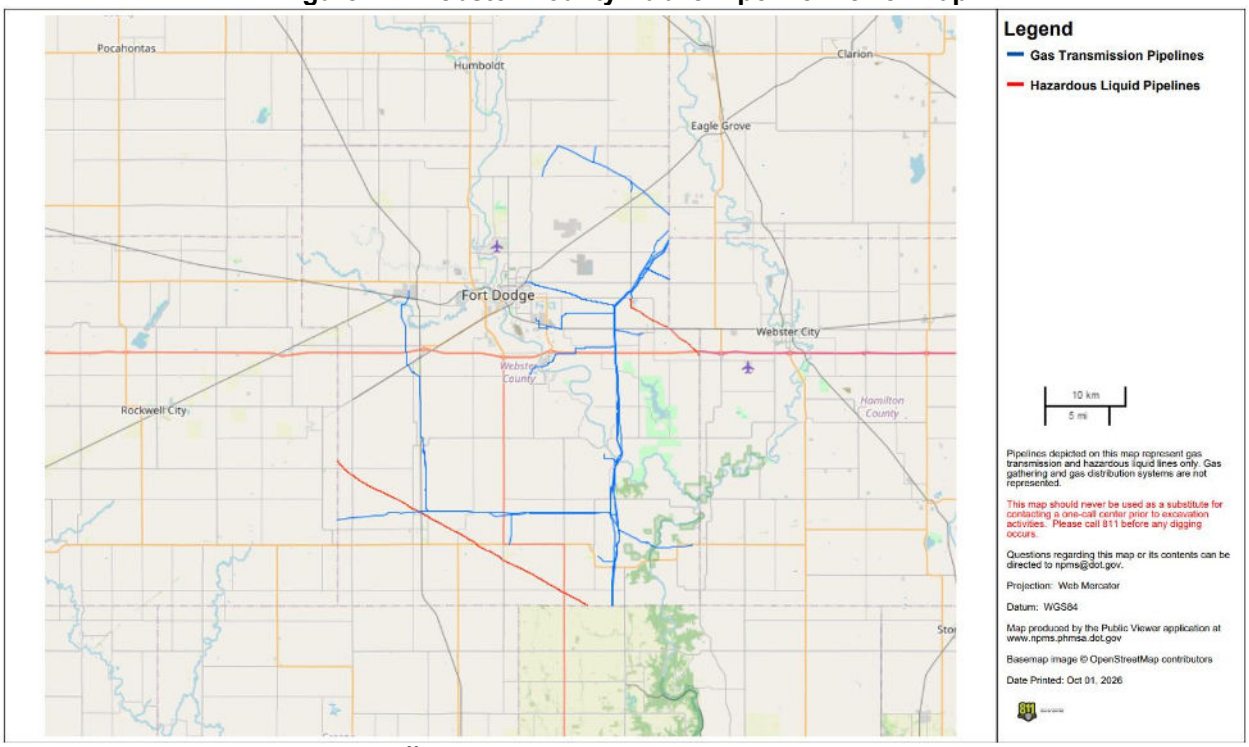


Figure 41: Webster County Public Pipeline Viewer Map



Source: National Pipeline Mapping System[89]

Iowa has established a Weapons of Mass Destruction (WMD)/HazMat team to provide statewide coverage for identification, assessment, and support of render-safe procedures involving explosive devices and those that may contain chemical, biological, radioactive, nuclear, or explosive (CBRNE) materials. The team is made up of personnel from Council Bluffs, Davenport, and Des Moines and helps enhance the capabilities of existing fire department hazmat teams across the state.[90]

Extent

The extent of chemical spills at fixed sites varies and depends on the type of chemical that is released with a majority of events localized to the facility. The probable extent of chemical spills during transportation is difficult to anticipate and depends on the type and quantity of chemical released. In total 361 fixed site releases have occurred in the planning area, and the total amount spilled ranged from one to 100,000 gallons and eight to fifty pounds. No spills resulted in evacuation, injury, or death.

In total, 41 hazardous materials releases have occurred during transportation in the planning area. Transportation spills ranged from 0.5 liquid gallons of material released to 20,000 liquid gallons released, with an average quantity spilled of 515 liquid gallons. None of the 41 chemical spills led to an evacuation, injury, or death. Based on historical records, a potential spill boundary can not be fully determined. Spill events including liquid gallons are unlikely to travel far from the site of incident; however, several ammonia gas spills have been known to travel for miles at a time before dispersing.

[89] National Pipeline Mapping System. 2026. "Public Viewer." Accessed October 2026. https://pvnpms.phmsa.dot.gov/PublicViewer/.
[90] HSEMD. 2020. "Iowa's Emergency Response Teams." https://homelandsecurity.iowa.gov/programs/special-teams/ https://homelandsecurity.iowa.gov/programs/special-teams/.

Historical Occurrences

Fixed Site Spills

According to the U.S. Coast Guard's National Response Center database (NRC), there have been 361 fixed site chemical spills from 1990 to May 2026 in the planning area. Total property damage was $139,000. The following table displays the 5 largest spills that have occurred throughout the planning area.

Table 82: Large Fixed Site Chemical Spills

DATE	LOCATION OF RELEASE	QUANTITY SPILLED	MATERIAL INVOLVED	NUMBER OF INJURIES	PROPERTY DAMAGE
9/13/2018	Gowrie — 1562 312th Street	100,000 gal.	Mash containing corn, yeast, water, and sulfuric acid	Not reported	Not reported
11/8/2019	Duncombe — 3160 200th Street	5,000 gal.	Ammonia and water mixture	Not reported	Not reported
10/31/2007	Fort Dodge — 150th Street and Oate Avenue	1,400 gal.	Anhydrous ammonia	Not reported	Not reported
7/19/2019	Fort Dodge — 2400 5th Avenue South	1,000 gal.	Wastewater	Not reported	Not reported
2/12/2001	Fort Dodge Correctional Facility — L Street	524 gal.	Gasohol (10% ethanol)	Not reported	Not reported

Source: National Response Center, 1990- May 2026

Transportation Spills

According to PHMSA, 41 hazardous materials releases occurred during transportation in the planning area between 1971 and 2025. No events were reported prior to 1994 for Webster County. During these events, there were no evacuations, fatalities, or injuries. Damages totaled $73,501. The following table provides a list of the larger historical transportation chemical spills (>25 gallons).

Table 83: Large Chemical Transportation Spills

Date of Event	Location of Release	Failure Description	Material Involved	Transportation Mode	Injuries or Fatalities	Total Damage
12/23/2014	Fort Dodge	Tank overfilled during delivery; human error	525 gal. gasoline	Highway	None	$23,601
12/31/2011	Gowrie	Tank overflowed during	300 gal. diesel fuel	Highway	None	$15,882

Date of Event	Location of Release	Failure Description	Material Involved	Transportation Mode	Injuries or Fatalities	Total Damage
		unloading; human error				
1/30/2009	Fort Dodge	Fill fitting disconnected during delivery	50 gal. gasoline	Highway	None	$1,600
7/26/2004	Duncombe	Faulty safety switch on stationary storage tank	20,000 gal. ammonia and water solution	Highway*	None	$9,600
5/13/2004	Fort Dodge	Tank overfilled due to incorrect tank identification	60 gal. gasohol	Highway	None	$1,248

Source: PHMSA, 1971 - 2025

Average Annual Damages

There have been 361 fixed site spills in the planning area reported from the NRC and 41 transportation spills as reported by PHMSA. Neither the NRC nor PHMSA track crop losses from chemical spills. These events resulted in $212,501 in reported property damage. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.

Table 84: Hazardous Materials Release Loss Estimate

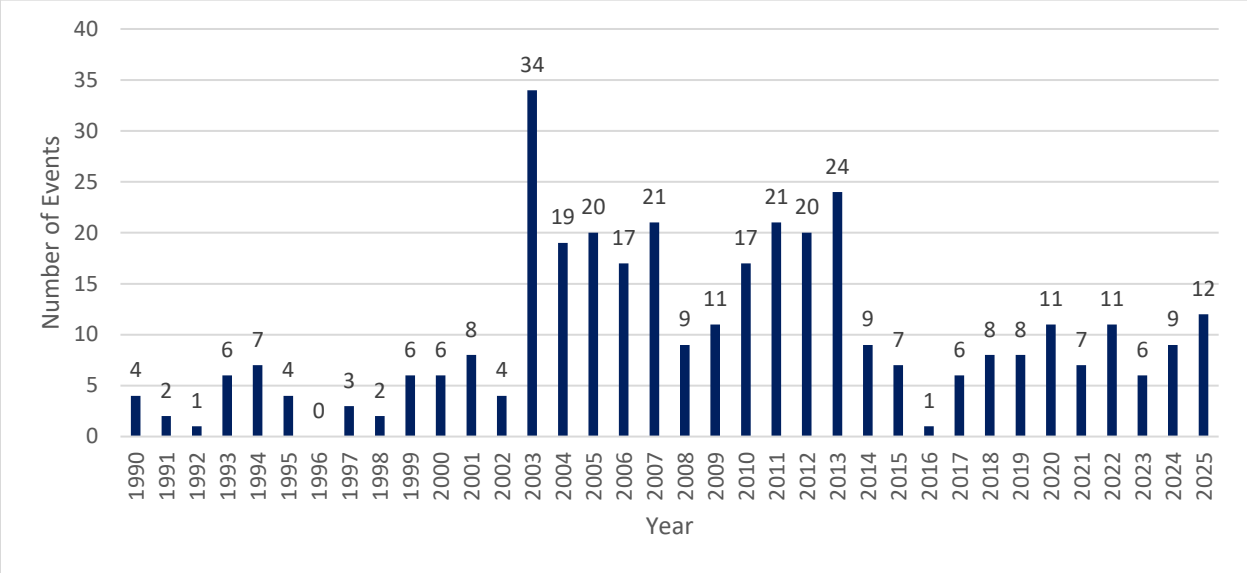
Hazard Type	Number of Events	Events Per Year	Injuries	Total Evacuated	Total Damages	Average Annual Loss
Hazardous Materials Release (Fixed Site)	361	10	0	0	$139,000	$3,861
Hazardous Materials Release (Transportation)	41	1.28	0	0	$73,501	$2,297

Source: National Response Center, 1990 - 2026; PHMSA, 1971 - 2025

Historical Probability and Future Likelihood

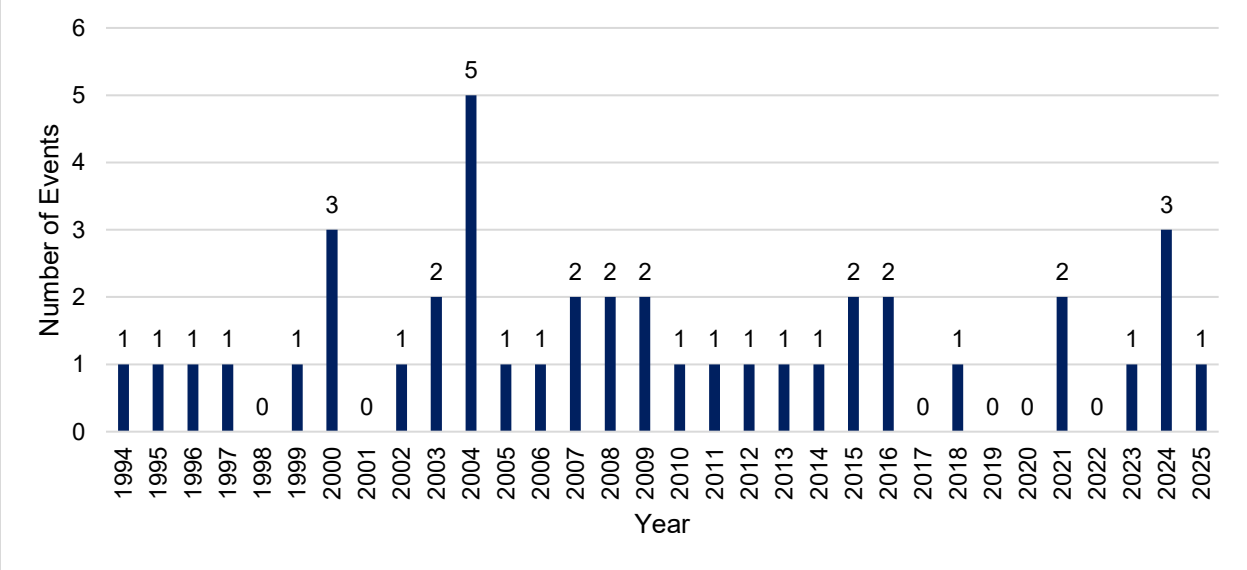
Given the historic record of occurrence for fixed chemical spill events (at least one chemical spill reported in 35 of 36 years), for the purposes of this plan, the annual probability of a fixed chemical spill is 97%. Given the historic record of occurrence for chemical transportation spill events (26 out of 32 years with a reported event), for the purposes of this plan, the annual probability of chemical transportation occurrence is 81%.

Figure 42: Chemical Fixed Site Spills by Year



Source: National Response Center, 1990-2025

Figure 43: Chemical Transportation Spills by Year



Source: PHMSA, 1971 - 2025

Table 85: Historical Probability & Future Likelihood – Hazardous Materials Release

Hazard	Historical Probability	Future Development Impact	Future Likelihood
Fixed Site	97%	Increase in Frequency and Exposure.	**Very Likely**
Transportation	81%	Increase in Frequency and Exposure.	**Very Likely**

Future Development

To reduce the risk to people and property damage, future development should encourage chemical storage and manufacturing facilities to be built away from community lifelines such as schools, daycares, nursing homes, and other residential areas. Likewise, residential development

and locations that house vulnerable populations should be built away from major transportation corridors used for chemical transportation.

Regional Vulnerabilities

To reduce the risk to people and property damage, future development should encourage chemical storage and manufacturing facilities to be built away from community lifelines such as hospitals, schools, daycares, nursing homes, and other residential areas. Likewise, development and community lifelines should be built away from major transportation corridors used for chemical transportation. Specific vulnerabilities exist for community lifelines or vulnerable population centers (schools, daycares, hospitals, etc.) which are most heavily populated during the daytime as most chemical transportation incidents occur during the weekday daytime hours.

The following table summarizes regional vulnerabilities; for jurisdiction-specific vulnerabilities, refer to *Section Seven: Community Profiles*.

Table 86: Regional Hazardous Materials Release Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Those in proximity could have minor to severe health impacts -Possible evacuation -Hospitals, nursing homes, and the elderly at greater risk due to low mobility	-Respiratory issues, burns, poisoning, irritations, and other health concerns to those exposed to hazardous materials -Need for short- or long-term shelters -Higher demand for medical services
Economic	-A chemical plant shutdown in smaller communities would have significant impacts on the local economy -Evacuations and closed transportation routes could impact businesses near the spill	-Interruption of production and operations, reduced employment and wages, increase costs for repairs -Business closures, supply-chain disruptions from transportation restrictions
Built Environment	-Risk of fire or explosion	-Destruction to nearby structures
Infrastructure	-Transportation routes can be closed during evacuations or cleanup	-Limited accessibility to communities and facilities, damaged transportation routes
Community Lifelines	-Risk of fire, explosion, or other damages -Risk of evacuation	-Damaged community lifelines and reduced operations of essential services -Need for short- and long-term shelters
Climate	-More extreme weather events and flood events increase flood exposure at sites containing hazardous materials	-Flood damage to sites containing hazardous materials could contaminate surrounding areas and water supply

Terrorism/Cyberattack

Man-made Hazard

For the purposes of this plan, this hazard is going to include terrorism, cyberattack, active shooter incidents, and other intentional human-caused threats that pose a significant hazard to life safety, property, infrastructure, or the environment.

Active Shooter
One or more individuals actively engaged in killing or attempting to kill people in a populated area.

Domestic Terrorism
Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences within the United States, such as those of a political, religious, social, racial, or environmental nature.

International Terrorism
Violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations.

Intentional attacks and terrorist activity may be based on ideology (i.e. religious fundamentalism, national separatist movements, and social revolutionary movements), but attacks can also be random with no ties to ideological reasoning.

Threat assessment, mitigation, and response to terrorism are federal and state directives that work in conjunction with local law enforcement and county emergency management.

Cyberattack
Cyberattack is an incident involving the theft or modification of information on computer systems that can compromise the system or potentially disrupt essential services. A cyberattack incident can impact governmental agencies, private utilities, or critical infrastructure/key resources like a power grid, public transportation system, and wireless networks. Cyber infrastructure includes electronic information and communications systems, and the information contained in those systems. Computer systems, control systems, and networks such as the internet are all part of cyber infrastructure.

> "Many of the Nation's essential and emergency services, as well as our critical infrastructure, rely on the uninterrupted use of the Internet and the communications systems, data, monitoring, and control systems that comprise our cyber infrastructure. A cyberattack could be debilitating to our highly interdependent critical infrastructure and key resources and ultimately to our economy and national security."
>
> - National Strategy for Homeland Security

Nation-states, criminal organizations, terrorists, and other malicious actors conduct attacks against critical cyber infrastructure on an ongoing basis. The impact of a serious cyber incident or successful cyberattack would be devastating to regional and local governments' assets,

systems, and/or networks; the information contained in those networks; and the confidence of those who trust governments to secure those systems.

A cyberattack can affect a system's:

- Confidentiality: protecting a user's private information
- Integrity: ensuring that data is protected and cannot be altered by unauthorized parties
- Availability: keeping services running and giving administration access to key networks and controls.

Location
Terrorism and cyberattacks can occur throughout the entire planning area. Most attacks in the United States have taken place in business/commercial sites, public open spaces, and schools. However, government buildings, healthcare facilities, and houses of worship can also be targets for ideologically motivated attacks. Critical infrastructure and commercial, private, and government computer systems may also be targeted for physical or cyberattacks.[91]

Extent
Terrorist and cyberattacks can vary greatly in scale and magnitude, depending on the location, method, and target of the attack. They can range from an entire water system to a single building or structure. The frequency of terrorism and cyberattacks cannot be estimated from available records.

Historical Occurrences
Previous incidents related to terrorism have been documented within the planning area. Details of these incidents are not included in this profile due to privacy concerns and the sensitive nature of the information.

Government agencies and private-sector organizations regularly experience attempted cyberattacks. Most attempts have been prevented before causing reported impacts; however, cyber threats remain ongoing and continue to evolve.

Average Annual Loss
Average annual losses from terrorism and cyberattacks are difficult to quantify due to limited reporting, the sensitive nature of incident information, and variation in the type and severity of impacts. Losses may include property damage, service disruptions, data recovery costs, lost revenue, and expenses associated with response and recovery. Indirect impacts, such as reduced public confidence and prolonged operational disruptions, are also difficult to measure. As a result, available loss data may not fully reflect the financial impacts of these hazards within the planning area.

Historical Probability & Future Likelihood
Available information is insufficient to calculate a reliable historical probability for terrorism and cyberattacks in the planning area. Records may be incomplete, incidents may go unreported, and sensitive information may not be publicly available. The absence of documented incidents does not indicate a zero probability of future occurrence.

91 Federal Bureau of Investigation. 2022. "Active Shooter Incidents in the United States in 2022". https://www.fbi.gov/file-repository/active-shooter-incidents-in-the-us-2022-042623.pdf/view.

Future likelihood is also difficult to determine because these hazards involve intentional actions, changing threats, and varying security capabilities. Future development and increased reliance on technology may increase the number of people, facilities, and systems exposed to potential impacts; however, these changes do not provide a measurable basis for predicting event frequency. Therefore, historical probability and future likelihood are considered undetermined based on available information.

Historical Probability & Future Likelihood – Terrorism and Cyberattack

Historical Probability	Future Development Impact	Future Likelihood
Unable to determine	Neither Increase nor Decrease in Frequency. Increase in Exposure	Effect on frequency uncertain

Future Development

Increased security measures at vulnerable locations such as schools or government buildings will reduce the likelihood and impacts of terrorism and cyberattacks. Measures can include bollards to protect from vehicles, fencing, security cameras, advanced locks, etc. Having strong cyber security can keep bad actors from taking control of virtual systems with the intent to cause harm to humans and damage to buildings.

Regional Vulnerabilities

Webster County's residents, businesses, schools, government agencies, healthcare facilities, and utilities are vulnerable to terrorism, cyberattacks, and other intentional threats. Physical attacks could cause injuries or fatalities, damage property, and require evacuations or facility closures. Cyberattacks have occurred within the county; however, incident details are excluded to protect privacy and sensitive information. These attacks could compromise personal and operational data, interrupt essential services, and disrupt business and agricultural operations. Impacts to interconnected utilities, communications, and emergency services could extend across multiple jurisdictions, particularly affecting residents who depend on continuous care or services. Smaller organizations may have fewer resources for prevention and recovery. Physical security measures, cybersecurity practices, staff training, secure backups, and continuity planning can help reduce these vulnerabilities and limit disruptions.

Table 81: Regional Terrorism and Cyberattack Vulnerabilities

Sector	Vulnerability	Expected Impacts
People	-Civilians at risk of injury or death -Students and staff at school facilities at risk of injury or death from school shootings -Police officers and first responders at risk of injury or death	- Injuries or fatalities among residents, students, staff, and responders. - Evacuations, displacement, and psychological distress. - Exposure of personal information through data theft. - Delayed access to emergency services or medical care.
Economic	-Damaged businesses can cause loss of revenue and loss of income for workers -Risk of violence in an area can reduce income flowing into and out of that area -Agricultural attacks could cause significant economic losses for the region	- Business closures, lost revenue, and interrupted employment. - Costs to repair damage, restore computer systems, and recover data. - Financial losses from fraud, theft, or disrupted agricultural operations.
Built Environment	-Targeted buildings may sustain heavy damage	- Damage to or destruction of targeted buildings.

		- Temporary closure of unsafe or inaccessible facilities. - Loss of building security, access controls, or other automated systems during cyberattacks.
Infrastructure	-Water supply, power plants, utilities may be damaged -Police stations, schools, and government offices are at a higher risk	- Interruptions to water, wastewater, electricity, and communications. - Damage to equipment or loss of control over utility systems. - Disruption of emergency response, school operations, and government services. - Loss or compromise of operational data and records.

Section Five: Mitigation Strategy

Introduction

The primary focus of the mitigation strategy is to identify action items to reduce the effects of hazards on existing infrastructure and property based on the established goals. These actions should consider the most cost effective and technically feasible manner to address risk.

Summary of Changes

The development of the mitigation strategy for this plan update includes the addition of new mitigation and strategic actions, updated status or removal of past actions, and revisions to the mitigation and strategic action selection process or descriptions of actions for consistency across the planning area.

Goals

The establishment of goals took place during the kick-off meeting. Goals from the 2020 HMP were reviewed and consolidated to primary themes which best represented the current priorities of the Emergency Management Commission and participating jurisdictions. Jurisdictions that participated in this plan update agreed that the goals identified by the Commission would be utilized for the 2026 plan. The intent of each goal is to develop strategies to account for risks associated with hazards and identify ways to reduce or eliminate those risks.

Below is the final list of goals as determined for this plan update. These goals provide direction to guide participants in reducing future hazard related losses.

Goal 1: Protect Health and Safety of Residents
Goal 2: Protect Infrastructure

Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these tools.

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

Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. The jurisdiction's participation in the National Flood Insurance Program and continued compliance with NFIP requirements, as appropriate, must also be addressed.

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

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

Goal 3: Improve Emergency Management and Response Capacity
Goal 4: Increase Awareness and Education of Hazards
Goal 5: Reduce Future Hazard Risk through Planning and Implementation

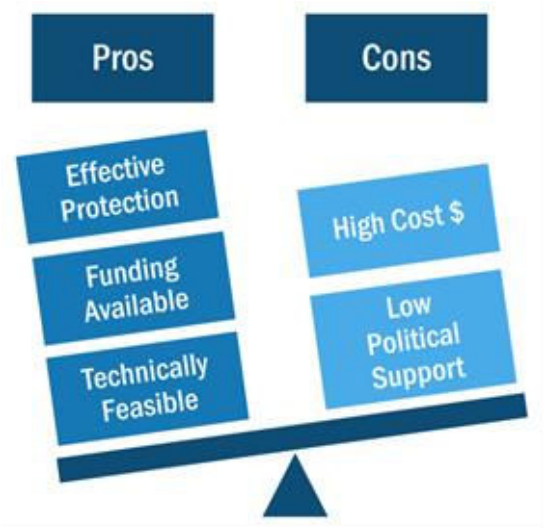
Selected Mitigation and Strategic Actions

Local community representatives evaluated and prioritized mitigation and strategic actions at the local level. These actions included: the mitigation and strategic actions identified per jurisdiction in the previous plan; additional mitigation and strategic actions discussed during the planning process; and recommendations from JEO for additional mitigation and strategic actions based on risk probability and vulnerability at the local level.

The STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, Environmental) feasibility review process was used as the standard approach to determine project priorities. These prioritized projects are the core of a hazard mitigation plan. The local planning teams were instructed that each action must directly relate to the natural hazards profiled as part of the HMP and should support the identified goals of the plan overall. Actions must be specific activities that are concise and can be implemented individually. Mitigation and strategic actions were evaluated based on referencing the community's risk assessment and capability assessment.

The local planning team members prioritized the mitigation actions according to criteria most applicable to their jurisdiction. Note that the listed priority rating does not indicate which actions may be implemented first – as some low priority actions may be easily accomplished while high priority actions may require a more time-consuming implementation process. Not all mitigation actions identified by a community can be a high priority project due to a lack of funds, time, or local capacity. The following questions consider the pros and cons when determining whether to pursue a mitigation action and its priority level:

- Does the action address a local concern? To what extent does it mitigate local risk? Does the action address multiple hazard concerns or broadly improve resiliency?
- How much might the action cost? Are the costs reasonable compared to probable benefits? Are there local funds to accomplish the project or is outside funding needed?
- Does the lead agency or responsible party have the time, expertise, or capacity to implement the project?
- Does the project or action have local and/or political support?
- Is the project prohibitive in some way? For example: financially prohibitive; lacking legal authority to implement; strong local opposition; etc.



Generally, high priority actions either address a major concern for the jurisdiction, have few to no challenges in implementation, and/or garner large support from the public and administration. Low priority actions either address a minor concern for the jurisdiction, have many challenges in implementation, and/or may not have support from the public or administration at this time. Medium priority actions may only have one or two of the items listed above. A mitigation action's priority may change very quickly as circumstances change. The local planning team members

qualitatively established all mitigation action priority levels. Future updates to the plan should consider a quantitative approach to feasibility, benefit, and support when prioritizing actions.

It is important to note that not all the mitigation and strategic actions identified by a jurisdiction may ultimately be implemented due to limited capabilities; availability of existing information; prohibitive costs or funding opportunities and limitations; low benefit-cost ratio; administrative capabilities of communities; or other concerns. These factors may not be identified during this planning process. The cost estimates, priority rating, potential funding, and identified agencies are used to give communities an idea of what actions may be most feasible over the next five years. This information will serve as a guide for the participants to assist in hazard mitigation for the future. Also, some jurisdictions may identify and pursue additional mitigation and strategic actions not identified in this HMP.

Mitigation and Strategic Actions Project Matrix

Mitigation and strategic actions identified by participants of the Webster County HMP are found in the Mitigation and Strategic Actions Project Matrix below. The information listed in the following tables is a compilation of new, ongoing, completed and removed mitigation and strategic actions identified by jurisdiction. Each action includes the following information in the respective community profile.

- Action: General title of the action item.
- Description: Brief summary of what the action item(s) will accomplish.
- Hazard(s) Addressed: Which hazard the action aims to address.
- Estimated Cost: General cost estimate for implementing the action for the appropriate jurisdiction.
- Funding: A list of any potential local funding mechanisms to fund the action.
- Timeline: General timeline as established by planning participants.
- Priority: General description of the importance and workability in which an action may be implemented (high/medium/low); priority may vary between each community, mostly dependent on funding capabilities and the size of the local tax base.
- Lead agency: Listing of agencies or departments which may lead or oversee the implementation of the action item.
- Status: A description of what has been done, if anything, to implement the action item.

Table 87: Mitigation and Strategic Actions Identified per Jurisdiction

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Acquire an ATV with Tracks	x																	x
Acquire Flood-Prone Property Located Within the Floodplain	x																	x
Acquire Property in the Floodplain								x										
Acquire Truck Mounted Snowblower	x																	x
Active Shooter Training											x							
Backup Energy for Friendship Haven								x										
Backup Energy for Lift Stations								x										
Backup Generator		x	x														x	
Backup Generator for Critical Facilities										x								
Build Public Awareness on Hazardous Material Reporting								x										
Build Tornado Safe Room		x	x															
Build Tornado Safe Rooms in Campgrounds and Recreational Areas	x																	x
Bury Powerlines								x										
City Equipment Maintenance			x															
City Ordinance for Water Usage in Case of Drought														x				
Clare Community Center Shelter Designation					x													
Clean Storm Sewer			x															
Community Tornado Safe Room					x													
COOP/COOG	x																	x
Correct Inflow and Infiltration Problem														x				

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
County Wide Emergency Storage Facility				x														
Create a Community Tornado Shelter														x				
Create a Retention Pond for Storm Water														x				
Create and Maintain Provisions List at Storm Shelter							x											
Debris Removal Equipment					x													
Demolish Dilapidated Structures									x									
Designate Shelter Areas				x														
Designate Shelters within the Community						x												
Develop a Tree-Trimming Management Program			x															
Develop Drought Contingency Plan		x																
Develop Flood-Related Alternate Bus Routes																	x	
Drought and Water Conservation Education					x							x				x		
Educate the Public on Alert Iowa/Inspiron								x										
Educate the Public on Fire Hazards								x										
Educate the Public on Weather Radios								x										
Education Materials for Tree-Trimming Practices													x					
Education on Health Risk of Floodwater														x				
Education on Sinkholes		x																
Electricity Distribution Engineering Study				x														
Emergency Plan Review						x												
Emergency Response Equipment						x												

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Emergency Response Mutual Aid Agreements							x											
Emergency Staff Training				x														
Encourage Participation in the Iowa Floodplain and Storm Water Management Association								x										
Encourage Residents to Disconnect Sump Pump									x									
Encourage Training City Personnel on NIMS							x											
Enforce Burn Bans		x				x							x					
Enforce Current Building Codes					x													
Ensure Dayton Has Adequate Equipment						x												
Ensure Elderly and Disabled Residents Safety						x												
Ensure Emergency Responders Have Adequate Equipment and Training								x										
Ensure Safety for Disabled Residents				x														
Ensure Street Signage is Up-to-Date						x												
Establish Drought Ordinance													x					
Establish Public Tornado Safe Rooms								x										
Establish Safe Room Building Locations													x					
Establish Snow Fences								x										
Establish Water Preservation Ordinance		x																
Evaluate and Update Law Enforcement Equipment	x																	x
Expand Storm Sewer System		x																
Extreme Temperature Education												x				x		

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Firefighter HAZMAT Training		x					x											
Flood Risk Education																x		
Flood-hazard Area Development Restrictions						x												
Flooding Education											x							
Generator Cost Analysis											x							
Generator Hookup on Designated Shelters				x														
Generator Installation for Critical Facilities	x																	x
Geophyscial Ground Survey and Database								x									x	
GIS Mapping of Underground Mines and Sinkholes														x				
Handicap-Accessible Improvements										x								
Hazard Public Education	x																	x
Hazardous Materials Firefighter Training											x							
Hire More EMT Personnel									x									
Hire Reserve Law Enforcement											x							
Implement Sanitary Sewer and Storm Sewer Projects to Reduce/Eliminate Backflow and Flash Flooding								x										
Improve Storm Water Drainage					x													
Improve Water Infrastructure							x		x									
Inform the Public About Alert Iowa/Inspiron	x																	x
Inform the Public of Road Clearance Requirements During Snow Events								x										
Inspect Local Firefighting and Water-Supply Capabilities														x				

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Install City Storm Sewer										x								
Interoperable Communication Upgrades	x																	x
Locate Additional Funding for Region V HAZMAT Team	x																	x
Maintain and Evaluate Outdoor Warning Sirens													x					
Mapping Utilities				x														
Mobile Command Center	x																	x
Mutual Aid Agreement Between Fire Departments										x								
New Fire Station							x											
Perform Field Tile Study													x					
Plan For and Identify Plant Diseases						x												
Portable Generator Installation				x														
Promote Alert Iowa		x	x															
Promote NOAA Weather Radios													x					
Public Education				x										x				
Repair City Tile										x								
Replace and Bury Overhead Power Lines						x												
Research Shelter Options											x							
Resident Emergency Plans							x											
Review and Assess Mutual Aid Agreements								x										
Review and Upgrade Plumbing Infrastructure																	x	
Right Sizing of Drainage Capabilities				x														

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Sanitary Sewer Evaluation Study								x										
Severe Thunderstorm Education																x		
Severe Winter Storms Education																x		
Sinkhole Awareness Education											x	x				x		
Slip Line Sanitary Sewer Mains Throughout City							x											
Stabilize Tributaries								x										
Storm Sewer Line Installation				x														
Stormwater System Extension													x					
Televise Sanitary and Storm Sewer Systems to Identify Necessary Repairs								x										
Tornado and Windstorm Education																x		
Tornado Safe Room				x														
Tornado/Windstorm Education												x						
Tree Removal Ordinance		x																
Tree-Trimming Program											x							
Unused Hazardous Materials Dropoff														x				
Update and Install New Warning Sirens									x									
Update City Disaster Plan			x															
Update City Hall					x													
Update Communication Equipment for Fire Station					x													
Update Outdoor Warning Sirens	x																	x

Mitigation Alternatives	Webster County	Badger	Barnum	Callender	Clare	Dayton	Duncombe	Fort Dodge	Gowrie	Harcourt	Lehigh	Moorland	Otho	Vincent	Iowa Central College	Fort Dodge Schools	Manson NW Schools	Southeast Valley Schools
Update Warning Siren		x	x		x		x											
Upgrade City Radios							x											
Upgrade City Storm Sewer										x								
Vegetation Management																	x	
Water Conservation Public Awareness						x												
Water Facility Fencing									x									
Water Tile Relief												x						
Wildfire Prevention Education											x	x				x		

Section Six: Plan Implementation and Maintenance

Monitoring, Evaluating, and Updating the Plan

Each participating jurisdiction in the Webster County Hazard Mitigation Plan will monitor, evaluate, and update the plan during its five-year lifespan. Each participant's governing body will prioritize hazard mitigation projects with support and suggestions from the public and local business owners. Each local planning team will be responsible for plan maintenance, the frequency of reviews, and public involvement. This information can be found in each participant's profile under the *Local Planning Team* section (except the County's, which is found on the next page). During the review, the local planning team can report on the effectiveness of the hazard mitigation plan and the status of projects. It can also include which implementation processes worked well, any difficulties encountered, how coordination efforts proceed, and which strategies could be revised.

In addition, each local planning team will be responsible for ensuring that the plan's goals are incorporated into applicable revisions of their jurisdiction's relevant planning documents. The hazard mitigation plan will also consider any changes in planning documents and include the information accordingly in its next update. *Appendix C: Guide to Review and Update the Hazard Mitigation Plan* may also be used to assist with plan updates.

The FEMA-required update of this plan will occur at least every five years to reduce the risk of the plan expiring. Updates may be incorporated more frequently, especially in the event of a significant hazard. Webster County will start meetings to discuss mitigation plan updates at least nine months before the deadline for completing the plan update. The Webster County Emergency Management Department will review the goals of the previous plan and evaluate them to determine whether they are still pertinent and current. Among other criteria, they may want to consider the following:

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

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

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

Requirement §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years to continue to be eligible for mitigation project grant funding.

- Do the goals address current and expected conditions?
- If any of the recommended projects have been completed, did they have the desired impact on the goal for which they were identified? If not, what was the reason it was not successful (lack of funds/resources, lack of political/popular support, underestimation of the amount of time needed, etc.)?
- Have either the nature, magnitude, and/or type of risks changed?
- Are there implementation problems?
- Are current resources appropriate to implement the plan?
- Were the outcomes as expected?
- Did the plan partners participate as originally planned?
- Are there other agencies which should be included in the revision process?

Worksheets in *Appendix C* may also be used to assist with plan reviews and updates.

Continued Public Involvement

To ensure continued plan support and input from the public and business owners, public involvement should remain a top priority for each participating jurisdiction. Notices for public meetings involving discussion of an action on mitigation updates should be published and posted in the following locations:

- Public spaces around the jurisdiction
- City Hall
- Websites
- Social media
- Local radio stations
- Local newspapers
- Regionally distributed newsletters

Plan maintenance and engagement strategies are outlined in applicable jurisdictional profiles.

Integrating Other Capabilities

There are a number of state and federal agencies with capabilities that can be leveraged during HMP updates or mitigation and strategic action implementation. A description of some regional resources is provided below.

Iowa Department of Homeland Security and Emergency Management

HSEMD is the coordinating body for homeland security and emergency management activities across the state of Iowa. HSEMD is responsible for emergency management, which is usually divided into five phases: preparedness, response, recovery, prevention, and mitigation.

The governor appoints the Iowa homeland security advisor and the director of the Iowa HSEMD. The HSEMD director serves as the state administrative agent for grants administered by the federal government: such as HMGP, FMA and BRIC. HSEMD is responsible for developing the state hazard mitigation plan, which serves as a comprehensive set of guidelines for hazard mitigation across the state. The state hazard mitigation officer (SHMO) is responsible for the coordination of plan updates and maintenance. The SHMO also serves as the lead coordinator for the State Hazard Mitigation Team (SHMT), which provides input on the state hazard mitigation planning process.

For more information regarding HSEMD responsibilities as well as their ongoing projects and programs, please go to https://homelandsecurity.iowa.gov/.

Iowa Department of Natural Resources

The IDNR is committed to providing Iowa's citizens and leaders with the data and analyses they need to make appropriate natural resource decisions for the benefit of all Iowans both now and in the future. This state agency is responsible in the areas of forest and prairie management, fish and wildlife programs, fire prevention, surface water and groundwater, floodplain management, dam safety, natural resource planning, animal feeding operations, permitting, solid waste management, household hazardous materials and many other programs and services. IDNR also coordinates with the US Forest Service, State and private forest agencies, the Big Rivers Forest Fire Management Compact to support natural resource managers and fire departments in fire prevention efforts.

For more information regarding IDNR's responsibilities as well as their ongoing projects, please go to https://www.iowadnr.gov/.

Silver Jackets Program

The Silver Jackets program is also worth mentioning for their extensive role in providing a formal and consistent strategy for an interagency approach to planning and implementing measures to reduce the risks associated with flooding and other natural hazards. It brings together multiple state, federal, and sometimes tribal and local agencies to learn from one another and apply their knowledge to reduce risk. The State Hazard Mitigation Team and the Iowa Flood Risk Management Team, also known as the Silver Jackets, coordinate efforts related to the review and update of the Iowa Hazard Mitigation Plan. The State Hazard Mitigation Team has largely delegated flood mitigation interagency coordination to the Silver Jackets.

Unforeseen Opportunities

If new, innovative mitigation options arise that could impact Webster County or elements of this plan deemed important, a plan amendment may be proposed and considered separately from the annual review and other proposed plan amendments. Webster County Emergency Management, as the plan sponsor, allows jurisdictions to compile proposed amendments and send them to HSEMD, and subsequently to FEMA, for a plan amendment. Such amendments should include all applicable information for each proposal, including a description of changes, identified funding, responsible agencies, and related details.

Incorporation into Existing Planning Mechanisms

The Webster County Planning Team utilized various plan integration tools to help communities determine how their existing planning mechanisms were related to the Hazard Mitigation Plan. Utilizing FEMA's *Integrating Hazard Mitigation Into the Local Comprehensive Plan*[92] guidance, each jurisdiction engaged in a plan integration discussion. This discussion was facilitated by a Plan Integration Worksheet or questions created by the Webster County Planning Team. This provided participants with an easy way to notify the Webster County Planning Team of existing planning mechanisms and whether they are integrated with the hazard mitigation plan.

Each jurisdiction referenced all relevant existing planning mechanisms and provided information on whether these mechanisms addressed hazards and vulnerabilities. Summaries of plan

[92] Federal Emergency Management Agency. July 2020. "FEMA Region X Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan." https://www.fema.gov/sites/default/files/2020-07/integrating-hazard-mitigation-local-plan.pdf

integration are available in each participant's profile. In jurisdictions without existing planning mechanisms, especially smaller communities, the plan may serve as a guide for future activity and development.

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Section Seven: Community Profiles

Purpose of Community Profiles

Community Profiles contain information specific to jurisdictions participating in the Webster County planning effort. Community Profiles were developed with the intention of highlighting each jurisdiction's unique characteristics that affect its risk to hazards. Community Profiles may serve as a reference of identified vulnerabilities and mitigation and strategic actions for a jurisdiction as they implement the mitigation plan. Information from individual jurisdictions was collected at public and one-on-one meetings and used to establish the plan and include the following elements:

- Community Fact Sheet
- Local Planning Team
- Plan Maintenance
- Capability Assessment
- Plans and Studies
- Development Trends
- Community Lifelines
- Hazard and Risk Discussion

The hazard prioritization information, as provided by individual participants, varies due to the extent of the geographical area, the jurisdiction's designated representatives (who were responsible for completing meeting worksheets), identification of hazards, and occurrence and risk of each hazard type. The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the entire planning area.

Community Profiles

Individual community profiles can be found in the following section. These include:

- Webster County
- City of Badger
- City of Barnum
- City of Callender
- City of Clare
- City of Dayton
- City of Duncombe
- City of Fort Dodge
- City of Gowrie
- City of Harcourt
- City of Lehigh
- City of Moorland
- City of Otho
- City of Vincent
- Iowa Central Community College
- Fort Dodge Community School District
- Southeast Valley Community School District