

Marshall County, Iowa Multi-Jurisdictional Hazard Mitigation Plan

2022-2027



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Executive Summary

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Marshall County and participating jurisdictions developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses to the County and its communities resulting from hazard events. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

The Marshall County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following jurisdictions that participated in the planning process:

- Unincorporated Marshall County
- City of Albion
- City of Clemons
- City of Ferguson
- City of Gilman
- City of Haverhill
- City of Laurel
- City of Le Grand
- City of Liscomb
- City of Marshalltown
- City of Melbourne
- City of Rhodes
- City of St. Anthony
- City of State Center
- East Marshall Community School District
- GMG Marshall Community School District
- Marshalltown Community School District
- West Marshall Community School District

Marshall County and the incorporated areas that participated in this plan update developed a Multi-jurisdictional Hazard Mitigation Plan that was previously approved by FEMA in 2016. A planning effort in 2021 serves to update the previous plan to make it effective for implementation during 2022-2027.

The plan update process followed a methodology recommended by FEMA guidance, which began with organizing the Hazard Mitigation Planning Committee (HMPC), comprised of representatives from Marshall County and participating jurisdictions. The HMPC updated the risk assessment that identified and profiled hazards that pose a risk to the Marshall County planning area, assessed the vulnerability to these hazards, and examined the capabilities in place to mitigate them. The planning area is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Riverine and flash flooding, winter storms, tornadoes and windstorms are among the hazards that can have a significant impact.

Based upon the risk assessment, the HMPC updated goals for reducing risk from hazards. The goals are listed below:

- Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.
- Protect the health and safety of Marshall County residents and visitors.
- Educate Marshall County citizens about the dangers of hazards and how they can be prepared.

- Ensure the continuity of county and local operations will not be significantly disrupted by disasters in Marshall County.

To meet the identified goals, the recommended mitigation action details are in Chapter 4. The HMPC developed an implementation plan for each action, which identifies priority level, background information, responsible agency, timeline, cost estimate, potential funding sources, and more.

Prerequisites

44 CFR Requirement §201.6(c)(5):

The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

The following jurisdictions participated in the development of this plan and have adopted the multi-jurisdictional plan. Resolutions of Adoptions are included in Appendix C.

- Unincorporated Marshall County
- City of Albion
- City of Clemons
- City of Ferguson
- City of Gilman
- City of Haverhill
- City of Laurel
- City of Le Grand
- City of Liscomb
- City of Marshalltown
- City of Melbourne
- City of Rhodes
- City of St. Anthony
- City of State Center
- East Marshall Community School District
- GMG Marshall Community School District
- Marshalltown Community School District
- West Marshall Community School District

Chapter 1 Introduction and Planning Process

1.1 Purpose

Marshall County, and the participating cities and public school districts, prepared this Multi-jurisdictional Hazard Mitigation Plan update to guide hazard mitigation planning to better protect the people and property of the planning area from the effects of hazard events.

This plan demonstrates the jurisdictions' commitments to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Marshall County and the participating jurisdictions eligible for certain federal grant programs; specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grants such as the Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities (BRIC), and Flood Mitigation Assistance Program.

1.2 Background and Scope

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$6 in avoided future losses in addition to saving lives and preventing injuries (Natural Hazard Mitigation Saves: 2017 Interim Report).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. Marshall County and the incorporated areas that participated in this plan update developed a *Multi-jurisdictional Hazard Mitigation Plan* that was approved by FEMA in September 2016 (hereafter referred to as the 2016 Marshall County Multi-jurisdictional Hazard Mitigation Plan). Therefore, the 2021 planning effort serves to update the previous plan. This plan is anticipated to be fully approved and adopted by early 2022 and is effective for the five year span of 2022-2027 before the next required update cycle.

This plan documents the hazard mitigation planning process undertaken by the Marshall County Hazard Mitigation Planning Committee (HMPC). It identifies relevant hazards and vulnerabilities in the planning area and sets forth an updated mitigation strategy to decrease vulnerability and increase resiliency and sustainability in Marshall County.

The *Marshall County Multi-jurisdictional Hazard Mitigation Plan* is a multi-jurisdictional plan that geographically covers the participating jurisdictions within Marshall County's boundaries (hereinafter referred to as the planning area). The following jurisdictions officially participated in the planning process:

- Unincorporated Marshall County

- City of Albion
- City of Clemons
- City of Ferguson
- City of Gilman
- City of Haverhill
- City of Laurel
- City of Le Grand
- City of Liscomb
- City of Marshalltown
- City of Melbourne
- City of Rhodes
- City of St. Anthony
- City of State Center
- East Marshall Community School District
- GMG Marshall Community School District
- Marshalltown Community School District
- West Marshall Community School District

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The Marshall County planning area has been affected by hazards in the past and the participating jurisdictions are therefore committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

1.3 Plan Organization

This *Marshall County Multi-jurisdictional Hazard Mitigation Plan* update is organized as follows:

- Executive Summary, Special Thanks and Acknowledgements, Table of Contents, Prerequisites
- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
- Appendices

This is a reorganization of the general format that was used for the *2016 Marshall County Multi-jurisdictional Hazard Mitigation Plan*, which was prepared by the Iowa Region 6 Planning Commission.

1.4 Planning Process

44 CFR 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.

This plan update was collaboratively prepared between March-November 2021 by Marshall County and the participating jurisdictions and stakeholders collectively known as the HMPC. Professional planning assistance was provided by Wood Environment & Infrastructure, Inc. (Wood) through a contract held with Iowa Homeland Security and Emergency Management Division. Wood's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA),
- Ensure the updated plan meets the DMA requirements as established by federal regulations and following FEMA's planning guidance,
- Facilitate the entire planning process,
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data,
- Assist in facilitating the public input process,
- Produce the draft and final plan update documents, and
- Coordinate the Iowa Homeland Security and Emergency Management Division and FEMA plan reviews.

1.4.1 Multi-Jurisdictional Participation

44 CFR Requirement §201.6(a)(C):

Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.

Marshall County Emergency Management as the lead coordinator invited the incorporated cities, public school districts, and various other stakeholders in mitigation planning to participate in the *Marshall County Multi-jurisdictional Hazard Mitigation Plan* update process. The jurisdictions that elected to participate in this plan are listed above in section 1.2. These are the same jurisdictions that participated in the 2016 Plan. The DMA requires that each jurisdiction that participates in the planning process must officially adopt the multi-jurisdictional hazard mitigation plan. Each jurisdiction that chose to participate in the planning process and development of the plan was required to meet plan participation requirements defined at the first planning meeting, which includes the following:

- Designate a representative to serve on the HMPC;
- Participate in at least one of three HMPC meetings by either direct representation or authorized representation or participate in related side-bar meetings or correspondence;
- Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact your jurisdiction;
- Provide data to describe current capabilities, update existing mitigation actions and identify additional mitigation actions for the plan (at least one);
- Review and comment on plan drafts;
- Inform the public, local officials, and other interested parties about the planning process and provide an opportunity for them to comment on the plan; and

- Formally adopt the mitigation plan.

All of the jurisdictions listed as official participants in this plan met all of these participation requirements. Coordination during the planning process occurred through a combination of emails, in-person and webinar meetings, and individual meetings/discussions/emails with the County Emergency Manager as the lead planner/coordinator. Table 1-1 shows the representation of each participating jurisdiction at the planning meetings and/or provided input on update/development of mitigation actions. Sign-in sheets and attendance logs are included in Appendix B: Documentation of Planning Process.

Table 1-1 Jurisdictional Participation in Planning Process

Jurisdiction	Kick-off Meeting	Meeting #2	Meeting #3	Coordination on Update/Develop Mitigation Actions
Marshall County	X	X	X	X
City of Albion				X
City of Clemons	X			X
City of Ferguson				X
City of Gilman		X		X
City of Haverhill	X	X		X
City of Laurel	X		X	X
City of Le Grand	X	X	X	X
City of Liscomb	X			X
City of Marshalltown	X	X	X	X
City of Melbourne		X		X
City of Rhodes	X			X
City of St. Anthony				X
City of State Center	X	X	X	X
East Marshall Community School District	X			X
GMG Community School District	X			X
Marshalltown Community School District	X	X		X
West Marshall Community School District	X			X

The following table lists the members of the Hazard Mitigation Planning Committee including the jurisdiction, organization, and title.

Table 1-2 Hazard Mitigation Planning Committee

Jurisdiction	Department/Organization	Title	Name
Marshall County	Emergency Management	Emergency Management Coordinator	Kimberly Elder
	Sheriff's Office	Sheriff	Steve Hoffman
Albion	City Hall	City Clerk	Jody Wallen
	City Hall	Mayor	John Henze

Jurisdiction	Department/Organization	Title	Name
	Fire Department	Fire Chief	Aaron Betts
	First Responders	First Responder Chief	Ryan McRill
	Utilities	City Maintenance	Doug Loffgren
	Water Department		Rhonda Guy
Clemons	City Hall	City Clerk	Barbara Evertson
	City Hall	Mayor	Chad Affeldt
	Fire Department	Fire Chief	John Witte
Ferguson	City Hall	City Clerk	Chuck Finders
	City Hall	Mayor	Dale Thompson
	Fire Department	Fire Chief	Dan Scovill
Gilman	City Hall	City Clerk	Karen Buchanan
	Fire Department	Fire Chief	Randy Mommer
	First Responders	First Responder Chief	Phil Summer
	Utilities/Water Department		Jeff Duncan
Haverhill	City Hall	City Clerk	Jenny Fogle
	City Hall	Mayor	Madaleine Welton
	Fire Department	Fire Chief	Dick Stalzer
Laurel	City Hall	City Clerk	Lynn Gummert
	City Hall	Mayor	Evan Folk
	Fire Department	Fire Chief	Rusty Aman
	First Responders	First Responder Chief	Vicky Daters
	Utilities/Water Department	Public Works	David Atcher
Le Grand	City Hall	City Clerk	Jodi Abrahams
	City Hall	Mayor	Jay Wyatt
	Fire Department	Fire Chief	Brad Mauseth
	First Responders	First Responder Chief	Missy Mauseth
	Water Department	Public Works Director	Doug Beadle
Liscomb	City Hall	City Clerk	Kristi Schiebel
	City Hall	Mayor	Dynette Mosher
	Fire Department	Fire Chief	Larry Olson
	First Responders	First Responder Chief	Jordan Hoy
Marshalltown	City Hall	City Clerk	Alicia Hunter
	City Hall	City Administrator	Jessica Kinser
	City Hall	Mayor	Joel Greer
	Fire Department	Fire Chief	David Rierson
	Fire Department	Assistant Fire Chief	Chris Cross
	Police Department	Police Chief	Michael Tupper
	Utilities	Director of Public Works	Justin Nickel
	Water Department	General Manager	Shelli Lovell
	Unity Point Health	UP Health Ambulance	Nick Heintz
	Marshalltown Medical and Surgical Center	UP Marshalltown	Dane Zuercher
Melbourne	City Hall	City Clerk	Mary Pothast
	City Hall	Mayor	John White
	Fire Department	Fire Chief	Bob Monroe

Jurisdiction	Department/Organization	Title	Name
	First Responders	First Responder Chief	Gary Fricke
	Police Department		Mike Ball
	Utilities/Water Department	Superintendent of Public Works	Gary Fricke
Rhodes	City Hall	City Clerk	Nancy Youker-Raney
	City Hall	Mayor	Cyril Thill
	Fire Department	Fire Chief	Mike Overman
	First Responders	First Responder Chief	Wendy Eldridge
St. Anthony	City Hall	City Clerk	Tracey Grossman
	City Hall	Mayor	Sam Bryant
State Center	City Hall	City Clerk	Lori Bearden
	City Hall	Mayor	Steve Sodders
	Fire Department/EMS	Fire/EMS Chief	Brad Pfantz
	Police Department	Police Chief	Jon Thomas
	Utilities	Electric Superintendent	Jeff Robinson
	Public Works	Director	Zack Faught
East Marshall CSD		Superintendent	Tony Ryan
GMG Schools		Superintendent	Ben Petty
Marshalltown CSD		Superintendent	Theron Schutte
West Marshall CSD		Superintendent	Jacy Large

1.4.2 The Planning Steps

Wood and Marshall County worked together to establish the framework and process for this planning effort using FEMA's Local Mitigation Planning Handbook (March 2013). The plan update was completed utilizing the 9-task approach within a broad four-phase process:

1. Organize resources,
2. Assess risks,
3. Develop the mitigation plan, and
4. Implement the plan and monitor progress.

Into this process, Wood integrated a detailed 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the process used for this plan meets the funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Community Rating System, and Flood Mitigation Assistance Program. Table 1 2 shows how the process followed fits into FEMA's original four-phase DMA process as well as the revised Nine Task Process outlined in the 2013 Local Mitigation Planning Handbook and the 10-step CRS process.

Table 1-3 Mitigation Planning Process Used to Develop the Marshall County Multi-jurisdictional Local Hazard Mitigation Plan

Phase	Community Rating System (CRS) Planning Steps (Activity 510)	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Phase I	Step 1. Organize	Task 1: Determine the Planning Area and Resources
		Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
	Step 2. Involve the public	Task 3: Create an Outreach Strategy y 44 CFR 201.6(b)(1)
	Step 3. Coordinate	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Phase II	Step 4. Assess the hazard	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
	Step 5. Assess the problem	
Phase III	Step 6. Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)
	Step 7. Review possible activities	
	Step 8. Draft an action plan	
Phase IV	Step 9. Adopt the plan	Task 8: Review and Adopt the Plan
	Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current
		Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Phase I Organize Resources**Step 1: Organize the Planning Team (Handbook Tasks 1 & 2)**

The planning process resulting in the preparation of this plan document officially began with an Initial Coordination Meeting held on February 22, 2021. Participants of the meeting included the Marshall County Emergency Management Coordinator and Wood Project Manager. The purpose of this meeting was to determine the jurisdictions and other stakeholders that would be invited to be participants of the HMPC (Step 1), discuss GIS needs, provide recommendations regarding the hazards to be included in the plan update, develop an initial public participation strategy, discuss the plan update format and the final plan document.

The 2016 HMPC list that formed the basis for the previous plan update, and interim annual implementation meetings includes representatives from each participating jurisdiction. This list was reviewed and updated to form the basis for the 2021 HMPC. Other regional, local, state, and federal stakeholder organizations were also invited. Stakeholders are listed in subsection Step 3: Coordinate with Other Departments and Agencies.

After the initial coordination meeting, a formal Kick-off meeting was held on March 11, 2021 followed by two additional planning meetings held on May 11, 2021 and July 27, 2021.

The HMPC communicated during the planning process with a combination of face-to-face meetings, webinars, phone interviews, and email correspondence. The planning effort coincided with the 2020-2021 Coronavirus (COVID-19) pandemic, thus some meetings were facilitated via a webinar; the first two meetings were all web-based, while the third meeting was an in-person meeting. The meeting schedule and topics are listed in Table 1-4. The meeting minutes for each of the meetings are included in Appendix B.

Table 1-4 Schedule of HMPC Meetings

Meeting	Topic	Date
Coordination call	General overview of planning process/requirements and schedule.	February 22, 2021
Kick-off Webinar	Introduction to DMA, the planning process, hazard identification and public input strategy. Distribution of plan update guide to jurisdictions. Revisit hazard identification. Determine process to monitor, evaluate, and update plan.	March 11, 2021
Planning Meeting #2 Webinar	Presentation of draft Risk Assessment including vulnerability and critical facility analysis; development of plan goals.	May 11, 2021
Planning Meeting #3 – in person meeting- Joint with Tama County	Results of public survey; mitigation action update, development, and prioritization; plan maintenance; next steps in HMGP plan review and final public comment period.	July 27, 2021

During the kickoff meeting, Wood presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. Plans for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. Wood also introduced hazard identification requirements and data needs. The HMPC discussed potential hazards as well as past events and impacts and refined the identified hazards to be relevant to Marshall County.

Participants were given a Plan Update Guide by Wood to facilitate the collection of information needed to support the plan, such as data on historic hazard events, values at risk, and current capabilities. Each participating jurisdiction completed and returned the worksheets in the Plan Update Guide to Wood. Wood integrated this information into the plan, supporting the update of Chapters 2 and 3.

Step 2: Plan for Public Involvement (Handbook Task 3)

44 CFR Requirement §201.6(b):

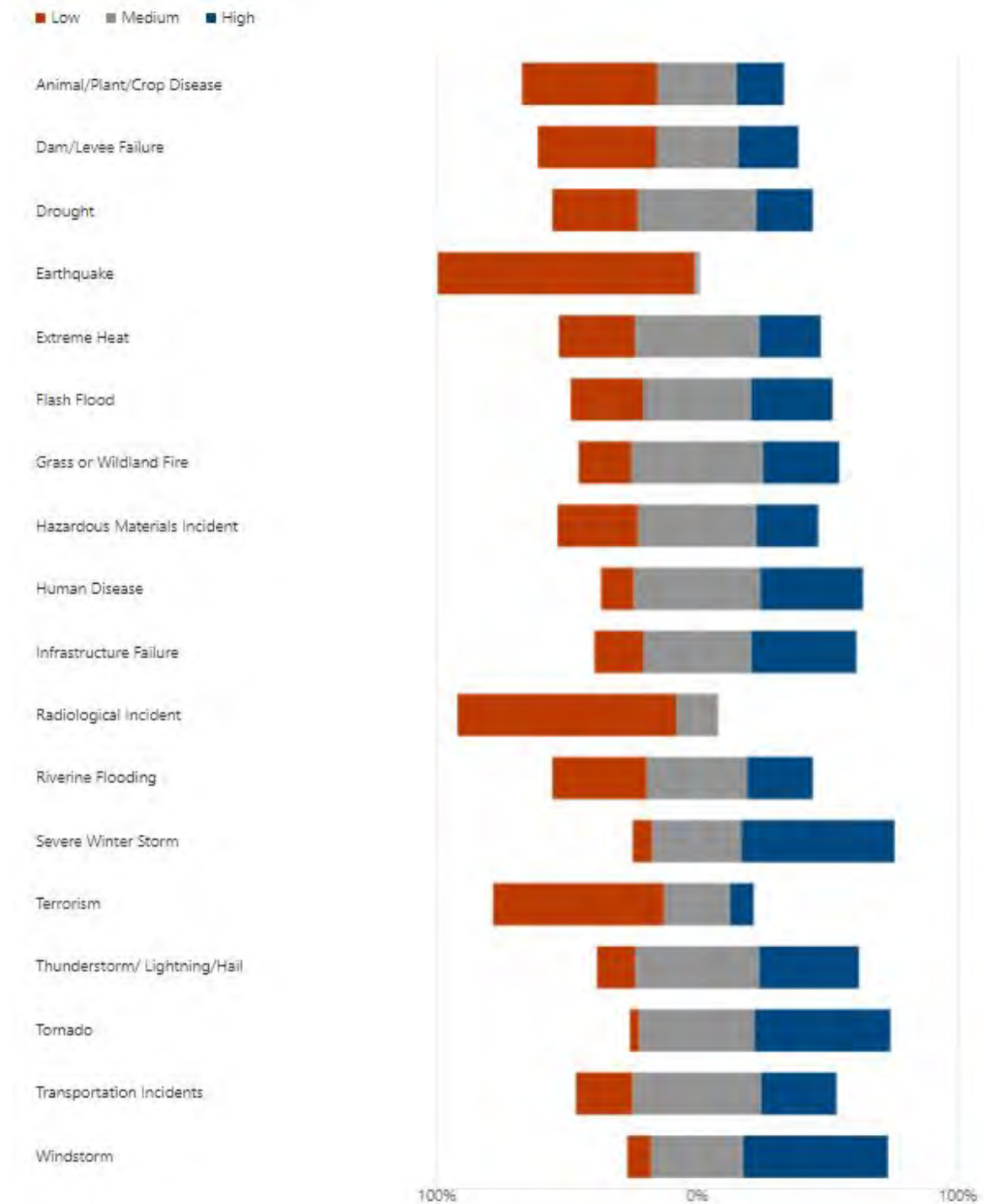
An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

At the kickoff meeting, the HMPC discussed options for soliciting public input on the mitigation plan. To provide an opportunity for the public to comment during the drafting stage, the committee determined that the most effective method would be dissemination of a survey.

A survey was developed specific to the Marshall County Mitigation Plan that provided a brief plan summary as well as a questionnaire to capture public and stakeholder input. The results of the online survey are provided in Appendix B. A press release and posted to the Marshall County's website as well as each participating jurisdiction's website and social media (Facebook, Twitter, and/or Instagram) pages announced the opening of the online survey. The survey was available to the public from April 19 to May 31, 2021.

In all, 56 surveys were completed. Responses reflect the public perception that the most significant hazards are severe winter storm, tornado, and windstorm, followed by thunderstorm/lightning/hail, human disease, and infrastructure failure.

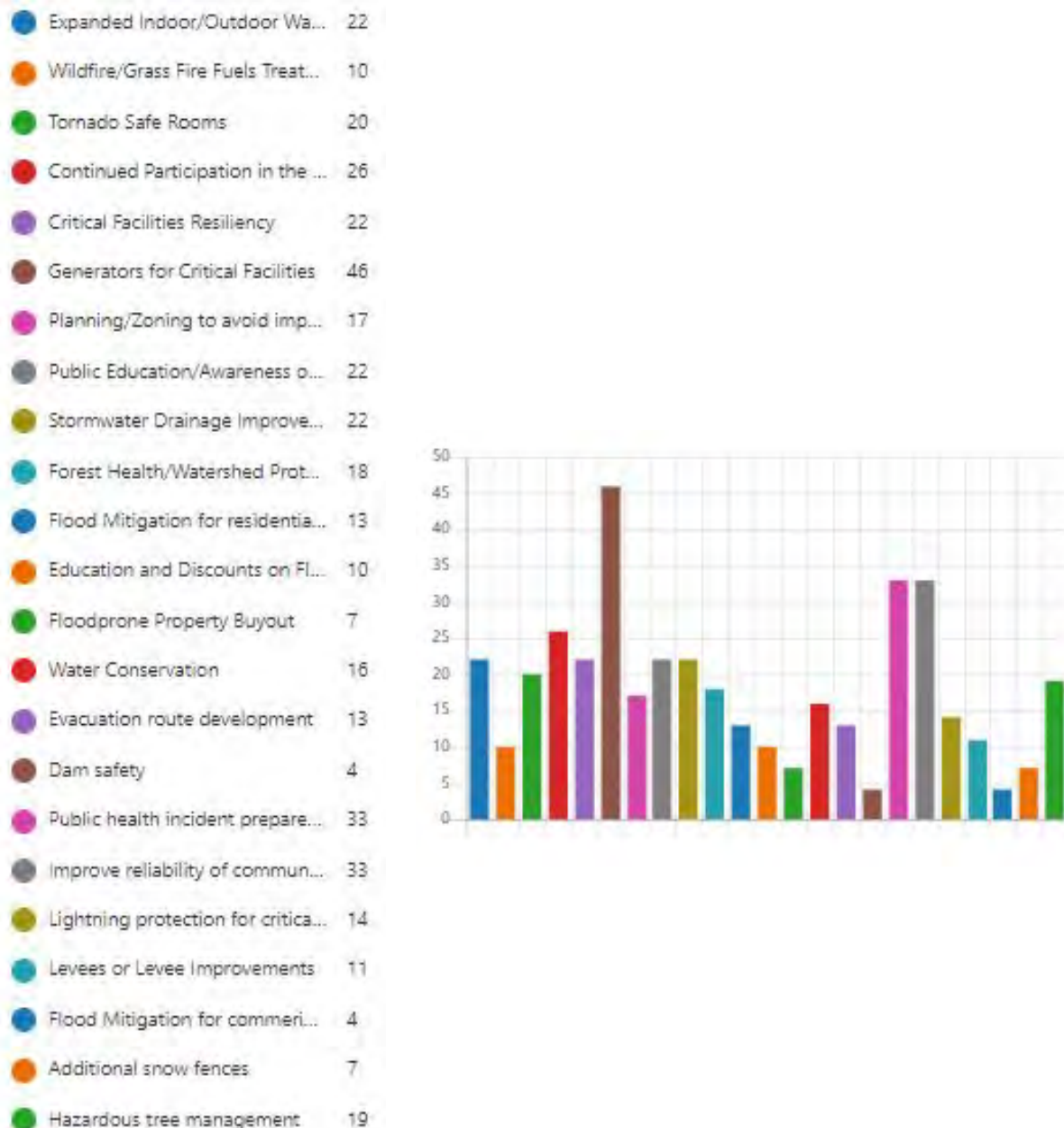
Figure 1-1 Survey Results – Hazard Level of Significance



Source: Microsoft Forms Online Survey developed by Wood

In the survey, the public was also asked to review 23 types of mitigation actions. The Marshall County HMPC also considered these types of projects in the Marshall County Multi-jurisdictional Hazard Mitigation Plan. The survey asked the public to place a check next to the mitigation project types that they felt could benefit their community. Figure 1-2 provides the compiled results of this question. The public opinion is that generators for critical facilities, improved reliability of communications systems, and public health incident preparedness would benefit their jurisdictions the most.

Figure 1-2 Survey Results – Types of Projects



Source: Microsoft Forms Online Survey developed by Wood

The public was also asked to comment on any other issues that the Marshall County HMPC should consider in developing a strategy to reduce future losses caused by natural hazard events. Some of the comments provided by the public are included below:

- "Strategies that address a critical mass event resulting in catastrophic loss of utilities, communications, transportation, etc. Planning for the worst & including in that plan the phases of recovery will help us move forward without the divisiveness we've seen in addressing SARS-CoV-2/COVID-19. This is how we make it through hard things."
- "Electric system improvements to prevent power loss for long periods."
- "Citizen education."
- "Melbourne either cannot or does not use the tornado sirens in event of a tornado/derecho. There's no warning unless I find it while on my phone. More warning would be beneficial out in rural areas. If the sirens do not work, we need to remedy that. Otherwise someone needs access to the fire station to set them off when needed"
- "Removal of derecho debris from wooded areas in and around cities to prevent West coast style wildfires."
- "Flooding and more disease preparedness."

The public was also given an opportunity to provide input on a draft of the complete plan prior to its submittal to the State and FEMA. The entire plan draft was made available on the County's website as a PDF document. An online comment form was posted to collect input.

Marshall County announced the availability of the entire final draft plan and the two-week final public comment period in the Marshalltown *Times Republican* and a variety of social media platforms including Facebook. A hardcopy was available for review at the Marshall County Emergency Management Department's offices by appointment. A copy of the announcement is provided in Appendix B. The final public comment period was from Nov 1- 15th, 2021. There were no public comments received. Comments received shared with the HMPC for consideration. Public comment resulted in (TBD).

The HMPC invited other targeted stakeholders and neighboring jurisdictions to comment on the draft plan via an e-mail letter, which is described in greater detail in Step 3: Coordinate with Other Departments and Agencies. There was no stakeholder comments received from the agencies which were invited to review the plan.

Step 3: Coordinate with Other Departments and Agencies and Incorporate Existing Information (Handbook Task 3)

44 CFR Requirement §201.6(b):

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

There are organizations whose goals and interests' interface with hazard mitigation in Marshall County. Marshall County invited neighboring counties, other local, regional, state, and federal departments and agencies to learn about the hazard mitigation planning initiative. The HMPC developed a list of additional stakeholders involved in hazard mitigation activities, or the authority to regulate development, to invite by e-mail to review and comment on the draft of the Marshall County Multi-jurisdictional Hazard Mitigation

Plan prior to submittal to the State and FEMA. Some of these agencies were consulted for data and information during the plan update. Those agencies were invited to comment on the plan draft and included emergency management officials of adjacent counties. Marshall and Tama County were working on updating their HMPs during 2021 on a similar time frame. The third mitigation planning meeting was held jointly in-person in Tama County at the Meskwaki Casino in July 2021, as an example of neighboring jurisdiction cross-coordination in mitigation planning. Academic institutions include the participating school districts noted previously.

Stakeholders

- State of Iowa – Department of Natural Resources/Dam Safety
- State of Iowa – Department of Natural Resources/Floodplain Management
- State of Iowa Homeland Security and Emergency Management Department
- State of Iowa Department of Public Safety – State Fire Marshal Division

Private and non-profit organizations

- Unity Point Healthcare
- Lennox Distribution
- Alliant Energy
- Koch Fertilizer
- Marshalltown Chamber of Commerce
- Heartland Coops

Adjacent Counties and Cities

- Jasper County Emergency Management
- Tama County Emergency Management
- Poweshiek County Emergency Management
- Grandy County Emergency Management
- Hardin County Emergency Management
- Story County Emergency Management

Appendix B includes a copy of the e-mail letter that was sent providing a link to the draft plan during the final public comment period.

Integration of Other Data, Reports, Studies, and Plans

In addition, input was solicited from many other agencies and organizations that provided information but were not able to attend planning meetings. As part of the coordination with other agencies, the HMPC collected and reviewed existing technical data, reports, and plans. These included:

- *Iowa Hazard Mitigation Plan* (June 2018);
- *Marshall County Multi-jurisdictional Hazard Mitigation Plan* (May 2016);
- Federal Emergency Management Agency (FEMA);
- FEMA Community Information System, NFIP, Repetitive Loss Property Data;
- Dam Inventory and Inspection Reports for Marshall County, Iowa Department of Natural Resources;
- National Drought Mitigation Center Drought Impact Reporter;
- U.S. Drought Monitor;
- Plan Update Guides completed by each jurisdiction;
- Environmental Protection Agency;
- Flood Insurance Administration;
- Hazards US (HAZUS);
- Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation;

- Iowa Department of Education, Bureau of Information and Analysis Services;
- Iowa Department of Public Safety;
- Iowa Department of Transportation, Office of Traffic and Safety;
- Iowa State University Department of Agronomy;
- Iowa Utilities Board;
- National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information;
- National Weather Service;
- Pipeline and Hazardous Materials Safety Administration;
- Marshall County Emergency Management;
- Marshall County National Flood Hazard Layer;
- U.S. Department of Agriculture, Risk Management Agency;
- U.S. Department of Agriculture, Forest Service
- U.S. Department of Transportation;
- United States Geological Survey

This information was used in the development of the hazard identification, vulnerability assessment, and capability assessment and in the formation of goals, objectives, and mitigation actions. These sources, as well as additional sources of information are documented throughout the plan and in Appendix A: References and Resources.

Integration of the 2016 Plan into Other Planning Mechanisms

The 2016 Hazard Mitigation Plan was incorporated into or cross referenced with other planning mechanisms between 2016-2021, such as the county's and some municipalities Emergency Operations Plans. Strategies and opportunities to do so in the future are outlined in Chapter 5.

Phase 2 Assess Risk (Handbook Task 5)

Step 4: Assess the Hazard: Identify and Profile Hazards

Wood assisted the HMPC in a process to identify the hazards that have impacted or could impact communities in Marshall County. At the kick-off meeting, Wood presented information gathered for all the hazards. The HMPC examined the history of disaster declarations in Marshall County. They discussed past hazard events, types of damage, and where additional information might be found. The committee identified 17 natural and human-caused hazards that have the potential to impact the planning area. Additional information on the hazard identification process and which hazards were identified for each jurisdiction is provided in Chapter 3.

During the kick-off meeting, the HMPC refined the list of hazards to make the analysis relevant to Marshall County, discussed past events and impacts and came to consensus on the preliminary probability, magnitude, warning time, and duration levels on a county-wide basis to contribute to the hazard ranking methodology utilized by the State. In addition, each jurisdiction completed either a Local or School District Plan Update Guide, including information on previous hazard events in their community. Utilizing the information from the Plan Update Guides as well as existing plans, studies, reports, and technical information as well as information available through internet research and GIS analysis, the profile for each hazard identified was updated. More information on the methodology and resources used to identify and profile the hazards can be found in Chapter 3.

Step 5: Assess the Problem: Identify Assets and Estimate Losses

Assets for each jurisdiction were identified from the Marshall County Assessor's Department which provided public datasets with parcel and building data. The Marshall County Emergency Management

Coordinator worked with the Marshall County GIS Department to populate an inventory of critical facilities in the planning area. Population data was obtained from the U.S. Census Bureau. Methodologies and results of the analyses are provided in Chapter 3.

Additional assets such as historic, cultural, and economic assets as well as specific vulnerable populations and structures were obtained from a variety of sources as described in Chapter 3.

The HMPC also analyzed development trends from data available from the U.S. Census Bureau as well as information obtained from each jurisdiction such as Comprehensive Plans. For each hazard, there is a discussion regarding future development and how it may impact vulnerability to that specific hazard.

After profiling the hazards that could affect Marshall County and identifying assets, the HMPC collected information to describe the likely impacts of future hazard events on the participating jurisdictions.

Existing mitigation capabilities were also considered in developing loss estimates. This assessment consisted of identifying the existing mitigation capabilities of participating jurisdictions. This involved collecting information about existing government programs, policies, regulations, ordinances, and plans that mitigate or could be used to mitigate risk from hazards. Participating jurisdictions collected information on their regulatory, personnel, fiscal, and technical capabilities, as well as previous and ongoing mitigation initiatives. This information is included in Chapter 2 Planning Area Profile and Capabilities.

Specific capabilities such as participation in the National Flood Insurance Program as well as designation as Fire Wise Communities or Storm Ready Communities and placement of storm sirens are incorporated in the vulnerability analysis discussions, where applicable.

Taking into consideration the vulnerability and capability assessments, a variety of methods was used to estimate losses for each profiled hazard. For geographic hazards such as river flooding, specific assets at risk and loss estimates were determined through GIS analysis. For other hazards such as weather-related hazards and hazardous materials, loss estimates were developed based on statistical analysis of historic events. For hazards such as dam failure of state-regulated dams, GIS data was not available to identify specific geographic boundaries at risk. Therefore, the risk assessment provides descriptions of the types of improvements located in approximated risk areas downstream of high and significant hazard dams. For some human-caused hazards and the tornado hazard, loss estimates were scenario-based. The methodologies for each loss estimate are described in detail in Chapter 3. Within each hazard section, the text provides details on how the hazard varies by jurisdiction, where applicable. In addition, at the conclusion of each hazard section, a summary table indicates the specific probability, magnitude, warning time, and duration rating of the hazard for each jurisdiction is provided to show how the hazard varies. Where applicable, introductory text preceding the table highlights noted variables.

Results of the preliminary risk assessment were presented at Meeting #2 to inform the planning process as the basis for updating the mitigation strategy.

Hazard Ranking Summary and EMAP Consequence Analysis

The conclusion of the Risk Assessment Chapter (Chapter 3) provides a tabular summary of the hazard ranking for each jurisdiction as well as a consequence analysis summary for each hazard based on Emergency Management Accreditation Program (EMAP) risk assessment standards.

Phase 3 Develop the Mitigation plan (FEMA Handbook Task 6)

Step 6: Set Goals

Wood facilitated a discussion session with the HMPC during Meeting #2 to review and update goals. Common categories of mitigation goals were presented as well as the 2018 State Hazard Mitigation Plan goals.

This planning effort is an update to an existing hazard mitigation plan. During this process the 4 goals from the *2016 Marshall County Multi-jurisdictional Hazard Mitigation Plan* were reviewed. The goals as proposed for the 2022 plan update can be found in Section 4.1 Goals.

Step 7: Review Possible Activities

The focus of Meeting #3 was to update the mitigation strategy. To consider a comprehensive range of alternatives, the HMPC reviewed all actions from the *2016 Marshall County Multi-jurisdictional Hazard Mitigation Plan* as well as the following: key issues for each of the top 10 hazards identified in the updated risk assessment, State priorities for Hazard Mitigation Assistance Grants, public opinion from Surveys, and FEMA's January 2013 publication *Mitigation Ideas*. Committee members discussed issues such as: availability of funds, prioritization of actions, and feasibility of implementation utilizing the STAPLEE methodology as a guide. As part of this discussion, consideration was given to the potential cost of each project in relation to the anticipated future cost savings.

Jurisdictions were encouraged to maintain a focused approach and continue forward only those actions that are aimed at implementing long-term solutions to prevent losses from hazards. To facilitate the update of previous actions, a spreadsheet was provided listing all previous actions submitted by each jurisdiction. The jurisdictions were provided instructions for completing the status of each of the 111 previous actions as well as the details to provide for continuing and newly developed actions. A modified form of the STAPLEE prioritization method was provided to assist jurisdictions in determining the prioritization that should be assigned to each new action. Each participating jurisdiction prioritized the new actions they submitted by indicating high, moderate, or low local priority. The completed worksheets with action details were returned to Wood. Chapter 4 provides additional details regarding the process undertaken to refine the mitigation strategy to make Marshall County and its jurisdictions more disaster resistant as well as the continuing and new actions submitted as the mitigation strategy for this plan update. The completed and deleted actions have been separated out in Chapter 4. The number of completed actions have been summarized as a measure of progress toward the overall goals of the plan.

Step 8: Draft an Action Plan

A complete draft of the plan was made available to the HMPC for review. Following that review a second draft was posted online and in hard copy for review and comment by the public, other agencies and interested stakeholders. Methods for inviting interested parties and the public to review and comment on the plan were discussed in Steps 2 and 3, and materials are provided in Appendix B. A final plan was then created for submittal to the Iowa Homeland Security and Emergency Management Department and FEMA for review and approval per the DMA requirements.

Phase 4 Implement the Plan and Monitor Progress

Step 9: Adopt the Plan (Handbook Task 8)

To secure buy-in and officially continue to implement the plan, the governing bodies of each participating jurisdiction re-adopted the plan in 2021. Scanned copies of resolutions of adoption are included in Appendix C of this plan.

Step 10: Implement, Evaluate, and Revise the Plan (Handbook Tasks 7 & 9)

The HMPC developed and agreed upon an overall strategy for plan implementation and for monitoring and maintaining the plan over time during Meeting #3. This updated strategy is described in Chapter 5,

Plan Maintenance Process. This process was followed and proved effective in the 2016-2021 timeframe. Between 2016 and 2021 the HMPC met during the recovery from the 2018 tornado and 2020 derecho. The only change in implementation process was a recommendation that during the third interim annual meeting that the HMPC outline necessary steps to begin the next plan update process so that the effort can be completed during year four and five, to allow time for completion, approval, and re-adoption within the five-year time frame so there is not a lapse in the plan, which could jeopardize grant funding.

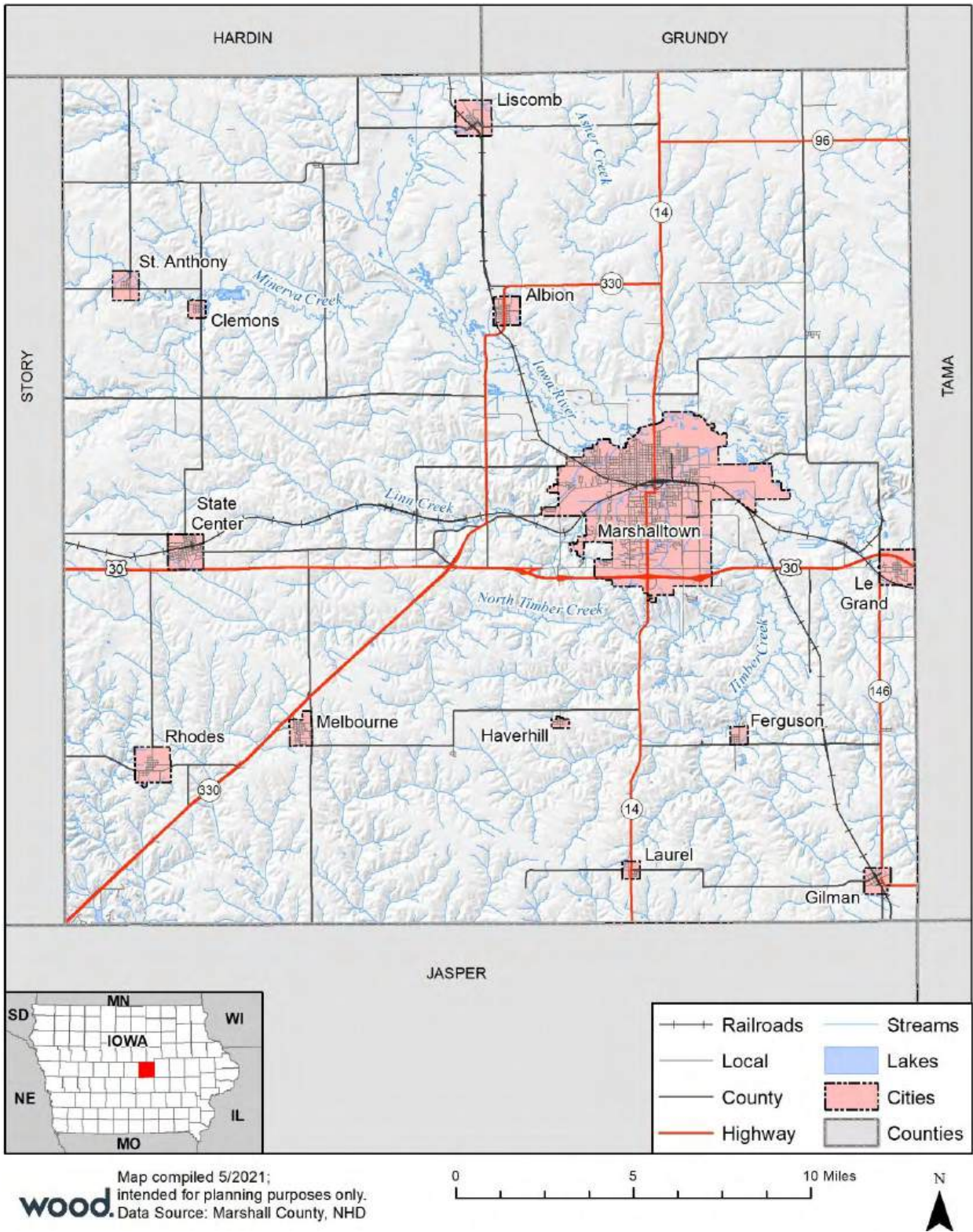
Chapter 2 Planning Area Profile and Capabilities

This chapter provides a general profile of Marshall County followed by individual sections for each participating jurisdiction. The sections for each jurisdiction provide an overview profile as well as details on existing capabilities, plans, and programs that enhance their ability to implement mitigation strategies.

2.1 Marshall County Planning Area Profile

Figure 3-1 provides a map of the Marshall County planning area. The planning area boundaries include the unincorporated areas of Marshall County as well as the city limits of the following incorporated cities: City of Albion, City of Clemons, City of Ferguson, City of Gilman, City of Haverhill, City of Laurel, City of Le Grand, City of Liscomb, City of Marshalltown, City of Melbourne, City of Rhodes, City of St. Anthony, and City of State Center. Several public-school districts also participated in the plan update process, including East Marshall Community School District, GMG Marshall Community School District, Marshalltown Community School District, and West Marshall Community School District. The boundaries of these districts are shown in Figure 2-5 below.

Figure 2-1 Marshall County Planning Area and Participating Jurisdictions



2.1.1 Geography and Topography

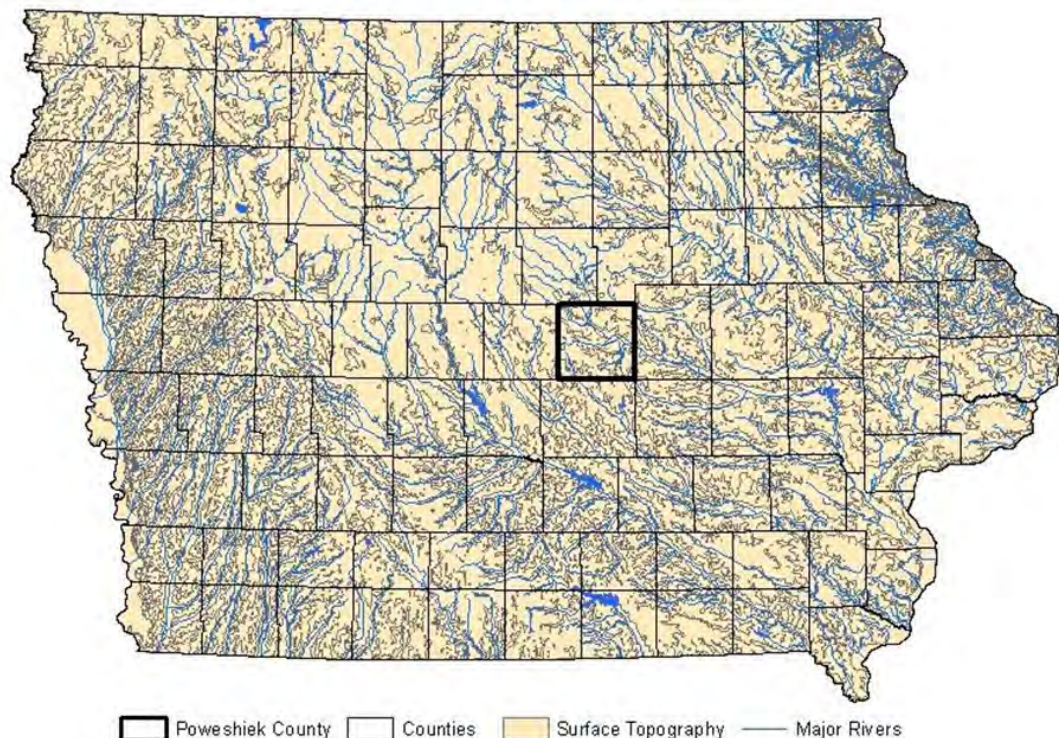
Marshall County is located in central Iowa and is in the fifth tier of counties north of the State of Missouri. The county comprises the Marshalltown Micropolitan Statistical Area according to the U.S. Census Bureau. The county seat and largest city is Marshalltown, home to more than half of the total county population.

Marshall County has an area of 366,732.8 acres, or about 573.02 square miles. Most of the soils in the county are nearly level to gently sloping or moderately sloping. The highest surface elevation in the county of 1150 feet is in State Center Township in the SE quarter of the SW quarter, Section 5. This is approximately 1.5 miles west of State Center on 230th St., between Binford and Canfield Avenues. The lowest elevation of 820 feet is at the Ferguson Quarry, East of Underwood Avenue and North of 290th Street near Ferguson. It is located in Green Castle Township in the NW quarter of the SE quarter, Section 5.

There are two major drainage systems for Marshall County, consisting of the Iowa-Cedar River and the Skunk River, according to the 1981 Marshall County Soil Survey. Nearly 80 percent of the county is drained by the Iowa River and its tributaries. A small area in northeastern Marshall County is drained by the Wolf Creek and the remaining area in the southwestern portion of the County is drained by the Skunk River. Though 12% of the soils in the county are poorly to very poorly drained, they are drained enough for crop production. In other areas with insufficient underground and surface drainage, crops may be ruined by the pooling of the still water.

About 182,000 acres (50%) of Marshall County land is prime farmland, which can produce high yields for crops such as corn and soybeans. Some of this land has been converted into industrial and urban uses.

Figure 2-2 Topography and Waterways of Iowa



Map by Alyson Lutz, 06/21/2011, Shapefile Source: Iowa DNR

All of Iowa is shown in the map in Figure 3-2 in order to provide a reference for comparison. Marshall County is one of the moderately hilly, central counties in Iowa.

Marshall has seven soil associations. The one soil that takes up the most (30%) of the county is, "Moderately sloping, to steep, well drained and moderately well drained, silty and loamy soils formed in loess and glacial till; on uplands" (Marshall County Soil Survey, 1981) This soil is called Killduff-Tama-Shelby.

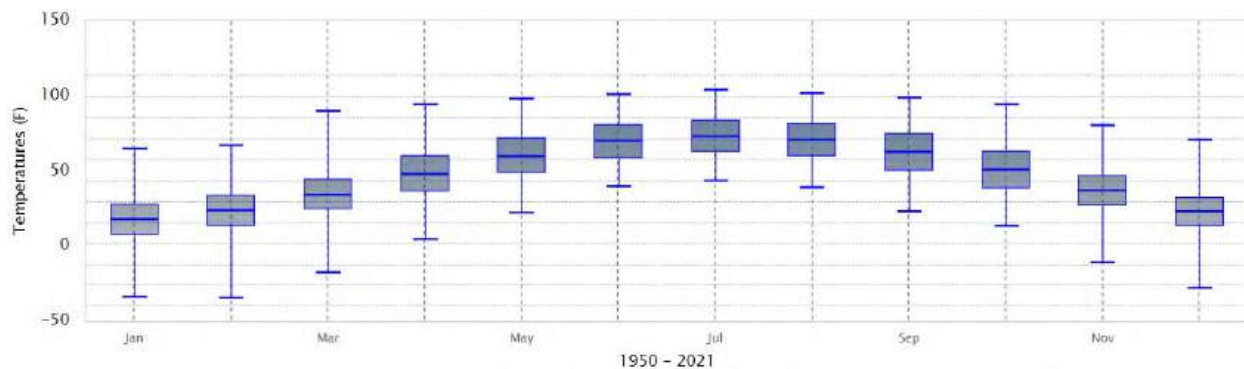
The main enterprises that come from the Killduff-Tama-Shelby soil association are cash grain crops and feeding swine and beef cattle. The suitability for this association are cultivated crops, hay, and pasture. Much of the land is suited for row crops such as corn and beans. The association has a good drainage pattern.

For more extensive information on the soils in Marshall County, refer to the Soil Survey of Marshall County, Iowa. This survey was completed in 1981 by the USDA and several Iowa government departments and institutions.

2.1.2 Climate

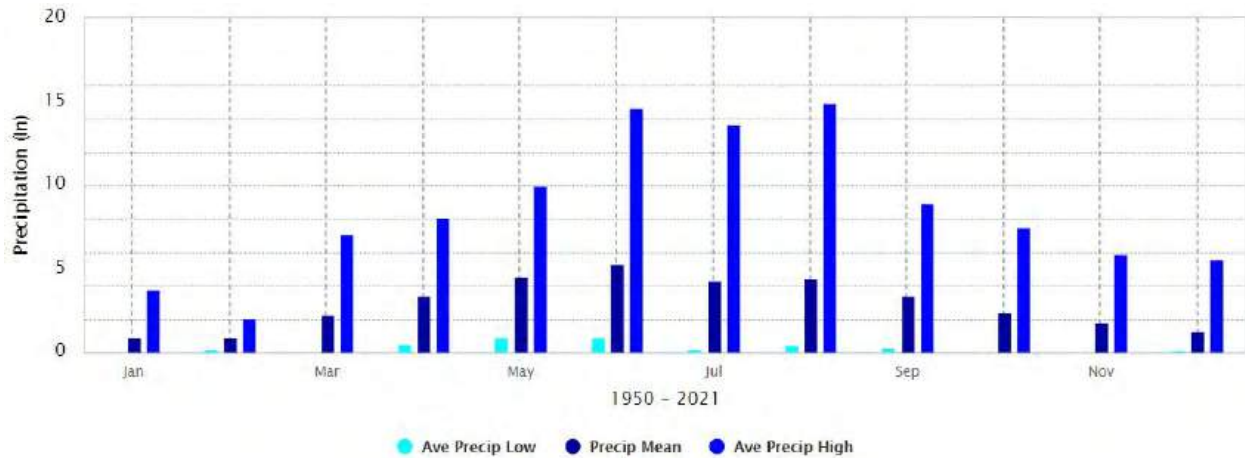
The climate of Marshall County in central Iowa has wide seasonal fluctuations in temperature and precipitation. The average annual temperature is 48 degrees Fahrenheit (F.) with an average high in July of 80 degrees F. and average low in January of 5 degrees F. The annual precipitation averages 35.11 inches. Of this, 21.4 inches fall during the growing season from April to September. An average of 35.1 inches of snowfall occurs each winter (Southwest Climate and Environmental Information Collaborative). Figure 2-3 and Figure 2-4 below illustrate the average annual temperature ranges and precipitation each month.

Figure 2-3 Marshalltown, Iowa Average Annual Temperatures, 1950-2021



Source: Southwest Climate and Environmental Information Collaborative

Figure 2-4 Marshalltown, Iowa Average Annual Precipitation (in), 1950-2021



Source: Southwest Climate and Environmental Information Collaborative

2.1.3 Population and Demographics

The 2020 population of Marshall County was 40,105. This is a decrease from the 2010 census population of 40,648. The 2019 Marshall County median household income was \$56,437 and median house value was \$106,000.

Table 2-1 provides the populations for each city and the county for 2000, 2010, and 2019 with the number and percent change from 2010 to 2019. These figures are based off the U.S. Census Bureau's American Community Survey 5-year estimates.

Table 2-1 Marshall County Population 2000-2020 by City

Jurisdiction	2000 Population	2010 Population	2019 Population Estimates	# Change 2000-2019	% Change 2000-2019
Marshall County	39,311	40,648	39,964	653	2%
City of Albion	592	505	570	-22	-4%
City of Clemons	148	148	140	-8	-6%
City of Ferguson	126	126	176	50	28%
City of Gilman	600	509	509	-91	-18%
City of Haverhill	170	173	179	9	5%
City of Laurel	266	239	219	-47	-21%
City of Le Grand	883	938	990	107	11%
City of Liscomb	272	301	274	2	1%
City of Marshalltown	26,009	27,552	27,053	1,044	4%
City of Melbourne	794	830	843	49	6%
City of Rhodes	294	305	260	-34	-13%
City of St. Anthony	109	102	36	-73	-203%
City of State Center	1,349	1,468	1,661	312	19%

Source: US Census Bureau ACS 5-year Data Estimates

According to the 2019 population estimates, 6.7 percent of the population is under age 5 and 17.7 percent of the population is over age 65 in Marshall County. There were 15,419 households with an

average household size of 2.52 people. Table 2-2 provides additional demographic and economic indicators for Marshall County. Table 2-3 provides the same information in comparison to the rest of the State of Iowa and the country as a whole. The Marshall County values are for all of Marshall County, including the incorporated cities. These details are also included for each incorporated city in Section 2.2.

Table 2-2 Marshall County Demographic and Social Characteristics, 2014-2019

Marshall County	2014	2019	% Change
Population	40,922	39,964	-2.34%
Median Age	38.6	38.7	0.3%
% of Population under 5	7%	6.7%	-4.3%
% of Population over 65	16.7%	17.7%	6.0%
Housing Occupancy Rate	91.5%	91.8%	0.3%
% of Owner Occupied Housing	73.3%	70.5%	-3.8%
% of Renter Occupied Housing	26.7%	29.5%	10.5%
% of Housing Units with no Vehicles Available	6.5%	7.6%	16.9%
Median Household Income	\$104,200	\$106,000	1.7%
Per Capita Income	\$24,549	\$27,196	10.8%
% of Individuals Below Poverty Level	12.6%	11.5%	-8.7%
# of Households	16,779	15,419	-8.1%
Average Household Size	2.59	2.52	-2.7%
% of Population Over 25 with High School Diploma	84.7%	83.8%	-1.1%
% of Population Over 25 with Bachelor's Degree or Higher	20.1%	18.8%	-6.5%
% with Disability	12.5%	11.6%	-7.2%
% Speak English less than "Very Well"	18.8%	12.6%	-33.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-3 Marshall County Demographic and Social Characteristics Compared to the State and Nation, 2014-2019

Demographic & Social Characteristics (as of 2019)	County	Iowa	U.S.
Median Age	38.7	38.5	37.9
% of Population under 5	6.7%	6%	6%
% of Population over 65	17.7%	17.5%	17%
Housing Occupancy Rate	91.8%	90.7%	87.8%
% of Owner Occupied Housing	70.5%	71%	64.1%
% of Renter Occupied Housing	29.5%	29.5%	35.9%

Demographic & Social Characteristics (as of 2019)	County	Iowa	U.S.
% of Housing Units with no Vehicles Available	7.6%	6.1%	8.7%
Median Household Income	\$56,437	\$61,691	\$60,293
Per Capita Income	\$27,196	\$33,109	\$32,621
% of Individuals Below Poverty Level	12.2%	7.3%	14.1%
Average Household Size	2.52	2.4	2.6
% of Population Over 25 with High School Diploma	83.8%	92.6%	87.7%
% of Population Over 25 with bachelor's degree or Higher	18.8%	29.3%	31.5%
% with Disability	11.6%	11.8%	12.6%
% Speak English less than "Very Well"	12.6%	3.6%	8.5%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-4 Demographics by Race and Sex

Marshall County	Population	%
Total Population	39,964	
Male	20,308	50.8%
Female	19,656	49.2%
White, not Hispanic	34,303	85.8%
Hispanic or Latino	8,771	21.9%
Black	1,067	2.7%
Asian	15,863	39.7%
American Indian and Alaska Native	337	0.8%
Native Hawaiian and Other Pacific Islander	15	0.0%
Some other race	2,706	6.8%
Two or more races	913	2.3%

Source: US Census Bureau ACS 5-year Data Estimates

2.1.4 Occupations

Table 2-3 provides occupation statistics for the incorporated cities and the county as a whole.

Table 2-5 Occupation Statistics for Marshall County

Jurisdiction	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Operations	Production, Transportation, and Material Moving Operations
Iowa	37.8%	15.8%	19.3%	9.7%	17.4%
Marshall County	26.9%	16.5%	18.6%	11.0%	26.9%

Jurisdiction	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Operations	Production, Transportation, and Material Moving Operations
City of Albion	13.8%	13.0%	29.0%	9.4%	34.8%
City of Clemons	33.8%	5.2%	26.0%	9.1%	26.0%
City of Ferguson	12.9%	12.9%	19.4%	22.6%	32.3%
City of Gilman	37.1%	15.5%	22.0%	9.8%	15.5%
City of Haverhill	19.8%	8.9%	43.6%	9.9%	17.8%
City of Laurel	30.6%	18.5%	17.6%	8.3%	25.0%
City of Le Grand	34.6%	15.5%	20.8%	7.0%	22.1%
City of Liscomb	22.5%	17.9%	24.5%	4.6%	30.5%
City of Marshalltown	24.7%	17.5%	16.7%	11.0%	30.2%
City of Melbourne	27.2%	20.0%	20.8%	15.5%	16.5%
City of Rhodes	18.9%	25.2%	15.0%	22.8%	18.1%
City of St. Anthony	4.5%	27.3%	9.1%	27.3%	31.8%
City of State Center	28.9%	10.0%	24.1%	8.1%	28.9%

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates

2.1.5 Agriculture

According to the 2017 Census of Agriculture for Marshall County there were 886 farms in the County covering 316,451 acres of land. Crop and livestock production are visible parts of the agricultural economy, but many related businesses contribute by producing, processing, and marketing farm and food products. These businesses generate income, employment, and economic activity throughout the region. In 2017, Marshall County farmers harvested 141,425 acres of corn, 122,556 acres of soybeans and produced 177,646 hogs and 31,933 head of cattle. Farms in Marshall County have an average size of 357 acres. Total market value of agricultural products sold countywide in 2017 was approximately \$266 million. The agriculture industry provides 653 jobs, representing 3.7 percent of the County's workforce.

2.2 City/County Capabilities and Jurisdictional Profiles

This section includes the capabilities of each jurisdiction that relate to their ability to implement mitigation opportunities. Table 2-4 and Table 2-5 provide a summary table of the following capabilities in the County and each incorporated city: city governance, policies & ordinances, programs, staffing & departments, non-governmental organizations (NGOs), and local funding availability. Following the summary table, individual profiles are provided for each participating jurisdiction with information including size, government structure, and previous and ongoing mitigation capabilities and programs. Opportunities to expand or improve capabilities are also discussed.

Table 2-6 City/County Jurisdictional Profiles and Mitigation Capabilities

	Marshall County	City of Albion	City of Clemons	City of Ferguson	City of Gilman	City of Haverhill	City of Laurel	City of Le Grand
City Governance – Departments, Boards, & Commissions								
City Hall (City Clerk)	Yes	Yes	No	No	No	Yes	Yes	No
Fire Department	Yes	No	No	No	No	Yes	Yes	No
Police Department	Yes	No	No	No	No	No	No	No
Public Works Department	N/A, Secondary Roads Department	Yes	No	No	No	N/A	Yes	No
Planning & Zoning Commission	Yes	No	No	No	No	N/A	No	No
Board of Adjustments	Yes	No	No	No	No	N/A	No	No
Library Board of Trustees	Yes	No	No	No	No	N/A	Yes	No
Electric Board of Trustees	No	No	No	No	No	N/A	No	No
Community Center Board	No	No	No	No	No	N/A	No	No
Policies/Ordinances								
Comprehensive/Land Use Plan	No	No	No	No	No	N/A	No	No
Capital Improvement Plan	Yes	No	No	No	No	No	No	No
Local/County Emergency Plan	Yes	No	No	No	No	Yes	Yes	No
Local Mitigation Plan	Yes	No	No	No	No	Yes	No	No
Flood Mitigation Assistance (FMA) Plan	Yes	No	No	No	No	Yes	No	No
Watershed Plan	Yes	No	No	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	Yes	No	No	No	No	Yes	No	No
Economic Development Plan	No	No	No	No	No	Yes	No	No
Transportation Plan	No	No	No	No	No	N/A	N/A	No
Firewise or Other Fire Mitigation Plan	Yes	No	No	No	No	Yes	No	No
Zoning Ordinance	Yes	No	No	No	No	Yes	No	No
Restricted Residential District	Yes	No	No	No	No	Yes	Yes	No
Subdivision Ordinance	No	No	No	No	No	N/A	No	No
Building Code	Yes	No	No	No	No	N/A	No	Yes
Building Permit Ordinance	Yes	No	No	No	No	Yes	Yes	Yes
Floodplain Ordinance	Yes	Yes	Yes	Yes	No	N/A	No	Yes

	Marshall County	City of Albion	City of Clemons	City of Ferguson	City of Gilman	City of Haverhill	City of Laurel	City of Le Grand
Tree Trimming Ordinance	No	No	No	No	No	Yes	Yes	No
Nuisance Ordinance	No	No	No	No	No	Yes	Yes	No
Stormwater Ordinance	No	No	No	No	No	N/A	No	No
Drainage Ordinance	Yes	No	No	No	No	N/A	Yes	No
Site Plan Review Requirements	Yes	No	No	No	No	N/A	Yes	Yes
Historic Preservation Ordinance	No	No	No	No	No	Yes	No	NA
Landscape Ordinance	No	No	No	No	No	N/A	No	No
Iowa Wetlands and Riparian Areas Conservation Plan	No	No	No	No	No	N/A	N/A	No
Debris Management Plan	Yes	No	No	No	No	Yes	No	No
Program								
Zoning/Land Use Restrictions	Yes	No	No	No	No	Yes	Yes	No
Codes Building Site/Design	Yes	No	No	No	No	Yes	No	No
National Flood Insurance Program (NFIP) Participant	Yes, Joined 9/19/1997	Yes, Joined 3/30/2009	Yes, Joined 4/1/1992	Yes, Joined 7/13/2010	Sanctioned	Not Participating	Sanctioned	Yes, Joined 9/1/1987
NFIP Community Rating System (CRS) Participant	No	No	No	No	No	No	No	No
Hazard Awareness Program	Yes	No	No	No	No	N/A	No	No
Planning/Zoning Boards	Yes	No	No	No	No	N/A	No	Yes
Tree Trimming Program	No	No	No	No	No	N/A	No	Yes
Engineering Studies for Streams (Local/County/Regional)	Yes	No	No	No	No	N/A	No	No
National Weather Service (NWS) Storm Ready	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No	N/A	No	No
ISO Fire Rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economic Development Program	No	No	No	No	No	N/A	No	No
Land Use Program	Yes	No	No	No	No	N/A	No	No
Public Education/Awareness	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Acquisition	Yes	No	No	No	No	N/A	No	No
Stream Maintenance Program	No	No	No	No	No	N/A	No	No
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No	N/A	No	N/A

	Marshall County	City of Albion	City of Clemons	City of Ferguson	City of Gilman	City of Haverhill	City of Laurel	City of Le Grand
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Staff/Department								
Building Code Official	Yes	No	No	No	No	N/A	No	Yes
Building Inspector	No	No	No	No	No	N/A	No	Yes
Mapping Specialist (GIS)	Yes	No	No	No	No	N/A	No	Yes
Engineer	Yes	No	No	No	No	N/A	No	No
Public Works Official	No	No	No	No	No	N/A	Yes	No
Emergency Response Team*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NFIP Floodplain Administrator	Yes	Yes	Yes	Yes	No	N/A	No	No
Development Planner	No	No	No	No	No	N/A	No	No
Emergency Management Coordinator**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hazardous Materials Expert	Yes	No	No	No	No	N/A	No	No
Local Emergency Planning Committee	Yes	No	No	No	No	N/A	No	No
County Emergency Management Commission	Yes	No	No	No	No	Yes	Yes	No
Sanitation Department	Yes	No	No	No	No	N/A	No	No
Transportation Department	No	No	No	No	No	N/A	No	No
Economic Development Department	No	No	No	No	No	N/A	No	No
Housing Department	No	No	No	No	No	N/A	No	No
Planning Consultant	Yes	No	No	No	No	N/A	No	No
Regional Planning Agencies	Yes	No	No	No	No	N/A	Yes	Yes
Historic Preservation	Yes	No	No	No	No	N/A	No	No
Non-Governmental Organizations (NGOs)								
American Red Cross	No	No	No	No	No	No	No	No
Salvation Army	Yes	No	No	No	No	No	No	No
Veterans Groups	Yes	No	No	No	No	No	No	No
Environmental Organization	Yes	No	No	No	No	No	No	No
Homeowner Associations	Yes	No	No	No	No	No	No	No
Neighborhood Associations	Yes	No	No	No	No	No	No	No
Chamber of Commerce	Yes	No	No	No	No	No	No	No
Community Organizations (Lions, Kiwanis, etc.)	Yes	No	No	No	No	No	Yes	No

	Marshall County	City of Albion	City of Clemons	City of Ferguson	City of Gilman	City of Haverhill	City of Laurel	City of Le Grand
Local Funding Availability								
Ability to fund projects through Capital Improvements funding	Yes	No	No	No	No	Yes	Yes	No
Ability to incur debt through general obligation bonds	Yes	No	No	No	No	Yes	Yes	No
Ability to incur debt through special tax bonds	Yes	No	No	No	No	Yes	Yes	No
Ability to incur debt through private activities	N/A	No	No	No	No	Yes	Yes	No
Ability to withhold spending in hazard prone areas	N/A	No	No	No	No	No	Yes	No
Fees for water, sewer, gas, or electric services	No	No	No	No	No	No	Yes	No
Apply for Community Development Block Grants	Yes	No	No	No	No	No	Yes	No
Authority to levy taxes for a special purpose	Yes	No	No	No	No	Yes	No	No
Impact fees for new development	N/A	No	No	No	No	Yes	N/A	No
Other local funding availability	Yes	No	No	No	No	Yes	No	Yes

* Cert and EMS

**All jurisdictions equally represented on the Marshall County Emergency Management Commission

Table 2-7 City/County Jurisdictional Profiles and Mitigation Capabilities Continued

	City of Liscomb	City of Marshalltown	City of Melbourne	City of Rhodes	City of St. Anthony	City of State Center
City Governance – Departments, Boards, & Commissions						
City Hall (City Clerk)	No	Yes	No	No	No	No
Fire Department	No	Yes	No	No	No	No
Police Department	No	Yes	No	No	No	No
Public Works Department	No	Yes	No	No	No	No
Planning & Zoning Commission	No	Yes	No	No	No	No

	City of Liscomb	City of Marshalltown	City of Melbourne	City of Rhodes	City of St. Anthony	City of State Center
Board of Adjustments	No	Yes	No	No	No	No
Library Board of Trustees	No	Yes	Yes	No	No	No
Electric Board of Trustees	No	No	No	No	No	No
Community Center Board	No	No	Yes	No	No	No
Policies/Ordinances						
Comprehensive/Land Use Plan	No	Yes	No	No	No	No
Capital Improvement Plan	No	Yes	No	No	No	Yes
Local/County Emergency Plan	No	Yes	No	No	No	No
Local Mitigation Plan	No	No	No	No	No	No
Flood Mitigation Assistance (FMA) Plan	No	No	No	No	No	No
Watershed Plan	No	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No	No	No	Yes
Economic Development Plan	No	Yes	No	No	No	No
Transportation Plan	No	Yes	No	No	No	No
Firewise or Other Fire Mitigation Plan	No	No	No	No	No	No
Zoning Ordinance	No	Yes	Yes	No	No	No
Restricted Residential District	No	Yes	No	No	No	No
Subdivision Ordinance	No	Yes	No	No	No	No
Building Code	No	Yes	No	No	No	No
Building Permit Ordinance	No	Yes	No	No	No	No
Floodplain Ordinance	No	Yes	No	Yes	Yes	No
Tree Trimming Ordinance	No	Yes	No	No	No	No
Nuisance Ordinance	No	Yes	No	No	No	Yes
Stormwater Ordinance	No	Yes	No	No	No	No
Drainage Ordinance	No	Yes	No	No	No	No
Site Plan Review Requirements	No	Yes	No	No	No	Yes
Historic Preservation Ordinance	No	No	No	No	No	Yes
Landscape Ordinance	No	Yes	No	No	No	No
Iowa Wetlands and Riparian Areas Conservation Plan	No	No	No	No	No	No
Debris Management Plan	No	Yes	No	No	No	No
Program						

	City of Liscomb	City of Marshalltown	City of Melbourne	City of Rhodes	City of St. Anthony	City of State Center
Zoning/Land Use Restrictions	No	Yes	Yes	No	No	Yes
Codes Building Site/Design	No	Yes	No	No	No	Yes
National Flood Insurance Program (NFIP) Participant	Sanctioned	Yes, Joined 4/17/1984	Sanctioned	Yes, Joined 10/13/2010	Yes, Joined 9/30/2013	Sanctioned
NFIP Community Rating System (CRS) Participant	No	No	No	No	No	No
Hazard Awareness Program	No	No	No	No	No	No
Planning/Zoning Boards	No	Yes	Yes	No	No	Yes
Tree Trimming Program	No	Yes	No	No	No	No
Engineering Studies for Streams (Local/County/Regional)	No	Yes	No	No	No	No
National Weather Service (NWS) Storm Ready	Yes	Yes	Yes	Yes	Yes	Yes
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No	No
ISO Fire Rating	Yes	Yes	Yes	Yes	Yes	Yes
Economic Development Program	No	Yes	No	No	No	Yes
Land Use Program	No	Yes	No	No	No	Yes
Public Education/Awareness	Yes	Yes	Yes	Yes	Yes	Yes
Property Acquisition	No	Yes	No	No	No	No
Stream Maintenance Program	No	Yes	No	No	No	No
Engineering Studies for Streams (Local/County/Regional)	No	Yes	No	No	No	No
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Yes	Yes
Staff/Department						
Building Code Official	No	Yes	No	No	No	No
Building Inspector	No	Yes	No	No	No	No
Mapping Specialist (GIS)	No	No	No	No	No	No
Engineer	No	Yes	No	No	No	No
Public Works Official	No	Yes	No	No	No	No
Emergency Response Team*	Yes	Yes	Yes	Yes	Yes	Yes
NFIP Floodplain Administrator	No	Yes	No	Yes	Yes	No
Development Planner	No	Yes	No	No	No	No
Emergency Management Coordinator**	Yes	Yes	Yes	Yes	Yes	Yes

	City of Liscomb	City of Marshalltown	City of Melbourne	City of Rhodes	City of St. Anthony	City of State Center
Hazardous Materials Expert	No	No	No	No	No	No
Local Emergency Planning Committee	No	Yes	No	No	No	No
County Emergency Management Commission	No	Yes	No	No	No	No
Sanitation Department	No	No	No	No	No	No
Transportation Department	No	Yes	No	No	No	No
Economic Development Department	No	Yes	No	No	No	No
Housing Department	No	Yes	No	No	No	No
Planning Consultant	No	No	No	No	No	Yes
Regional Planning Agencies	No	Yes	No	No	No	Yes
Historic Preservation	No	No	No	No	No	No
Non-Governmental Organizations (NGOs)						
American Red Cross	No	Yes	No	No	No	No
Salvation Army	No	Yes	No	No	No	No
Veterans Groups	No	Yes	Yes	No	No	Yes
Environmental Organization	No	Yes	No	No	No	No
Homeowner Associations	No	Yes	No	No	No	No
Neighborhood Associations	No	Yes	No	No	No	No
Chamber of Commerce	No	Yes	No	No	No	No
Community Organizations (Lions, Kiwanis, etc.)	No	Yes	Yes, Masons	No	No	Yes
Local Funding Availability						
Ability to fund projects through Capital Improvements funding	No	Yes	No	No	No	No
Ability to incur debt through general obligation bonds	No	Yes	No	No	No	Yes
Ability to incur debt through special tax bonds	No	Yes	No	No	No	No
Ability to incur debt through private activities	No	Yes	No	No	No	No
Ability to withhold spending in hazard prone areas	No	Unsure	No	No	No	No
Fees for water, sewer, gas, or electric services	No	Yes	No	No	No	Yes

	City of Liscomb	City of Marshalltown	City of Melbourne	City of Rhodes	City of St. Anthony	City of State Center
Apply for Community Development Block Grants	No	Yes	No	No	No	Yes
Authority to levy taxes for a special purpose	No	Yes	No	No	No	Yes
Impact fees for new development	No	No	No	No	No	Yes
Other local funding availability	No	Yes	Yes	No	No	Yes

* Cert and EMS

**All jurisdictions equally represented on the Marshall County Emergency Management Commission

2.2.1 Unincorporated Marshall County

The jurisdiction of Marshall County includes all unincorporated areas within the County boundaries. The Marshall County government structure includes a Board of Supervisors which has three positions; there is a chairman, vice chairman, and a member, all of whom serve the county at large. The county is not divided into specific districts based on location. Regular Board of Supervisors meetings are held every other Tuesday morning in the Marshall County Courthouse. The Marshall County government includes the following departments, offices, and commissions:

- 911 Communications Center (E911 Board)
- Assessor
- Attorney
- Auditor
- Board of Supervisors
- Community Services
- Communications Commission
- Conservation Board
- Courts
- Emergency Management (Marshall County Emergency Management Commission)
- Engineer
- Environmental Health
- Geographic Information Services
- Information Technology
- Planning & Zoning
- Public Health
- Recorder
- Sheriff
- Treasurer
- Veteran's Affairs

Mitigation Initiatives/Capabilities

Chapter 29C of the Code of Iowa creates the State Emergency Management Division and the local Emergency Management Commission in Iowa. The Marshall County Emergency Management Commission is made up of the mayors of all the jurisdictions in Marshall County, one member of the Marshall County Board of Supervisors (who serves as the chair) and the Sheriff. The Commission appoints an Emergency Management Coordinator to manage the agency and assist the commission.

Additional initiatives/capabilities are discussed below:

- The Alert Iowa System, which is a high-speed emergency notification system that sends warning messages to certain areas in the county or the entire county through telephone.
- CERT and all-hazards education offered to the public

2.2.2 City of Albion

The City of Albion is located in the north central portion of Marshall County. The town is in the crux of IA 330 as it curves north east/southwest. Iowa Highway 14 runs north/south east of town. Albion is 7 miles north of U.S. Highway 30. Albion is the oldest community in Marshall County, platted in 1852. It had a 2019 estimated population of 570 persons, a 4% decrease from the 2000 population. Table 2-8 through Table 2-11 below provide details on several demographic and social characteristics of Albion.

Table 2-8 City of Albion Demographic and Social Characteristics, 2014-2019

City of Albion	2014	2019	% Change
Population	430	570	32.56%
Median Age	48.2	45.8	-4.98%
% of Population under 5	3%	2%	-11.54%
% of Population over 65	21%	21%	0.00%
Housing Occupancy Rate	93.2%	97.2%	4.29%
% of Owner Occupied Housing	92.7%	84.8%	-8.52%
% of Renter Occupied Housing	7.3%	15.2%	108.22%
% of Housing Units with no Vehicles Available	1.60%	0.00%	-100.00%
Median Household Income	\$53,750	\$51,563	-4.07%
Per Capita Income	\$25,441	\$24,980	-1.81%
% of Individuals Below Poverty Level	5.1%	4.0%	-21.57%
# of Households	205	250	21.95%
Average Household Size	2.27	2.32	2.20%
% of Population Over 25 with High School Diploma	91.1%	79.4%	-12.84%
% of Population Over 25 with Bachelor's Degree or Higher	14.2%	8.6%	-39.44%
% with Disability	14.4%	18.1%	25.69%
% Speak English less than "Very Well"	1.2%	0.0%	-100.00%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-9 City of Albion Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Albion	County	Iowa
Median Age	45.8	38.7	38.5
% of Population under 5	2.3%	6.7%	6%
% of Population over 65	20.5%	17.7%	17.5%
Housing Occupancy Rate	97.1%	91.8%	90.7%
% of Owner Occupied Housing	84.8%	70.5%	71%
% of Renter Occupied Housing	15.2%	29.5%	29.5%
% of Housing Units with no Vehicles Available	0.0%	7.6%	6.1%
Median Household Income	\$51,563	\$ 56,437	\$61,691

Demographic & Social Characteristics (as of 2019)	Albion	County	Iowa
Per Capita Income	\$24,980	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	0.0%	12.2%	7.3%
Average Household Size	2.35	2.52	2.4
% of Population Over 25 with High School Diploma	79.4%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	8.6%	18.8%	29.3%
% with Disability	18.1%	11.6%	11.8%
% Speak English less than "Very Well"	0.0%	12.6%	3.6%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-10 City of Albion Demographics by Race and Sex

Albion	Population	%
Total Population	570	
Male	297	52.1%
Female	273	47.9%
White, not Hispanic	493	86.5%
Hispanic or Latino	570	100.0%
Black	0	0.0%
Asian	0	0.0%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	4	0.7%
Two or more races	73	12.8%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-11 City of Albion Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	250	
1-unit detached	232	92.8%
1-unit attached	0	0.0%
2 units	0	0.0%
3 or 4 units	0	0.0%
5 to 9 units	16	6.4%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	2	0.8%

Type of housing units	Total	%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Albion could finance a hazard mitigation project. This city in particular maintains its own water system so fees for this service are available to finance projects. The financing resources available to the City of Albion are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In summer 2011, Albion was granted money from State of Iowa CDBG for a well project.
- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.3 City of Clemons

The City of Clemons is located in the northwest portion of Marshall County. County Hwy S52 runs along its east side while U.S. Highway 65 is about 10 miles west of town. It had a 2019 estimated population of 140 persons, a 6% decrease from the 2000 population. Table 2-12 through Table 2-15 below provide details on several demographic and social characteristics of Clemons.

Table 2-12 City of Clemons Demographic and Social Characteristics, 2014-2019

City of Clemons	2014	2019	% Change
Population	125	140	12.00%
Median Age	39.9	47.7	19.5%
% of Population under 5	2%	4%	79.2%
% of Population over 65	19%	24%	26.6%
Housing Occupancy Rate	74%	84.7%	15.2%
% of Owner Occupied Housing	86%	93.4%	8.6%
% of Renter Occupied Housing	14%	6.6%	-52.9%
% of Housing Units with no Vehicles Available	16%	0.00%	-100.0%
Median Household Income	\$55,833	\$62,625	12.2%
Per Capita Income	\$22,746	\$28,168	23.8%
% of Individuals Below Poverty Level	3.2%	5.0%	56.3%

City of Clemons	2014	2019	% Change
# of Households	50	61	22.0%
Average Household Size	2.5	2.3	-8.4%
% of Population Over 25 with High School Diploma	92.5%	89.8%	-2.9%
% of Population Over 25 with Bachelor's Degree or Higher	3.8%	14.8%	289.5%
% with Disability	4.0%	17.1%	327.5%
% Speak English less than "Very Well"	2.5%	10.4%	316.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-13 City of Clemons Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Clemons	County	Iowa
Median Age	47.7	38.7	38.5
% of Population under 5	4%	6.7%	6%
% of Population over 65	24%	17.7%	17.5%
Housing Occupancy Rate	84.7%	91.8%	90.7%
% of Owner Occupied Housing	93.4%	70.5%	71%
% of Renter Occupied Housing	6.6%	29.5%	29.5%
% of Housing Units with no Vehicles Available	0.0%	7.6%	6.1%
Median Household Income	\$62,625	\$ 56,437	\$61,691
Per Capita Income	\$28,168	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	5.0%	12.2%	7.3%
Average Household Size	2.3	2.35	2.4
% of Population Over 25 with High School Diploma	89.8%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	14.8%	18.8%	29.3%
% with Disability	17.1%	11.6%	11.8%
% Speak English less than "Very Well"	10.4%	12.6%	3.6%

Table 2-14 City of Clemons Demographics by Race and Sex

Clemons	Population	%
Total Population	140	
Male	72	51.4%

Clemons	Population	%
Female	68	48.6%
White, not Hispanic	130	92.9%
Hispanic or Latino	4	2.9%
Black	0	0.0%
Asian	10	7.1%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-15 City of Clemons Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	72	
1-unit detached	66	91.7%
1-unit attached	2	2.8%
2 units	0	0.0%
3 or 4 units	0	0.0%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	4	5.6%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Clemons could finance a hazard mitigation project. This city does not maintain any of its own utilities so fees for these services are not available to finance projects. Resources available to the City of Clemons are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Clemons has not received any money in the past several years for hazard mitigation projects.

- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.4 City of Ferguson

Ferguson is located in southeast portion of the county on County Hwy E63. Iowa 14 is less than 3 miles to the west and Iowa 146 just 4 miles to the east. Ferguson, Iowa was incorporated on December 4, 1906. The highest ancestry percentage in the city is German with 29.4% followed by Norwegian at 10.3%. Ferguson had a 2019 estimated population of 178, which is a 28% increase from the population at the 2000 census. Table 2-16 through Table 2-19 below provide details on several demographic and social characteristics of Ferguson.

Table 2-16 City of Ferguson Demographic and Social Characteristics, 2014-2019

City of Ferguson	2014	2019	% Change
Population	108	176	62.96%
Median Age	51.5	54.0	4.9%
% of Population under 5	4%	7%	83.8%
% of Population over 65	27%	24%	-9.3%
Housing Occupancy Rate	96.4%	95.6%	-0.8%
% of Owner Occupied Housing	89%	61%	-31.8%
% of Renter Occupied Housing	11%	40%	249.6%
% of Housing Units with no Vehicles Available	4%	2%	-39.5%
Median Household Income	\$45,536	\$40,500	-11.1%
Per Capita Income	\$25,556	\$20,994	-17.9%
% of Individuals Below Poverty Level	15.4%	25.6%	66.2%
# of Households	53	86	62.3%
Average Household Size	2.0	2.1	0.5%
% of Population Over 25 with High School Diploma	90.0%	79.1%	-12.1%
% of Population Over 25 with Bachelor's Degree or Higher	3.3%	2.0%	-39.4%
% with Disability	23.1%	18.2%	-21.2%
% Speak English less than "Very Well"	0.0%	0.0%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-17 City of Ferguson Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Ferguson	County	Iowa
Median Age	54.0	38.7	38.5
% of Population under 5	6.8%	6.7%	6%
% of Population over 65	24.4%	17.7%	17.5%

Demographic & Social Characteristics (as of 2019)	Ferguson	County	Iowa
Housing Occupancy Rate	95.6%	91.8%	90.7%
% of Owner Occupied Housing	60.5%	70.5%	71%
% of Renter Occupied Housing	39.5%	29.5%	29.5%
% of Housing Units with no Vehicles Available	2.3%	7.6%	6.1%
Median Household Income	\$40,500	\$56,437	\$61,691
Per Capita Income	\$20,994	\$27,196	\$33,109
% of Individuals Below Poverty Level	25.6%	12.2%	7.3%
Average Household Size	2.17	2.30	2.4
% of Population Over 25 with High School Diploma	79.1%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	2.0%	18.8%	29.3%
% with Disability	18.6%	11.6%	11.8%
% Speak English less than "Very Well"	0%	12.6%	3.6%

Table 2-18 City of Ferguson Demographics by Race and Sex

Ferguson	Population	%
Total Population	176	
Male	76	43.2%
Female	100	56.8%
White, not Hispanic	174	98.9%
Hispanic or Latino	5	2.8%
Black	0	0.0%
Asian	0	0.0%
American Indian and Alaska Native	14	8.0%
Native Hawaiian and Other Pacific Islander	2	1.1%
Some other race	0	0.0%
Two or more races	14	8.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-19 City of Ferguson Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	90	
1-unit detached	81	90.0%
1-unit attached	0	0.0%

Type of housing units	Total	%
2 units	0	0.0%
3 or 4 units	6	6.7%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	3	3.3%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Ferguson could finance a hazard mitigation project. This city in particular provides its own water utility so it has those fees to use for projects. The other financing resources available to the City of Ferguson are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In 2008, Ferguson was granted Federal FEMA money for flood recovery, specifically lagoon treatment.
- Opportunity for improvement: Upgrading the city's emergency siren.

2.2.5 City of Gilman

The City of Gilman is located in the very southeast corner of Marshall County. Iowa 146 runs through town from the north and exiting to the east. Gilman, Iowa was founded in 1876. In its early years the town had a brick and tile factory, an opera house, a railroad depot and a bank, according to city representatives. The City of Gilman had a 2019 estimated population of 509, which is a decrease of 18% since the 2000 census. Table 2-20 through Table 2-23 below provide details on several demographic and social characteristics of Gilman.

Table 2-20 City of Gilman Demographic and Social Characteristics, 2014-2019

City of Gilman	2014	2019	% Change
Population	692	509	-26.45%
Median Age	38.7	36.4	-5.9%
% of Population under 5	2%	4%	129.4%
% of Population over 65	14%	12%	-12.4%
Housing Occupancy Rate	85.8%	90.4%	5.4%

City of Gilman	2014	2019	% Change
% of Owner Occupied Housing	77.9%	71.0%	-8.9%
% of Renter Occupied Housing	22.1%	29.0%	31.2%
% of Housing Units with no Vehicles Available	5.60%	3.40%	-39.3%
Median Household Income	\$54,375	\$55,625	2.3%
Per Capita Income	\$25,792	\$25,738	-0.2%
% of Individuals Below Poverty Level	16.6%	10.5%	-36.7%
# of Households	285	207	-27.4%
Average Household Size	2.4	2.7	14.2%
% of Population Over 25 with High School Diploma	88.2%	96.3%	9.2%
% of Population Over 25 with Bachelor's Degree or Higher	8.6%	15.8%	83.7%
% with Disability	15.3%	9.6%	-37.3%
% Speak English less than "Very Well"	0.3%	0.0%	-100.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-21 City of Gilman Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Gilman	County	Iowa
Median Age	36.4	38.7	38.5
% of Population under 5	4%	6.7%	6%
% of Population over 65	12%	17.7%	17.5%
Housing Occupancy Rate	0.9	91.8%	90.7%
% of Owner Occupied Housing	71%	70.5%	71%
% of Renter Occupied Housing	29%	29.5%	29.5%
% of Housing Units with no Vehicles Available	3%	7.6%	6.1%
Median Household Income	\$55,625.00	\$ 56,437	\$61,691
Per Capita Income	\$25,738.00	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	11%	12.2%	7.3%
Average Household Size	207.0	2.30	2.4
% of Population Over 25 with High School Diploma	274%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	96%	18.8%	29.3%

Demographic & Social Characteristics (as of 2019)	Gilman	County	Iowa
% with Disability	16%	11.6%	11.8%
% Speak English less than "Very Well"	10%	12.6%	3.6%

Table 2-22 City of Gilman Demographics by Race and Sex

Gilman	Population	%
Total Population	509	
Male	255	50.1%
Female	254	49.9%
White, not Hispanic	507	99.6%
Hispanic or Latino	22	4.3%
Black	0	0.0%
Asian	2	0.4%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-23 City of Gilman Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	229	
1-unit detached	178	77.7%
1-unit attached	4	1.7%
2 units	0	0.0%
3 or 4 units	35	15.3%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	5	2.2%
Mobile home	7	3.1%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Gilman could finance a hazard mitigation project. This city in particular does not maintain its own utilities besides a water system so there are not many fees from these services available to finance projects. The resources available to the City of Gilman are below:

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In 2007, Gilman was granted money from the Federal Highway Administration's Surface Transportation Program to repave their Main Street.
- Opportunity for improvement: Promoting public information on hazards and mitigation

2.2.6 City of Haverhill

The City of Haverhill is located in the south-central portion of the county. County Highway E63 runs east-west just north of town and Iowa 14 is just 1 mile east of town. A big part of Haverhill's history is its people; many Emslanders settled in the area and enriched the culture by doing so. According to www.emslanders.com, Emslanders are 19th century German emigrants who came to America from the part of Hannover known today as Emsland, Niedersachsen, and settled in the mid-western United States.

Haverhill had a 2019 estimated population of 179 residents, which is a 5% increase over the 2000 population. Table 2-24 through Table 2-27 below provide details on several demographic and social characteristics of Haverhill.

Table 2-24 City of Haverhill Demographic and Social Characteristics, 2014-2019

City of Haverhill	2014	2019	% Change
Population	175	179	2.29%
Median Age	38.6	36.8	-4.7%
% of Population under 5	5%	12%	154.3%
% of Population over 65	16%	8%	-47.5%
Housing Occupancy Rate	76.8%	67%	-12.8%
% of Owner Occupied Housing	98.4%	100.0%	1.6%
% of Renter Occupied Housing	1.6%	0.0%	-100.0%
% of Housing Units with no Vehicles Available	0.00%	0.00%	0
Median Household Income	\$70,938	\$77,813	9.7%
Per Capita Income	\$29,653	\$28,907	-2.5%
% of Individuals Below Poverty Level	1.2%	0.6%	-50.0%
# of Households	63	67	6.3%
Average Household Size	2.81	2.67	-5.0%
% of Population Over 25 with High School Diploma	91.3%	97.5%	6.8%

City of Haverhill	2014	2019	% Change
% of Population Over 25 with Bachelor's Degree or Higher	17.3%	19.3%	11.6%
% with Disability	12.0%	1.7%	-85.8%
% Speak English less than "Very Well"	0.0%	0.0%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-25 City of Haverhill Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Haverhill	County	Iowa
Median Age	36.8	38.7	38.5
% of Population under 5	0.1	6.7%	6%
% of Population over 65	0.1	17.7%	17.5%
Housing Occupancy Rate	7%	91.8%	90.7%
% of Owner Occupied Housing	100%	70.5%	71%
% of Renter Occupied Housing	0%	29.5%	29.5%
% of Housing Units with no Vehicles Available	0%	7.6%	6.1%
Median Household Income	\$77,813.00	\$ 56,437	\$61,691
Per Capita Income	\$28,907.00	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	1%	12.2%	7.3%
Average Household Size	2.7	2.30	2.4
% of Population Over 25 with High School Diploma	98%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	19%	18.8%	29.3%
% with Disability	2%	11.6%	11.8%
% Speak English less than "Very Well"	0%	12.6%	3.6%

Table 2-26 City of Haverhill Demographics by Race and Sex

Haverhill	Population	%
Total Population	179	
Male	97	54.2%
Female	82	45.8%
White, not Hispanic	178	99.4%
Hispanic or Latino	9	5.0%
Black	0	0.0%

Haverhill	Population	%
Asian	0	0.0%
American Indian and Alaska Native	1	0.6%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-27 City of Haverhill Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	73	
1-unit detached	73	100.0%
1-unit attached	0	0.0%
2 units	0	0.0%
3 or 4 units	0	0.0%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	0	0.0%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Haverhill could finance a hazard mitigation project. This city in particular does not maintain its own utilities so fees for these services are not available to finance projects. The financing resources available to the City of Haverhill are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In the past several years, Haverhill has not been granted money for any hazard mitigation projects.
- Since the last plan update, the City of Haverhill has also utilized information from the HMP in the development of an Emergency Operations Plan.
- Opportunity for improvement: Creation of a designated public tornado shelter/saferoom.

2.2.7 City of Laurel

Laurel is located at the intersection of County Hwy E65 and IA 14. Laurel is just 8 miles south of U.S. Highway 30. With regards to ancestry, 32% of Laurel residents report German heritage, and 12% report Irish. The City of Laurel's estimated 2019 population was 219, a 21% decrease since the 2000 census. Table 2-28 through Table 2-31 below provide details on several demographic and social characteristics of Laurel.

Table 2-28 City of Laurel Demographic and Social Characteristics, 2014-2019

City of Laurel	2014	2019	% Change
Population	361	219	-39.34%
Median Age	33.5	41.9	25.1%
% of Population under 5	6.1	5%	-99.2%
% of Population over 65	19.4	18%	-99.1%
Housing Occupancy Rate	90.5%	83.7%	-7.5%
% of Owner Occupied Housing	71.0%	79.6%	12.1%
% of Renter Occupied Housing	29.0%	20.4%	-29.7%
% of Housing Units with no Vehicles Available	10.50%	1.90%	-81.9%
Median Household Income	\$41,111	\$49,688	20.9%
Per Capita Income	\$17,755	\$25,817	45.4%
% of Individuals Below Poverty Level	11.7%	7.0%	-40.2%
# of Households	124	103	-16.9%
Average Household Size	2.81	2.2	-22.8%
% of Population Over 25 with High School Diploma	92.1%	88.6%	-3.8%
% of Population Over 25 with Bachelor's Degree or Higher	12.3%	16.5%	34.1%
% with Disability	6.3%	13.7%	117.5%
% Speak English less than "Very Well"	0.0%	0.0%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-29 City of Laurel Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Laurel	County	Iowa
Median Age	41.9	38.7	38.5
% of Population under 5	5%	6.7%	6%
% of Population over 65	18%	17.7%	17.5%
Housing Occupancy Rate	83.7%	91.8%	90.7%

Demographic & Social Characteristics (as of 2019)	Laurel	County	Iowa
% of Owner Occupied Housing	80%	70.5%	71%
% of Renter Occupied Housing	20%	29.5%	29.5%
% of Housing Units with no Vehicles Available	2%	7.6%	6.1%
Median Household Income	\$49,688	\$ 56,437	\$61,691
Per Capita Income	\$25,817	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	7.0%	12.2%	7.3%
Average Household Size	2.2	2.30	2.4
% of Population Over 25 with High School Diploma	88.6%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	16.5%	18.8%	29.3%
% with Disability	13.7%	11.6%	11.8%
% Speak English less than "Very Well"	0.0%	12.6%	3.6%

Table 2-30 City of Laurel Demographics by Race and Sex

Laurel	Population	%
Total Population	219	
Male	120	54.8%
Female	99	45.2%
White, not Hispanic	212	96.8%
Hispanic or Latino	0	0.0%
Black	1	0.5%
Asian	0	0.0%
American Indian and Alaska Native	5	2.3%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	6	2.7%
Two or more races	5	2.3%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-31 City of Laurel Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	123	
1-unit detached	110	89.4%
1-unit attached	0	0.0%
2 units	7	5.7%

Type of housing units	Total	%
3 or 4 units	5	4.1%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	1	0.8%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Laurel could finance a hazard mitigation project. This city in particular does not maintain its own utilities so fees for these services are not available to finance projects. The financing resources available to the City of Laurel are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In 2007, the city received Federal FEMA as well as State of Iowa Public Assistance money for mitigation projects such as cleanup after winter and spring storms.
- Opportunity for improvement: Purchase and install an emergency warning siren.

2.2.8 City of Le Grand

Le Grand is located directly south of Highway 30 in the far east central portion of the county. It is situated very close to the Marshall/Tama County border. Le Grand was laid out in 1852 and incorporated as a city in 1891. Le Grand had a 2019 estimated population of 990, which is an 11% increase over the 2000 census. Table 2-32 through Table 2-35 below provide details on several demographic and social characteristics of Le Grand.

Table 2-32 City of Le Grand Demographic and Social Characteristics, 2014-2019

City of Le Grand	2014	2019	% Change
Population	954	990	3.77%
Median Age	36.2	40.6	12.2%
% of Population under 5	7%	5%	-31.8%
% of Population over 65	15%	18%	23.0%
Housing Occupancy Rate	95.5%	91.0%	-4.7%
% of Owner Occupied Housing	78.2%	76.4%	-2.3%

City of Le Grand	2014	2019	% Change
% of Renter Occupied Housing	21.8%	23.6%	8.3%
% of Housing Units with no Vehicles Available	2.60%	1.50%	-42.3%
Median Household Income	\$53,929	\$56,000	3.8%
Per Capita Income	\$24,949	\$71,094	185.0%
% of Individuals Below Poverty Level	5.2%	11.3%	117.3%
# of Households	386	394	2.1%
Average Household Size	2.54	2.7	7.9%
% of Population Over 25 with High School Diploma	95.2%	93.9%	-1.4%
% of Population Over 25 with Bachelor's Degree or Higher	15.7%	13.1%	-16.6%
% with Disability	12.8%	8.8%	-31.3%
% Speak English less than "Very Well"	0.8%	3.8%	375.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-33 City of Le Grand Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Le Grand	County	Iowa
Median Age	40.6	38.7	38.5
% of Population under 5	5%	6.7%	6%
% of Population over 65	18%	17.7%	17.5%
Housing Occupancy Rate	91%	91.8%	90.7%
% of Owner Occupied Housing	76%	70.5%	71%
% of Renter Occupied Housing	24%	29.5%	29.5%
% of Housing Units with no Vehicles Available	1.5%	7.6%	6.1%
Median Household Income	\$56,000	\$ 56,437	\$61,691
Per Capita Income	\$71,094	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	11.3%	12.2%	7.3%
Average Household Size	2.7	2.30	2.4
% of Population Over 25 with High School Diploma	93.9%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	13.1%	18.8%	29.3%
% with Disability	8.8%	11.6%	11.8%

Demographic & Social Characteristics (as of 2019)	Le Grand	County	Iowa
% Speak English less than "Very Well"	3.8%	12.6%	3.6%

Table 2-34 City of Le Grand Demographics by Race and Sex

Le Grand	Population	%
Total Population	990	
Male	489	49.4%
Female	501	50.6%
White, not Hispanic	948	95.8%
Hispanic or Latino	27	2.7%
Black	19	1.9%
Asian	0	0.0%
American Indian and Alaska Native	6	0.6%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	27	2.7%
Two or more races	10	1.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-35 City of Le Grand Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	433	
1-unit detached	303	70.0%
1-unit attached	18	4.2%
2 units	17	3.9%
3 or 4 units	39	9.0%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	2	0.5%
Mobile home	54	12.5%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Le Grand could finance a hazard mitigation project. This city in particular does not maintain its own utilities so fees for these services are not available to finance projects. The financing resources available to the City of Le Grand are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)

- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- Le Grand received State Revolving Fund money in 2008 for water distribution lines, curb stops, and some hydrants.
- Le Grand completed upgrades to the city's wastewater facility since the last plan update.
- The city completed an upgrade to the tornado warning siren.
- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.9 City of Liscomb

Liscomb is located at the intersection of County Hwy S75 and E18/Marble Road in north central Marshall County. It is approximately 30 miles to the west of U.S. Interstate 35, which runs north/south. The City of Liscomb had an estimated population of 274 in 2019. Table 2-36 through Table 2-39 below provide details on several demographic and social characteristics of Liscomb.

Table 2-36 City of Liscomb Demographic and Social Characteristics, 2014-2019

City of Liscomb	2014	2019	% Change
Population	265	274	3.40%
Median Age	34.9	43.4	24.4%
% of Population under 5	4.5	10%	-97.9%
% of Population over 65	10.2	10%	-99.0%
Housing Occupancy Rate	92.9%	92.5%	-0.4%
% of Owner Occupied Housing	82.7%	70.2%	-15.1%
% of Renter Occupied Housing	17.3%	29.8%	72.3%
% of Housing Units with no Vehicles Available	2.90%	1.60%	-44.8%
Median Household Income	\$44,643	\$59,500	33.3%
Per Capita Income	\$21,481	\$30,713	43.0%
% of Individuals Below Poverty Level	19.2%	11.3%	-41.1%
# of Households	104	124	19.2%
Average Household Size	2.7	2.3	-15.4%
% of Population Over 25 with High School Diploma	94.0%	96.4%	2.6%
% of Population Over 25 with Bachelor's Degree or Higher	3.8%	10.2%	168.4%
% with Disability	12.5%	19.0%	52.0%
% Speak English less than "Very Well"	0.0%	0.0%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-37 City of Liscomb Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Liscomb	County	Iowa
Median Age	43.4	38.7	38.5
% of Population under 5	10%	6.7%	6%
% of Population over 65	10%	17.7%	17.5%
Housing Occupancy Rate	93%	91.8%	90.7%
% of Owner Occupied Housing	70%	70.5%	71%
% of Renter Occupied Housing	30%	29.5%	29.5%
% of Housing Units with no Vehicles Available	1.6%	7.6%	6.1%
Median Household Income	\$59,500	\$ 56,437	\$61,691
Per Capita Income	\$30,713	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	11.3%	12.2%	7.3%
Average Household Size	2.3	2.30	2.4
% of Population Over 25 with High School Diploma	96.4%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	10.2%	18.8%	29.3%
% with Disability	19.0%	11.6%	11.8%
% Speak English less than "Very Well"	0.0%	12.6%	3.6%

Table 2-38 City of Liscomb Demographics by Race and Sex

Liscomb	Population	%
Total Population	274	
Male	122	44.5%
Female	152	55.5%
White, not Hispanic	274	100.0%
Hispanic or Latino	4	1.5%
Black	0	0.0%
Asian	0	0.0%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-39 City of Liscomb Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	134	
1-unit detached	98	73.1%
1-unit attached	1	0.7%
2 units	6	4.5%
3 or 4 units	8	6.0%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	21	15.7%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Liscomb could finance a hazard mitigation project. Liscomb only maintains the city's water system so fees from utilities are not plentiful but can be used toward debt incurred for projects. The financing resources available to the City of Liscomb are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (utility fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In 2007, Liscomb was granted State of Iowa CDBG money for water mains throughout town.
- For the years 2007 to present Liscomb has received USDA money for fire department equipment like turnout gear, pagers, base radio, and air packs.
- Liscomb has completed public improvements to minimize runoff and erosion around the city's sewage lagoon.
- Opportunity for improvement: Purchase and install an emergency warning siren.

2.2.10 City of Marshalltown

Marshalltown is very well connected from its location in east central Marshall County at the point where IA-14 and Highway 30 intersect. The City is only 40 miles from Ames and Interstate 35. It is also only 5 miles from Highway 330 which angles southwest directly to the Des Moines area. Marshalltown is the largest city in the county and the 17th largest in the State of Iowa, as well as serving as the Marshall County seat. Marshalltown's population is larger by tens of thousands than the next largest city in the county; with a 2019 population estimated at 27,053, this is an overall increase from the population at the 2000 census, but a slight decrease from the population recorded at the 2010 census. Table 2-36 through Table 2-39 below provide details on several demographic and social characteristics of Marshalltown.

Table 2-40 City of Marshalltown Demographic and Social Characteristics, 2014-2019

City of Marshalltown	2014	2019	% Change
Population	27,749	27,053	-2.51%
Median Age	35.9	36.7	2.2%
% of Population under 5	7.9	7%	-99.1%
% of Population over 65	16.6	18%	-98.9%
Housing Occupancy Rate	91.3%	91.9%	0.7%
% of Owner Occupied Housing	66.7%	64.7%	-3.0%
% of Renter Occupied Housing	33.3%	35.5%	6.6%
% of Housing Units with no Vehicles Available	8.30%	10.30%	24.1%
Median Household Income	\$48,750	\$52,035	6.7%
Per Capita Income	\$22,512	\$24,600	9.3%
% of Individuals Below Poverty Level	14.6%	14.8%	1.4%
# of Households	10,054	10,273	2.2%
Average Household Size	2.8	2.7	-1.1%
% of Population Over 25 with High School Diploma	80.3%	78.7%	-2.0%
% of Population Over 25 with Bachelor's Degree or Higher	20.1%	18.1%	-10.0%
% with Disability	12.2%	11.9%	-2.5%
% Speak English less than "Very Well"	13.8%	18.2%	31.9%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-41 City of Marshalltown Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Marshalltown	County	Iowa
Median Age	36.7	38.7	38.5
% of Population under 5	7%	6.7%	6%
% of Population over 65	18%	17.7%	17.5%
Housing Occupancy Rate	92%	91.8%	90.7%
% of Owner Occupied Housing	65%	70.5%	71%
% of Renter Occupied Housing	36%	29.5%	29.5%
% of Housing Units with no Vehicles Available	10.3%	7.6%	6.1%
Median Household Income	\$52,035	\$ 56,437	\$61,691

Demographic & Social Characteristics (as of 2019)	Marshalltown	County	Iowa
Per Capita Income	\$24,600	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	14.8%	12.2%	7.3%
Average Household Size	2.7	2.30	2.4
% of Population Over 25 with High School Diploma	78.7%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	18.1%	18.8%	29.3%
% with Disability	11.9%	11.6%	11.8%
% Speak English less than "Very Well"	18.2%	12.6%	3.6%

Table 2-42 City of Marshalltown Demographics by Race and Sex

Marshalltown	Population	%
Total Population	27,053	
Male	13,763	50.9%
Female	13,290	49.1%
White, not Hispanic	21,938	81.1%
Hispanic or Latino	8,313	30.7%
Black	438	1.6%
Asian	1402	5.2%
American Indian and Alaska Native	97	0.4%
Native Hawaiian and Other Pacific Islander	13	0.0%
Some other race	2432	9.0%
Two or more races	733	2.7%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-43 City of Marshalltown Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	11,173	
1-unit detached	7,794	69.8%
1-unit attached	283	2.5%
2 units	429	3.8%
3 or 4 units	765	6.8%
5 to 9 units	456	4.1%
10 to 19 units	487	4.4%
20 or more units	686	6.1%
Mobile home	257	2.3%

Type of housing units	Total	%
Boat, RV, van, etc.	16	0.1%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

The City of Marshalltown is a large city for Iowa and therefore has more resources and staff than smaller cities in the county. There are multiple ways the City of Marshalltown could finance a hazard mitigation project. An appointed board manages and maintains the city's water system so fees from that utility can be used toward debt incurred for projects. The financing resources available to the City of Marshalltown are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (utility fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In the past few years Marshalltown has received Federal and State FEMA funding to repair a diffusion pipe on the bike trail as a mitigation project.
- In a water pollution control effort, the city also received State of Iowa funds for basement pump repairs.
- The city currently has a pending grant application to purchase a generator for the city's shelter.
- Opportunity for improvement: Promoting public information on hazards and mitigation and translating hazard education messaging.

2.2.11 City of Melbourne

Melbourne is located in the southwest corner of the county, just northeast of Rhodes. This is at the crux of where Iowa Highway 330 and County Road S62 intersect. This location is ideal for getting on Iowa 330 to Des Moines or getting on Highway 30 to travel to Ames or Cedar Rapids. Melbourne had an estimated population of 843 residents in 2019, which is a 6% increase from the 2000 census. Table 2-44 through Table 2-47 below provide details on several demographic and social characteristics of Melbourne.

Table 2-44 City of Melbourne Demographic and Social Characteristics, 2014-2019

City of Melbourne	2014	2019	% Change
Population	868	843	-2.88%
Median Age	36.2	37.1	2.5%
% of Population under 5	7%	8%	25.8%
% of Population over 65	19%	13%	-30.3%
Housing Occupancy Rate	97.2%	91.5%	-5.9%
% of Owner Occupied Housing	79.7%	76.9%	-3.5%
% of Renter Occupied Housing	20.3%	23.1%	13.8%

City of Melbourne	2014	2019	% Change
% of Housing Units with no Vehicles Available	0.90%	0.30%	-66.7%
Median Household Income	\$48,906	\$68,690	40.5%
Per Capita Income	\$22,929	\$34,809	51.8%
% of Individuals Below Poverty Level	6.3%	3.8%	-39.7%
# of Households	345	324	-6.1%
Average Household Size	2.7	2.9	7.5%
% of Population Over 25 with High School Diploma	97.2%	94.9%	-2.4%
% of Population Over 25 with Bachelor's Degree or Higher	17.0%	17.7%	4.1%
% with Disability	12.3%	9.7%	-21.1%
% Speak English less than "Very Well"	0.0%	0.6%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-45 City of Melbourne Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Melbourne	County	Iowa
Median Age	37.1	38.7	38.5
% of Population under 5	8%	6.7%	6%
% of Population over 65	13%	17.7%	17.5%
Housing Occupancy Rate	92%	91.8%	90.7%
% of Owner Occupied Housing	77%	70.5%	71%
% of Renter Occupied Housing	23%	29.5%	29.5%
% of Housing Units with no Vehicles Available	0.3%	7.6%	6.1%
Median Household Income	\$68,690	\$ 56,437	\$61,691
Per Capita Income	\$34,809	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	3.8%	12.2%	7.3%
Average Household Size	2.9	2.72	2.4
% of Population Over 25 with High School Diploma	94.9%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	17.7%	18.8%	29.3%
% with Disability	9.7%	11.6%	11.8%
% Speak English less than "Very Well"	0.6%	12.6%	3.6%

Table 2-46 City of Melbourne Demographics by Race and Sex

Melbourne	Population	%
Total Population	843	
Male	442	52.4%
Female	401	47.6%
White, not Hispanic	836	99.2%
Hispanic or Latino	13	1.5%
Black	0	0.0%
Asian	4	0.5%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	3	0.4%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-47 City of Melbourne Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	354	
1-unit detached	281	79.4%
1-unit attached	0	0.0%
2 units	3	0.8%
3 or 4 units	34	9.6%
5 to 9 units	16	4.5%
10 to 19 units	0	0.0%
20 or more units	2	0.6%
Mobile home	18	5.1%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Mitigation Initiatives/Capabilities

There are multiple ways the City of Melbourne could finance a hazard mitigation project. Melbourne provides its own water utility services so fees from that can be used toward debt incurred for projects. The financing resources available to the City of Melbourne are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (utility fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.12 City of Rhodes

The City of Rhodes is located in the southwestern corner of Marshall County, just southwest of Melbourne. County Highways E63 and S52 intersect in town. Rhodes is also located less than 3 miles to the west of Iowa 330. The City of Rhodes had an estimated 2019 population of 260, a 13% decrease from the 2000 census. Table 2-48 through Table 2-51 below provide details on several demographic and social characteristics of Rhodes.

Table 2-48 City of Rhodes Demographic and Social Characteristics, 2014-2019

City of Rhodes	2014	2019	% Change
Population	310	260	-16.13%
Median Age	44	43.5	-1.1%
% of Population under 5	4%	17%	333.3%
% of Population over 65	18%	12%	-32.8%
Housing Occupancy Rate	93.7%	84.5%	-9.8%
% of Owner Occupied Housing	76.1%	88.8%	16.7%
% of Renter Occupied Housing	23.9%	11.2%	-53.1%
% of Housing Units with no Vehicles Available	1.50%	2.00%	33.3%
Median Household Income	\$42,222	\$63,750	51.0%
Per Capita Income	\$21,856	\$23,963	9.6%
% of Individuals Below Poverty Level	16.6%	11.5%	-30.7%
# of Households	134	98	-26.9%
Average Household Size	2.3	2.8	20.5%
% of Population Over 25 with High School Diploma	89.9%	90.8%	1.0%
% of Population Over 25 with Bachelor's Degree or Higher	9.1%	7.6%	-16.5%
% with Disability	16.5%	17.3%	4.8%
% Speak English less than "Very Well"	0.3%	0.0%	-100.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-49 City of Rhodes Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	Rhodes	County	Iowa
Median Age	43.5	38.7	38.5

Demographic & Social Characteristics (as of 2019)	Rhodes	County	Iowa
% of Population under 5	17%	6.7%	6%
% of Population over 65	12%	17.7%	17.5%
Housing Occupancy Rate	85%	91.8%	90.7%
% of Owner Occupied Housing	89%	70.5%	71%
% of Renter Occupied Housing	11%	29.5%	29.5%
% of Housing Units with no Vehicles Available	2.0%	7.6%	6.1%
Median Household Income	\$63,750	\$ 56,437	\$61,691
Per Capita Income	\$23,963	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	11.5%	12.2%	7.3%
Average Household Size	2.8	2.88	2.4
% of Population Over 25 with High School Diploma	90.8%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	7.6%	18.8%	29.3%
% with Disability	17.3%	11.6%	11.8%
% Speak English less than "Very Well"	0.0%	12.6%	3.6%

Table 2-50 City of Rhodes Demographics by Race and Sex

Rhodes	Population	%
Total Population	260	
Male	146	56.2%
Female	113	43.5%
White, not Hispanic	250	96.2%
Hispanic or Latino	7	2.7%
Black	3	1.2%
Asian	0	0.0%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	7	2.7%
Two or more races	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-51 City of Rhodes Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	116	

Type of housing units	Total	%
1-unit detached	95	81.9%
1-unit attached	0	0.0%
2 units	2	1.7%
3 or 4 units	5	4.3%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	14	12.1%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimate

Mitigation Initiatives/Capabilities

There are multiple ways the City of Rhodes could finance a hazard mitigation project. This city in particular maintains its own water system so fees for this service are available to finance projects. Other resources available to the City of Rhodes are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In June 2011, Rhodes was granted money from the State of Iowa CDBG program for sewer improvements.
- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.13 City of St Anthony

St Anthony is located in the northwestern portion of Marshall County. County Highways S57 and E23 run along the perimeter of town. St Anthony is located 3 miles west of Clemons with whom it shares many services. St. Anthony has experienced a major population decline of 203% over the past 20 years, with a 2019 estimated population of 36. Table 2-52 through Table 2-55 below provide details on several demographic and social characteristics of St. Anthony.

Table 2-52 City of St. Anthony Demographic and Social Characteristics, 2014-2019

City of St. Anthony	2014	2019	% Change
Population	125	36	-71.20%
Median Age	30.8	45.5	47.7%
% of Population under 5	18%	11%	-36.9%

City of St. Anthony	2014	2019	% Change
% of Population over 65	6%	8%	29.7%
Housing Occupancy Rate	90.0%	55.6%	-38.2%
% of Owner Occupied Housing	86.1%	68.0%	-21.0%
% of Renter Occupied Housing	13.9%	32.0%	130.2%
% of Housing Units with no Vehicles Available	0.00%	24.00%	0
Median Household Income	\$40,833	\$32,188	-21.2%
Per Capita Income	\$14,801	\$24,742	67.2%
% of Individuals Below Poverty Level	31.1%	13.9%	-55.3%
# of Households	36	25	-30.6%
Average Household Size	3.3	1.7	-49.8%
% of Population Over 25 with High School Diploma	84.3%	89.7%	6.4%
% of Population Over 25 with Bachelor's Degree or Higher	11.4%	0.0%	-100.0%
% with Disability	12.0%	16.7%	39.2%
% Speak English less than "Very Well"	0.0%	0.0%	0

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-53 City of St. Anthony Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	St. Anthony's	County	Iowa
Median Age	45.5	38.7	38.5
% of Population under 5	11%	6.7%	6%
% of Population over 65	8%	17.7%	17.5%
Housing Occupancy Rate	56%	91.8%	90.7%
% of Owner Occupied Housing	68%	70.5%	71%
% of Renter Occupied Housing	32%	29.5%	29.5%
% of Housing Units with no Vehicles Available	24.0%	7.6%	6.1%
Median Household Income	\$32,188	\$56,437	\$61,691
Per Capita Income	\$24,742	\$27,196	\$33,109
% of Individuals Below Poverty Level	13.9%	12.2%	7.3%
Average Household Size	1.7	2.82	2.4
% of Population Over 25 with High School Diploma	89.7%	83.8%	92.6%

Demographic & Social Characteristics (as of 2019)	St. Anthony's	County	Iowa
% of Population Over 25 with bachelor's degree or Higher	0.0%	18.8%	29.3%
% with Disability	16.7%	11.6%	11.8%
% Speak English less than "Very Well"	0.0%	12.6%	3.6%

Table 2-54 City of St. Anthony Demographics by Race and Sex

St. Anthony's	Population	%
Total Population	36	
Male	19	52.8%
Female	17	47.2%
White, not Hispanic	34	94.4%
Hispanic or Latino	0	0.0%
Black	2	5.6%
Asian	0	0.0%
American Indian and Alaska Native	0	0.0%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	0	0.0%
Two or more races	2	5.6%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-55 City of St. Anthony Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	45	
1-unit detached	35	77.8%
1-unit attached	0	0.0%
2 units	0	0.0%
3 or 4 units	3	6.7%
5 to 9 units	0	0.0%
10 to 19 units	0	0.0%
20 or more units	0	0.0%
Mobile home	7	15.6%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimate

Mitigation Initiatives/Capabilities

There are multiple ways the City of St Anthony could finance a hazard mitigation project. This city in particular does not maintain its own utilities so fees for those services are not available to finance projects. The financing resources available to the City of St Anthony are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using sewer fees, water fees, road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- In the past several years St Anthony has not received federal and state funding for mitigation projects.
- Opportunity for improvement: Promoting public information on hazards and mitigation.

2.2.14 City of State Center

The City of State Center is located in the west central portion of Marshall County. U.S. Highway 30 runs east/west just south of town. The City has several historical businesses, buildings, and events in town including; the Rose Garden and Parade, a commercial historic district, the Gutekunst Public Library, Watson's Grocery Store Museum, a restored country school house and a restored 1950's era barbershop which is fully equipped. State Center is the second largest city in Marshall County, after Marshalltown, and the only other city with a population greater than 1,000 residents. The 2019 estimated population of State Center is 1,661, representing a 19% increase since the 2000 census. Table 2-56 through Table 2-59 below provide details on several demographic and social characteristics of State Center.

Table 2-56 City of State Center Demographic and Social Characteristics, 2014-2019

City of State Center	2014	2019	% Change
Population	1,475	1,661	12.61%
Median Age	38.2	35.0	-8.4%
% of Population under 5	9%	7%	-19.5%
% of Population over 65	15%	14%	-7.5%
Housing Occupancy Rate	89.9%	93.9%	4.4%
% of Owner Occupied Housing	74.1%	72.3%	-2.4%
% of Renter Occupied Housing	25.9%	27.7%	6.9%
% of Housing Units with no Vehicles Available	2.20%	3.00%	36.4%
Median Household Income	\$57,661	\$63,375	9.9%
Per Capita Income	\$23,045	\$24,633	6.9%
% of Individuals Below Poverty Level	9.1%	9.7%	6.6%
# of Households	540	603	11.7%

City of State Center	2014	2019	% Change
Average Household Size	2.5	2.9	15.7%
% of Population Over 25 with High School Diploma	94.0%	93.0%	-1.1%
% of Population Over 25 with Bachelor's Degree or Higher	22.9%	16.0%	-30.1%
% with Disability	10.5%	7.9%	-24.8%
% Speak English less than "Very Well"	3.8%	1.7%	-55.3%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-57 City of State Center Demographic and Social Characteristics Compared to the County and State

Demographic & Social Characteristics (as of 2019)	State Center	County	Iowa
Median Age	35.0	38.7	38.5
% of Population under 5	7%	6.7%	6%
% of Population over 65	14%	17.7%	17.5%
Housing Occupancy Rate	94%	91.8%	90.7%
% of Owner Occupied Housing	72%	70.5%	71%
% of Renter Occupied Housing	28%	29.5%	29.5%
% of Housing Units with no Vehicles Available	3.0%	7.6%	6.1%
Median Household Income	\$63,375	\$ 56,437	\$61,691
Per Capita Income	\$24,633	\$ 27,196	\$33,109
% of Individuals Below Poverty Level	9.7%	12.2%	7.3%
Average Household Size	2.9	1.65	2.4
% of Population Over 25 with High School Diploma	93.0%	83.8%	92.6%
% of Population Over 25 with bachelor's degree or Higher	16.0%	18.8%	29.3%
% with Disability	7.9%	11.6%	11.8%
% Speak English less than "Very Well"	1.7%	12.6%	3.6%

Table 2-58 City of State Center Demographics by Race and Sex

State Center	Population	%
Total Population	1,661	
Male	866	52.1%
Female	795	47.9%

State Center	Population	%
White, not Hispanic	1,556	93.7%
Hispanic or Latino	65	3.9%
Black	24	1.4%
Asian	11	0.7%
American Indian and Alaska Native	8	0.5%
Native Hawaiian and Other Pacific Islander	0	0.0%
Some other race	62	3.7%
Two or more races	13	0.8%

Source: US Census Bureau ACS 5-year Data Estimates

Table 2-59 City of State Center Types and Amounts of Housing Units

Type of housing units	Total	%
Total housing units	642	
1-unit detached	522	81.3%
1-unit attached	4	0.6%
2 units	12	1.9%
3 or 4 units	56	8.7%
5 to 9 units	38	5.9%
10 to 19 units	0	0.0%
20 or more units	3	0.5%
Mobile home	7	1.1%
Boat, RV, van, etc.	0	0.0%

Source: US Census Bureau ACS 5-year Data Estimate

Mitigation Initiatives/Capabilities

There are multiple ways the City of State Center could finance a hazard mitigation project. This city maintains its own electric and water utilities so fees for these services are available to finance projects. Resources available to the City of State Center are below.

- Grants
- General obligation bonds (up to 5% of City's valuation)
- Revenue bonds through publicly secured sources (paid back using road use tax, local option sales tax in accordance with approved referendum, revenue from certain enterprises, and tax increment financing)
- Capital improvements fund
- Special assessment taxes

Additional mitigation initiatives/capabilities are discussed below:

- The city is currently planning new drinking water and wastewater treatment plants in the next 2 and 5 years.

- Since the last plan update the city completed repairs on their warning siren to include remote triggering and backup power.
- Opportunity for improvement: Construction of a new safe room/emergency shelter.

2.2.15 Public School District Profiles and Mitigation Capabilities

This section includes general profile information for four Marshall County school districts. The four school districts in the planning area are as follows.

- East Marshall Community School District
- GMG Marshall Community School District
- Marshalltown Community School District
- West Marshall Community School District

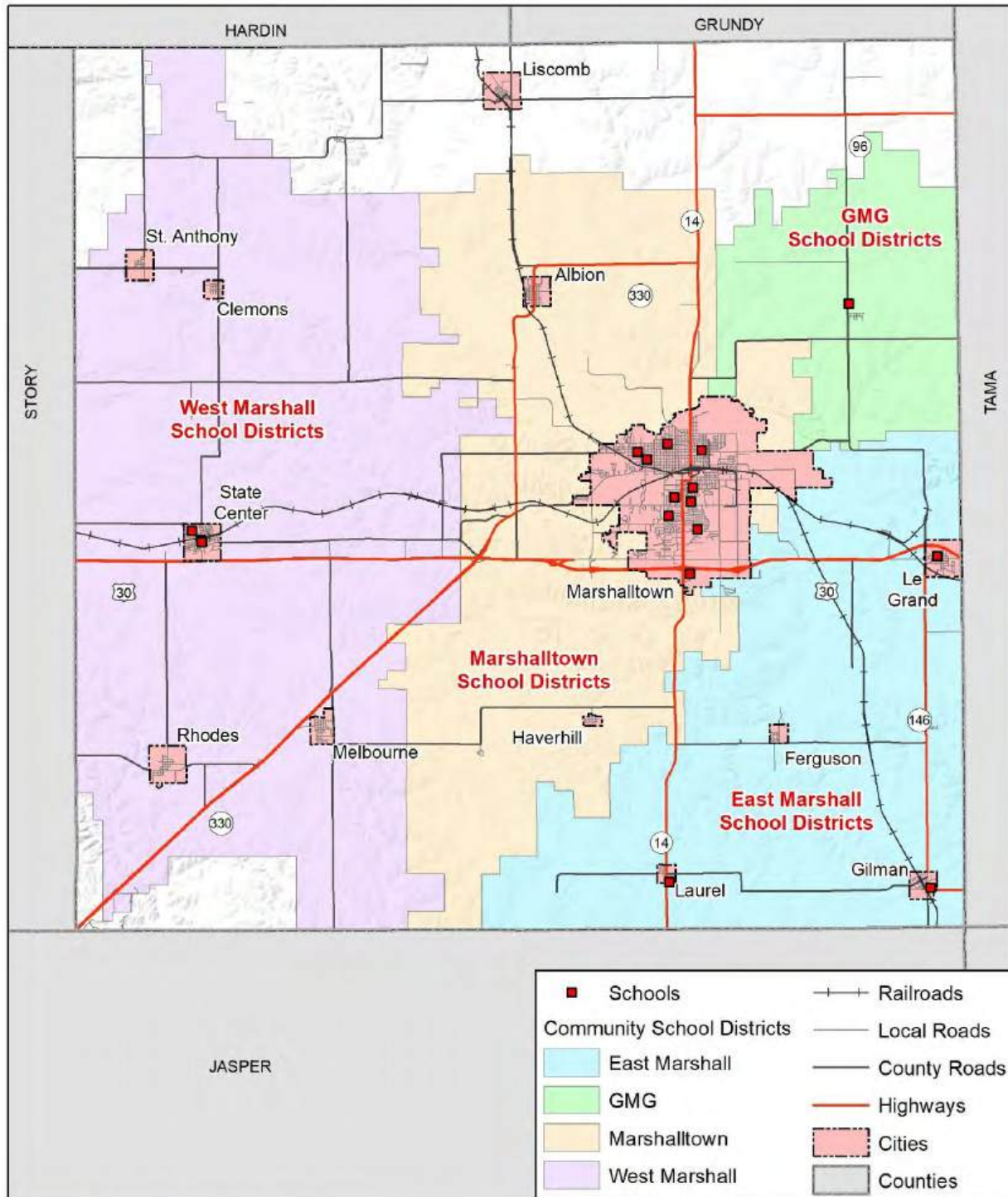
The map in Figure 2-5 provides the boundaries of the school districts in Marshall County and Table 2-6 that follows provides location and enrollment information for each school district. For school districts that are in more than one county, the school building and enrollment data is for the entire district, not only the portion within Marshall County.

Mitigation Initiatives/Capabilities

Additional mitigation initiatives/capabilities are discussed below:

- Since the last plan update the East Marshall CSD has completed several mitigation actions (see Section 4.3)
- Opportunity for improvement: Construction of a new safe room/emergency shelter in schools for each district.

Figure 2-5 Marshall County School District Boundaries



wood. Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Cedar Watershed, Middle Iowa Watershed,
FEMA NFHL 11/16/2011

Table 2-60 Marshall County School Districts Enrollment Data, 2010-2020

District	2010-2011 Certified Enrollment	2020-2021 Certified Enrollment	# Change 2010- 2020	% Change 2010-2020
East Marshall	691.3	576.3	-115	-16.6%
GMG	329.4	250.4	-79	-24%
Marshalltown	5,200.4	5332.3	131.9	2.5%
West Marshall	858.7	815.3	-43.4	-5%

Source: Iowa Department of Education, Bureau of Planning, Research and Evaluation

http://educateiowa.gov/index.php?option=com_content&view=article&id=346&Itemid=4439

Potential capabilities to implement mitigation programs and projects can vary among school districts. To determine mitigation capabilities, each of the participating school districts completed a Data Collection Guide to report planning, personnel, fiscal, and other capabilities related to implementation of mitigation programs and projects. Table 2-7 provides a summary of the reported capabilities for each participating school district.

Table 2-61 Summary of Mitigation Capabilities, Marshall County Public School Districts

Capability	East Marshall Community School District	GMG Community School District	Marshalltown Community School District	West Marshall Community School District
Planning Elements				
Master Plan	Y	Y	Y	Y
Capital Improvement Plan	Y	Y	Y	Y
School Emergency Plan	Y	Y	Y	Y
Weapons Policy	Y	Y	Y	Y
Personnel Resources	Y	Y	Y	Y
Full-time building official (i.e. principal)	Y	Y	Y	Y
Emergency Manager	N	N	N	N
Grant Writer	N	N	N	N
Public Information Officer	N	N	N	N
Financial Resources				
Capital Improvements project funding	Y	Y	Y	Y
Local funds	Y	Y	Y	Y
General obligation bonds	Y	Y	Y	Y
Bonds	Y	Y	Y	Y
Private activities/donations	Y	Y	Y	Y
State and federal funds	Y	Y	Y	Y
Other				
Public Education Programs				
Fire evacuation training	Y	Y	Y	Y
Tornado sheltering Exercises	Y	Y	Y	Y
Public Address/Emergency Alert System	Y	Y	Y	Y
NOAA Weather Radios	Y	Y	Y	Y
Lock-down security training	Y	Y	Y	Y
Mitigation Programs	N	N	N	N
Tornado Shelter/Saferoom	N	N	N	N

Capability	East Marshall Community School District	GMG Community School District	Marshalltown Community School District	West Marshall Community School District
Campus Police	N	N	Y	N

Chapter 3 Risk Assessment

44 CFR Requirement §201.6(c)(2):

[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.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure within Marshall County, Iowa to these hazards. The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities in the planning area to better understand their potential risk to the identified hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The risk assessment for Marshall County and participating jurisdictions followed the methodology described in the 2013 FEMA Local Mitigation planning Handbook, which includes a four-step process:

Step 1—Describe Hazards

Step 2—Identify Community Assets

Step 3—Analyze Risks

Step 4—Summarize Vulnerability

The risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural and human caused hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. Data collected through this process has been incorporated into the following sections of this chapter:

Section 3.1: Hazard Identification – Identifies the hazards that threaten the Planning Area (Marshall County) and describes why some hazards have been omitted from further consideration.

Section 3.2: Assets Summary - Describes the methodology for inventorying assets as the basis for determining vulnerability of the Planning Area to the identified hazards.

Sections 3.3-3.4: Hazard Profiles - Discusses the threat each hazard poses to the Planning Area and describes previous occurrences of hazard events and the likelihood of future occurrences (2013 FEMA Local Mitigation Planning Handbook Risk Assessment, Step 1). It also includes a vulnerability assessment for each hazard, considering assets at risk, critical facilities, and future development trends (2013 FEMA Local Mitigation Planning Handbook Risk Assessment, Steps 2, 3 and 4). Section 3.3 discusses natural hazards, while Section 3.4 Other Hazards discusses human caused hazards.

3.1 Hazard Identification

DMA Requirement §201.6(c)(2)(i):

[The risk assessment shall include a] description of the type of all-natural hazards that can affect the jurisdiction.

The first step in developing a risk assessment is identifying the hazards. The Marshall County Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the Planning Area and estimates of potential losses or assets that could be affected by those hazards (if/as applicable).

3.1.1 Results and Methodology

The hazard scoring methodology used for this plan's update follows the methodology used in the 2016 planning process, for consistency and continuity. This method was originally used in Iowa's 2007 Hazard Mitigation Plan.

The previous plan included the following five ranking criteria: (1) historic occurrence, (2) probability, (3) human vulnerability, (4) severity of impact, and (5) speed of onset. The hazard scoring methodology that was used for the risk assessment of this plan update is described in the following tables.

Historical Occurrence: number of times that a hazard has occurred in the jurisdiction in the past.

Score	Number of Historical Occurrences
1	Less than 4 occurrences
2	4 to 7 occurrences
3	8 to 12 occurrences
4	More than 12 occurrences

Probability reflects the likelihood of a hazard occurring again in the future.

Score	Frequency of Occurrence
1	Unlikely – Less than 10% chance probability in the next year
2	Possible – Between 10% and 25% probability in the next year
3	Likely – Between 26% and 60% probability in the next year
4	High Likely – More than 60% chance in the next year

Vulnerability measures the percentage of people and property that would be affected by the hazard event.

Score	Percentage of People and Property Affected
1	Less than 25% of people and property affected
2	25-50% of people and property affected
3	51-75% of people and property affected
4	More than 75% of people and property affected

Severity of Impact is an assessment of severity in terms of injuries and fatalities, personal property, and infrastructure.

Score	Characteristics
1	Negligible Few if any injuries. Minor quality of life lost with little or no property damage. Brief interruption of critical facilities and services for less than 4 hours. No environmental impact. No impact to reputation of the jurisdiction
2	Limited Minor injuries and illness. Minor or short-term property damage which does not threaten structural stability. Shutdown of critical facilities and services for 4 to 24 hours. Minor short-term environmental impact. Very limited impact to reputation of the jurisdiction
3	Critical Serious injury and illness. Major or long-term property damage which threatens structural stability. Shutdown of essential facilities for 24 to 72 hours. Minor long-term environmental impact. Moderate impact to the reputation of the jurisdiction
4	Catastrophic Multiple deaths. Property destroyed or damaged beyond repair. Complete shutdown of critical facilities and services for 3 days or more. Major long-term environmental impact. Severe impacts to the reputation of the jurisdiction.

Speed of Onset is the rating of the potential amount of warning time that is available before the hazard occurs.

Score	Probable Amount of Warning Time
1	More than 24 hours warning time
2	12 to 24 hours warning time
3	6 to 12 hours warning time
4	Minimal or no warning

The results from the hazard risk and vulnerability assessment of this plan were used to help determine just how vulnerable Marshall County and its individual jurisdictions are to natural and manmade hazards. For the purposes of determining what the greatest risks were across the county according to the results of the risk assessment, risk assessment scores were averaged among jurisdictions to result in one total hazard score per hazard. These averaged scores are included in Table 3-1. As a reminder, the total risk assessment score considered the following hazard characteristics: historical occurrence, probability, vulnerability, severity of impact, and speed of onset.

During the scoring process, the highest score a hazard could possibly receive is 20. Based on averaged scores, the highest score a hazard received was an 18, while the lowest score a hazard received was a 7. These scores were used to assign a vulnerability rating of high, medium, or low. Hazards that scored 15 to 18 are considered high priority. Hazards that scored 10 to 14 are medium, and hazards that scored 9 or below are considered lower priority. It is important to note that although a score may have received an overall vulnerability rating, there are differences among jurisdictions regarding hazard risk and vulnerability. Some of these differences are described in this chapter.

Regarding the vulnerability rating, a high rating generally indicates that the hazard is a major threat to a jurisdiction. Its effects may be widespread and severe, and the hazard could result in human loss and major property damage. Effects may vary among the high vulnerability hazards so a more detailed description of a hazard's potential effects will be discussed later in this section. In addition, referring back

to the detailed ranking score for each hazard will help distinguish the differences among all of the high-rated hazards.

A hazard with a medium rating is also a major threat to a jurisdiction, but its effects are on a smaller, less severe scale. The details of these hazards will also be discussed and referring back to the detailed ranking score for each hazard will be helpful to distinguish differences among hazards. The hazards rated “low,” on the other hand, are those that do not pose a major threat to the jurisdiction. If they were to occur, more than likely, their effects would not be extremely widespread or very severe when compared to the high- and medium-rated hazards. Human disease and flooding priority changed from low to medium during the 2021 plan update process to reflect hazard events of the previous five years, including the impacts of COVID-19 pandemic. Radiological changed from medium to low due to closing of the Duane Arnold nuclear plant in 2021.

Table 3-1 Final Table of Risk Assessment Scores (Average)

Hazard	TotalScore	Priority
Severe Winter Storm	18	High
Wind Storms	18	High
Tornado	17	High
Thunderstorms, Lightning, and Hail	17	High
Extreme Heat	17	High
Hazardous Materials	13	Medium
Drought	11	Medium
Infrastructure Failure	11	Medium
Transportation Incident	10	Medium
Terrorism	10	Medium
Grass or Wildland Fire	10	Medium
Human Disease	10	Medium
Flooding	10	Medium
Dam/Levee Failure	8	Low
Earthquake	8	Low
Radiological	8	Low
Animal/Plant/Crop Disease	7	Low

Jurisdictions' vulnerability to hazards are described in the chapter in several ways. First, an average annual countywide loss estimate has been calculated for hazards that have previous loss data. This calculation is based on the methodology described above. Hazards that did not have historical loss estimates available do not have average annual countywide loss estimates.

Data Sources

Hazard data was obtained from various federal, state, and local sources such as FEMA, the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), the United States Geological Survey (USGS), and others. Together, these sources were examined to assess the significance of these hazards to the County. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

Data Limitations

While this plan takes advantage of the data that is available through NOAA's National Center for Environmental Information (NCEI) Storm Events Database and other sources, some hazards have a shorter span of time for which data is available. The NCEI database is used as a primary source for many hazards

discussed in this plan, but for some hazards and/or some communities, only partial records of significant events are available. In addition, details about each hazard event may not be available if the data is older. For example, tornado data from the 1950's classifies tornado events at the county level and often does not give a specific location of the event within the county. Historical trends can help us predict the probability of each hazard, but realistically, many hazards analyzed in this plan could occur at any point in time. The hazard identification and risk assessment activities rank hazards according to the data that was available at the time of the plan update.

For flash flooding, communities described flood events in which short periods of heavy rainfall flooded streets, basements, and backed up sewer systems. In some cases, any period of prolonged rainfall could cause streets or sewers to flood; NCEI data did not capture the frequency of these events, but communities did not feel that it was necessary to add to the events that NCEI data already reported. It should be noted that these events may not cause substantial damage to houses or structures, but they may result in flood costs that the county taxpayers and individual property owners must finance.

Data frames vary for each hazard. For most hazards with established data sets (i.e.: NCEI, IDNR hazardous spills summary reports, Iowa Department of Public Health, etc.), the data frame begins with the earliest year in which data was available and ends with 2020. The year 2020 was used as an ending date for data to allow for a complete year of data as data collection and the planning process began in 2021. For hazards that relied more on the knowledge of city officials, public works employees, firefighters, and emergency responders as a data source, a ten-year data frame was used. The ten-year period for this type of data allows people to recall events and problems to the best of their knowledge. Hazards that used a ten-year period include grass or wildland fire, infrastructure failure, terrorism, and transportation incident. Note that some of these hazards used supplementary data in addition to local knowledge; this data also used a ten-year time frame.

3.1.2 Hazard Identification and Summary

For this plan, the Hazard Mitigation Planning Committee (HMPC) considered the full range of natural hazards that could impact the planning area and then listed hazards that present the greatest concern. The process also incorporated a review of state and local hazard planning documents. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. Based on the review, this plan addresses the following hazards of concern:

Natural Hazards

- Animal/Crop/Plant Disease
- Dam/Levee Failure
- Drought
- Earthquake
- Flooding
- Extreme Heat
- Severe Winter Storm
- Thunderstorm/Lightning/Hail
- Tornado
- Windstorm
- Grass or Wildland Fire

Other Hazards

- Hazardous Materials Incident
- Human Disease

- Infrastructure Failure
- Radiological
- Terrorism
- Transportation Incident

During the 2021 plan update process the HMPC compared the list of hazards with the 2018 Iowa Hazard Mitigation Plan (HMP) and discussed adding or removing hazards. The group felt that the list of hazards remained relevant. The only change was to combine the Riverine Flood and Flash Flood sections into one overall Flood section to be more consistent with the State HMP.

Hazards Not Profiled

At the first meeting, the HMPC was asked to discuss how the county might be affected by each hazard listed above. The HMPC was also asked if they wanted to add any additional hazards to the plan; no hazards were added. Members were given the option to remove hazards from the plan if they could provide sufficient reasoning related to a lack of historical occurrence, low likelihood of a future occurrence, or less potential for mitigation. The HMPC removed the following hazards from consideration in the plan:

1. Expansive Soils. Marshall County is not located in an area that has high percentages of clay soils that can swell or shrink excessively due to variations in moisture content. The community has a remote chance of sustaining damage from this hazard. Most of Marshall County is located in a "brown" area on the map below that contains little or no swelling clay or at most, no more than 50%. Expansive soils were also excluded from the previous plan. See Figure 3-1 for more information.

Figure 3-1 USGS Map of Percentage of Swelling Clay in Iowa

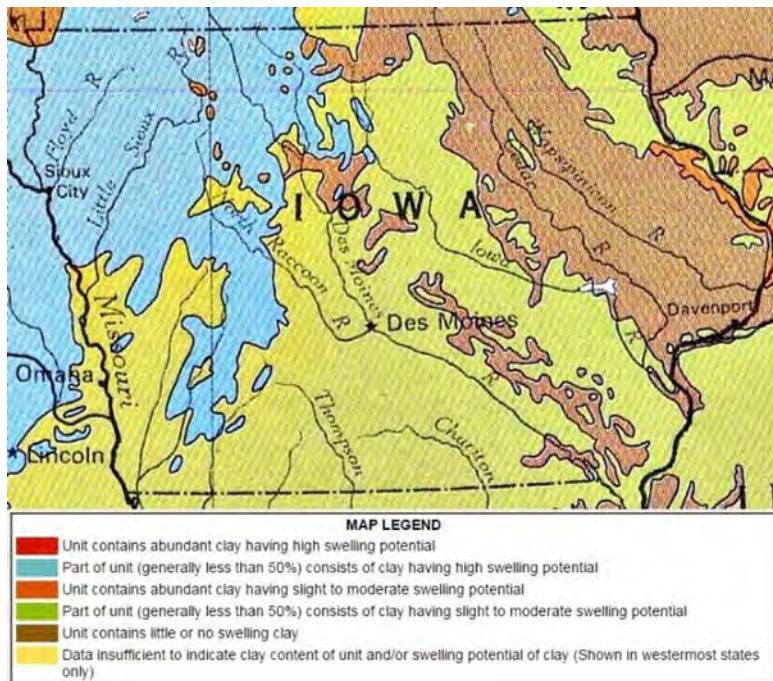


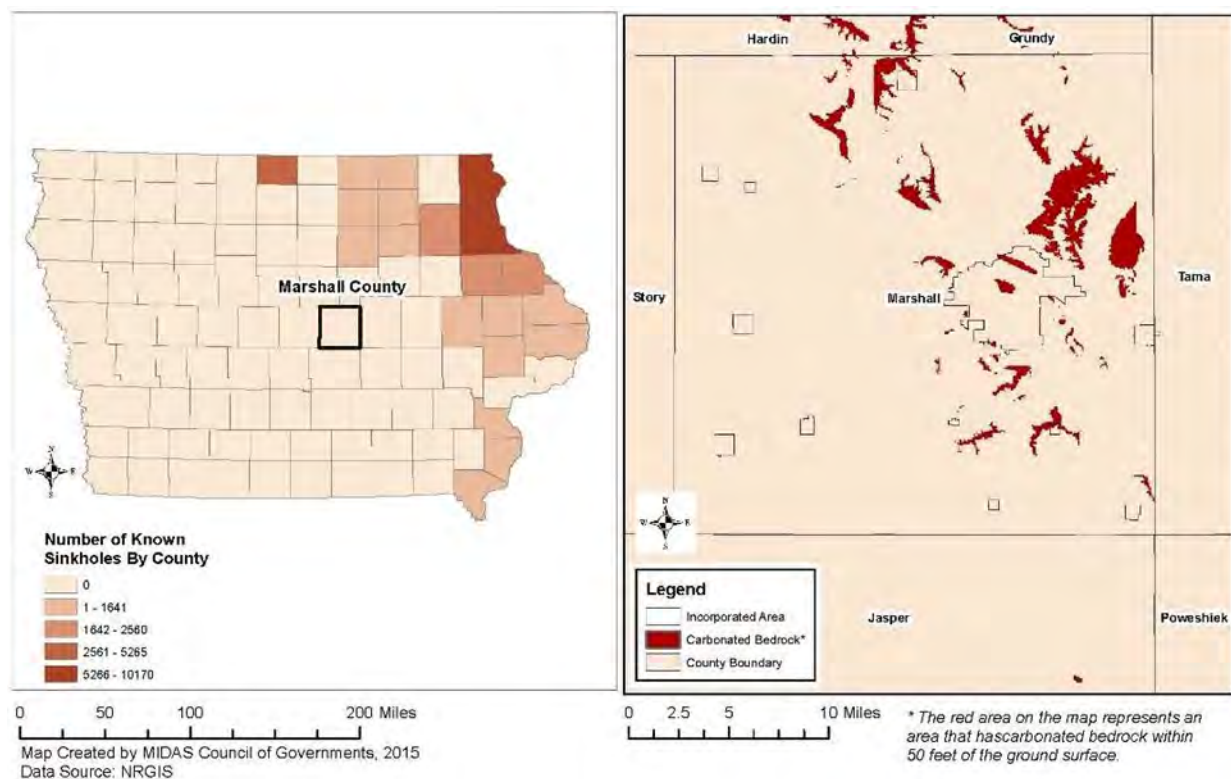
Image Obtained from: http://www.surevoid.com/soil_maps/ia.php

2. Landslide. Marshall County does not have significant slopes that could play a role in a landslide event. Marshall County's elevation varies from between 820 and 1115 feet, a difference of 295

feet (NRGIS 2015). The HMPC did not recall any landslide events that had ever occurred in Marshall County. The hazard was removed based on all of the information available. Landslides were also removed from the previous plan.

3. Sinkholes. There are no known sinkholes in Marshall County. This risk of sinkholes is remote, as there is no history of sinkholes in Marshall County and there are very few areas of the county that have carbonated bedrock within 50 feet of the ground surface (a risk factor for sinkholes). While sinkholes were included in the previous plan, the HMPC decided to remove the hazard from the plan after viewing the data and the actual possibility that a sink hole would affect the county. This hazard may be possible, but the likelihood and magnitude area would be so minimal that the planning team decided not to provide a detailed description or risk assessment.

Figure 3-2 Sinkhole Risk in Marshall County



Disaster Declaration History

One method used to identify hazards applicable for this HMP involved researching past events that triggered federal and state emergency or disaster declarations in Marshall County. Federal disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond to such hazard event and have difficulty in recovering. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal monetary or other assistance. In other words, a presidential disaster declaration puts federal recovery programs in place to help disaster victims, business, and public agencies.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and come without the long-term federal recovery programs of major disaster declarations (Farm Service Agency 2018). The quantity and types of damage are the determining factors behind receiving these assistance sources. The following section focuses on state and federal disaster and emergency declarations.

Marshall County is among the many communities in Iowa that are susceptible to disasters. Details on federal and state disaster declarations were obtained by the HMPC and FEMA and compiled in chronological order in Table 3-2. A review of state and federal declared disasters indicates that Marshall County experienced 19 disaster declarations between 1965 and 2020. The 2020 declarations were related to the Covid-19 pandemic, an ongoing disaster that occurred during the 2021 plan update process, and severe storms.

Review of these events helps identify hazards for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Still, many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern. More detailed event tables can be found in the individual hazard profile sections.

Table 3-2 Disaster Declarations in Iowa 1965-2020

Date Declared	Disaster Type
2020	Severe Storms
2020	COVID-19 Pandemic
2020	COVID-19
2019	Severe Storms and Flooding
2018	Severe Storms and Tornadoes
8/5/2014	Severe Storms, Tornadoes, Straight-line Winds, and Flooding
7/24/2014	Severe Storms, Tornadoes, Straight-line Winds, and Flooding
7/14/2014	Severe Storms, Tornadoes, Straight-line Winds, and Flooding
7/31/2013	Severe Storms, Tornadoes, and Flooding
7/2/2013	Severe Storms, Tornadoes, and Flooding
5/31/2013	Severe Storms, Straight-line Winds, and Flooding
5/6/2013	Severe Winter Storm
8/30/2011	Severe Storms and Flooding
8/24/2011	Severe Storms, Straight-Line Winds, and Flooding
6/27/2011	Flooding
5/5/2011	Severe Storms, Tornadoes, and Straight-line Winds
7/29/2010	Severe Storms, Flooding, and Tornadoes
7/27/2010	Severe Storms and Flooding
3/2/2010	Severe Winter Storms
2/25/2010	Severe Winter Storms and Snowstorm
8/13/2009	Severe Storm
5/27/2008	Severe Storms, Tornadoes, and Flooding
1/4/2008	Severe Winter Storm
9/14/2007	Severe Storms and Flooding
5/25/2007	Severe Storms, Flooding, and Tornadoes
3/30/2007	Snow
3/14/2007	Severe Winter Storms
9/10/2005	Hurricane Katrina Evacuation
5/25/2004	Severe Storms, Tornadoes, and Flooding
6/19/2002	Severe Storms and Flooding
5/2/2001	Severe Storms & Flooding
7/22/1999	Severe Storms and Flooding

Date Declared	Disaster Type
5/21/1999	Severe Storms, Flooding and Tornadoes
7/2/1998	Severe Weather, Tornadoes and Flooding
11/20/1997	Severe Snowstorms
8/21/1996	Flooding
6/24/1996	Flooding
7/9/1993	Flooding, Severe Storm
4/26/1993	Flooding, Severe Storm
10/2/1992	Flooding, Severe Storm
12/26/1991	Ice Storm
7/12/1991	Flooding, Severe Storm
9/6/1990	Flooding, Severe Storm
5/26/1990	Flooding, Severe Storm
1974	Severe Storms and Flooding
1969	Heavy Rains and Flooding
1969	Flooding
1965	Flooding

Data Source: FEMA Disaster Declarations <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

3.1.3 Overview of Hazard Identification and Risk Assessment

Sections 3.3 - 3.4.6 contains detailed hazard profiles for the identified hazards. Each hazard profiled includes the following subsections:

- **Description**—This section gives a description of the hazard in question and associated issues followed by details on the hazard specific to the Marshall County Planning Area.
- **Location**— This section gives a spatial description of the potential location or areas of Marshall County where the hazard is expected to have an impact or generally occur.
- **Historical Occurrence**—This section contains information on historical incidents, including impacts where known.
- **Probability of Future Occurrence** – The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data.
- **Magnitude and Severity (Extent)**– This section also gives a description of the potential strength or magnitude of the hazard as it pertains to Marshall County.
- **Climate Change Considerations**—Descriptions of the potential for climate change to affect the frequency and intensity of the hazard in the future.
- **Vulnerability** —Following the hazard profiles is a vulnerability assessment for each identified hazard. The assessment was conducted through the study of potential impacts to the following specific sectors:
 - People
 - Property
 - Critical Facilities and Infrastructure
 - Economy
 - Historic, Cultural, and Natural Resources
- **Development Trends** – This section reviews current trends in land use development in the county and how that might impact the vulnerability to specific hazards in the County.

3.2 Asset Summary

As a starting point for analyzing the Planning Area’s vulnerability to identified hazards, the HMPC used a variety of data to define a baseline of property exposure against which disaster impacts could be

compared. If a catastrophic disaster was to occur in the Planning Area, this section describes significant assets exposed or at risk in the Planning Area. Data used in this baseline assessment included:

- Total property assets at risk based on County Assessor's Office parcel values;
- Critical facility inventory;
- Cultural, historical, and natural resources; and
- Population growth and land use/development trends.

Total Assets at Risk

Marshall County Assessor data was used to inventory the total number and types of parcels with improvements, defined as parcels with an improvement value greater than zero, in the County. Building content values were estimated based on the following formulas based on FEMA methods: a) Residential properties received content values worth 50% of the improved values; b) Commercial, Agricultural, and Government related properties (including State Assessed and Exempt parcels) received content values worth 100% of the improved values; and c) Industrial properties received content values worth 150% of the improved values. Adding up these content and original improved values yields the Total Value of Improved Parcels, which is an estimation of the total property exposure within the County. Building counts were based on an address point database to further refine the number of structures, as one parcel may have multiple buildings.

Table 3-3 Property Exposure Summaries by Jurisdiction and Parcel Type

Jurisdiction	Property Type	Improved Parcels/Structures	Improved Value	Estimated Content Value	Total Value
Albion	Agricultural	3	\$7,460	\$7,460	\$14,920
	Commercial	8	\$845,450	\$845,450	\$1,690,900
	Exempt	7	\$0	\$0	\$0
	Industrial	6	\$1,022,140	\$1,533,210	\$2,555,350
	Mixed Use	1	\$35,020	\$35,020	\$70,040
	Residential	213	\$13,971,340	\$6,985,670	\$20,957,010
	Total	238	\$15,881,410	\$9,406,810	\$25,288,220
Clemons	Commercial	2	\$506,130	\$506,130	\$1,012,260
	Exempt	10	\$0	\$0	\$0
	Residential	69	\$2,899,250	\$1,449,625	\$4,348,875
	Total	81	\$3,405,380	\$1,955,755	\$5,361,135
Ferguson	Agricultural	2	\$37,550	\$37,550	\$75,100
	Commercial	1	\$24,160	\$24,160	\$48,320
	Exempt	7	\$0	\$0	\$0
	Residential	56	\$1,767,440	\$883,720	\$2,651,160
	Total	66	\$1,829,150	\$945,430	\$2,774,580
Gilman	Agricultural	2	\$19,530	\$19,530	\$39,060
	Commercial	22	\$1,570,370	\$1,570,370	\$3,140,740
	Exempt	16	\$0	\$0	\$0
	Mixed Use	1	\$49,570	\$49,570	\$99,140
	Residential	214	\$12,462,930	\$6,231,465	\$18,694,395
	Total	255	\$14,102,400	\$7,870,935	\$21,973,335
Haverhill	Commercial	6	\$1,931,980	\$1,931,980	\$3,863,960
	Exempt	7	\$0	\$0	\$0
	Residential	69	\$6,415,420	\$3,207,710	\$9,623,130
	Total	82	\$8,347,400	\$5,139,690	\$13,487,090
Laurel	Agricultural	1	\$5,050	\$5,050	\$10,100

Jurisdiction	Property Type	Improved Parcels/Structures	Improved Value	Estimated Content Value	Total Value
	Commercial	15	\$632,120	\$632,120	\$1,264,240
	Exempt	14	\$0	\$0	\$0
	Residential	105	\$6,559,290	\$3,279,645	\$9,838,935
	Total	135	\$7,196,460	\$3,916,815	\$11,113,275
Le Grand	Commercial	15	\$1,636,860	\$1,636,860	\$3,273,720
	Exempt	15	\$0	\$0	\$0
	Mixed Use	1	\$53,910	\$53,910	\$107,820
	Residential	311	\$31,827,590	\$15,913,795	\$47,741,385
	Total	342	\$33,518,360	\$17,604,565	\$51,122,925
Liscomb	Agricultural	2	\$114,530	\$114,530	\$229,060
	Commercial	9	\$4,089,220	\$4,089,220	\$8,178,440
	Exempt	13	\$0	\$0	\$0
	Mixed Use	3	\$73,590	\$73,590	\$147,180
	Residential	112	\$5,379,770	\$2,689,885	\$8,069,655
	Total	139	\$9,657,110	\$6,967,225	\$16,624,335
Marshalltown	Agricultural	5	\$539,060	\$539,060	\$1,078,120
	Commercial	578	\$184,864,513	\$184,864,513	\$369,729,026
	Exempt	245	\$0	\$0	\$0
	Industrial	56	\$67,231,732	\$100,847,598	\$168,079,330
	Mixed Use	27	\$4,377,800	\$4,377,800	\$8,755,600
	Residential	8,722	\$821,026,560	\$410,513,280	\$1,231,539,840
	Total	9,633	\$1,078,039,665	\$701,142,251	\$1,779,181,916
Melbourne	Agricultural	1	\$14,810	\$14,810	\$29,620
	Commercial	19	\$4,579,230	\$4,579,230	\$9,158,460
	Exempt	11	\$0	\$0	\$0
	Mixed Use	2	\$88,110	\$88,110	\$176,220
	Residential	300	\$24,822,670	\$12,411,335	\$37,234,005
	Total	333	\$29,504,820	\$17,093,485	\$46,598,305
Rhodes	Agricultural	4	\$9,410	\$9,410	\$18,820
	Commercial	11	\$107,720	\$107,720	\$215,440
	Exempt	15	\$0	\$0	\$0
	Residential	130	\$7,511,900	\$3,755,950	\$11,267,850
	Total	160	\$7,629,030	\$3,873,080	\$11,502,110
St. Anthony	Commercial	2	\$20,980	\$20,980	\$41,960
	Exempt	2	\$0	\$0	\$0
	Mixed Use	1	\$33,670	\$33,670	\$67,340
	Residential	59	\$1,334,630	\$667,315	\$2,001,945
	Total	64	\$1,389,280	\$721,965	\$2,111,245
State Center	Agricultural	4	\$56,400	\$56,400	\$112,800
	Commercial	52	\$4,802,615	\$4,802,615	\$9,605,230
	Exempt	36	\$0	\$0	\$0
	Mixed Use	9	\$814,810	\$814,810	\$1,629,620
	Residential	558	\$54,533,330	\$27,266,665	\$81,799,995
	Total	659	\$60,207,155	\$32,940,490	\$93,147,645
Unincorporated	Agricultural	471	\$6,894,740	\$6,894,740	\$13,789,480
	Commercial	62	\$23,889,250	\$23,889,250	\$47,778,500
	Exempt	157	\$0	\$0	\$0
	Industrial	103	\$117,343,590	\$176,015,385	\$293,358,975
	Mixed Use	3	\$2,078,930	\$2,078,930	\$4,157,860

Jurisdiction	Property Type	Improved Parcels/Structures	Improved Value	Estimated Content Value	Total Value
	Residential	3,023	\$382,321,120	\$191,160,560	\$573,481,680
	Total	3,819	\$532,527,630	\$400,038,865	\$932,566,495
	Grand Total	16,006	\$1,803,235,250	\$1,209,617,361	\$3,012,852,611

Source: Marshall County Assessor's GIS Office, Wood Analysis

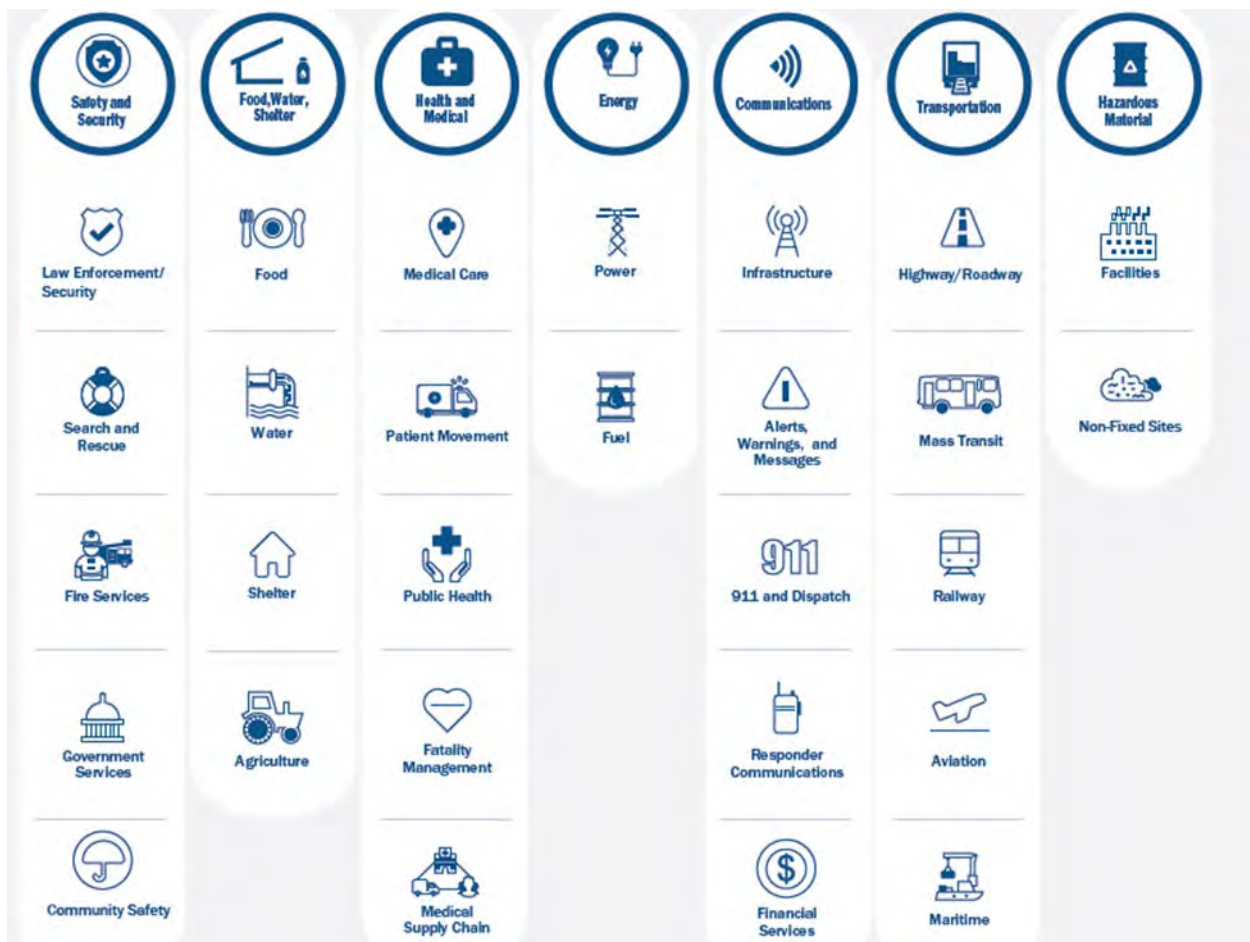
3.2.1 Human Assets

The people who live and visit Marshall County are the first priority for providing protection from natural and manmade hazards. One of the two main goals of hazard mitigation is to prevent human injury and death. Refer to Chapter 2, section 2.13 Population and Demographics for more details on the population in Marshall County.

3.2.2 Critical Facilities, Infrastructure, Other Community Assets

For the purposes of this plan, a critical facility is defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA organizes critical facilities into seven lifeline categories as shown in Figure 3-3.

Figure 3-3 FEMA Lifeline Categories



Source: FEMA

These lifeline categories standardize the classification of critical facilities and infrastructure that provide indispensable service, operation, or function to a community. A lifeline is defined as providing

indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security. These categorizations are particularly useful as they:

- Enable effort consolidations between government and other organizations (e.g. infrastructure owners and operators)
- Enable integration of preparedness efforts among plans; easier identification of unmet critical facility needs
- Refine sources and products to enhance awareness, capability gaps, and progress towards stabilization
- Enhance communication amongst critical entities, while enabling complex interdependencies between government assets
- Highlight lifeline related priority areas regarding general operations as well as response efforts.

To develop a comprehensive list of critical facilities in Marshall County (Table 3-4), three data sources were compiled and broken down along the three aforementioned critical asset categories: Marshall County's GIS databases of critical facilities and infrastructure.

The best available data was used, but some limitations include lack of complete or comprehensive data and values such as replacement costs. These databases were used in vulnerability assessments for hazards such as wildfire and flood and are represented in maps and tables in the vulnerability by hazard section that follows. Figure 3-4 illustrates the location of critical facilities in Marshall County.

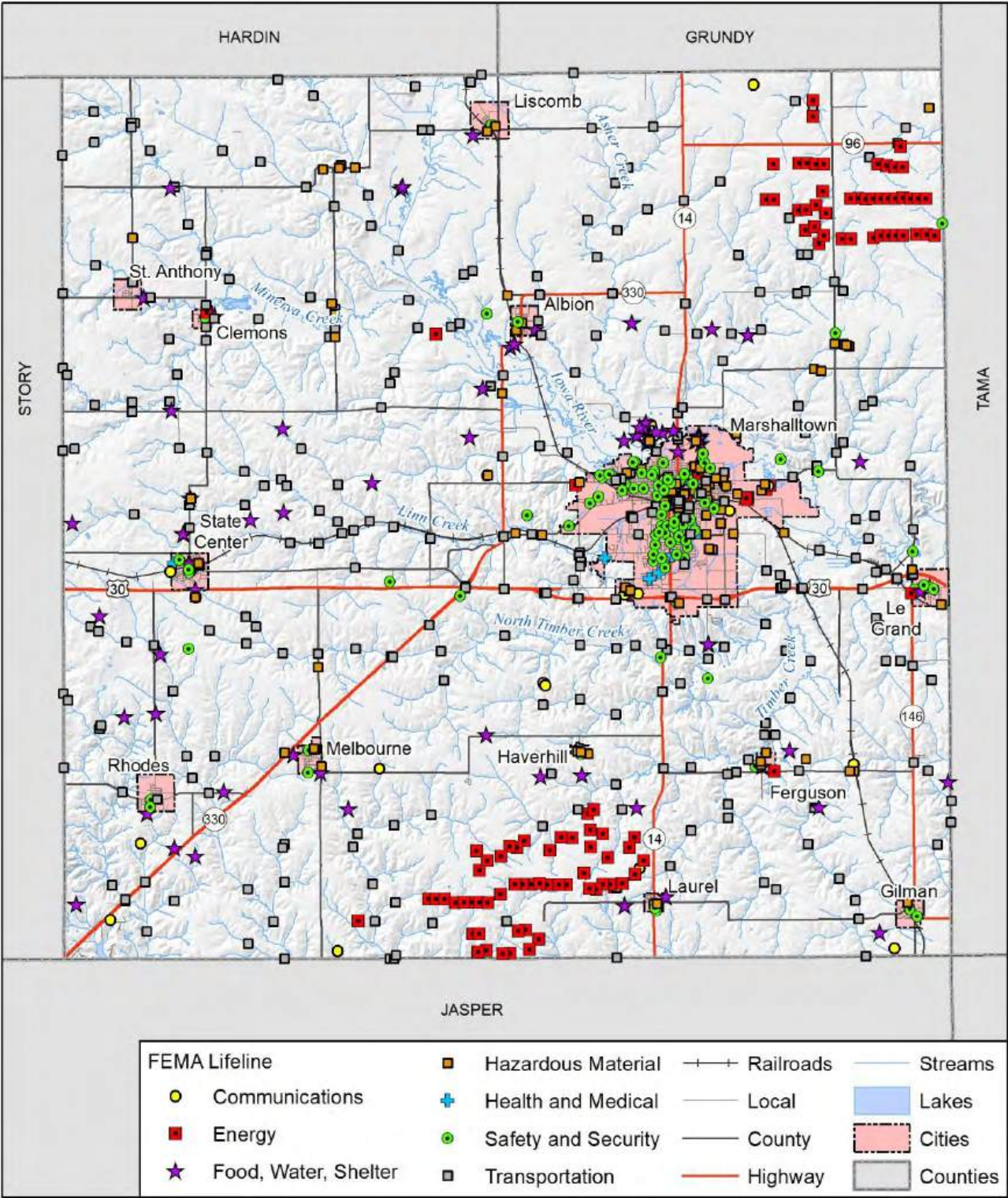
Table 3-4 Total Critical Facilities by FEMA Lifeline and Jurisdiction

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
Albion	Food, Water, Shelter	Wastewater Treatment Plant	2
	Hazardous Material	EHS Tier II Facility	1
		Tier II Facility	1
	Safety and Security	DHS Childcare	1
		Fire Station	1
	Total		6
Clemons	Energy	Electric Substation	1
	Safety and Security	Fire Station	1
	Transportation	Bridge	1
	Total		3
Ferguson	Energy	Electric Substation	1
	Food, Water, Shelter	Water Treatment Plant	2
	Hazardous Material	EHS Tier II Facility	1
		EPA RMP Facility	1
	Total		5
Gilman	Hazardous Material	EPA RMP Facility	1
	Safety and Security	Fire Station	1
		Public School	1
	Total		3
Haverhill	Hazardous Material	EHS Tier II Facility	2
		EPA RMP Facility	1
	Safety and Security	Fire Station	1
	Total		4
Laurel	Hazardous Material	EHS Tier II Facility	1
		EPA RMP Facility	1
	Safety and Security	DHS Childcare	1

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
		Fire Station	1
		Public School	1
		Total	5
Le Grand	Food, Water, Shelter	Wastewater Treatment Plant	2
		Water Treatment Plant	2
	Hazardous Material	Tier II Facility	1
	Safety and Security	DHS Childcare	1
		Fire Station	1
		Law Enforcement	1
		Public School	1
	Transportation	Bridge	1
	Total		10
Liscomb	Food, Water, Shelter	Wastewater Treatment Plant	2
	Hazardous Material	EHS Tier II Facility	1
		Tier II Facility	1
	Safety and Security	Fire Station	1
	Total		5
Marshalltown	Communications	Cellular Tower	1
		Microwave Service Tower	23
	Energy	Electric Substation	6
		Power Plant	4
	Food, Water, Shelter	Wastewater Treatment Plant	2
		Water Use Well	45
	Hazardous Material	Contaminated Facilities	20
		EHS Tier II Facility	18
		EPA RMP Facility	1
		Tier II Facility	15
	Health and Medical	Hospital	1
		Nursing Home	6
		Public Health Office	1
	Safety and Security	City Hall	1
		College	1
		College and University	1
		Courthouse	1
		DHS Childcare	38
		Fire Station	1
		Law Enforcement	1
		Library	1
		Private School	2
		Public School	10
		Solid Waste Facility	11
	Transportation	Bridge	29
	Total		240
Melbourne	Food, Water, Shelter	Water Treatment Plant	2
	Hazardous Material	EHS Tier II Facility	2
		EPA RMP Facility	1
	Safety and Security	DHS Childcare	1
		Fire Station	1
	Total		7
Rhodes	Food, Water, Shelter	Wastewater Treatment Plant	2

Jurisdiction	FEMA Lifeline	Critical Facility Type	Count
	Safety and Security	Fire Station	1
		Solid Waste Facility	3
	Transportation	Bridge	1
	Total		7
St Anthony	Transportation	Bridge	1
	Total		1
State Center	Communications	Microwave Service Tower	1
	Energy	Power Plant	1
	Food, Water, Shelter	Wastewater Treatment Plant	2
		Water Treatment Plant	2
		Water Use Well	1
	Hazardous Material	Contaminated Facilities	4
		EPA RMP Facility	1
		Tier II Facility	1
	Health and Medical	Nursing Home	1
	Safety and Security	DHS Childcare	2
		Fire Station	1
		Law Enforcement	1
		Public School	3
Total		21	
Unincorporated	Communications	Cellular Tower	5
		Microwave Service Tower	34
	Energy	Electric Substation	5
		Power Plant	1
		Wind Turbine	97
	Food, Water, Shelter	Open Feedlot	28
		Wastewater Treatment Plant	10
		Water Treatment Plant	15
		Water Use Well	19
	Hazardous Material	Contaminated Facilities	6
		EHS Tier II Facility	11
		EPA RMP Facility	10
		Tier II Facility	13
	Safety and Security	DHS Childcare	5
		Fire Station	2
		Law Enforcement	1
		Public School	1
		Solid Waste Facility	8
	Transportation	Airport	1
		Bridge	284
	Total		556
Grand Total			873

Figure 3-4 Marshall County Critical Facilities



wood
Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD, DNR,
National Inventory of Bridges, HIFLD

0 5 10 Miles



3.2.3 Historic Assets

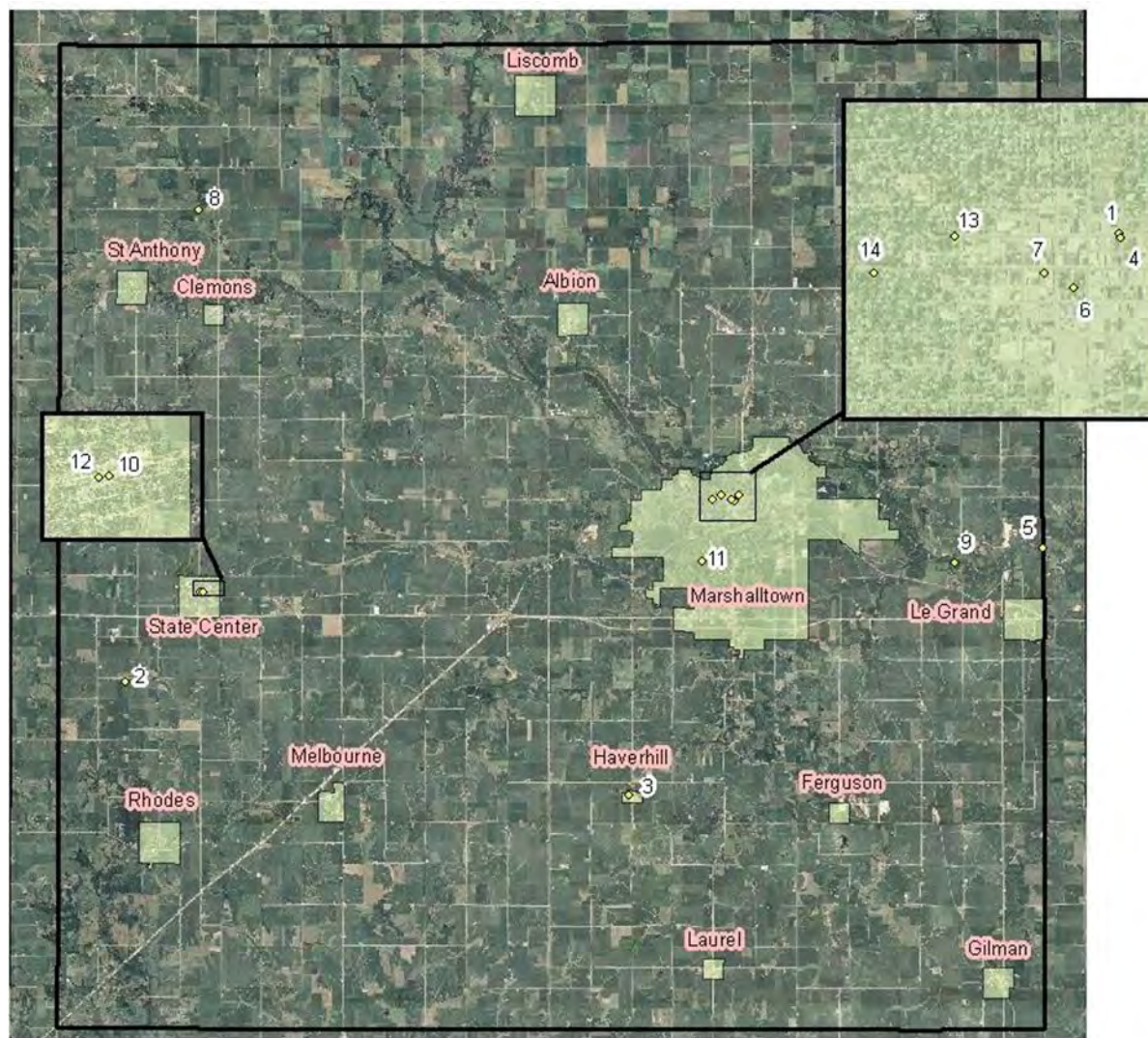
The 14 historic sites are spread across only some parts of Marshall County. There is one major cluster of historic sites in the city of Marshalltown, which can be seen in the call out in Figure 3-5 on the next page. This cluster contains a majority of the sites in the county. Because these historic sites are in such close proximity, they should have a high priority and consideration when it comes to protection from hazards. Many of these sites are used presently as critical facilities and therefore, maintain a high importance to the city.

In order to identify the locations of 14 registered historic sites in Marshall County, Geographic Information Systems software was used. The National Geographic Information System Library and the Iowa Department of Natural Resources provided aerial photos as well as county and incorporated city boundary shapefiles. The State Historic Society provided the points of the historic sites listed on the National Register of Historic Places. (<http://www.nps.gov/nr/>) The full list of Marshall County's historic sites is below:

1. Binford, Thaddeus, House, aka City Federation of Women's Club
2. Dobbin Round Barn
3. Edel, Matthew, Blacksmith Shop and House
4. Glick--Sower House, aka Sower, Susie, Historical House
5. Le Grand Bridge
6. Marshall County Courthouse
7. Marshalltown Downtown Historic District
8. Minerva Creek Bridge
9. Quarry Bridge
10. State Center Commercial Historic District
11. Sunday, Robert H., House, aka Cassidy House
12. Watson's Grocery
13. Whitehead, C. H., House
14. Willard, Leroy R., House

Refer to Figure 3-4. This map shows the location of each historic site with its corresponding number in the list above as its identifier.

Figure 3-5 Marshall County Historic Sites



Legend

- ◆ Historic Sites ■ Incorporated Cities □ Marshall County

Created By: Alyson Lutz, 6/24/2011
Shapefile Sources: NRGIS Library, Iowa DNR and State Historic Society

3.3 Natural Hazards

44 CFR Requirement §201.6(c)(2)(i): [The risk assessment shall include] a description of the 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.

The following hazards are included in the Natural Hazard section: Animal/Plant/Crop Disease, Drought, Dam/Levee Failure, Earthquake, Extreme Heat, Flooding, Thunderstorm/Lightning/Hail, Tornado, Severe Winter Storms, and Wind. Natural hazard profiles are listed in alphabetical order.

3.3.1 Animal/Crop/Plant Disease

Animal/Crop/Plant Disease – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	3	1	7
Clemons	1	1	1	3	1	7
Ferguson	1	1	1	3	1	7
Gilman	1	1	1	3	1	7
Haverhill	1	1	1	3	1	7
Laurel	1	1	1	3	1	7
Le Grand	1	1	1	3	1	7
Liscomb	1	1	1	3	1	7
Marshalltown	1	1	1	3	1	7
Melbourne	1	1	1	3	1	7
Rhodes	1	1	1	3	1	7
St. Anthony	1	1	1	3	1	7
State Center	1	1	1	3	1	7
Marshall County	1	1	1	3	1	7
East Marshall Community SD	1	1	1	3	1	7
GMG Community SD	1	1	1	3	1	7
Marshalltown Community SD	1	1	1	3	1	7
West Marshall Community SD	1	1	1	3	1	7

Description

Agricultural, Crop or Plant Disease is defined as an outbreak of disease that can be transmitted from animal to animal or plant to plant. Infectious diseases introduced onto an operation can have a devastating effect on cash flow and equity. Major animal diseases include foot and mouth disease, rinderpest, African swine fever, classical swine fever, brucellosis, lumpy skin disease, and others. Adverse effects of infectious diseases can occur at the farm or industry level. Some diseases may severely limit or eliminate animal marketing options (for example: to slaughter only). In the future, producers may be responsible for potential pathogen contamination of the food supply or environment. Negative effects may be short- or long-term depending on the nature of the pathogen and level of concern among producers and consumers. Presence of some pathogens can also affect market access for high priority in day-to-day management decisions.

With Marshall County's large amount of cropland, the county is vulnerable to an animal/plant/crop disease outbreak. According to the 2017 Census of Agriculture, Marshall County has 886 farms which use approximately 316,451 acres of land in the county. The most common livestock produced in Marshall County is hogs and pigs, with 177,646 hogs and pigs sold across. Corn for grain was the top crop in acres

with 141,425 in the County. Table 3-5 provides a summary of the value of agricultural products sold in the planning area. Agricultural infestation of crops or livestock in the planning area would severely affect the economy.

Table 3-5 Market Value of Agricultural Products Sold in Marshall County

Market Value of Products Sold (Total)	\$266,035,000
Crop Sales	\$175,281,000 (66%)
Livestock Sales	\$90,754,000 (34%)
Average Per Farm	\$300,265

Source: USDA National Agricultural Statistics Service, 2017 Census of Agriculture

Animal Disease

Agricultural incidents are naturally occurring infection of livestock with insects, vermin, or diseases that render the livestock unfit for consumption or use. The livestock inventory for the state of Iowa includes 3,900,000 cattle and calves. With this substantial agricultural industry and related facilities throughout the State, the potential for infestation of livestock poses a significant risk to the Iowa economy.

The Iowa Department of Agriculture and Land Stewardship (IDALS) monitors and reports on the following animal reportable diseases in Iowa:

- African Swine Fever
- Avian Influenza,
- Bovine Spongiform Encephalopathy (BSE) Disease,
- Chronic Wasting Disease,
- Exotic Newcastle Disease,
- Foot and Mouth Disease,
- Johne's Disease,
- Pseudo rabies,
- Scrapie,
- Swine vesicular disease, and
- West Nile Virus.

Producers are required by state law to report any of the reportable animal diseases to the IDALS's Bureau of Animal Industry. The IDALS's Bureau of The Center for Agriculture Security is the lead coordinating bureau for any emergency response for an agriculture incident.

African swine fever (ASF) is a severe viral disease of pigs that can spread very rapidly in pig herds (Center for Food Security & Public Health, 2018). ASF was first discovered in Kenya in 1921 and is now found in most of sub-Saharan Africa and some areas of West Africa. ASF has no vaccine, treatment or cure, infection in a herd would lead to movement restriction, herd depopulations and other strict measures to eliminate the disease in affected areas. While ASF has never been found in the U.S., if it were to occur it could have a devastating impact on pig herds as well as economic consequences.

Avian influenza continues to be of concern in Iowa as the State is number one in poultry egg layers (over 17 million in 2019) and consisting of 15% of the egg production in the United States; 7th nationally in turkey raised, 5% of total raised in the United States in 2019 (USDA 2020).

Bovine Spongiform Encephalopathy (BSE) "mad cow" disease is a chronic, degenerative disease affecting the central nervous system of cattle. Cases have been found world-wide since 1986, but in Canada and the

U.S. only a single cow was reported with BSE in 2003. Additional cases were reported in 2005, 2006, 2012 and 2017. A BSE case was reported in 2018 in Florida, making it the sixth recorded case in the United States since 2003 (USDA 2020). No cases have been reported in the state of Iowa.

Chronic Wasting Disease (CWD) is a fatal, neurological disease of farmed and wild deer and elk. The disease has been identified in wild and captive mule deer, white-tailed deer and North American elk, and in captive black-tailed deer. The first case of CWD in Iowa was found in 2012 on a hunting preserve in the southeastern part of the State.

Virulent Newcastle disease (vND), formally known as Exotic Newcastle disease (END), is a contagious and fatal viral disease affecting all species of birds. There was an epidemic of vND in California in 2003 that is resulting in the death of millions of chickens and other birds, and costing millions of dollars. vND is probably one of the most infectious diseases of poultry in the world. vND is so virulent that many birds die without showing any clinical signs. As of June 1, 2020, the USDA Animal and Plant Health Inspection Services, certified that the United States has eradicated vND from poultry, satisfying the World Organization for Animal Health criteria for eradication of the disease (USDA APHIS 2020).

Johne's (yo-knees) disease is a contagious, chronic and eventually fatal infection that affects the small intestine of ruminants, including cattle, sheep and goats. Johne's, also called Para tuberculosis, is a slow progressive wasting disease with an incubation period of usually 2 or more years. Johne's is a reportable disease, but not a quarantinable disease.

Pseudo rabies is a viral disease most prevalent in swine, often causing newborn piglets to die. Older pigs can survive infection, becoming carriers of the pseudo rabies virus for life. Other animals infected from swine die from pseudo rabies, which is also known as Aujeszky's disease and "mad itch." Infected cattle and sheep can first show signs of pseudo rabies by scratching and biting themselves. In dogs and cats, pseudo rabies can cause sudden death. The virus does not cause illness in humans. Due to an extensive eradication program, Iowa and the rest of United States are free of pseudo rabies.

Scrapie is a fatal, degenerative disease affecting the central nervous system of sheep and goats that is very similar to BSE (mad cow disease), although it does not cause disease in humans, and has been present in the U.S. for over 50 years. Infected flocks that contain a high percentage of susceptible animals can experience significant production losses. In these flocks, over a period of several years, the number of infected animals increases and the age at onset of clinical signs decreases making these flocks economically unviable. Animals sold from infected flocks spread scrapie to other flocks. The presence of scrapie in the U.S. also prevents the export of breeding stock, semen, and embryos to many other countries. Currently there is a national program underway to eradicate scrapie in the U.S.

Swine vesicular disease is a contagious viral disease of pigs and hogs (Center for Food Security & Public Health, 2018). The disease is similar to a number of other vesicular diseases such as foot and mouth disease but is not life-threatening and pigs usually recover on their own. Swine vesicular disease can be found in parts of Europe and Asia. While not found in North America, if an imported pig was to arrive in the U.S. with the illness it could still have an economic impact on the agricultural economy.

Disease outbreaks can also occur in wild animal populations. The IDALS's Bureau of Animal Industry also monitors wild animal species and game throughout the state as well as diseases that may impact them.

Crop Pests/Disease

A plant disease outbreak or a pest infestation could negatively impact crop production and agriculturally dependent businesses. An extreme outbreak or infestation could potentially result in billions of dollars in production losses. The cascading net negative economic effects could result in wide-spread business

failures, reduction of tax revenues, harm to other state economies, and diminished capability for this country to compete in the global market.

Many factors influence disease development in plants, including hybrid/variety genetics, plant growth stage at the time of infection, weather (e.g., temperature, rain, wind, hail, etc.), single versus mixed infections, and genetics of the pathogen populations. The two elements of coordination and communication are essential when plant diseases or pest infestations occur. The United States Department of Agriculture/ Animal Plant Health Inspection Service, Iowa Department of Agriculture and Land Stewardship, local producers, local government, assessment teams, and state government entities must work together to effectively diagnose the various plant hazards to determine if immediate crop quarantine and destruction is required.

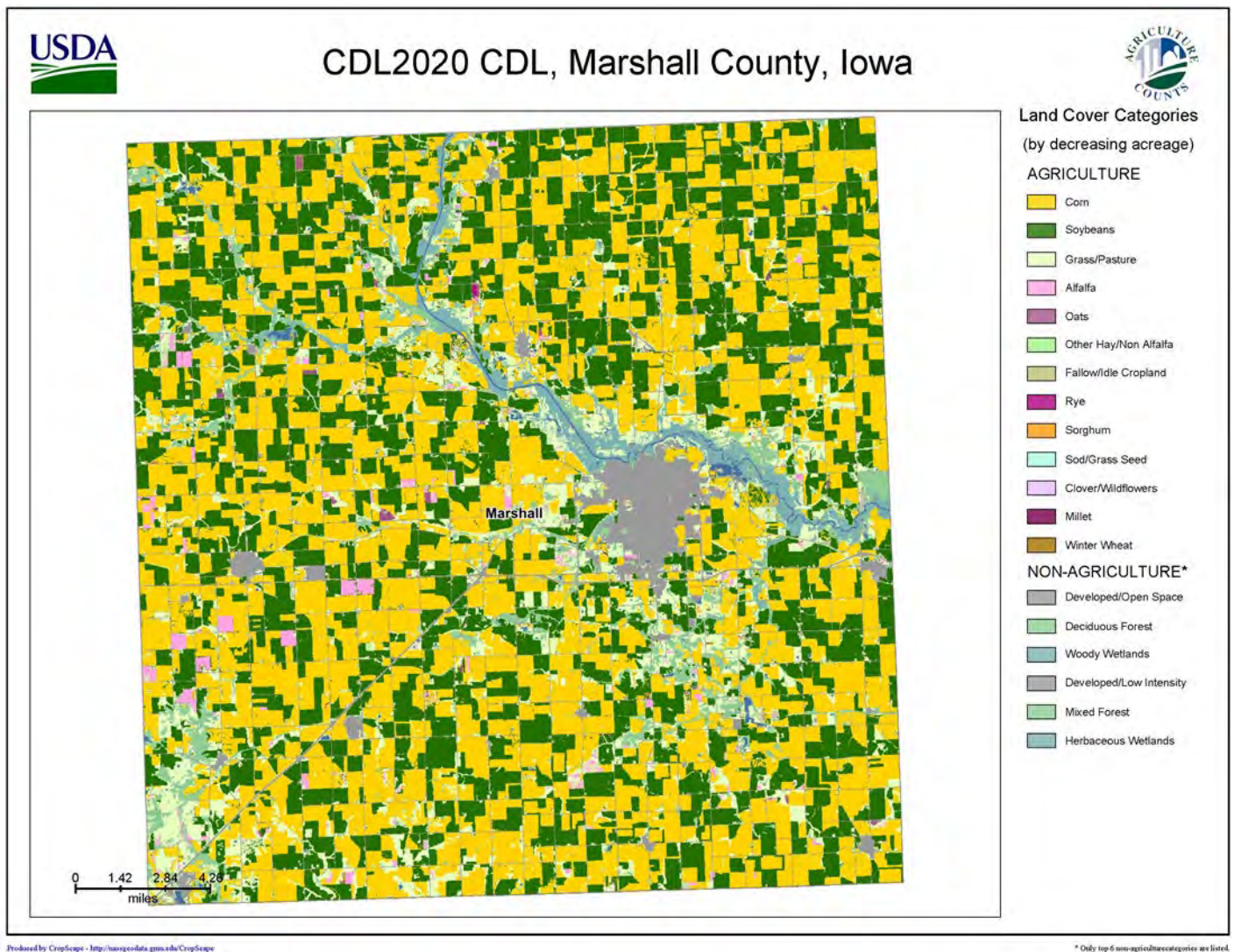
Iowa State University, College of Agriculture and Life Sciences, has The Plant and Insect Diagnostic Clinic that provides diagnosis of plant problems (plant diseases, insect damage, and assessment of herbicide damage) and the identification of insects and weeds from the field, garden, and home. Specific plant pests can vary from year to year. For complete details of all insects and diseases that can impact crops in Marshall County, see the website above.

Location

All of Marshall County is subject to animal/livestock incidents and agricultural infestations. There are 886 farms in the County that cover 316,451 acres of land.

As can be seen in the USDA Crop Data Layer (CDL) for 2020 in Figure 3-6, a large amount of land outside the county's boundaries is in agricultural use, with primary crops of corn and soybeans.

Figure 3-6 Marshall County Land Use Classification



Historical Occurrence

Statewide, there are several animal/plant/crop diseases that have the potential to affect Marshall County.

Animal Disease

One disease is the West Nile Virus (WNV). First identified in New York City and carried by birds and mosquitoes, the disease spread to four states in 1999 and to 12 states and the District of Columbia in 2000. WNV causes severe neuralgic infections in humans, horses, and other mammal species. As of early 2003, the disease has been found in nearly all states east of the Rocky Mountains, including Iowa where 15 confirmed human cases, 113 birds, and 1,039 horses have tested positive. Marshall County has had no reported cases of West Nile Virus from 2007 to 2017 (the time frame for which data was available) (Iowa Department of Public Health, Center for Acute Disease Epidemiology).

Porcine Epidemic Diarrhea (PED) Virus was confirmed in the US in 2013 (Iowa State University Veterinary Medicine Center 2015). The disease causes severe diarrhea in pigs of all ages; mortality rates in young

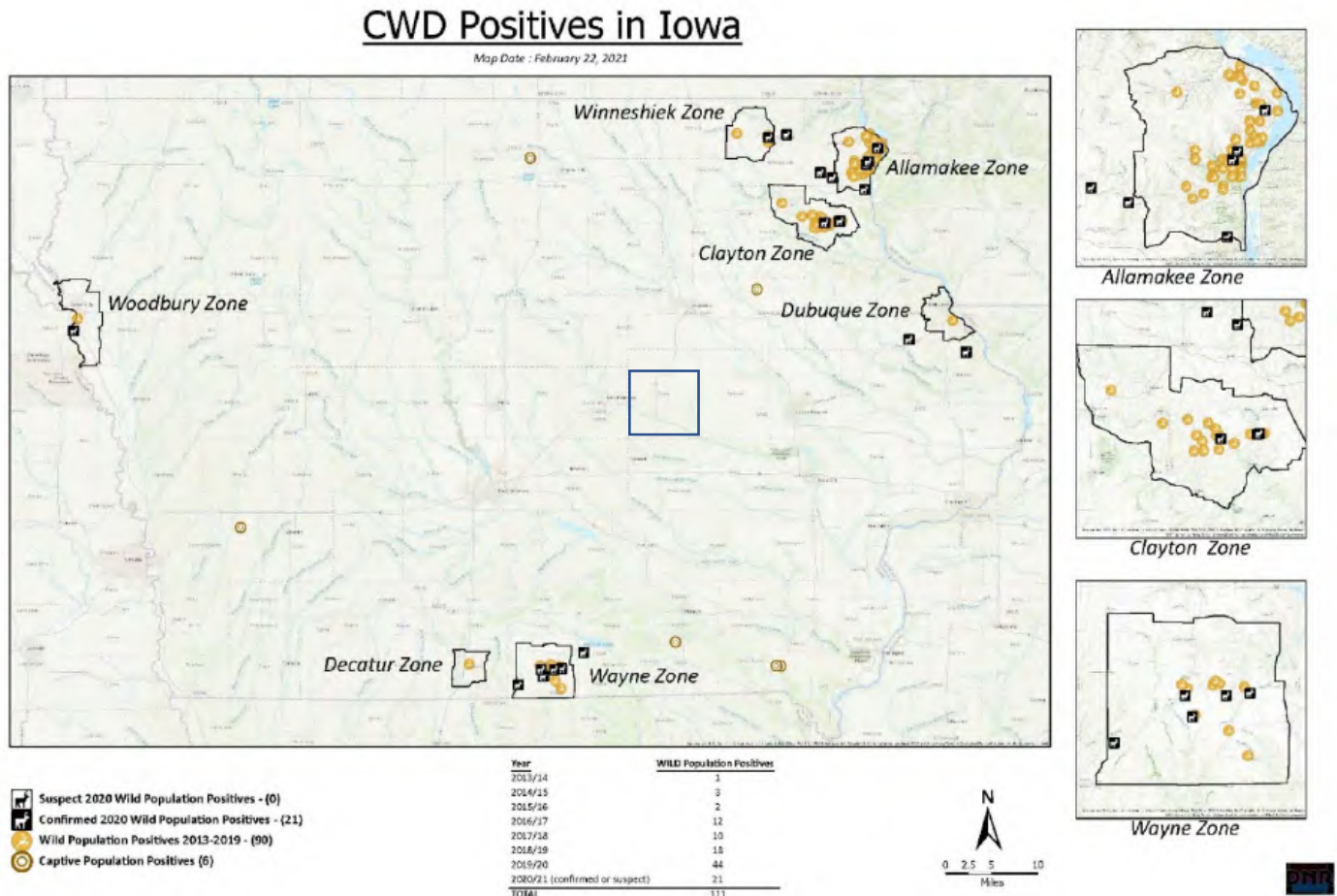
pigs range from 30 – 100%. This disease's effect on Marshall County alone is not clear, but it has affected the hog market at large.

Avian Influenza, or Bird Flu, was detected in Iowa in the spring of 2015. At the time that this plan was written in the summer of 2015, 70 farm facilities have been affected in 18 counties, resulting in 32.7 million affected chickens or turkeys in Iowa (IDALS 2015). There are no confirmed cases of the disease in Marshall County. According to the last Ag Census in 2012, Marshall County only had 33 poultry operations in the county that generated \$199,900 in sales. The small size of poultry in the agricultural economy of Marshall County gives the county a low risk for the disease (National Agricultural Statistics Service 2015). According to data obtained from NRGIS, Marshall County currently has no confined animal feeding operations that house poultry, which also makes the county's risk for avian flu low.

There has been a total of 77 sheep flocks in Iowa that have been found to be infected with Scrapie since the accelerated national Scrapie Eradication Program started in November 2001. In fiscal year 2005, Iowa had a high of 15 newly infected flocks. The number of new infected flocks has been decreasing since that time. Iowa's last infected flock was found in June 2010. There were no infected herd identified in the United States in 2020 (USDA 2020).

The first case of CWD in Iowa was found in 2012 on a hunting preserve in the southeastern part of the state. In that case, it was determined the CWD-positive mature buck had been transferred to the hunting preserve from a deer farm in north central Iowa. Iowa Department of Natural Resources collects samples from deer hunters and conducts testing for CWD. A total of 68,878 samples were collected between 2002 and the 2018/19 hunting season statewide; 273 samples were collected in Marshall County in this time period (IDNR 2019). No positive cases have been found in Marshall County in 2020. In samples collected between 2013 and 2020 from wild deer populations found 111 positives in the state. A majority of the positive cases were found in the state Department of Natural Resources established deer management zones.

Figure 3-7 Positive CWD Cases in Iowa 2013-2021



Source: Iowa Department of Natural Resources Note: Blue square represents Marshall County

Crop/Plant Disease

According to the U.S. Department of Agriculture's Risk Management Agency, between 2007-2017, combined crop insurance payments for damages resulting from insects, and plant disease totaled \$71,239 for 1,229 acres lost. Note, records between 2007 and 2020 were searched but no records of events were found in Marshall County after 2017. Table 3-6 provides a summary of insured crop losses as a result of crop infestations.

Table 3-6 Crop Insurance Payments for Crop/Pest Diseases 2007-2017

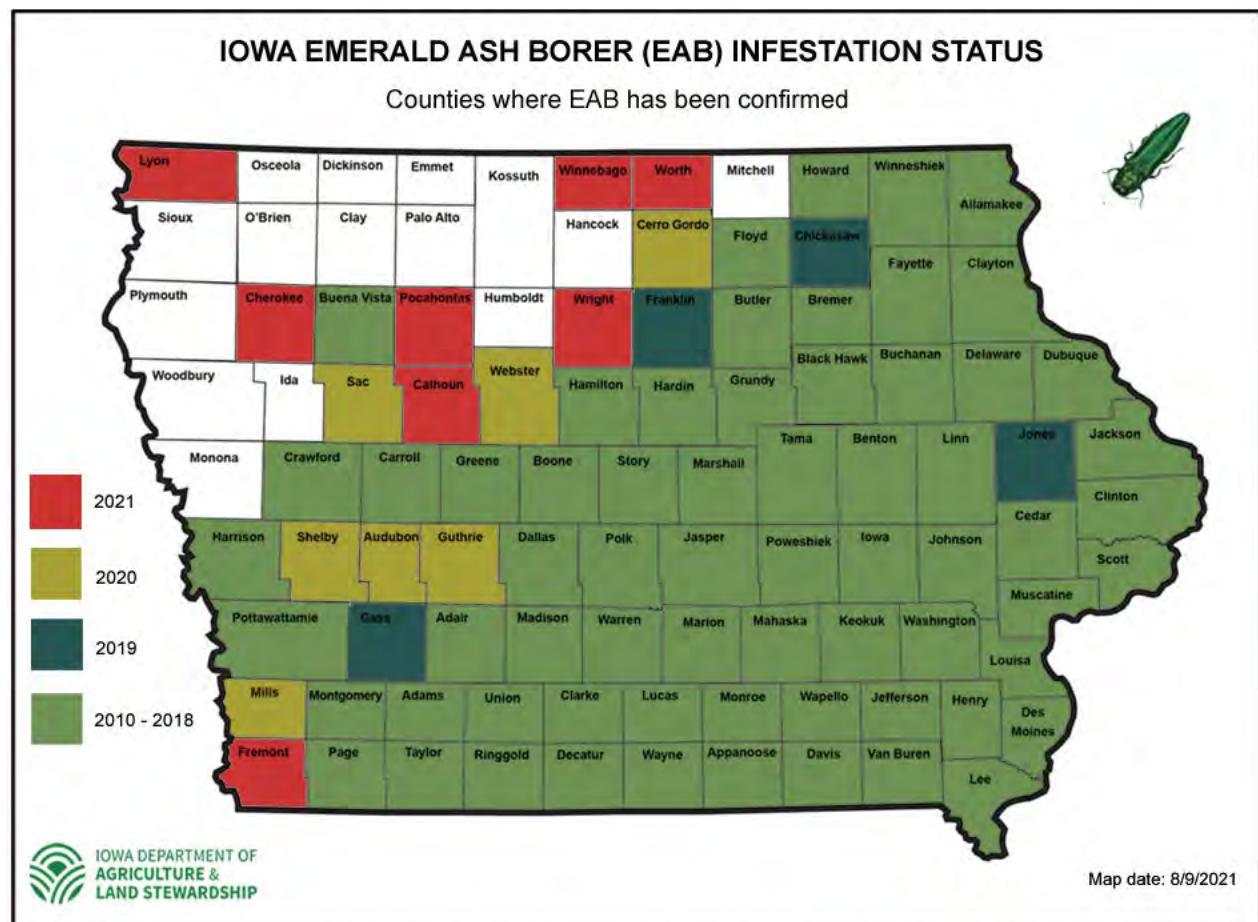
Crop Year	Crop Name	Cause of Loss Description	Acres Lost	Insurance Paid (\$)
2007	Corn	Insects	65	\$2,111
2010	Soybeans	Plant Disease	78.5	\$9,458
2011	Corn	Plant Disease	146.4	\$9,850
	Soybeans	Insects	206.25	\$9,436
2014	Soybeans	Plant Disease	341.7	\$19,533
2016	Soybeans	Plant Disease	370.3	\$20,098
2017	Corn	Plant Disease	21.2	\$753

Crop Year	Crop Name	Cause of Loss Description	Acres Lost	Insurance Paid (\$)
Total			1,229.4	\$71,239

Source: USDA Risk Management Agency

As of April 2021, 76 counties in Iowa had confirmed Emerald Ash Borer within their boundaries. Between 2010 and 2018, EAB was confirmed in Marshall County, and treatment areas continued in 2020. Areas identified in 2018 included rural areas north of Le Grand and in Marshalltown. According to the HMPC, the City of Marshalltown is actively removing ash trees that have been damaged by the Emerald Ash Borer, with 89 trees scheduled to be removed during the fall of 2021.

Figure 3-8 Iowa Emerald Ash Borer (EAB) Infestation Status, August 2021



Iowa Department of Agriculture & Land Stewardship, Entomology & Plant Science Bureau, Entomology@iowaAgriculture.gov, 515-725-1470

Although there is potential for animal/plant/crop diseases to occur in Marshall County, the previous historical occurrence is rare, especially on a scale that has significantly affected the region's economy or public safety. Marshall County has had no animal/plant/crop diseases that have affected the county on an epidemic scale. The HMPC determined the county's score to be a 1, with fewer than four hazard events that have affected the county in the last 16 years.

Probability of Future Occurrences

As one of the nation's top producer of corn, soybeans, eggs, and hogs, Iowa farmers and producers know the importance of securing America's food supply. With hundreds of thousands of head of livestock produced and transported in Iowa each year, Iowa could be a rich environment for a disease epidemic to take hold if precautions such as vaccinations and handling procedures are not rigorously followed. However, based on the historical occurrence of animal/plant/crop diseases probability of a future occurrence is low. The Hazard Mitigation Planning Committee determined that Marshall County had a less than 10% chance of a significant animal/plant/crop disease occurring.

Magnitude and Severity (Extent)***Severity of Impact***

Animal health emergencies can take many forms: disease epidemics, large-scale incidents of feed and water contamination, extended periods without adequate water, harmful exposure to chemical, radiological, or biological agents, and large-scale infestations of disease-carrying insects or rodents, to name a few. One of the principal dangers of disease outbreaks is that they can rapidly overwhelm the animal care system. However, state and federal animal health programs have been very successful in preventing or limiting the scope and magnitude of animal emergencies. If all of these safeguards failed, a disease outbreak might cause injury, illness, or major property damage (in the form of agricultural losses). Critical facilities and emergency services could be shut down or overwhelmed for more than 24 hours.

Speed of Onset

The private practitioner is the first line of defense and will undoubtedly be the first to witness the symptoms of animal/crop/plant diseases. The United States Department of Agriculture monitors reports submitted by veterinarians and labs to identify patterns. The department is proactive in providing information to the agricultural community on medical concerns. Conditions related to scope and magnitude can escalate quickly in certain circumstances, but farmers would be given at least a 24-hour notice.

Climate Change Considerations

The climate change impacts below are excerpted from the 2010 Report on Climate Change Impacts on Iowa developed by the Iowa Climate Change Impacts Committee.

Crops

Despite great improvements in yield potential over the last several years, crop production remains highly dependent on climate in conjunction with other variables. The overall effect of climate change on crop productivity in Iowa remains unclear, as positive climatic events could be overridden by the impacts of poor management or genetics, or favorable management and genetics could override negative climate events.

Regardless of these interactions, it is certain that climate changes will affect future crop production. Greenhouse and growth chamber studies suggest increases in atmospheric carbon dioxide (CO₂) will generally have a substantial positive effect on crop yields by increasing plant photosynthesis and biomass accumulation.

Greater precipitation during the growing season, as we have been experiencing in Iowa, has been associated with increased yields; however, excessive precipitation early in the growing season adversely affects crop productivity. Waterlogged soil conditions during early plant growth often result in shallower root systems that are more prone to diseases, nutrient deficiencies and drought stress later in the season.

An increase in temperature, especially during nighttime, reduces corn yield by shortening the time in which grain is accumulating dry matter (the grain fill period). According to research, Iowa's nighttime temperatures have been increasing more rapidly than daytime temperatures.

The current changes in precipitation, temperature, wind speeds, solar radiation, dew-point temperatures, and cloud cover imply less ventilation of crops and longer dew periods. Soybean plants in particular readily absorb moisture, making harvest problematic. One adaptive approach to these conditions involves farmers purchasing larger harvesting equipment to speed harvest, compensating for the reduced daily time suitable for soybean harvest.

The recent extreme weather events involving greater intensity and amount of rainfall have increased the erosive power of Iowa's precipitation, resulting in significant erosion of topsoil. The impact of climate change on the erosive force of precipitation in the U.S. is expected to increase by as much as 58%. These rates are expected to increase exponentially as precipitation continues to rise.

Plant disease can also increase as temperature, soil wetness, and humidity increase as these conditions favor the development of various plant diseases.

Animals

Despite the fact that Iowa ranks first in hog and fifth in cattle production nationwide, there is a lack of information about the effects of climate change on animal production in Iowa. Nevertheless, our general knowledge and principles pertaining to livestock and extreme weather events are applicable to Iowa's changing climate conditions.

High temperatures have been shown to reduce summer milk production, impair immunological and digestive functions of animals, and increase mortality rates among dairy cattle.

In general, domestic livestock can adapt to gradual changes in environmental conditions; however, extended periods of exposure to extreme conditions greatly reduce productivity and is potentially life threatening.

Vulnerability

Unincorporated Marshall County was identified as the jurisdiction most at risk for this hazard, as most domestic animals are located outside city corporate limits in Marshall County. Agriculture is vulnerable to the introduction of a foreign animal disease. Outbreaks can be inadvertently introduced by contaminated material carried by an international traveler or by the importation of infected animals and animal products. Foreign animal disease could enter the U.S. vectored by wild animals, insects, or migratory birds or they could be intentionally introduced to cause severe economic problems or to target human health. However, Marshall County's vulnerability is significantly diminished due to the safeguards that the agriculture industry has in place for vaccinations, research, testing, and quarantine. The HMPC determined that less than 25% of people or property would be affected in the event of an outbreak.

People

A widespread infestation of animals/livestock and crops could impact the economic base of the county and its communities. According to the USDA 2017 Census of Agriculture, Marshall County has 886 farms, - 4% change from the previous census in 2012. Animal disease outbreak specific to hogs would have a significant impact on the County. JBS Pork Production Facility is Marshalltown's largest employer, any disease outbreak related to hog production would have a significant impact on Marshalltown and for hog farmers in the County. Jobs could be negatively impacted during an agriculture emergency; jobs tangentially tied to the agriculture industry could also be affected.

Disease can exacerbate the impacts from other hazards, and an example of this is adverse weather; dead branches weakened by Emerald Ash Borer can be broken by high winds, and there are reports of these branches falling and causing harm to people.

Property

An infestation of agriculture pests could impact crop yields, potentially destroying whole fields. Between 2007 and 2017, insects and crop disease damaged 1,229.4 acres of corn and soybean field causing the RMA paying \$71,239 in indemnities to farmers.

Critical Facilities and Infrastructure

Animal, crop or plant disease is not expected to have any impacts on critical facilities or infrastructure.

Economy

According to the 2017 census of agriculture hogs and pork represented \$47,940,000 of the livestock sold in Marshall County. As of December 31, 2017, there were 177,646 hogs and pigs in the County. A serious illness that affected pig herds in the county could have a devastating impact on the local economy as well as employment in Marshalltown specifically, where JBS Pork Production Facility is a leading employer.

Nationally, it is estimated that invasive species cost the USA \$138 billion per year. As noted above, pests and crop disease in Marshall County have caused \$71,239 of indemnity payments. Average annualized losses due to crop and plant disease is estimated to be \$7,124. Economic impacts also include both prevention, response and recovery costs.

Historic, Cultural, and Natural Resources

Invasive species typically harm native species through predation, habitat degradation and competition for shared resources; they can displace native species out of natural habitats and are a leading cause of population decline and extinction in animals.

Development Trends

Future development is not expected to significantly impact the planning area's vulnerability to this hazard. However, if crop production and numbers of animals/livestock increase, the amount vulnerable to infestation also increases. Regarding the Emerald Ash Borer, the Iowa Department of Natural Resources recommends that other native tree species be planted in lieu of Ash trees to avoid increasing vulnerability to infestation of the Emerald Ash Borer.

3.3.2 Dam/Levee Failure

Dam/Levee Failure – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	1	1	4	8
Ferguson	1	1	1	1	4	8
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	1	1	4	8
Le Grand	1	1	1	1	4	8
Liscomb	1	1	1	1	4	8
Marshalltown	1	1	1	3	4	10
Melbourne	1	1	1	1	4	8
Rhodes	1	1	1	1	4	8
St. Anthony	1	1	1	1	4	8
State Center	1	1	1	1	4	8
Marshall County	1	1	1	2	4	9
East Marshall Community SD	1	1	1	1	4	8
GMG Community SD	1	1	1	1	4	8
Marshalltown Community SD	1	1	1	2	4	9
West Marshall Community SD	1	1	1	1	4	8

Description

Many of Iowa's community settlements were founded along rivers and streams due to their reliance on water resources. Often, these streams or rivers later needed a dam for flood control or a reservoir for a constant water source. A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, affecting both life and property. Dam failure can be caused by any of the following: flooding; earthquakes; flow blockages; landslides; lack of maintenance; improper operation; poor construction; vandalism; or terrorism.

The thresholds for when a dam falls under State regulation are outlined in Iowa Administrative Code 567-71.3 and are listed below. The thresholds are primarily based on both dam height and water storage volumes. State regulated dams are those dams that meet the following:

In rural areas:

- Any dam designed to provide a sum of permanent and temporary storage exceeding 50 acre-feet at the top of dam elevation, or 25 acre-feet if the dam does not have an emergency spillway, and which has a height of 5 feet or more.
- Any dam designed to provide permanent storage in excess of 18 acre-feet and which has a height of 5 feet or more.
- Any dam across a stream draining more than 10 square miles.

- d. Any dam located within 1 mile of an incorporated municipality, if the dam has a height of 10 feet or more, stores 10 acre-feet or more at the top of dam elevation, and is situated such that the discharge from the dam will flow through the incorporated area.

In urban areas:

Any dam which exceeds the thresholds in 71.3 (1) "a", "b", or "d".

Low head dams:

Any low head dam on a stream draining 2 or more square miles in an urban area, or 10 or more square miles in a rural area.

Dams are classified by the State of Iowa into three categories based on the potential risk to people and property in the event of failure (see Table 3-7). The classification can change over time due to changes in development downstream from the dam. In addition, older dams may not have been built to the standards of their updated classification when this occurs. The Iowa Department of Natural Resources performs annual inspections on all high hazard dams in the State.

Levee failure can occur by overtopping or breaching. Overtopping occurs when a river rises higher than the levee's crown. Breaching can result from the loss of structural integrity of a wall, dike, berm, or elevated soil by erosion, piping, saturation, under seepage, or animal burrows.

Any shaking or vibration of the earth caused by the sudden release of energy that may impose a direct threat on life and property.

Table 3-7 Dam Hazard Classification Definitions

Hazard Class	Definition
High	A structure shall be classified as high hazard if located in an area where failure may create a serious threat of loss of human life or result in serious damage to residential, industrial, or commercial areas, important public utilities, public buildings, or major transportation facilities.
Moderate (Significant)*	A structure shall be classified as moderate hazard if located in an area where failure may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads or railroads, interrupt major utility services, but without substantial risk of loss of human life. In addition, structures where the dam and its impoundment are of themselves of public importance, such as dams associated with public water supply systems, industrial water supply or public recreation, or which are an integral feature of a private development complex, shall be considered moderate hazard for design and regulatory purposes unless a higher hazard class is warranted by downstream conditions.
Low	A structure shall be classified as low hazard if located in an area where damages from a failure would be limited to loss of the dam, loss of livestock, damages to farm outbuildings, agricultural lands, and lesser used roads, and where loss of human life is considered unlikely.

Source: Iowa Department of Natural Resources; *the term "moderate" is used by the Iowa Department of Natural Resources. However, the National Inventory of Dams uses the term "significant" to identify the same general hazard classification

Warning Time Score: 4—Minimal or no warning (up to 6 hrs. warning)

Duration Score: 1—Less than 6 hours

Location

The Iowa Department of Natural Resources tracks all dams in the State of Iowa with a height of at least 25 feet or a total storage of at least 50 acre-feet of water. The inventory excludes dams less than 6 feet high, regardless of storage capacity, and dams less than 15 acre feet of storage, regardless of height. Marshall County has a total of 20 dams. 17 of these dams are Low Hazard Dams and three are

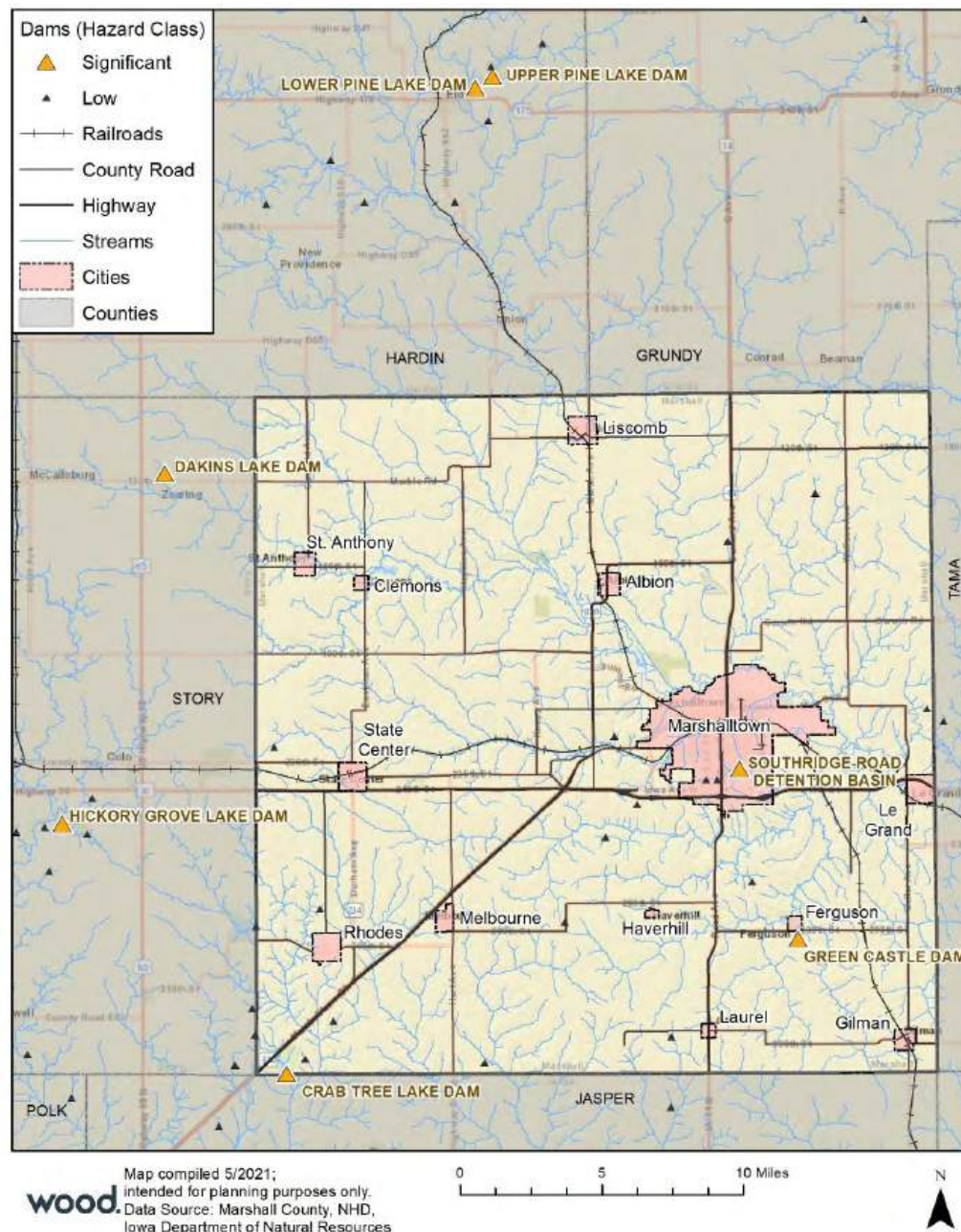
Moderate/Significant Hazard Dams. The majority of dams in the county were built for the purposes of fire protection, stock or small fish ponds. Three dams were built for the purposes of recreation, and two were built for flood control purposes. There are an additional 17 dams within five miles of Marshall County boundaries. One of those dams is a moderate classification dam but poses a minimal risk to downstream communities in Marshall County. See Figure 3-9 in this plan for a map of dams in Marshall County and adjacent counties.

Table 3-8 Marshall County High and Significant Hazard State-regulated Dams

Dam Name	Hazard Potential	Owner Name	Owner Type	River	Height (ft.)	Maximum Storage (acre feet)	Normal Storage (acre feet)	Dam Length (ft.)	Year Completed
Crab Tree Lake Dam	Significant	Crab Tree Lake Golf Club	Private	Clear Creek	33	800	400	1300	1948
Green Castle Dam	Significant	Marshall Co Conservation Bd.	Local Gvt	Brush Creek	30	263	150	650	1954
Southridge Road Detention Basin	Significant	City of Marshalltown	Local Gvt	Anson Creek	18	101	0	800	1996

Source: Iowa Department of Natural Resources

Figure 3-9 Location of Dams in Marshall County



According to the National Levee Database, Marshall County has a three-levee system located in the City of Marshalltown. The levees are located on the right and left descending banks of Linn Creek, right and left descending banks of Anson Creek, and the right descending bank of the Iowa River

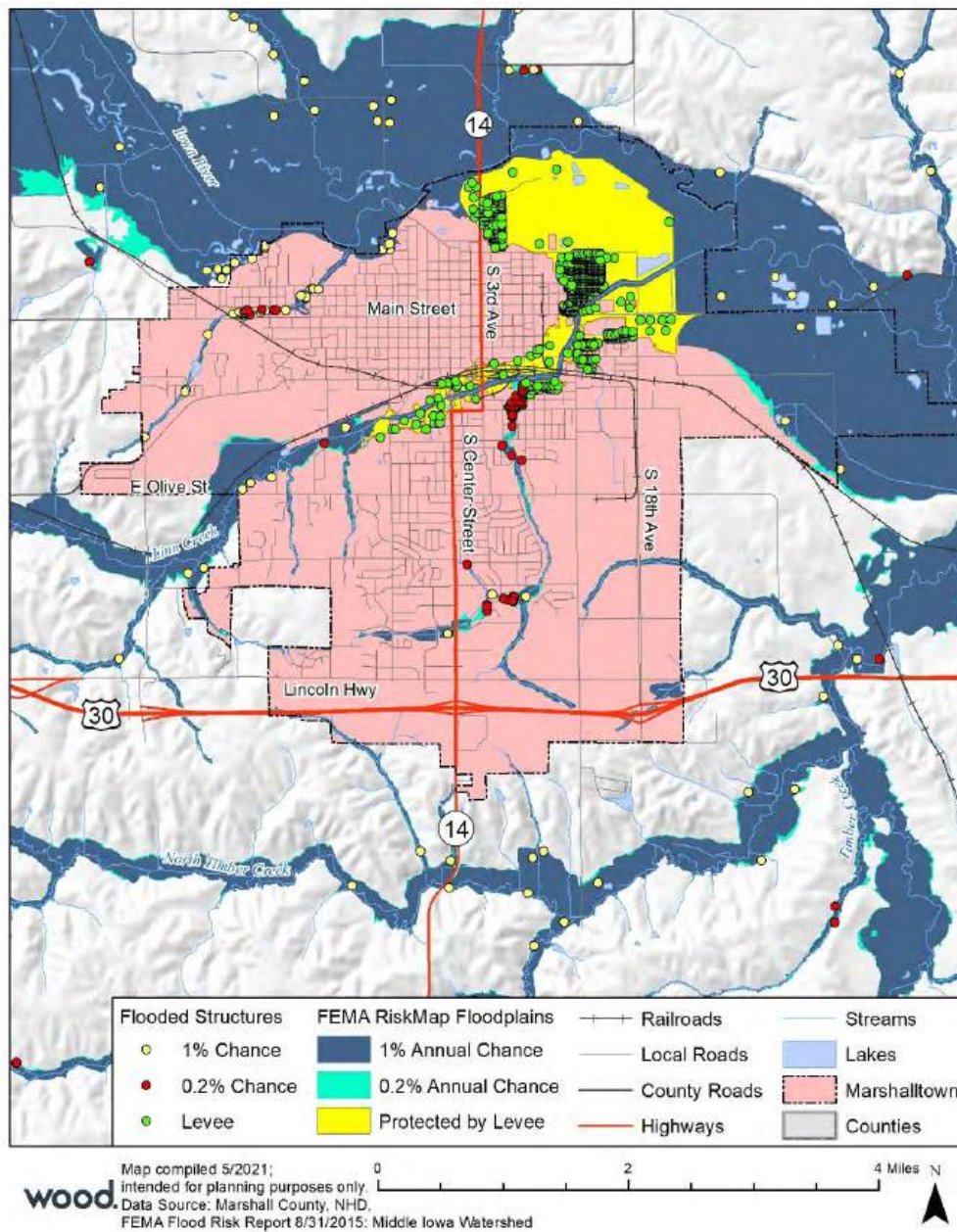
(US Army Corps of Engineers 2015). The levees' are 5.51, 2.32, and 1.28 miles in length. The levee system was completed in 1975 and were authorized by the Flood Control Act of 1965. The levee system has a total of 1361.3 leveed area acreage. As of May 2021, these levees are listed as Provisionally Accredited Levees (PALs) in the National Levee Database. PALs are levees that have been previously accredited to

reduce the area's flood hazard associated with a 1% Annual Chance flood on an effective FIRM, and are awaiting documentation that will demonstrate the levee's compliance with the NFIP regulatory criteria.

Note that the National Levee Database lists all federal levees; however, it is possible that there is more than just these levees located in Marshall County. Any levees not included in the National Levee Database are likely rural, agricultural-related man-made levees, dikes, or berms that protect primarily agricultural lands and communities. A breach or over-topping of these levees would likely not impact any other property than that of the levee owner.

There are 29 other levees within 75 miles of Marshall County; however, none of these levees pose a risk to Marshall County communities. Many of the levees are not located on the same rivers as those in Marshall County (i.e.: levees in Black Hawk, Dallas, Fayette, Polk, Wapello Counties). The location of levees in Marshalltown are shown in Figure 3-10.

Figure 3-10 Location of Levees in Marshalltown



Historic Occurrences

No jurisdictions have any reported incidents of a dam or levee failure in Marshall County.

Probability and Future Occurrences

There is an overall low probability of dam failures impacting Marshall County.

Probability Score: 1—Unlikely

Magnitude and Severity (Extent)

A failure of a low hazard dam, which includes the majority of dams in Marshall County, would result in damages that are limited to loss of the dam, livestock, farm outbuildings, agricultural lands, and lesser used roads. Low hazard dam failure would likely not have an impact on property beyond where the dam is located. The loss of human life is considered highly unlikely.

A failure of a moderate hazard dam may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads, or interrupt major utility services, but are without substantial risk of loss of human life. Dams are also classified as Moderate Hazard where the dam and its impoundment are themselves of public importance, such as dams associated with public water supply systems, industrial water supply or public recreation or which are an integral feature of a private development complex.

All jurisdictions scored vulnerability as a 1 due to the limited impact of a low hazard dam failure. The HMPC estimated that less than 25% of people and property would be affected.

Severity of Impact

Most jurisdictions in Marshall County determined the severity of impact of a dam failure to be negligible (a score of 1), with few or no injuries, little or no property damage, and any interruption of services to take place for less than four hours, if at all. Marshall County and Marshalltown Community School District determined their severity of impact to be a 2. Impacts could cause minor or short-term property damage or environmental impacts. Marshall County considered the potential damage that could be caused due to a moderate hazard dam failure in an incorporated area; the failure is remote and would still only result in minimal property damage, but this risk is slightly higher than most other communities in Marshall County. Marshalltown Community School District has a slightly higher severity of impact score than other communities because of its proximity to the levee system in Marshalltown. The City of Marshalltown determined their severity of impact to be a 3 due to the potential for flood damage from a levee failure that could cause property damage that threatens structural stability in houses and buildings. There are already some ponding issues that the city has to address near one of the levees. The city has a pump system set up to address this issue during potential flood events.

Speed of Onset

A dam failure can be immediate, leaving little or no time to warn those downstream of the imminent hazard. With maintenance and monitoring, weak areas and possible failure points can be identified allowing time for evacuation and securing of the dam. Most dams are only inspected periodically thus allowing problems to go undetected until a failure occurs. All jurisdictions scored speed of onset as a 4.

Climate Change Considerations

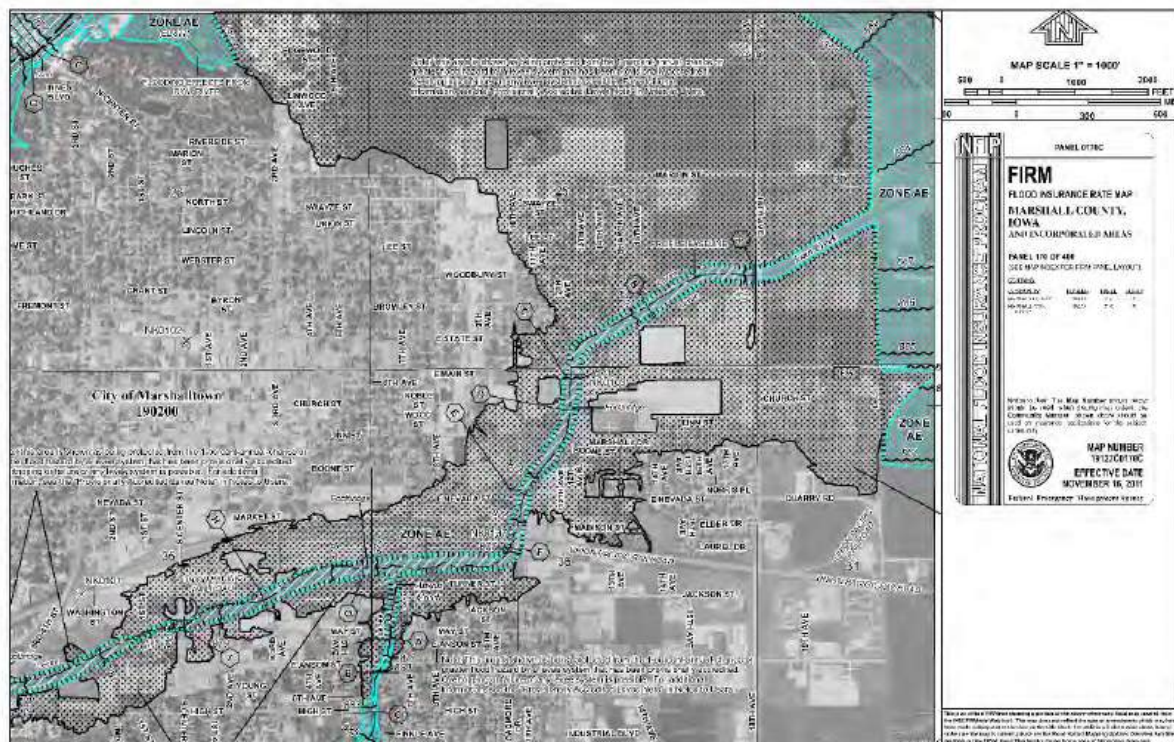
Many climate change studies have shown increases in precipitation extremes, especially in areas that are usually cold and humid. This could lead to an increased strain on dams and levee systems, leading to a higher chance of failure.

Vulnerability Assessment

Marshall County has a total of 20 dams. 17 of these dams are Low Hazard Dams and three are Moderate Hazard Dams. The majority of dams in the county were built for the purposes of fire protection, stock or small fish ponds. Three dams were built for the purposes of recreation, and two were built for flood control purposes. There are an additional 17 dams within five miles of Marshall County boundaries. One of those dams are moderate classification dams but pose a minimal risk to downstream communities in Marshall County. See Figure 3-10 for the location of these dams in the county.

The only jurisdiction at risk for levee failure is Marshalltown. Three levees are located in the northern area of the city. These levees were built in 1975 and were authorized by the Flood Control Act of 1965. The latest improvements to the levee system and floodwalls in Marshall County occurred between 2000 and 2008 (US Army Corps of Engineers 2015). Much of the area in northern Marshalltown is now protected from flooding from the Iowa River. More central Marshalltown is protected from flooding from Linn Creek, which is a tributary of the Iowa River. A FEMA FIRMette of the levee area in Marshalltown is included in Figure 3-11. The area with black stippling portrays the area that is considered to have reduced risk due to the levees, according to the FEMA Map Service Center (2021, effective 2011).

Figure 3-11 Area Protected from 1% Annual Chance Flood Hazard by Levee System



People

There are no dams with a substantial risk of loss of human life in Marshall County.

Property

To determine potential losses to existing development due to dam failure, available inundation maps and inspection reports were obtained from the Iowa Department of Natural Resources.

Properties affected by levee failure were included in the GIS analysis (detailed methods in Flooding Section 3.3.5, Vulnerability Assessment). The results of this analysis are shown in Table 3-9, and show structure breakdown by property type and count at risk to levee failure.

Table 3-9 Improved Properties in Area Protected from 1% Annual Chance Due to Levee

Jurisdiction	Property Type	Improved Parcels/ Structures	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Population
Marshalltown	Agricultural	2	\$221,920	\$221,920	\$443,840	\$110,960	
	Commercial	56	\$7,470,814	\$7,470,814	\$14,941,628	\$3,735,407	
	Exempt	17	\$0	\$0	\$0	\$0	
	Industrial	17	\$3,843,120	\$3,843,120	\$7,686,240	\$1,921,560	
	Mixed Use	2	\$149,090	\$149,090	\$298,180	\$74,545	5
	Residential	531	\$24,201,560	\$12,100,780	\$36,302,340	\$9,075,585	1,365
	Total	625	\$35,886,504	\$23,785,724	\$59,672,228	\$14,918,057	1,370

Significant Hazard Dams

Crab Tree Lake Dam: The July 24, 2017 inspection report was reviewed. This report concluded a "satisfactory" rating for the condition of the dam. This dam was constructed in the 1950s by a private landowner. Ownership has changed several times over the years. In 1986 the dam and surrounding area were purchased by Crab Tree Lake Resort Recreational Adventures, LTD, and the current owner is the Harvester Golf Club which has built a golf course next to part of the lake. The Harvester Golf Club is responsible for the operation and maintenance of the dam.

This dam is classified as a Significant Hazard structure because a breach flood would damage the Marshall-Jasper county line road and a sewage lagoon located immediately downstream of the road, and because of the important recreational values of the impoundment. While there would be damage to agricultural property, there is no potential for residential, commercial, or industrial property damage in the event of a sudden dam failure.

Green Castle Dam: The June 15, 2020 inspection report was reviewed. This report concluded a "satisfactory" rating for the condition of the dam. This dam was constructed by a private landowner in 1954. The Marshall County Conservation Board acquired the dam in 1976 and the DNR approved reconstruction of the dam in 1987 under FP #87-113. Construction was completed in 1988. The Board owns and operates the Green Castle Recreation Area and they are responsible for maintenance of the dam.

This dam is rated a Significant Hazard primarily due to the importance of the structure as a recreational facility. Downstream structures within one mile include a paved county road. There is no residential, commercial, or industrial development below the dam that would be affected by a breach flood.

Southridge Road Detention Basin: An inspection report was not available for this dam.

Marshalltown Levees: Marshalltown contains improved properties in areas protected from 1% Annual Chance Flooding by provisionally accredited levees. As of the assessment on 01/01/2017, these levees are rated as low risk for loss of life, economic, or environmental consequences.

Critical Facilities and Infrastructure

There are no critical facilities that are at risk to dam failures in Marshall County.

There are a total of 60 critical facilities that are within the area protected by levees from 1% annual chance flood hazards in Marshalltown. The FEMA lifelines protected by levees in Marshalltown include Communications; Food, Water, and Shelter; Hazardous Material; Safety and Security; and Transportation. See Table 3-10 for a detailed breakdown of critical facility by FEMA lifeline.

Table 3-10 Facilities Within the Area Protected by Levee Flood Hazard

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total
Marshalltown	5	-	37	9	-	6	3	60

Economy

Economic impacts due to a dam or levee failure event will be related to both the event (i.e. damage to containment structure) and the recovery after the event.

Historic, Cultural and Natural Resources

A dam failure event in Marshall County could cause damage to agricultural land and recreational facilities. There are no historic or cultural resources that would be affected by a dam failure. The Marshalltown Historic District is not within the area protected by levees and therefore would not be affected by a failure of the Marshalltown Levee System.

Development Trends

While Marshall County is at a low risk for dam failure, development below a significant hazard dam can change its classification, however development trends are not anticipated to change risk significantly. Levee failure risk is not expected to change significantly due to development trends.

3.3.3 Drought

Drought – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	2	3	3	2	1	11
Clemons	2	3	3	2	1	11
Ferguson	2	3	3	2	1	11
Gilman	2	3	3	2	1	11
Haverhill	2	3	3	2	1	11
Laurel	2	3	3	2	1	11
Le Grand	2	3	3	2	1	11
Liscomb	2	3	3	2	1	11
Marshalltown	2	3	3	2	1	11
Melbourne	2	3	3	2	1	11
Rhodes	2	3	3	2	1	11
St. Anthony	2	3	3	2	1	11
State Center	2	3	3	2	1	11
Marshall County	2	3	3	2	1	11
East Marshall Community SD	2	3	3	2	1	11
GMG Community SD	2	3	3	2	1	11
Marshalltown Community SD	2	3	3	2	1	11
West Marshall Community SD	2	3	3	2	1	11

Description

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. There are four types of drought conditions relevant to Iowa:

Meteorological drought is defined on the basis of the degree of dryness (in comparison to some “normal” or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.

Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts are out of phase with impacts in other economic sectors.

Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, and so forth. Plant water demand depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

Socioeconomic drought refers to when physical water shortage begins to affect people.

The four different types of drought can all occur in Iowa. A meteorological drought is the easiest to determine based on rainfall data and is an easier drought to monitor from rain gauges and reports. A hydrological drought means that stream and river levels are low, which also has an impact for surface water and ground water irrigators. In addition, in-stream discharges that fall below a pre-required level also place the State in regulatory difficulty with U.S. Fish and Wildlife and with neighboring states over cross-border flowage rights. An agricultural drought represents difficulty for Iowa's agricultural-based economy and is also relatively easy to monitor based on crop viabilities for different regions.

The National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln provides a clearinghouse for information on the effects of drought, based on reports from media, observers and other sources.

The NDMC categorizes impacts of drought as economic, environmental, or social. Many economic impacts occur in agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in both crop and livestock production, drought is associated with increases in insect infestations, plant disease and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk. Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected.

Although drought is not predictable, long-range outlooks may indicate an increased chance of drought, which can serve as a warning. A drought period can last for months, years, or even decades. It is rarely a direct cause of death, though the associated heat, dust and stress can all contribute to increased mortality.

Location

The entire planning area in Marshall County is at risk to drought. However, the agricultural use areas are at increased risk due to the dependence of agriculture on adequate precipitation. According to the 2017 USDA Census of Agriculture, 316,451 acres within Marshall County is designated agricultural land or cropland, a majority of which (92%) is cropland (USDA 2017). The average farm size in Marshall County is 357 acres.

Historical Occurrence

Drought occurs periodically in Iowa with the most severe in historical times occurring in the 1930's. Other major droughts, usually characterized by deficient rainfall combined with unusually high summer temperatures, occurred in 1886, 1893-1894, 1901, 1954-1956, 1976- 1977, 1988-1989, 1999, 2000, 2003, 2005, 2006, 2012-2013, 2017-2018. Historically droughts cause more economic damage to the State than all other weather events combined.

The National Center for Environmental Information (NCEI) data indicates that Marshall County has suffered ten periods of drought conditions from 2000 to 2020. Table 3-11 lists each event recorded in the NCEI database including property and crop damage totals. Note that the totals listed for property and crop damage are for all counties affected by this hazard event.

Table 3-11 Marshall County Drought Events From 2000-2020

Date	Property Damage	Crop Damage
8/14/2000		\$4,690,000
9/1/2000		\$5,030,000
8/1/2001		\$11,350,000
8/1/2003	\$12,650,000	\$0
7/1/2012		\$45,000,000
8/1/2012		\$6,000,000
9/1/2012		\$0
10/1/2012		\$0
8/1/2013		\$21,000,000
9/1/2020		\$0
Total	\$12,650,000	\$93,070,000

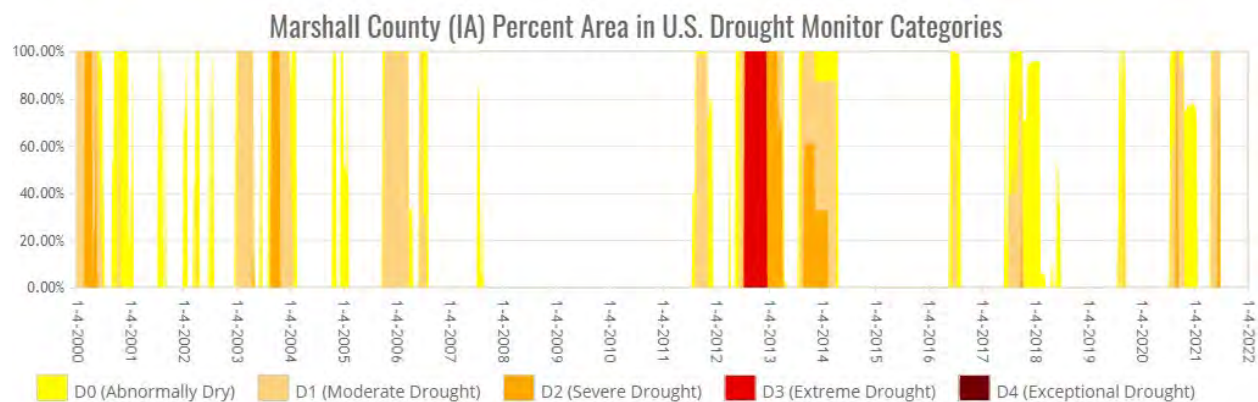
Source: NCEI

According to the National Drought Mitigation Center's Drought Impact Reporter, between January 1980 and December 31, 2020, Marshall County was included in 5 listed drought impacts. The entire State of Iowa was affected by 206 of these impacts. The following are the categories and reported number of impacts. Note: some impacts have been assigned to more than one category:

- Agriculture – 4
- Relief, Response & Restrictions – 3
- Water Supply & Quality – 1

While some past events have been more severe than others, agricultural areas were affected much more than the metropolitan areas where impacts were indirect. The 2012-2013 drought resulted in \$21 million for the affected counties in Iowa, according to the previous Hazard Mitigation Plan. No deaths or injuries were reported during any of drought events.

Figure 3-12 below provided by the U.S. Drought Monitor, summarizes the historical drought conditions for Marshall County by intensity and percent area from 2000 through January 2021. The county periodically experiences moderate to severe drought; extreme and severe drought intensity was experienced in 2012 and 2013.

Figure 3-12 Historic Drought Intensity (Percent Area), 2000-January 2021

Marshall County was designated in three USDA Secretarial disaster declarations that included drought in 2012 – September 2020 to make emergency loans available to producers suffering losses.

Table 3-12 USDA Disaster Designations for Drought, Marshall County, 2012-2020

Year	Declaration Number
2012	S3310
2013	S3614
2020	S4788

Source: USDA

According to the USDA's Risk Management Agency (RMA), payments for insured crop losses in Marshall County as a result of drought conditions occurred in nearly every year in the past thirteen years from 2007-2020 and totaled \$21,901,592 for a loss of 146,492 acres. The following table breaks down the RMA payments by year and crop type.

Table 3-13 Crop Insurance Claims Paid from Drought, 2007-2020

Year	Crop Name	Acres Lost	Insurance Paid
2007	Corn	183.6	\$4,677
	Corn	73.84	\$4,754
	Corn	139.2	\$8,934
	Soybeans	72.09	\$8,841
	Soybeans	80.09	\$2,790
2008	Soybeans	63.6	\$263
	Soybeans	69.5	\$3,212
2011	Corn	3428.78	\$461,953
	Soybeans	1138.41	\$130,132
2012	Oats	47.3	\$3,052
	Corn	395.1	\$74,546
	Corn	69.9	\$3,176
	Corn	1920.16	\$1,172,631
	Corn	22998.04	\$3,270,824
	Hybrid Corn Seed	868.15	\$298,876
	Soybeans	627.9	\$29,275
	Soybeans	6039.1	\$633,228
2013	Corn	186.93	\$16,502
	Corn	20.03	\$11,800
	Corn	508.06	\$133,266
	Corn	57407.08	\$10,044,347
	Hybrid Corn Seed	282.05	\$33,874
	Hybrid Corn Seed	76.75	\$99,680
	Soybeans	11.8	\$263
	Soybeans	28220.15	\$1,990,009
	Soybeans	759	\$66,633
	Corn	8	-\$103
2014	Corn	1963.235	\$124,741
	Soybeans	18.9	\$854
	Soybeans	269.63	\$7,317
	Soybeans	149.6	\$5,099
2015	Soybeans	52.6	\$783
2016	Soybeans	48	\$1,274

Year	Crop Name	Acres Lost	Insurance Paid
2017	Forage Production	20	4572
	Forage Production	38.7	1740
	Corn	617.496	65453.95
	Corn	4.15	152
	Corn	8.19	2000.18
	Hybrid Corn Seed	46.18	2997
	Soybeans	1529.8736	91395.36
	Soybeans	122.4	202
2018	Corn	136.59	45032.5
	Soybeans	62.865	1916.2
2020	Corn	2282.846	\$1,560,114
	Corn	228.752	\$159,546
	Corn	7211.0889	\$835,520
	Corn	38.68	\$6,690
	Corn	221	\$58,266
	Corn	361.619	\$44,741
	Corn	568.8575	\$109,918
	Hybrid Corn Seed	51.05	\$6,710
	Soybeans	28.42	\$419
	Soybeans	4049.57	\$226,416
	Soybeans	164.6033	\$8,499
	Soybeans	36.83	\$1,338
Total		146,026	\$21,881,141

Source: USDA Risk management Agency

Probability of Future Occurrences

Drought is part of normal climate fluctuations. Climatic variability can bring dry conditions to the region for up to years at a time. Research and observations of the El Nino/La Nina climatic events are resulting in more predictable climatic forecasts. The frequency of drought conditions in Iowa may increase with the onset on climate change.

NOAA's National Climatic Data Center uses the U.S. Palmer Drought Indices and the Standardized Precipitation Index to monitor and predict drought conditions. Lack of precipitation for a given area is the primary contributor to drought conditions. Since precipitation levels cannot be predicted in the long term, the following indices can be used to determine the probability of future occurrences of drought.

The following are the indices:

- Palmer Z Index monitors short-term monthly moisture conditions when depart from normal,
- Palmer Drought Severity Index measures the duration and intensity of the long-term (meteorological) drought patterns,
- Palmer Hydrological Drought Index measures long-term (hydrological) drought and wet conditions reflecting groundwater and reservoir levels.
- Standardized Precipitation Index is a probability index that considers only precipitation. This is important to farmers to estimate soil moisture.

Based on historic occurrences of drought Marshall County maintains between 25% and 50% chance of drought occurring in any given year. Based on this calculation and the documented trend of warmer climate conditions, the probability rating is "Likely"

Magnitude and Severity (Extent)

Those dependent on rain would be the most vulnerable during a drought. This means that agriculture, agribusiness, and consumers would be impacted. A drought limits the ability to produce goods and provide services. Because citizens draw their drinking water from groundwater sources, a prolonged severe drought may impact all citizens if there were to be a dramatic drop in the water table. Fire suppression can also become a problem due to the dryness of the vegetation and possible lack of water. Generally, a drought event may directly or indirectly impact 50-75% of people and property in Marshall County. A prolonged drought would have a larger impact.

A period of prolonged abnormally low precipitation that produces severe dry conditions. A chart that classifies drought severity is included in Table 3-14. All ranges of drought severity could be experienced, though the droughts in the past 20 years typically range from moderate to severe and occasionally extreme based on the information provided in the Historic Occurrences section.

Table 3-14 Drought Severity Classification Chart

Description	Possible Impacts	Palmer Drought Index
Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9
Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9
Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9
Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9
Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less

Source: The National Drought Mitigation Center, 2015

Severity of Impact

Drought in the U.S. seldom results directly in the loss of life. Deaths associated with drought are usually related to a heat wave. Drought more directly affects agricultural crops, livestock, natural vegetation, and stream flows that include fish and aquatic vegetation. Impacts are costly to the economy, environment, and general population. Drought may cause short-term property damage until drought conditions dissipate.

Speed of Onset

Drought warning is based on a complex interaction of many different variables, water uses, and consumer needs. Drought warning is directly related to the ability to predict the occurrences of atmospheric conditions that produce the physical aspects of drought, primarily precipitation and temperature. There are so many variables that can affect the outcome of climatic interactions, and it is difficult to predict a drought in advance. An area may already be in a drought before it is recognized. While the warning of the drought may not come until the drought is already occurring, the secondary effects of a drought may be predicted and warned against weeks in advance.

Climate Change Considerations

According to the Fourth National Climate Assessment, climate change impacts in the Midwest will include increased frequency of late-growing season drought conditions. Future conditions of surface soil moisture is projected to increase in insufficient levels in summer driven by an increase in temperatures leading to greater loss of moisture through evaporation (U.S. Global Change Research Program 2018).

Vulnerability

People

The historical and potential impacts of drought on populations include agricultural sector job loss, secondary economic losses to local businesses and public recreational resources, increased cost to local and state government for large-scale water acquisition and delivery, and water rationing and water wells running dry for individuals and families. As drought is often accompanied by prolonged periods of extreme heat, negative health impacts such as dehydration can also occur, where children and elderly are most susceptible. Other public health issues can include impaired drinking water quality, increased incidence of mosquito-borne illness, an increase in wildlife-human confrontations and respiratory complications as a result of declined air quality in times of drought.

Property

No structures will be directly affected by drought conditions, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Droughts can also have significant impacts on landscapes, which could cause a financial burden to property owners. However, these impacts are not considered critical in planning for impacts from the drought hazard.

Critical Facilities and Infrastructure

Drought typically affects crops and cropland more than it affects structures, but all critical facilities in the area could still experience effects. These critical facilities include, but are not limited to, schools, health care facilities, police and fire stations, water towers, lift stations, city and county buildings, and sirens.

Economy

Economic impact will be largely associated with industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. Agricultural industries will be impacted if water usage is restricted for irrigation. Table 3-13 shows crop loss data due to drought between 2007 and 2020. Based on information in that table Marshall County experiences an average annualized loss of \$1,683,165 due to drought.

Historic, Cultural, and Natural Resources

If a drought event were to occur in Marshall County, crops and grassland areas may be more susceptible to fire, water for fire suppression may be limited, and jurisdictions may have to limit water consumption or look for alternative water sources. Cultural facilities would likely not be impacted by drought unless water usage was limited, or a facility was affected by a grass or wildland fire.

Development Trends

Each municipal planning partner in this effort has an established comprehensive plan that includes policies directing land use and dealing with issues of water supply and the protection of water resources. These plans provide the capability at the local municipal level to protect future development from the

impacts of drought. All planning partners reviewed their general plans under the capability assessments performed for this effort. Deficiencies identified by these reviews can be identified as mitigation initiatives to increase the capability to deal with future trends in development. Currently population is decreasing but vulnerability to drought will increase if population growth increases in the future, putting more demands on existing water supplies. Future water use planning should consider increases in population as well as potential impacts of climate change.

3.3.4 Earthquake

Earthquake – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	1	1	4	8
Ferguson	1	1	1	1	4	8
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	1	1	4	8
Le Grand	1	1	1	1	4	8
Liscomb	1	1	1	1	4	8
Marshalltown	1	1	1	1	4	8
Melbourne	1	1	1	1	4	8
Rhodes	1	1	1	1	4	8
St. Anthony	1	1	1	1	4	8
State Center	1	1	1	1	4	8
Marshall County	1	1	1	1	4	8
East Marshall Community SD	1	1	1	1	4	8
GMG Community SD	1	1	1	1	4	8
Marshalltown Community SD	1	1	1	1	4	8
West Marshall Community SD	1	1	1	1	4	8

Description

An earthquake is a sudden motion or trembling that is caused by a release of energy accumulated within or along the edge of Earth's tectonic plates. Earthquakes occur primarily along fault zones, tears in the Earth's crust, along which stresses build until one side of the fault slips, generating compressive and shear energy that produces the shaking and damage to the built environment. Heaviest damage generally occurs nearest the epicenter which is that point on the Earth's surface directly above the point of fault movement. The composition of geologic materials between these points is a major factor in transmitting the energy to buildings and other structures on the Earth's surface.

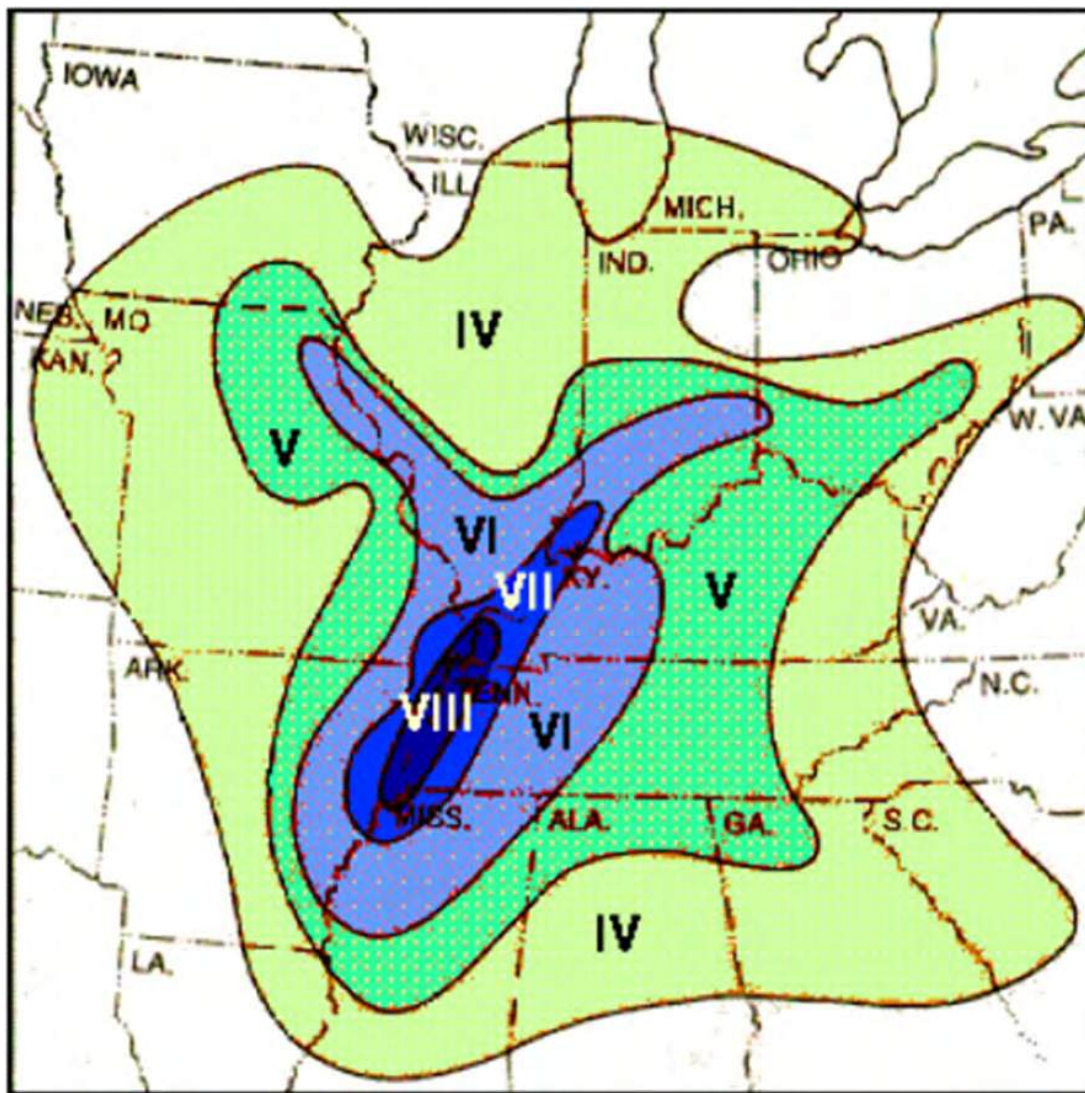
Location

While geologists often refer to the Midwest as the "stable midcontinent," because of its lack of major crustal movements, there are two regions of active seismicity, the Nemaha Ridge and the New Madrid Fault Zone. The Nemaha Ridge in Kansas and Nebraska, associated with the Humboldt Fault, is characterized by numerous small earthquakes that release stresses before they build to dangerous levels. The fault is not considered a threat to Iowa. The New Madrid Fault Zone, on the other hand, has greater destructive potential. It is located along the valley of the Mississippi River, from its confluence with the Ohio River southward, and includes portions of Illinois, Kentucky, Tennessee, Missouri, Arkansas, and Mississippi. The Earth's crust in the midcontinent is older, and therefore thicker, cooler, and more brittle

than that in California for example. Consequently, earthquake shock waves travel faster and farther in the Midwest, making quakes here potentially more damaging than similar sized events in other geologic settings.

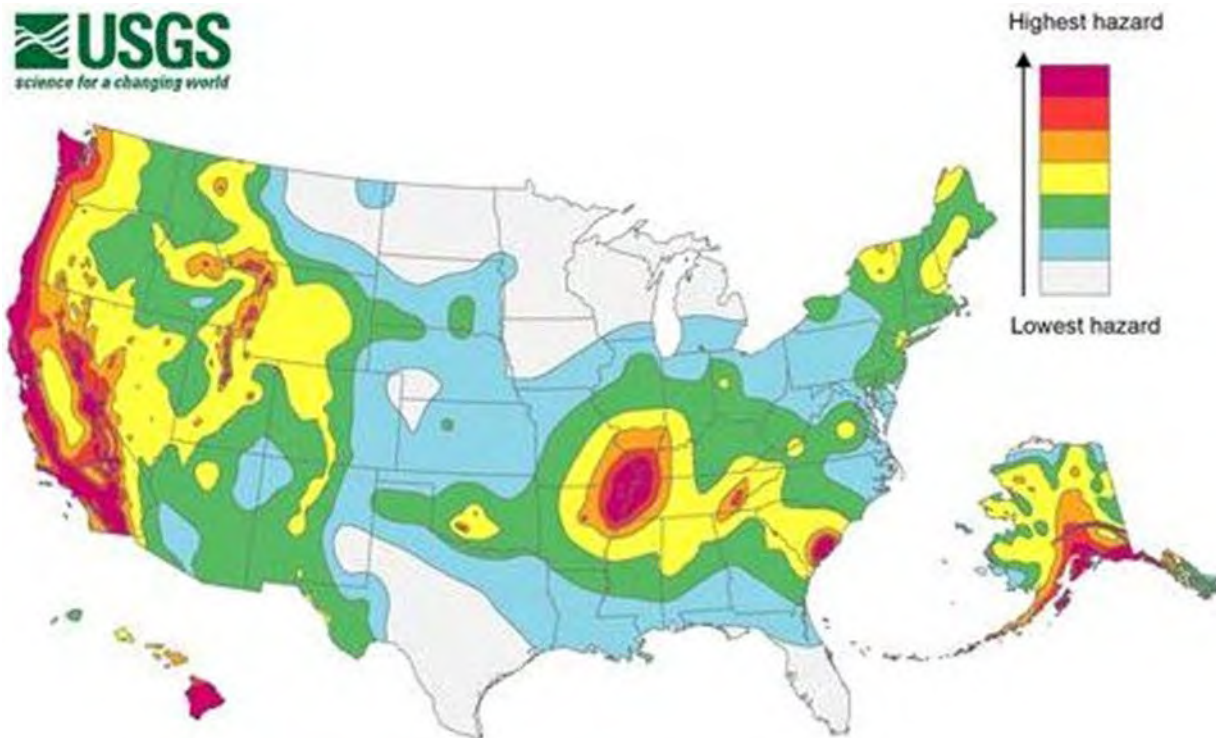
Iowa counties are located in low-risk zones as a whole. The southeastern part of the State is more at risk to earthquake effects from the New Madrid Fault Zone. Figure 3-13 shows the estimated effects of a 6.5 Richter magnitude earthquake scenario along the New Madrid Fault Zone. It suggests that Iowans in four southeast counties could experience trembling buildings, some broken dishes and cracked windows, movement and falling of small unstable objects, abrupt openings or closing doors, and liquids spilling from open containers. About 29 other counties, from Page to Madison to Muscatine, could experience vibrations similar to the passing of a heavy truck, rattling of dishes and windows, creaking of walls, and swinging of suspended objects. These effects will vary considerably with differences in local geology and construction techniques. Figure 3-14 shows the Seismic Hazard Map for the U.S. showing the peak ground acceleration of 10 percent in a 50-year timeframe.

Figure 3-13 6.5 Richter Magnitude Earthquake Scenario, New Madrid Fault Zone



Source: <http://www.igsb.uiowa.edu/Browse/quakes/quakes.htm>

Figure 3-14 United States Seismic Hazard Map



Source: United States Geological Survey, <https://www.usgs.gov/media/images/2018-long-term-national-seismic-hazard-map>

Historical Occurrence

Iowa as a whole has experienced the effects of only a few earthquakes in the past two centuries. The epicenters of 13 earthquakes have been located in the state. The majority have been along the Mississippi River, and none have been in central Iowa. The last earthquake to occur in Iowa was in the southwestern Iowa town of Shenandoah in 2004. Since the early 1800s, 9 earthquakes have occurred outside of Iowa but have impacted areas in the state. The most recent quakes were in the 1960s and occurred in Illinois and Missouri. While more than 20 earthquakes have occurred in or impacted Iowa in the past 200 years, they have not seriously affected Iowa. As of July 2021, no earthquakes have been reported in Marshall County.

Probability of Future Occurrences

Based on historical occurrence, Marshall County has a less than 10% chance of an earthquake occurring in any given year in the county.

Seismologists attempt to forecast earthquake size and frequency based on data from previous events. In the New Madrid Fault Zone, this analysis is difficult because there are few historic moderate to large earthquakes, and the active faults are too deeply buried to monitor effectively. Based on recurrence intervals for small earthquakes, scientists estimate a 90% chance of a Richter magnitude 6.0 earthquake in the New Madrid Fault Zone by 2040. A magnitude 6.5 in New Madrid would create a magnitude 4 effect in Iowa resulting in little or no damage or fear.

Magnitude and Severity (Extent)

The extent or severity of earthquakes is generally measured in two ways: 1) Magnitude Measurement utilizes the Richter Magnitude Scale and 2) Severity Measurement utilizes the Modified Mercalli Intensity Scale.

Richter Magnitude Scale

The Richter Magnitude Scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Modified Mercalli Intensity Scale

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. Although numerous intensity scales have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects.

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced.

The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

Severity of Impact

Most of Iowa is located in Seismic Zone 0, the lowest risk zone in the United States. Most structures in Iowa are not built to earthquake standards, but because of the relatively low magnitude of the possible quake, property damage would likely be very minimal. The most vulnerable structures are those built on poorly consolidated substrate, especially floodplain materials.

In general, peak ground acceleration (PGA) is a measure of the strength of ground movements. More specifically, the PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity. According to the United States Geological Services, for Marshall County, the peak acceleration with a 2% probability of exceeding in 50 years is 2% g, which means the County is under a very small threat in regard to earthquakes. Also, most of Iowa is located in Seismic Zone 0, which is the lowest risk zone in the United States.

The strongest earthquake in Iowa occurred in Davenport in 1934 and resulted in only slight damage. Estimated effects of a 6.5 Richter magnitude earthquake along the New Madrid Fault Zone suggests Iowans in four southeast counties could experience trembling buildings, some broken dishes and cracked windows. About 29 other counties, from Page to Polk to Muscatine, could experience vibrations similar to the passing of a heavy truck, rattling of dishes, creaking of walls, and swinging of suspended objects. If an earthquake were to occur, it would more than likely be felt in all of Marshall County.

Speed of Onset

Earthquake prediction is an inexact science. Even in areas that are well monitored with instruments, such as California's San Andreas Fault Zone, scientists only very rarely predict earthquakes.

Climate Change Considerations

Climate change is not anticipated to affect the frequency or severity of earthquakes.

Vulnerability

The HMPC estimated that, if an earthquake were to occur, less than 25% of people and property would be affected in Marshall County.

People

The main impacts to Marshall County from a New Madrid Earthquake would most likely be related to incoming evacuees from areas more heavily damaged by the event. This could result in a shortage of short-term lodging, such as hotel rooms and extended stay establishments. Depending on the magnitude of the earthquake, shelters may be designated in Marshall County as evacuee shelter locations. If this occurred, assistance would be coordinated through the Emergency Management Assistance Compact (EMAC) between the State of Iowa and State governments of impacted areas.

Property

Most structures in Marshall County are not built to withstand earthquake shaking, but because of the relatively low magnitude of a possible quake, property damage would likely be very minor damage.

Critical Facilities and Infrastructure

Critical facilities are potentially vulnerable to an earthquake event, but anticipated impacts are likely to be minor and mostly to be to non-structural items.

Economy

Economic impacts due to an earthquake event will be related to both the event and the recovery after the event and are expected to be minor.

Historic, Cultural, and Natural Resources

Historical and cultural buildings are vulnerable to the shaking of an earthquake and would likely suffer from minor damages if an event in Marshall County was to occur.

Development Trends

Overall, the planning area has a low vulnerability to earthquake risk. Future development is not expected to increase the risk other than contributing to the overall exposure of what could become damaged as a result of an unlikely event.

3.3.5 Flooding

River Flooding – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	2	6
Clemons	1	1	1	2	2	7
Ferguson	1	1	1	1	2	6
Gilman	1	1	1	1	2	6
Haverhill	1	1	1	1	2	6
Laurel	1	1	1	1	2	6
Le Grand	1	1	1	1	2	6
Liscomb	1	1	1	1	2	6
Marshalltown	3	4	1	3	2	13
Melbourne	1	1	1	1	2	6
Rhodes	1	1	1	1	2	6
St. Anthony	1	1	1	1	2	6
State Center	1	1	1	1	2	6
Marshall County	4	4	3	3	2	16
East Marshall Community SD	1	1	1	1	2	6
GMG Community SD	1	1	2	2	2	8
Marshalltown Community SD	3	4	3	2	2	14
West Marshall Community SD	1	1	1	1	2	6
Flash Flood – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	1	2	4	9
Ferguson	1	1	1	1	4	8
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	1	1	4	8
Le Grand	1	1	1	1	4	8
Liscomb	1	1	2	2	4	10
Marshalltown	2	3	1	2	4	12
Melbourne	1	1	1	2	4	9
Rhodes	1	1	1	1	4	8
St. Anthony	1	1	1	2	4	9
State Center	1	2	1	2	4	10
Marshall County	1	2	3	3	4	13
East Marshall Community SD	1	1	1	1	4	8
GMG Community SD	1	1	2	2	4	10
Marshalltown Community SD	2	3	3	2	4	14
West Marshall Community SD	1	2	1	1	4	9

Description

Flooding can be broken into two main categories: River Flooding and Flash Flooding.

Riverine flooding 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 during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms "base flood", "100-year flood", and "1% Annual Chance" 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, which is defined as all the land drained by a river and its branches.

Flash Flooding is a flood event that occurs with little to no warning where water levels rise at an extremely fast rate. Flash flooding results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces.

Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding which can reach full peak in only a few minutes and allows little or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower developing riverine 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. 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 sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disperse the water flow.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with rainfall trends and rainfall extremes all demonstrate the high probability, yet generally unpredictable nature of flash flooding in the planning area.

Although flash floods are somewhat unpredictable, there are factors that can point to the likelihood of flash floods occurring. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. This, along with knowledge of the watershed characteristics, modeling techniques, monitoring, and advanced warning systems increases the warning time for flash floods.

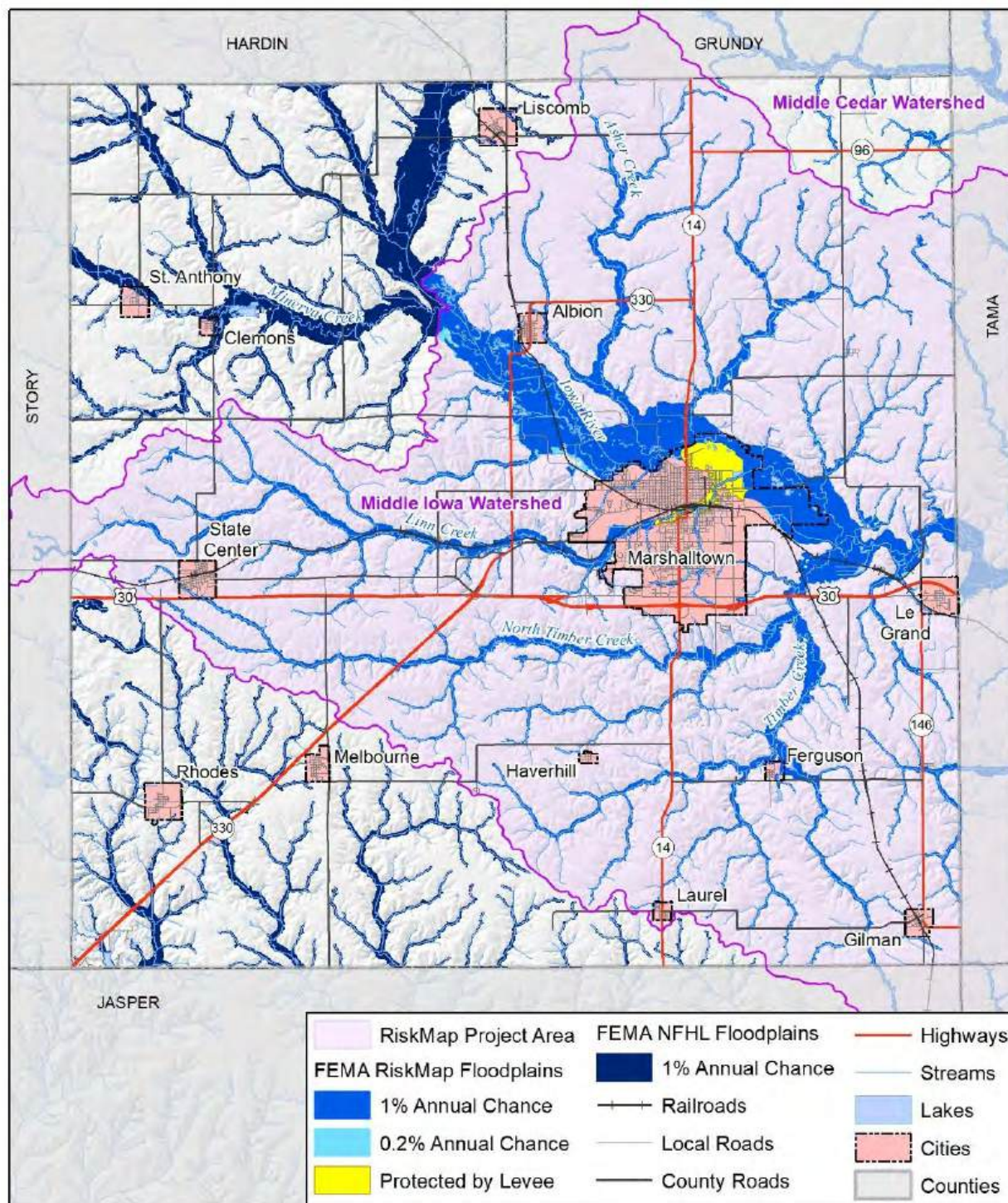
Location

Each community has its own specific issues pertaining to flooding. There is significant variability among communities in Marshall County regarding their proximity to rivers, water bodies, or Special Flood Hazard Areas (SFHAs). Maps showing this variability can be found for the county as a whole and for each incorporated area in Figures 3-15 through 3-28. These figures are based off of both the effective FEMA Flood Insurance Risk Study, effective November 16, 2011, and the more recent Flood Risk Reports for the Middle Cedar and Middle Iowa Watersheds, which together cover nearly 80% of Marshall County's population, both dated August 31, 2015. These reports feature more recent flood risk analysis than the 2011 effective FIRMs and were used in risk analysis for this report.

Some communities have had little to no issues with flooding. Albion, Clemons, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Liscomb, Melbourne, Rhodes, St. Anthony, State Center, East Marshall

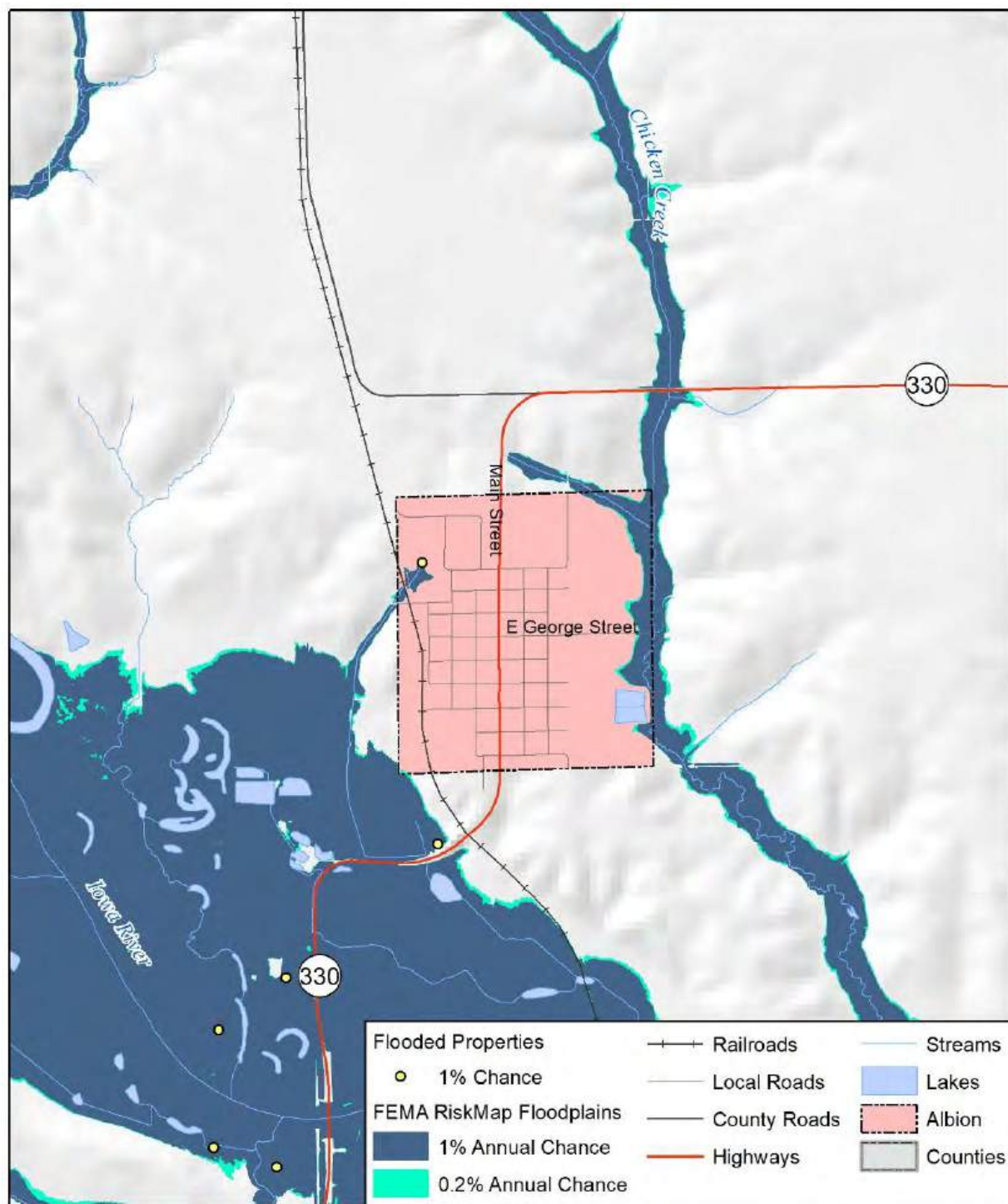
Community School District, GMG Community School District, and West Marshall Community School District have experienced fewer river flooding events. Many communities are located at a high elevation in relation to flood-prone areas in the county such as the Iowa River basin. Marshalltown and Marshalltown Community School District have experienced between several river flooding events. Marshalltown has a network of levees constructed in the city to protect much of the area when the Iowa River floods, but other portions of the city are still susceptible to flooding. Marshall County overall experiences many river flooding events. Portions of the county are vulnerable to road closures due to flooding.

Figure 3-15 Marshall County FEMA Flood Hazard Areas



Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Cedar Watershed, Middle Iowa Watershed,
FEMA NFHL 11/16/2011

Figure 3-16 Albion FEMA Flood Hazard Areas



wood. Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Iowa Watershed

0 0.5 1 Miles



Figure 3-17 Clemons FEMA Flood Hazard Areas

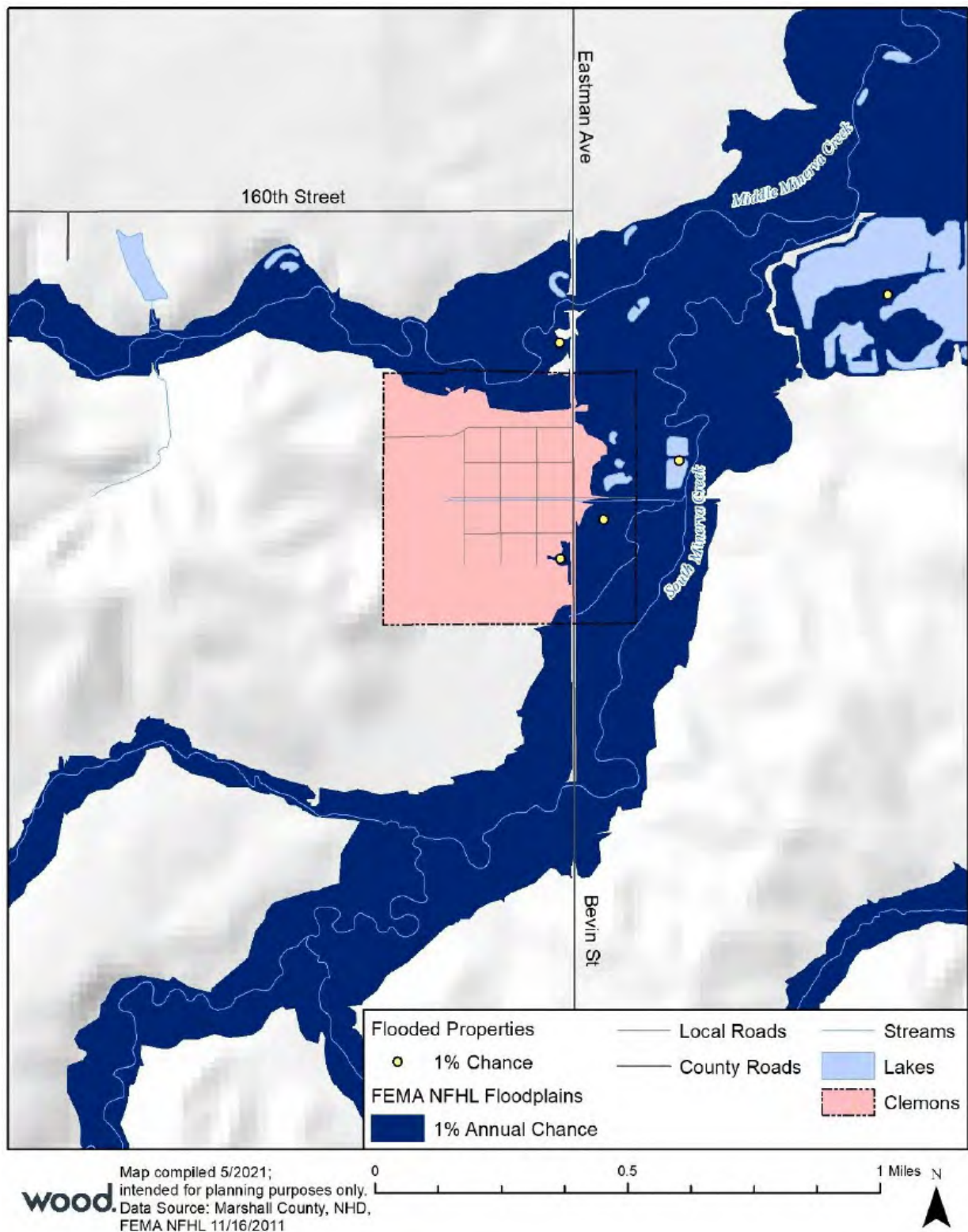
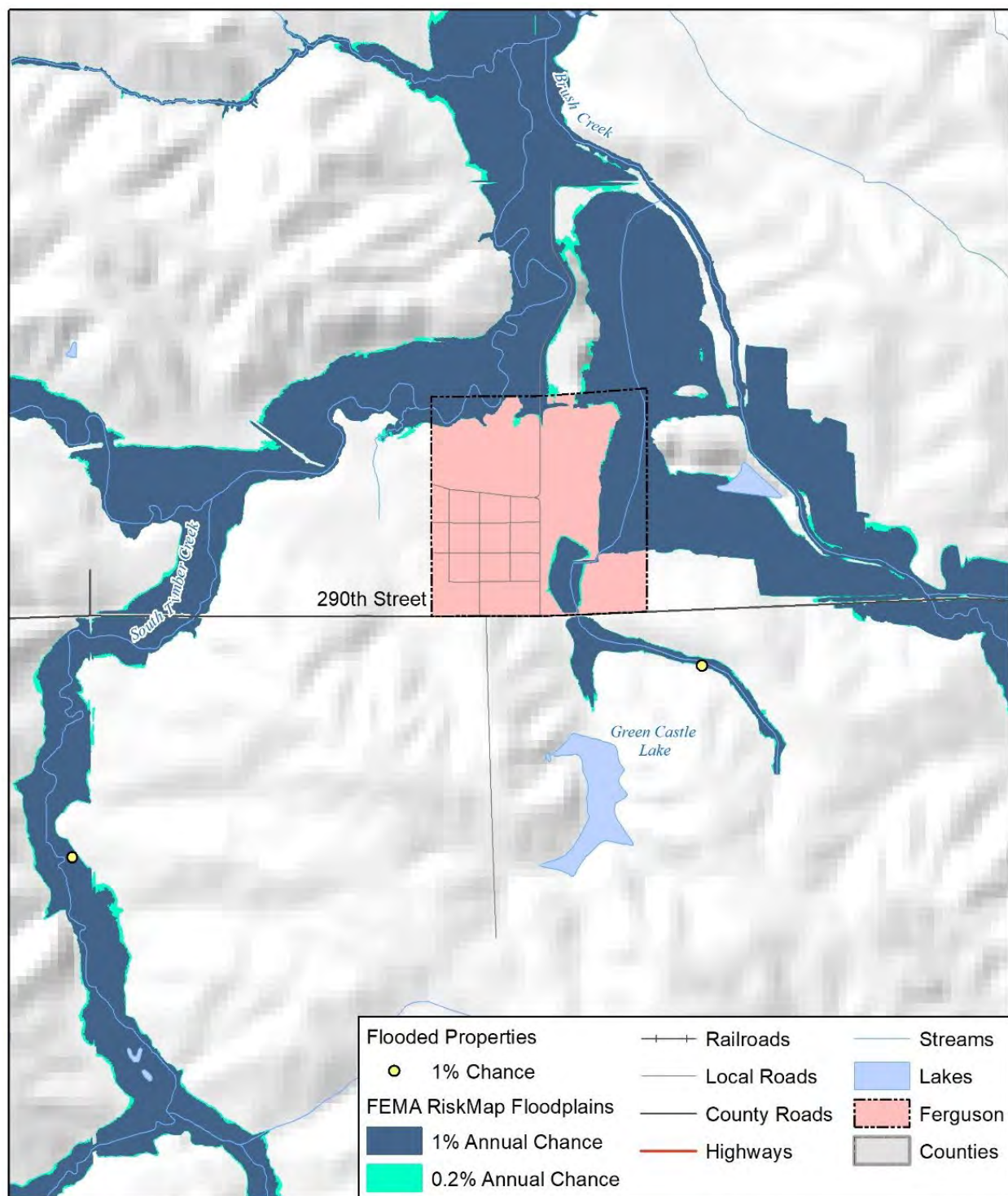
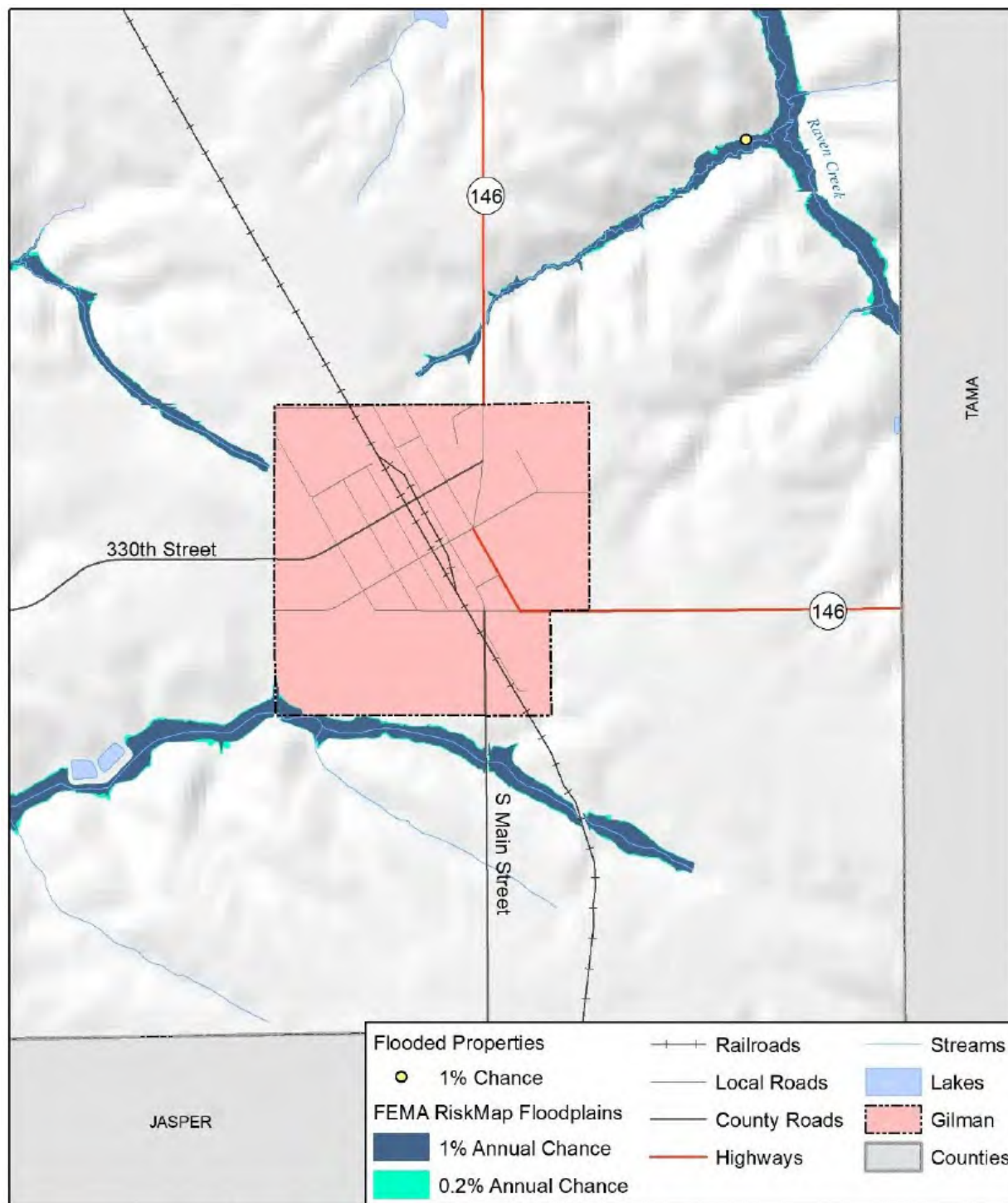


Figure 3-18 Ferguson FEMA Flood Hazard Areas



wood. Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Iowa Watershed

Figure 3-19 Gilman FEMA Flood Hazard Areas



wood
Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015. Middle Iowa Watershed

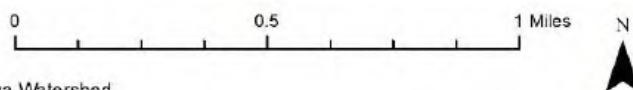


Figure 3-20 Haverhill FEMA Flood Hazard Areas

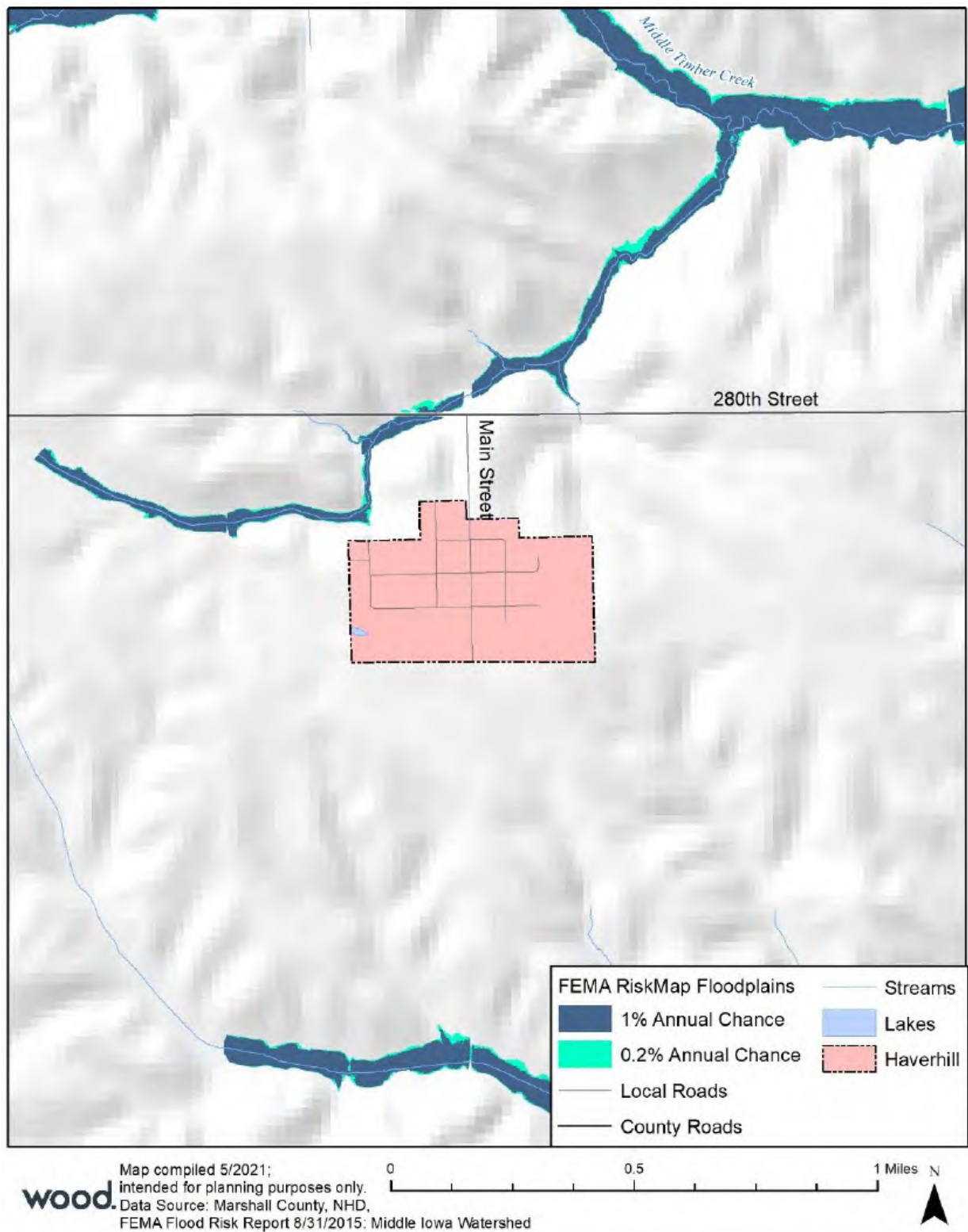


Figure 3-21 Laurel FEMA Flood Hazard Areas

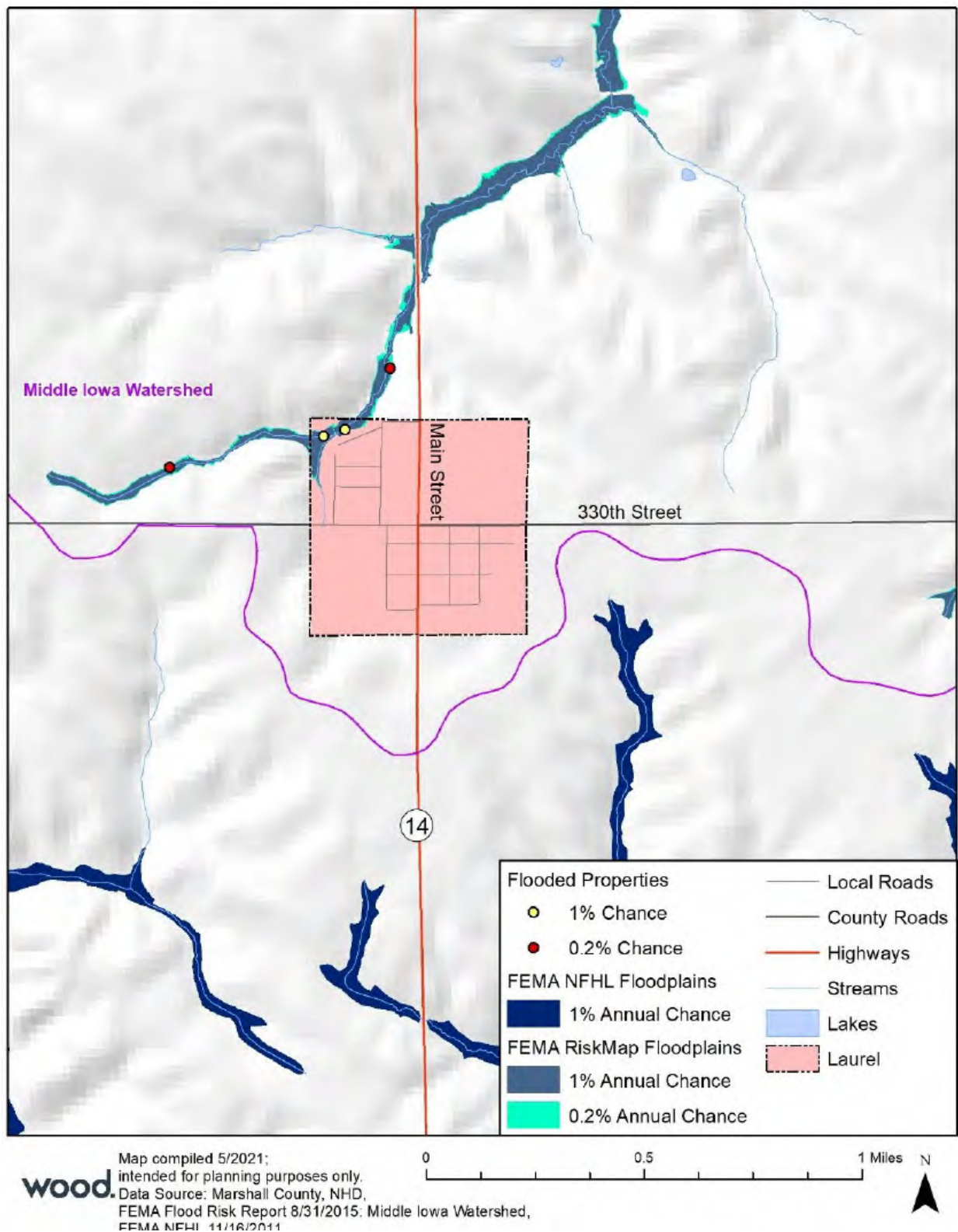
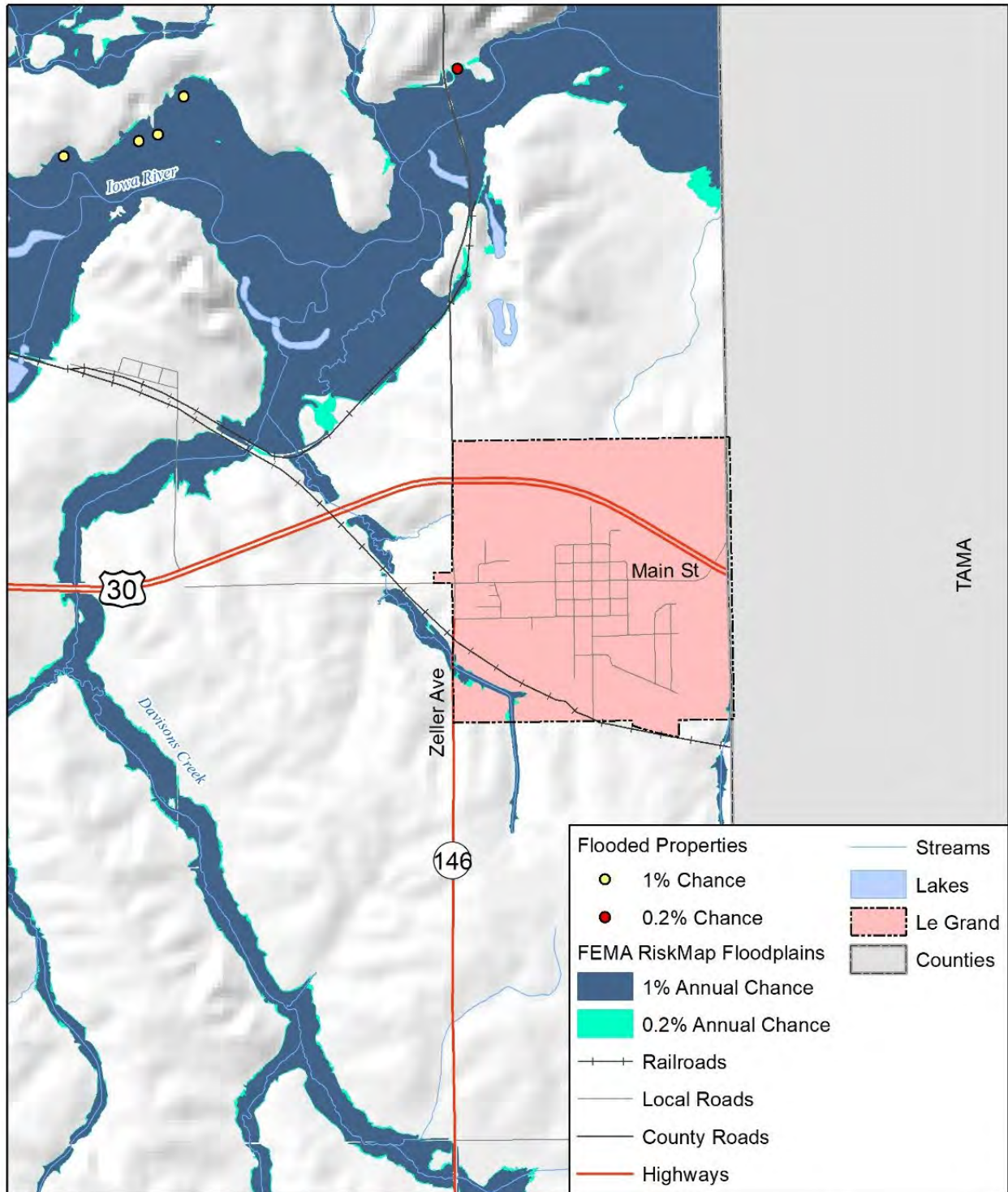


Figure 3-22 Le Grand FEMA Flood Hazard Areas

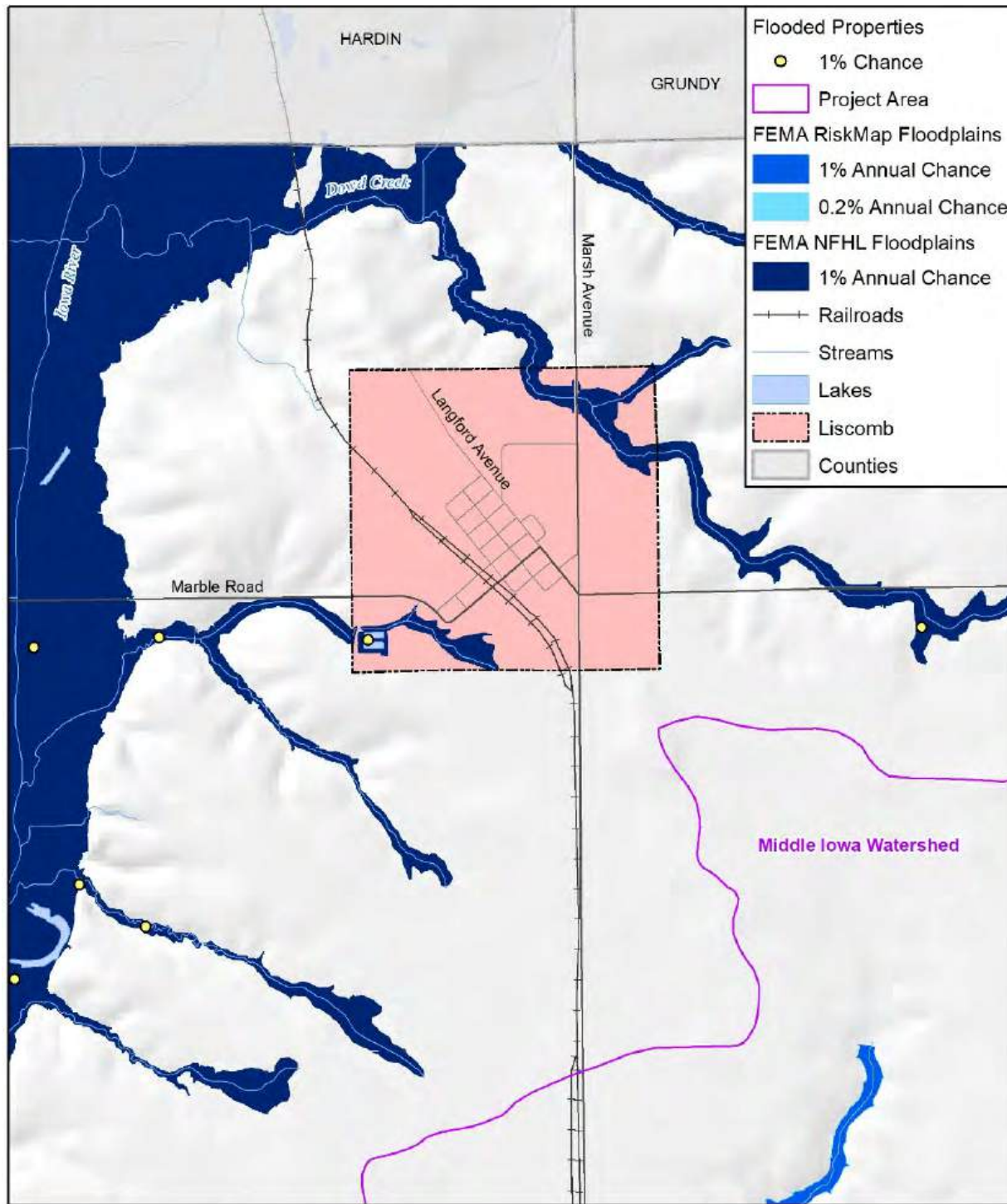


Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Iowa Watershed,

0 0.5 1 Miles



Figure 3-23 Liscomb FEMA Flood Hazard Areas

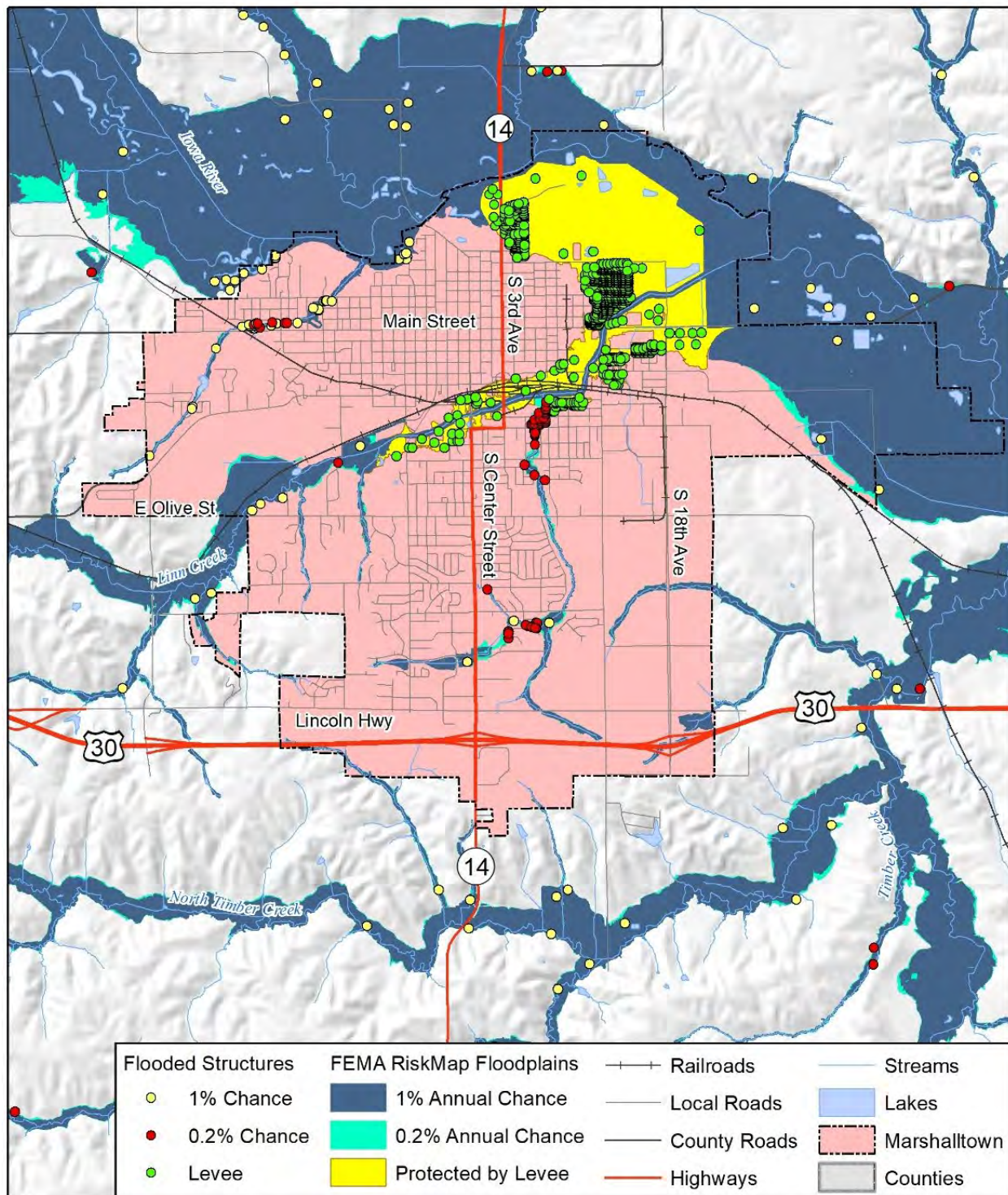


wood. Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Iowa Watershed
FEMA NFHL 11/16/2011

0 0.5 1 Miles



Figure 3-24 Marshalltown FEMA Flood Hazard Areas



Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
FEMA Flood Risk Report 8/31/2015: Middle Iowa Watershed

Figure 3-25 Melbourne FEMA Flood Hazard Areas

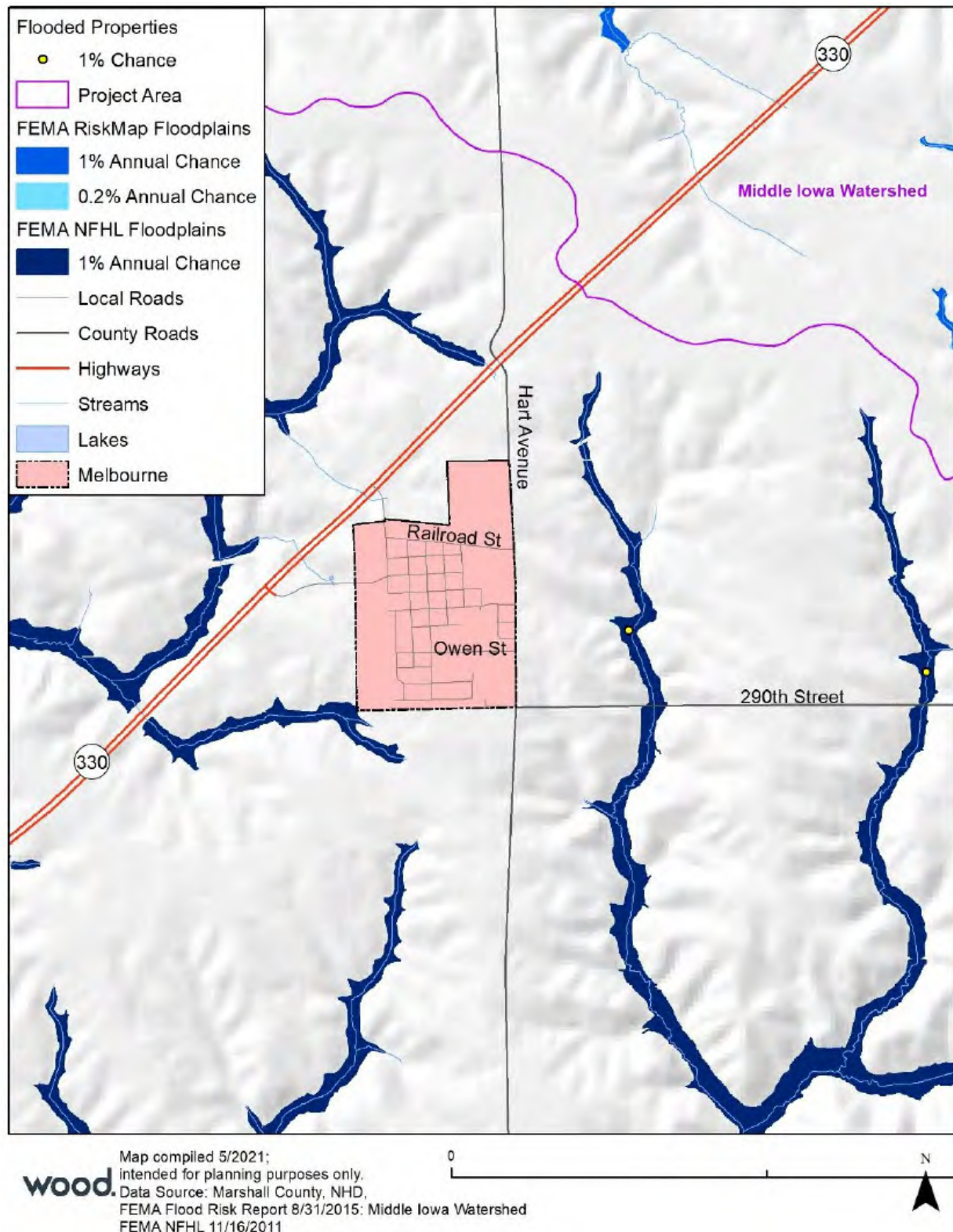


Figure 3-26 Rhodes FEMA Flood Hazard Areas

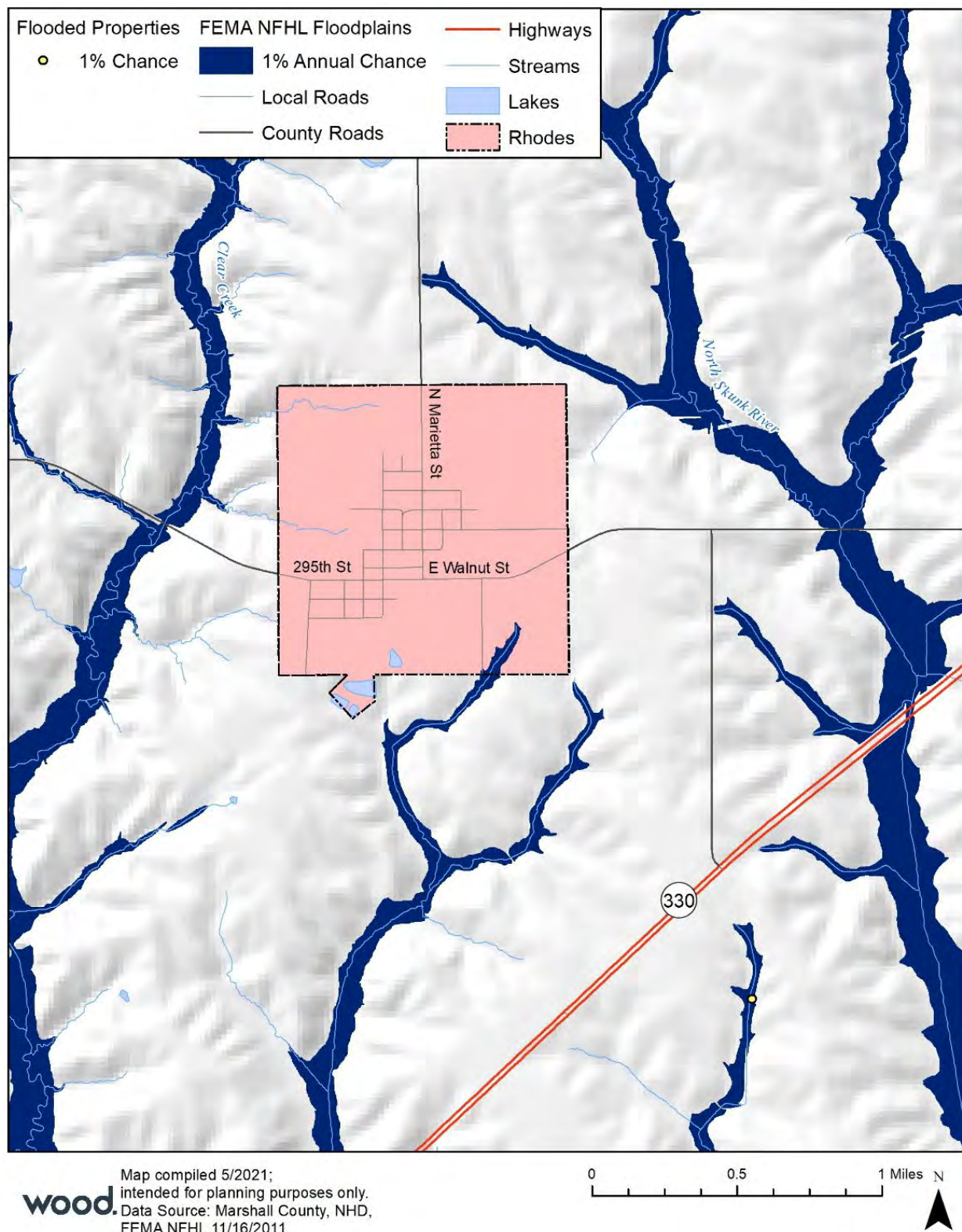


Figure 3-27 St. Anthony FEMA Flood Hazard Areas

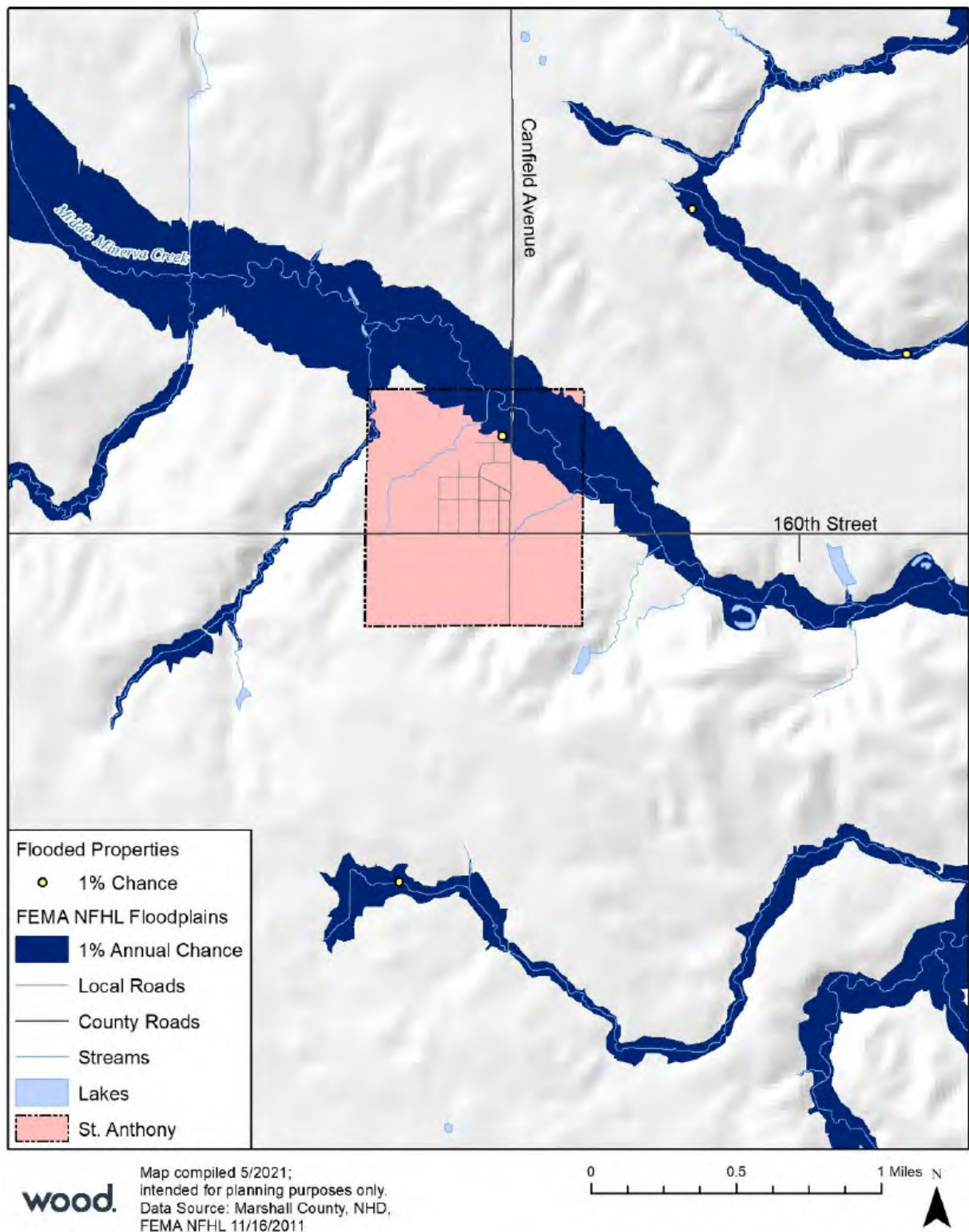
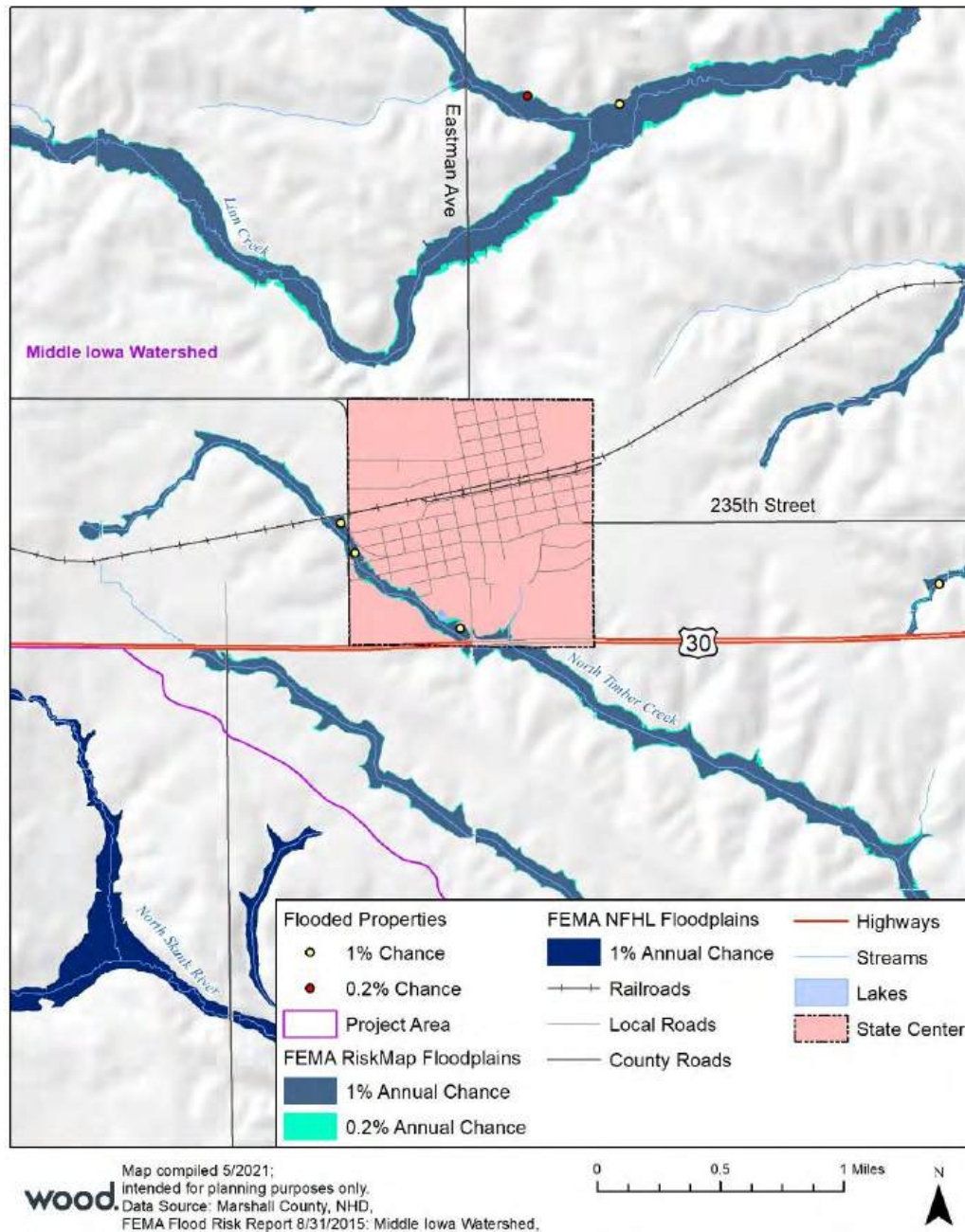


Figure 3-28 State Center FEMA Flood Hazard Areas



Historic Occurrences

The historical occurrence of flash flooding varies across jurisdictions. According to NCEI data, 85 flooding events have occurred in Marshall County from 1996 to 2021 (the time frame for which data was available). 22 of these events were considered flash flooding events and the remaining 63 were river flood events. Note that these events were based on all events that occurred throughout the county. A summary of NCEI data on flooding by jurisdiction is included in Table 3-15. These events have caused a total of \$6,728,570 in property damage and \$274,086,039 in crop damage. This number for crop damage may be lower for Marshall County than stated; the widespread flooding in 2008 and 2010 is reflected in this number and

includes losses for multiple counties in Iowa. Note that some flood events may go unrecorded by NCEI data; these events may not cause substantial damage to houses or structures, but they may result in flood costs that the county taxpayers and individual property owners must finance.

Some communities did not identify flash flooding as an issue and had no previous occurrences. All cities in Marshall County except for Marshalltown had less than four flash flood events according to NCEI data and scored historical occurrence as a one. The cities of Albion, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Rhodes, and State Center all stated that flash flooding had never been an issue in their city. Marshalltown has had many flash flooding events. Marshalltown Community School District and West Marshall Community School District scored three and two for historical occurrence, respectively.

Table 3-15 NCEI Data on Flooding in Marshall County

Hazard	Time Period	# of Events	Type of Event(s)	Total Damages
Albion	2/1996 – 6/2019 (23 years)	0		--
Clemons		1	Flash Flood	\$25,000 (Property)
Ferguson		0		--
Gilman		0		--
Haverhill		1	Flash Flood	\$100,000 (Property)
Laurel		0		--
Le Grand		0		--
Liscomb		1	Flash Flood	\$50,000 (Property)
Marshalltown		20	Flash Flood (7), River Flood (13)	\$945,000 (Property) \$498,000 (Crop)
Melbourne		0		--
Rhodes		1		\$5,000 (Property)
St. Anthony		5	Flash Flood (1), River Flood (4)	\$2,325,000 (Property) \$20,000,000 (Crop)*
State Center		2		\$50,000 (Property)
Marshall County Unincorporated		54	Flash Flood (8), River Flood (46)	\$3,228,570 (Property) \$253,588,039 (Crop)*

Source: National Center for Environmental Information (NCEI)

*These events in 2008 and 2010 impacted a large area in Iowa and do not represent losses for Marshall County alone. Additionally, many damages incurred were not the direct result of river/flash flooding but rather saturated ground after multiple flooding events that resulted in rotting crops and associated losses.

Probability of Future Occurrences

With the history of flooding in the planning area, it is likely that flooding of various levels will continue to occur. Marshalltown and the unincorporated areas of Marshall County have the highest risk of flooding due to river flooding or flash flooding events. Riverine flooding probability is often defined by the 1% and 0.2% chance flood events. The terms “base flood”, “100-year flood”, and “1% Annual Chance” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Likewise, the terms “500-year flood” and “0.2% Annual Chance” refer to the area in the floodplain that is subject to a 0.2% chance of flooding or greater in any given year. Based off the 85 total flooding events in Marshall County in the 23 year span from 1996-2019, there is a 100% Annual Chance of flooding of some magnitude in Marshall County, and on average 3/year.

Magnitude and Severity (Extent)

Areas in a floodplain, downstream from a dam or levee, or in low-lying areas can be impacted. People and property located in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be impacted in the event of a significant rainfall. Unlike areas impacted by a river/stream flood, flash floods can impact areas a good distance from the stream itself. Flash flood-prone areas are not particularly those areas adjacent to rivers and streams. Streets can become swift moving rivers, and basements can become deathtraps because flash floods can fill them with water in a matter of minutes.

All Marshall County communities are prone to flash flooding. Albion, Clemons, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Marshalltown, Melbourne, Rhodes, St. Anthony, State Center, East Marshall Community School District, and West Marshall Community School District ranked vulnerability to flash flooding as a 1, meaning that less than 25% of people and property would be affected. Many of these communities did not cite flash flooding as an issue historically and did not identify any areas of the community where flash flooding has damaged property or infrastructure. Marshalltown has a few intersections that have experienced flash flooding or ponding in the past.

Clemons ranked vulnerability to flash flooding as a 1. The city is sometimes affected by flash flooding from Minerva Creek and South Minerva Creek in the north, east, and south of the community. Historically, this flooding has only affected one house in 1993 and the sewer system for several hours in 2013. However, these flood events were extremely rare and historic. In the case of 2013, flash flooding did affect portions of the town, but only after 14 inches of rain had fallen over the area in a short period of time. On average, the effects of flash flooding are still localized to a small portion of the city; flood events generally impact less than 25% of people and property.

Liscomb and GMG Community School District ranked vulnerability to flash flooding as a 2, meaning that an event could affect 26-50% of the population. Liscomb is located very near to the Iowa River. A tributary of the river, Dowd Creek, runs through the northeast corner of the city. The city's proximity to both the Iowa River and this tributary increase its vulnerability to future flash flooding events. Marshall County and Marshalltown Community School District ranked vulnerability to flash flooding as a 3, meaning that an event could affect 51-75% of the population. When these areas experience flash flooding, roads, railroads, and other travel thoroughfares could be affected. In the unincorporated areas of the county, areas near Clemons, Rhodes, and outside of Marshalltown experience flash flooding and road closures during flood events. These closures can affect anyone traveling within the county who is forced to take a detour.

Severity of Impact

Flash floods are the number one weather-related killer in the United States. They can quickly inundate areas thought not to be flood-prone. Other impacts of flooding can include loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and interruption of business. Hazards of fire, health and transportation accidents, and contamination of water supplies are likely effects of flooding situations.

Albion, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Rhodes, East Marshall Community School District, and West Marshall Community School District ranked severity of impact as a 1, as most of these jurisdictions would experience little to no property damage such as the items described in the previous paragraph during flooding. These jurisdictions also did not see environmental impacts or interruptions in critical facilities as likely to occur.

Clemons, Liscomb, Marshalltown, Melbourne, St. Anthony, State Center, GMG Community School District, and Marshalltown Community School District ranked severity of impact as a 2, meaning that injuries,

property damage, and environmental impacts would be limited. Short-term property damage might occur, but the structural stability of buildings would not be threatened. Shutdown of critical facilities may occur, but shutdown times would be less than 72 hours.

Marshall County and Marshalltown rated severity of impact as a 3. When flooding occurs in these areas, it can cause property damage that sometimes threatens structural stability. These jurisdictions were not significantly concerned about the risk of severe injury or death since Marshall County has not experienced a river flooding-related death according to NCEI data, but the possibility still exists.

Speed of Onset

Gages along streams and rain gages throughout the state provide for an early flood warning system. River flooding usually develops over the course of several hours or even days depending on the basin characteristics and the position of the particular reach of the stream. The National Weather Service provides flood forecasts for Iowa. Flood warnings are issued over emergency radio and television messages as well as the NOAA weather radios. Jurisdictions in Marshall County would likely have at least 12-24 hours of warning time if a river flooding event was imminent.

Flash floods are somewhat unpredictable, but there are factors that can point to the likelihood of a flood occurring in the area. Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Warnings may not always be possible for these sudden flash floods. Predictability of flash floods depends primarily on the data available on the causal rain. Individual basins react differently to precipitation events. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. Knowledge of the watershed characteristics, modeling, monitoring, and warning systems increase the predictability of flash floods. Depending on the location in the watershed, warning time can be increased. The National Weather Service forecasts the height of floods crests, the data, and time the flow is expected to occur at a particular location. All jurisdictions in Marshall County scored speed of onset as a 4.

Climate Change Considerations

In 2010, the Iowa Climate Change Advisory Council reported to the Governor and the Iowa General Assembly on Climate Change Impacts on Iowa. According to this report, Iowa is already experiencing:

- More Precipitation
 - Increased frequency of precipitation extremes that lead to flooding
 - Increase of 8 percent more precipitation from 1873 to 2008
 - A larger increase in precipitation in eastern Iowa than in western Iowa
- Higher Temperatures
 - Iowa's humidity has risen substantially, especially in summer, which now has 13 percent more atmospheric moisture than 35 years ago, as indicated by a 3 – 5-degree F rise in dew-point temperature. This fuels convective thunderstorms that provide more summer precipitation.

In 2018, the U.S. Global Change Research Program published the Fourth National Climate Assessment. According to this report, flood risk continues to increase in the Midwest due to increasing temperatures and humidity, leading to increased rainfall. Episodes of widespread heavy rains in recent years have led to flooding, soil erosion, and water quality issues.

To reduce the impact of climate change and changing weather patterns, the report highlights that mitigation measures such as restoring systems like wetlands and forested floodplains and implementing

agricultural best management strategies that increase vegetative cover (such as cover crops and riparian buffers) can help reduce flooding risks and protect water quality.

Vulnerability Assessment

The risk of flooding is prevalent within all regions of Marshall County, however not all exposed areas have equal risk, and many areas may not experience serious flooding or flood related damages. This section summarizes the results of a countywide risk analysis intended to identify the vulnerability of population, property, and infrastructure. The vulnerability analysis was performed through the use of an address point layer to obtain more accurate property locations and the assessor's parcel layer to obtain different parcel types and improved values. Using GIS, this combined dataset was intersected with the effective FEMA special flood hazard area (SFHA) to determine at risk population, infrastructure, and assets.

People

Flash flooding poses the greatest risk to loss of life because of the sudden onset resulting in little warning time and high volume and velocity of water. Water over low-lying roads and bridges is the most frequent type of impact associated with flash flooding. There is potential for loss of life if motorists drive into moving water; however, public education campaigns have helped to educate citizens about not driving through moving water.

Property

The potential losses to existing development will be provided for the following categories of losses:

- Building Losses—this will include counts and values for buildings exposed to potential damage from the 1-percent annual chance flood for each jurisdictions in the planning area;
- Estimated Population Displaced;
- Critical Facilities and Infrastructure at Risk.

The flood vulnerability and loss estimates for the unincorporated county and the incorporated cities were generated using the 11/16/2011 Effective FEMA NFHL layer and the Marshall County parcels layer provided by Marshall County. GIS analysis was conducted to determine the number and values of buildings at risk to the 1-percent and 0.2 percent annual chance flood hazards.

GIS was used to overlay NFHL flood data on Marshall County parcel centroids. The analysis assumes that every parcel with an improvement value greater than zero is improved in some way. Only improved parcels and the value of their improvements were analyzed. The end result is an inventory of the number and types of parcels and buildings subject to the hazards. Results are presented by unincorporated county and incorporated jurisdictions in Figures 3-15 through 3-28. Table 3-16, Table 3-17, and Table 3-18 show counts of improved parcels/structures and land use type (Agricultural, Commercial, Industrial, Multi-Residential, and Residential) within each flood zone (1%, 1% Floodway, and 0.2% annual chance). Based on this analysis the greatest risk is in the unincorporated areas, followed by Marshalltown. The other jurisdictions are minimally flood prone.

The result of the exposure analysis summarizes the values at risk in the floodplain. When a flood occurs, seldom does the event cause total destruction of an area. Potential losses from flooding are related to a variety of factors including flood depth, flood velocity, building type and construction. Based on FEMA Flood Insurance Administration (FIA) flood depth-damage curves, the percent of damage is directly related to the flood depth. FEMA's HAZUS flood loss estimation tool and the flood benefit/cost module both use this simplified approach to model flood damage based on building type and flood depth. A damage estimation of 25 percent of the total value was used based on FIA depth-damage curves for a one-story structure with no basement flooded to two feet. While there are several limitations to this

model, it does present a methodology to estimate potential damages. This model may include structures within the 1-percent annual chance floodplain that may be elevated above the level of the base flood elevation, according to local floodplain development requirements, and thus mitigate the risk. Additionally, structures with finished basements and commercial properties would likely sustain a higher percentage of damage.

Table 3-16 Improved Properties at Risk to FEMA 1% Annual Chance Flood Hazard by Jurisdiction

Jurisdiction	Property Type	Improved Parcels/ Structures	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Population
Albion	Residential	1	\$99,610	\$49,805	\$149,415	\$37,354	2
	Total	1	\$99,610	\$49,805	\$149,415	\$37,354	2
Clemons	Exempt	2	\$0	\$0	\$0	\$0	
	Total	2	\$0	\$0	\$0	\$0	0
Laurel	Residential	2	\$304,850	\$152,425	\$457,275	\$114,319	5
	Total	2	\$304,850	\$152,425	\$457,275	\$114,319	5
Liscomb	Exempt	1	\$0	\$0	\$0	\$0	
	Total	1	\$0	\$0	\$0	\$0	0
Marshalltown	Agricultural	1	\$8,180	\$8,180	\$16,360	\$4,090	
	Commercial	3	\$677,090	\$677,090	\$1,354,180	\$338,545	
	Exempt	9	\$0	\$0	\$0	\$0	
	Residential	39	\$4,683,630	\$2,341,815	\$7,025,445	\$1,756,361	100
	Total	52	\$5,368,900	\$3,027,085	\$8,395,985	\$2,098,996	100
St. Anthony	Residential	1	\$3,590	\$1,795	\$5,385	\$1,346	2
	Total	1	\$3,590	\$1,795	\$5,385	\$1,346	2
State Center	Agricultural	1	\$1,840	\$1,840	\$3,680	\$920	
	Commercial	1	\$53,850	\$53,850	\$107,700	\$26,925	
	Total	2	\$55,690	\$55,690	\$111,380	\$27,845	0
Unincorporated	Agricultural	39	\$696,690	\$696,690	\$1,393,380	\$348,345	
	Commercial	7	\$820,850	\$820,850	\$1,641,700	\$410,425	
	Exempt	19	\$0	\$0	\$0	\$0	
	Industrial	4	\$4,430,600	\$6,645,900	\$11,076,500	\$2,769,125	
	Mixed Use	1	\$138,360	\$138,360	\$276,720	\$69,180	3
	Residential	116	\$14,167,680	\$7,083,840	\$21,251,520	\$5,312,880	296
Unincorporated	Total	186	\$20,254,180	\$15,385,640	\$35,639,820	\$8,909,955	298

Jurisdiction	Property Type	Improved Parcels/ Structures	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Population
	Grand Total	247	\$26,086,820	\$18,672,440	\$44,759,260	\$11,189,815	408

Table 3-17 Improved Properties at Risk to FEMA 1% Annual Chance Floodway

Jurisdiction	Property Type	Improved Parcels/ Structures	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Population
Marshalltown	Commercial	1	\$30,350	\$30,350	\$60,700	\$15,175	
	Exempt	2	\$0	\$0	\$0	\$0	
	Residential	5	\$537,490	\$268,745	\$806,235	\$201,559	13
	Total	8	\$567,840	\$299,095	\$866,935	\$216,734	13
Unincorporated	Exempt	3	\$0	\$0	\$0	\$0	
	Mixed Use	1	\$138,360	\$138,360	\$276,720	\$69,180	3
	Total	4	\$138,360	\$138,360	\$276,720	\$69,180	3
	Grand Total	12	\$706,200	\$437,455	\$1,143,655	\$285,914	15

Table 3-18 Improved Properties at Risk to FEMA 0.2% Annual Chance Flood Hazard by Jurisdiction

Jurisdiction	Property Type	Improved Parcels/ Structures	Improved Value	Estimated Content Value	Total Value	Loss Estimate	Population
Marshalltown	Commercial	2	\$211,970	\$211,970	\$423,940	\$105,985	
	Residential	52	\$3,396,350	\$1,698,175	\$5,094,525	\$1,273,631	134
	Total	54	\$3,608,320	\$1,910,145	\$5,518,465	\$1,379,616	134
Unincorporated	Agricultural	3	\$14,460	\$14,460	\$28,920	\$7,230	
	Commercial	1	\$21,340	\$21,340	\$42,680	\$10,670	
	Residential	14	\$1,526,420	\$763,210	\$2,289,630	\$572,408	36
Unincorporated	Total	18	\$1,562,220	\$799,010	\$2,361,230	\$590,308	36
	Grand Total	72	\$5,170,540	\$2,709,155	\$7,879,695	\$1,969,924	169

Critical Facilities and Infrastructure

When Marshall County experiences river flooding, it can be vulnerable to road closures. The following are transportation concerns due to river flooding:

- Iowa Highway 14 between US Highway 30 and Iowa Highway 330, Marshalltown.
- Iowa Highway 330 between County Road E29 and County Road S75, near Albion.
- Zeller Avenue from 2200 mile to 2300 mile is closed.
- East Main Street Road in Marshalltown is closed from 2900 to 3100 block due to water over the road.
- US Highway 63 between County Road E64 and US Highway 30, near Tama.
- US 30 eastbound: Left lane closed between County Road T47 and Exit 202: US 63, two miles east of the Montour area. The left lane is closed because of flooding.
- US 30 westbound: Right lane closed between County Road T47 and Exit 202: US 63, near Montour. The right lane is closed because of flooding.
- Stanley Mill Road from 2000 to 2100 mile is closed due to water over the road from east of Knapp Avenue to Lafayette Avenue.
- Garwin Road from 2600 to 2700 mile is closed due to water at the intersection of Highway 14 and Garwin Road, right of Wiesegarden intersection.
- North Center Street Road from 1900 to 2100 mile is closed due to water over the road south of KDAO through the Marshalltown Water Works.

There are a total of 214 critical facilities categorized as FEMA Lifelines within the 1% annual chance flood hazard area in Marshall County, and 12 critical facilities categorized as FEMA Lifelines within the 0.2% annual chance flood hazard area. Table 3-19 and Table 3-20 break down these facilities by FEMA Lifeline category.

Table 3-19 Critical Facilities Within the 1% Annual Chance Flood Hazard Area

Jurisdiction	FEMA Lifeline	Facility Type	Count
Liscomb	Food, Water, Shelter	Wastewater Treatment Plant	2
	Total		2
Marshalltown	Communications	Microwave Service Tower	2
	Energy	Electric Substation	1
	Energy	Power Plant	2
	Food, Water, Shelter	Water Use Well	1
	Hazardous Material	EHS Tier II Facility	1
	Hazardous Material	Tier II Facility	1
	Transportation	Bridge	12
	Total		20
St Anthony	Transportation	Bridge	1
	Total		1
Unincorporated	Communications	Cellular Tower	1
	Communications	Microwave Service Tower	2
	Energy	Wind Turbine	1
	Food, Water, Shelter	Wastewater Treatment Plant	2
	Food, Water, Shelter	Water Treatment Plant	7
	Food, Water, Shelter	Water Use Well	14

Jurisdiction	FEMA Lifeline	Facility Type	Count
	Hazardous Material	EHS Tier II Facility	1
	Hazardous Material	Tier II Facility	2
	Safety and Security	Solid Waste Facility	4
	Transportation	Bridge	157
	Total		191
	Grand Total		214

Table 3-20 Critical Facilities Within the 0.2% Annual Chance Flood Hazard Area

Jurisdiction	FEMA Lifeline	Facility Type	Count
Marshalltown	Hazardous Material	Tier II Facility	1
	Transportation	Bridge	1
	Total		2
Unincorporated	Food, Water, Shelter	Water Use Well	2
	Transportation	Bridge	8
	Total		10
	Grand Total		12

Economy

Economic damages related to flooding include crop loss, building damage, and recovery efforts after flood events. Flood insurance can help mitigate some of the costs of flood damages. Participation in the NFIP helps flood-prone communities reduce their economic risk to flooding.

Flood Insurance in Marshall County

According to the FEMA Community Information System, as of October 2021, in Marshall County Unincorporated Areas, there are 16 total flood insurance policies. The premiums amount to \$14,183, and the insurance in force amounts to \$2,875,000. There have been 8 total closed paid losses and the total dollar amount of closed paid losses amounts to \$95,322.

In Marshalltown, there are 29 total flood insurance policies. The premiums amount to \$35,630, and the insurance in force amounts to \$8,364,500. There have been 20 total closed paid losses and the total dollar amount of closed paid losses amounts to \$76,214.

In St. Anthony, there is 1 total flood insurance policy. The premium amounts to \$349, and the insurance in force amounts to \$175,000. There are 0 closed paid losses in St. Anthony.

No other communities in Marshall County have flood insurance policies.

Repetitive Loss in Marshall County

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP. The following RL information is from the FEMA Community Information System, as of October 2021.

In Marshall County Unincorporated Areas, there are three total Repetitive Loss (RL) properties. These properties have resulted in 4 total repetitive losses, with \$11,062 in building loss payments and \$75,405 in contents loss payments. The total repetitive loss payment amounts to \$86,467.

In Marshalltown, there is one total RL property. This has resulted in 2 losses, with \$17,016 in building loss payments and \$3,648 in contents loss payments. The total repetitive loss payment amounts to \$20,665.

No other communities in Marshall County contain repetitive loss properties.

Severe Repetitive Loss in Marshall County

A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

There are no SRL properties in Marshall County or its incorporated areas.

Historic, Cultural, and Natural Resources

A flood in Marshall County could cause damage to businesses, homes, roads, and agricultural land. It is not likely that flooding would damage the Marshalltown Historic District or other historic or cultural resources in Marshall County.

Development Trends

There is a correlation between increased population growth and development and increased risk to more intense flooding. Though Marshall County has seen a slight (2%) increase in overall population since 2000, it has seen a net decrease in population since 2010. Population growth is not a significant factor contributing to Marshall County's flood risk. Communities that are mapped and participating in the NFIP who implement their floodplain ordinance typically do not see an increase in flood risk. Development in the 500 year floodplain, which is not regulated, could result in an increased flood risk because it reduces the floodwater storage areas of large events.

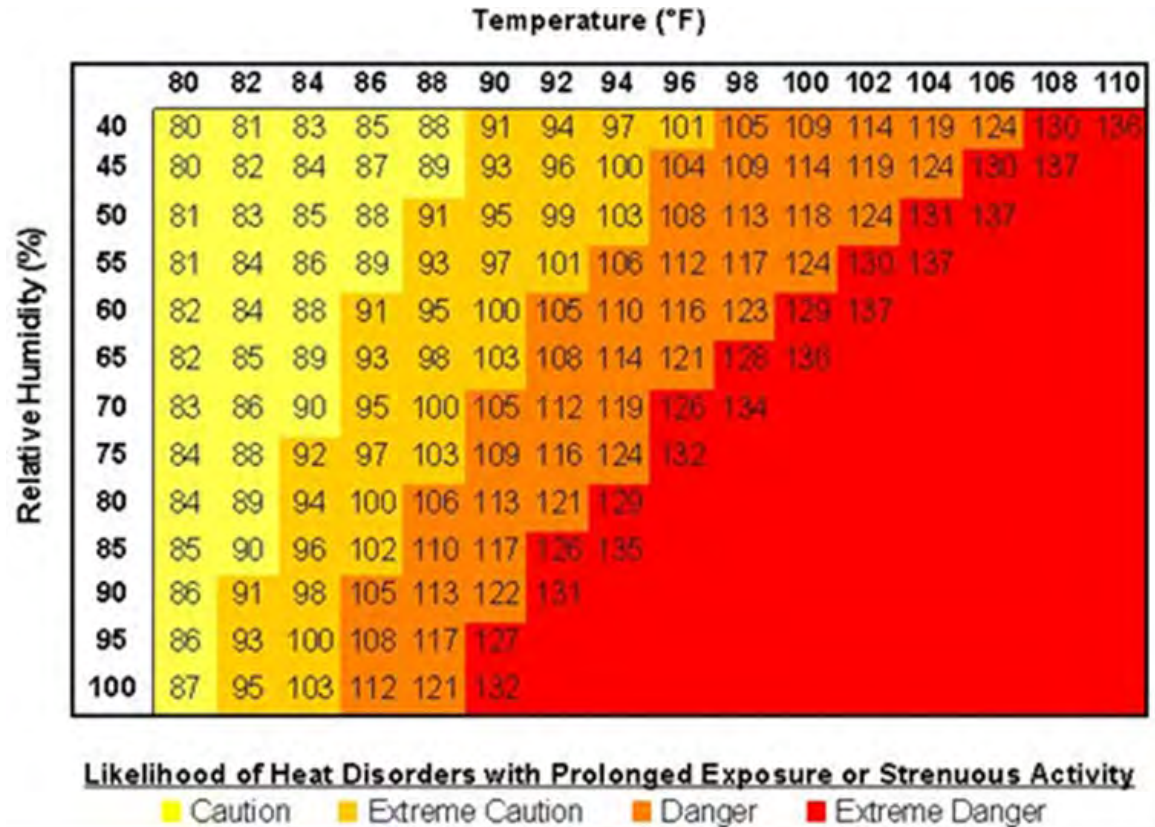
3.3.6 Extreme Heat

Extreme Heat – Hazard Score Calculation					
Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
4	4	4	2	1	15

Description

According to information provided by FEMA, extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index Chart in Figure 3-29 uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 3-29 Heat Index (HI) Chart



Source: National Weather Service (NWS)

Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is over exposed to heat. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks

According to a study from the Centers for Disease Control and Prevention, an average of 702 heat-related deaths occurred annually nationwide between 2004 and 2018 (Vaidyanathan 2020). One of the most dangerous places to be is in a home with little or no air conditioning. Those at greatest risk for heat-related illness include people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas, the exposure of farm workers, as well as livestock, to extreme heat is a major concern.

Location

The entire planning area is subject to extreme heat and all participating jurisdictions are affected. Table 3-21 lists typical symptoms and health impacts of exposure to extreme heat.

Table 3-21 Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: NWS Heat Index Program, <https://www.weather.gov/safety/heat-index>

The NWS has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the nighttime minimum Heat Index is 80°F or above for two or more consecutive days. A heat advisory is issued when temperatures reach 105 degrees, and a warning is issued at 115 degrees.

Historical Occurrences

According to information obtained from the NWS for Marshall County Zone on the Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, there have been a combined 69 excessive heat advisories, watches, and warnings between 2005 and 2020. These events are summarized in Table 3-22 below. The greatest number of heat advisories in a given year was 2011, with 5 advisories, 3 warnings, and 2 watches. Historic data tells us that extreme heat is a fairly common occurrence in Marshall County.

Table 3-22 Number of Heat Advisories, Watches, and Warnings, 2005-2020 Marshall County Zone

Year	Heat Advisory	Excessive Heat Warning	Excessive Heat Watch
2005	1	0	0
2006	3	0	0
2007	2	0	0
2008	1	0	0
2009	3	1	0
2010	5	1	1
2011	5	3	2
2012	4	2	0
2013	2	1	0
2014	1	0	0
2015	3	0	0
2016	4	1	2
2017	4	1	1
2018	8	0	0
2019	2	1	1
2020	3	0	0
Totals	51	11	7

Source: Iowa State University Environmental Mesonet

The record high temperature of 110 for Des Moines, which is approximately 45 miles southwest of Marshalltown, was recorded in 1936. During July 1936, 12 record setting days topped 100 degrees in Des

Moines. The record high temperatures for Des Moines are above 90 degrees Fahrenheit beginning in March and lasting through October.

Figure 3-30 provides the daily maximum temperatures for the Marshalltown, Iowa weather station for the period of record from 1893 to 2020 from the High Plains Regional Climate Center. This data shows that a temperature of 112 °F was reached in 1934 as the highest recorded temperature during the 120-year timeframe. The months of the year with the highest temperatures are generally July and August. The average maximum temperature for July is 84.55 °F and August is 82.89 °F for the planning area.

Figure 3-30 Average Temperature, Marshalltown, Iowa (1893-2020)



Source: High Plains Regional Climate Center, Station Data Explorer

The NCEI reported three regional heat and excessive heat events in and around Marshall County during the period from 2005 to 2020. The heat event of record occurred July 15-28, 2011. Temperatures rose into the 90s each day, but it was the dew point and overnight lows that were very significant. Low temperatures during most of the nights were in the 70s, with many of the nights in the mid to upper 70s. These conditions caused considerable stress on livestock. Statewide reports indicated that at least 4,000 head of cattle and thousands of turkeys were killed by the suffocating heat. Livestock losses were estimated in the \$5 to \$10 million dollar range.

Historical Occurrences Score: 4

Probability of Future Occurrences

For purposes of determining probability of future occurrence, the definition of extreme heat from FEMA's Ready.gov Community Preparedness program was used: "extreme heat is a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees". While there were 69 heat advisories over the 15-year period from 2005 to 2020 only 34 of the episodes lasted for two or more days. This translates to a greater than 100 percent probability, or a highly likely rate of occurrence, in any given year of an extreme heat event.

Probability Score: 4—Highly Likely

Magnitude and Severity (Extent)

Severity of Impact

Extreme heat has broad impacts for Marshall County. On the whole, many communities in Marshall County have learned to adapt to extreme heat and periods of hot weather during the summer months through the use of air conditioned spaces, which makes the severity of extreme heat for Marshall County low, as long as people have access to a cool place. However, extreme heat spells can and do result in serious injury or death. One negative impact of air conditioning is that it increases demand for electricity, which can outstrip supply and cause city infrastructure to fail.

These types of incidents can usually be resolved quickly, but sometimes power outages can affect communities for days.

Regarding agriculture, livestock and other animals can become stressed and adversely impacted by extreme heat. High temperatures at the wrong time can also inhibit crop yields. The demand for water increases sharply during periods of extreme heat, which may contribute to fire suppression problems for both urban and rural fire departments. In extreme cases, transportation impacts include the loss of lift for aircrafts, softening of asphalt roads, buckling of highways and railways, and stress on automobiles and trucks (increase in mechanical failures).

Severity of Impact Score: 2 – Limited

Speed of Onset

As with other weather phenomena, periods of extreme heat are predictable. Variations in local conditions can affect the actual temperature within a matter of hours or even minutes. The National Weather Service will initiate alert procedures when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.

Speed of Onset Score: 1—More than 24 hours warning time.

Climate Change Considerations

According to the Iowa Department of Natural Resources, the effects of climate change have already been felt in Iowa. Several of the climatic changes related to extreme heat which have been noted by the Department of Natural Resources are:

- 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 percent more atmospheric moisture than 35 years ago as indicated by a 3 – 5-degree Fahrenheit rise in dew-point temperature. This fuels convective thunderstorms that provide more summer precipitation.

Each of these changes could have direct impacts on human health in terms of heat related illness. With the general trend of increased warming of average temperatures, extreme high temperatures will likely increase as well. Cascading impacts include increased stress on water quantity and quality, degraded air quality, and increased potential for more severe or catastrophic natural events such as heavy rain, droughts, and wildfire. Another cascading impact includes increased duration and intensity of wildfires with warmer temperatures.

Vulnerability

Elderly people, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly

susceptible to heat reactions. Healthy individuals working outdoors in the sun and heat are vulnerable as well. Individuals and families with low budgets as well as inner city dwellers can also be susceptible due to poor access to air-conditioned housing. Generally, more than 75% of people and property in Marshall County are affected when this type of hazard occurs.

Vulnerability Score: 4 – Greater than 75% of people and property affected

People

The impacts of extreme heat on health are also a consideration. According to the US Census Bureau 2019 American Community Survey estimates, approximately 17% of Marshall County residents are over the age of 65. Traditionally, the very young and very old are considered at higher risk to the effects of extreme heat, but any populations outdoors exposed, including otherwise young and healthy adults and homeless populations, are at risk of adverse health impacts. Arguably, the young-and-otherwise-healthy demographic may be more exposed and experience a higher vulnerability because of the increased likelihood that they will be out in the extreme temperature deviation, whether due to commuting for work or school, conducting property maintenance, working in the agricultural sector, or for recreational reasons.

Property

Recent research indicates that the impact of extreme heat has been historically under-represented. The risks of extreme temperatures are often profiled as part of larger hazards, such as drought. However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures.

Critical Facilities and Infrastructure

Prolonged heat exposure can have significant impacts on infrastructure. Another type of infrastructure damage that can occur as a result of extreme heat is road damage. Prolonged high heat exposure increases the potential of pavement deterioration, as well as railroad warping or buckling. As mentioned above, high heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer. Extreme heat can also reduce transmission capacity over electric systems.

Economy

Extreme heat impacts on the economy may be more indirect compared to other hazards. 3.5% of all employment in Marshall County is in the agriculture sector. As noted previously outdoor laborers who are exposed to extreme heat are at a high risk of heat related illnesses, and a long-term heat event could cause work interruptions. Crops are also impacted by heat events and could have an impact on the overall economy in the county. According to the USDA RMA Indemnity Report, since 2007 there have been 3,234 acres lost to heat resulting in \$553,962 in indemnity payments due to insured crop loss. There is an estimated \$42,612 of annualized crop loss due to heat.

Historic, Cultural, and Natural Resources

Extreme heat may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist.

Development Trends

Structures are not usually directly impacted by extreme heat, therefore continued development is less impacted by this hazard than others in the plan. Continued growth and development in Marshall County would involve population growth, which raises the number of individuals potentially exposed to extreme heat. Public education efforts should continue to help the population understand the risks and vulnerabilities of outdoor activities, property maintenance, and regular exposures during periods of extreme heat.

3.3.7 Severe Winter Storm

Severe Winter Storm – Hazard Score Calculation					
Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
4	4	4	2	1	15

Description

Severe winter storms are an annual occurrence in Iowa. A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, cold temperatures and drifting snow creating blizzards. The NWS describes different types of winter storm events as follows:

- **Blizzard**—Winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

Heavy accumulations of ice, often the result of freezing rain, can bring down trees, utility poles, and communications towers and disrupt communications and power for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians.

Severe winter storms include extreme cold, heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in the planning area. Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. Ice can also become a problem on roadways if the air temperature is high enough so that precipitation falls as freezing rain rather than snow.

Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people who are exposed to the weather without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also

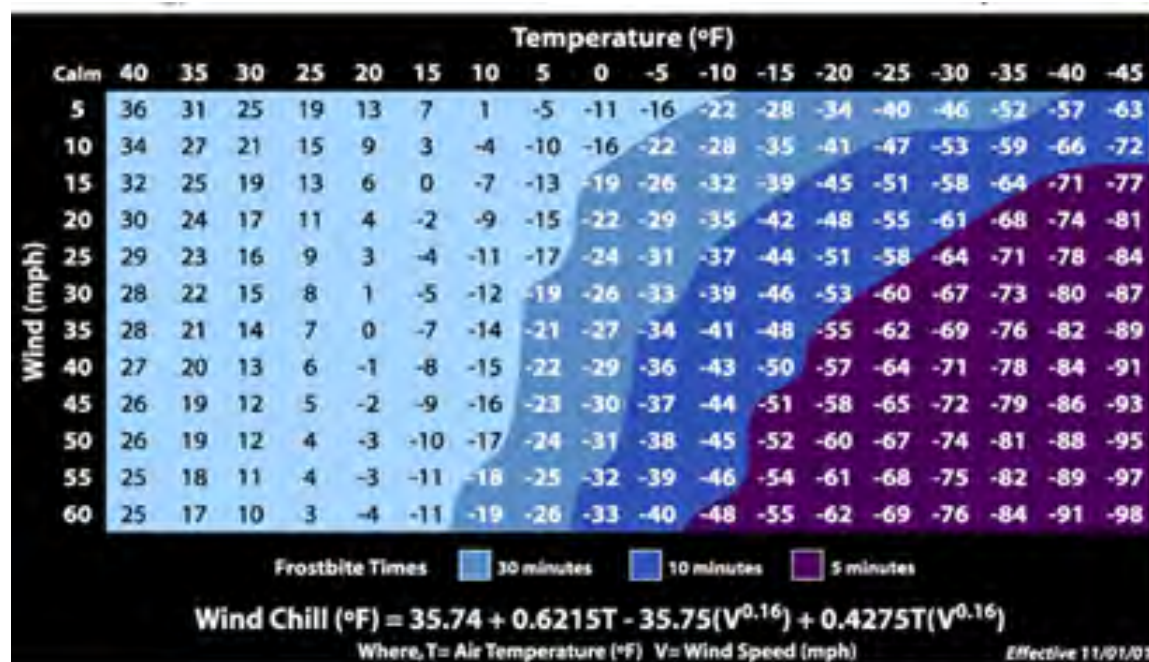
overpower a building's heating system and cause water and sewer pipes to freeze and rupture. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is extremely hazardous to health and safety.

The National Institute on Aging estimates that more than 2.5 million Americans are especially vulnerable to hypothermia, with the isolated elderly being most at risk. About 10 percent of people over the age of 65 have some kind of temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

Also, at risk are those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

Wind can greatly amplify the impact of cold ambient air temperatures. Provided by the NWS, Figure 3-31 below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Figure 3-31 Wind Chill Chart



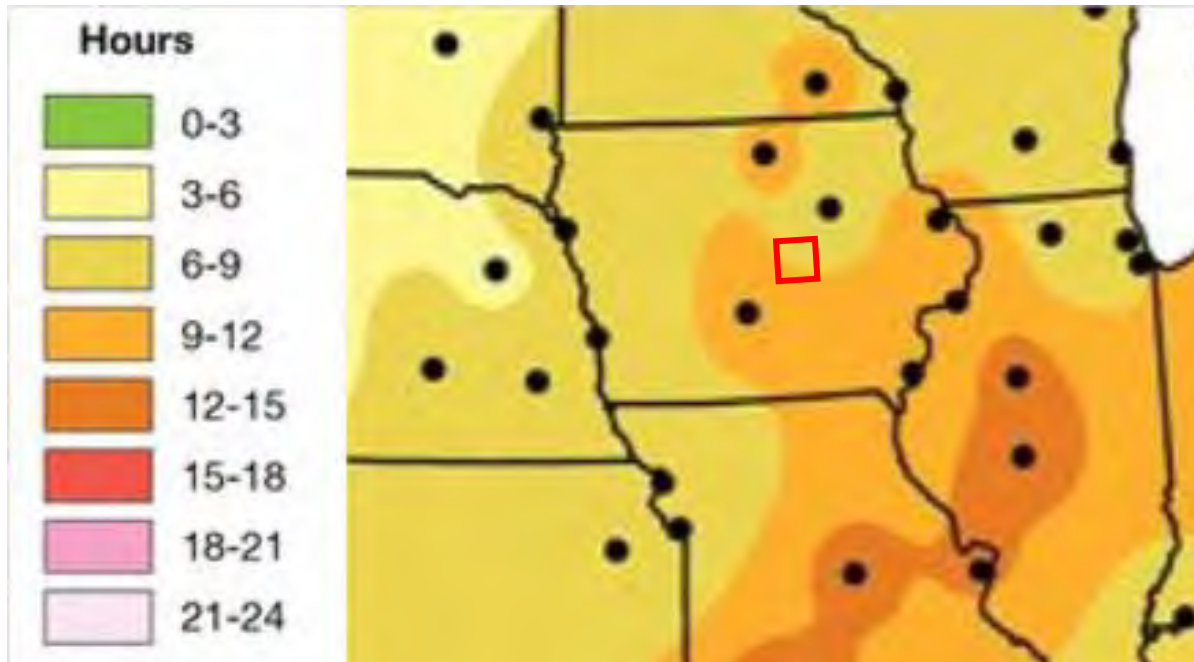
Source: NWS

Location

According to the Southwest Climate and Environmental Information Collaborative (SCENIC), the planning area has a January average high temperature normal of 28 degrees (F), a January average low temperature normal of 8 degrees (F), and the annual average snowfall of 35.25 inches from 1950 to 2020.

The entire state of Iowa is vulnerable to heavy snow, extreme cold temperatures and freezing rain. Generally, winter storms occur between the months of November and March but can occur as early as October and as late as April.

Figure 3-32 shows that the entire planning area (approximated within the red square) is in the yellow and orange-shaded areas that receive from 6-12 hours of freezing rain per year.

Figure 3-32 Average Number of Hours per Year with Freezing Rain

Source: Midwestern Regional Climate Center; http://mcc.sws.uiuc.edu/living_wx/icestorms/index.html

Note: Red square provides approximate location of planning area.

Historical Occurrences

From 1953 to 2020, there has been one Presidential Disaster Declarations involving severe winter weather that included Marshall County (Table 3-23).

Table 3-23 Winter Storm Presidential Disaster Declarations (1953-2020)

Disaster Number	Description	Declaration Date (Incident Period)
DR-1688	Severe Winter Storms	3/14/2007 (2/23/2007-3/2/2007)

Source: Federal Emergency Management Agency, www.fema.gov/; Note: Incident dates are in parentheses

From 1996 to 2020, the NCEI database reported 8 blizzard events, 5 extreme cold/wind chill events, 20 heavy snow events, 15 ice storm events, and 13 winter storm events in Marshall County. This results in a total of 61 incidents of severe winter storms in the county. According to NCEI data, these weather events did not result in any deaths or injuries, but they did cause a total of \$1.85 million in property damages and \$2.6 million in crop damages. This translates to an average of 2.5 winter storm events per year.

NOAA's National Weather Service has issued 447 Advisory, Watch, and/or Warnings concerning winter weather phenomena in the planning area between 2005 and 2020. This data is housed by the Iowa Environmental Mesonet, Iowa State University Department of Agronomy website.

Table 3-24 NWS Issuances for Winter Weather in Marshall County, Iowa, 2005-2020

Phenomena	Significance	Number Issued between 2005 and 2020
Blizzard	Watch	10
Blizzard	Warning	12
Blowing Snow	Advisory	8

Phenomena	Significance	Number Issued between 2005 and 2020
Freeze	Watch	8
Freeze	Warning	23
Freezing Rain	Advisory	8
Frost	Advisory	21
Ice Storm	Warning	5
Snow	Advisory	14
Snow and Blowing Snow	Advisory	7
Wind Chill	Advisory	86
Wind Chill	Watch	3
Wind Chill	Warning	11
Winter Storm	Watch	52
Winter Storm	Warning	44
Winter Weather	Advisory	135
Total		447

Source: Environmental Mesonet, Iowa State University Department of Agronomy website, <http://mesonet.agron.iastate.edu/vtec/search.php>

Historical Occurrence Score: 4

Probability of Future Occurrences

Winter storms regularly move easterly and use both the southward plunge of arctic cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow and sometimes blizzard conditions in Iowa and other parts of the Midwest. The cold temperatures, strong winds, and heavy precipitation are the ingredients of winter storms. Most counties in Iowa can usually expect 2 or 3 winter storms a season with an extreme storm every 3 to 5 years on average. Based on the historic occurrences of this hazard, Marshall County can expect to experience 2.5 winter storm events per year, giving a rating of Highly Likely.

Probability Score: 4—Highly Likely

Magnitude and Severity (Extent)

Severity of Impact

Certain areas may experience local variations in storm intensity and quantity of snow or ice. The Iowa Department of Transportation, county road departments, and local public works agencies are responsible for the removal of snow and treatment of snow and ice with sand and salt on the hundreds of miles of streets and highways in the area. Poor road conditions, immobilized transportation, and downed trees and electrical wire can impair snow removal on roads and road treatment.

Building and communication tower collapse and bodily injury or death are just a few of the impacts of a severe winter storm. Vehicle batteries and diesel engines are stressed, and the fuel often gels in extreme cold weather. This impacts transportation, trucking, and rail traffic. Rivers and lakes freeze, and subsequent ice jams threaten bridges and can close major highways. Ice jams can also create flooding problems when temperatures begin to rise.

An ice coating at least ¼ inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outages. Buried water pipes can burst causing massive ice problems, loss of water, and subsequent evacuations during sub-zero temperatures.

Fire during winter storms presents a great danger because water supplies may freeze, and firefighting equipment may not function effectively, or personnel and equipment may be unable to get to the fire. If power is out, interiors of homes become very cold, causing pipes to freeze and possibly burst.

Cold temperature impacts on agriculture are frequently discussed in terms of frost and freeze impacts early or late in growing seasons and on unprotected livestock. The cost of snow removal, repairing damage, and loss of business can have large economic impacts on a community.

Severity of Impact Score: 2 – Limited

Speed of Onset

The National Weather Service has developed effective weather advisories that are promptly and widely distributed. Radio, television, and All-hazard Radios provide the most immediate means to do this. Accurate information is made available to public officials and the public at least 12-24 hours in advance as storms form and totals are estimated. Several notifications made by the National Weather Service include winter storm warning, blizzard warning, winter weather advisory, and a frost/freeze advisory.

Speed of Onset Score: 1

Climate Change Considerations

Climate change has the potential to exacerbate the severity and intensity of winter storms, including potential heavy amounts of snow. A warming climate may also result in warmer winters, the benefits of which may include lower winter heating demand, less cold stress on humans and animals, and a longer growing season. However, these benefits are expected to be offset by the negative consequences of warmer summer temperatures.

The effects of a changing climate in Iowa in relation to temperatures and precipitation have already been observed. According to the report *Climate Change in the Midwest: A Synthesis Report for the National Climate Assessment*³, referenced in the 2018 Iowa State Hazard Mitigation Plan, average winter temperatures in Iowa have trended 0.031 degrees cooler per year from 1981-2010 and winter precipitation averages have increased by 0.031 inches per year over the same time period. These changes in average climate may impact the frequency and severity of winter weather in the coming years.

Vulnerability

The entire planning area is vulnerable to the effects of winter storm. Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents and can impact the response of emergency vehicles. The leading cause of death during winter storms is transportation accidents. About 70 percent of winter-related deaths occur in automobiles due to traffic accidents and about 25 percent are from people caught outside in a storm. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as for feed, water and shelter for livestock are unable to be met. The probability of utility and infrastructure failure increases during winter storms due to freezing rain accumulation on utility poles and power lines. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity (shoveling snow, digging out vehicles, or assisting stranded motorists), or are the elderly. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizens' use of kerosene heaters and other alternative forms of heating may create other hazards such as structural fires and carbon monoxide poisoning.

Vulnerability Score: 4 – Greater than 75% of people and property affected

People

The threat to public safety is typically the greatest concern when it comes to impacts of winter storms. The highest risk will be to travelers that attempt to drive during adverse conditions. People can also become isolated from essential services in their homes and vehicles. While virtually all aspects of the population are vulnerable to the potential indirect impacts of a winter storm, others may be more vulnerable, such as individuals with access and functional needs, who may become isolated to essential services.

Elderly populations are considered to be at increased risk to Winter Storms and associated extreme cold events. According to the 2019 US Census Bureau American Community Survey estimates, approximately 17.7% of Marshall County's population is over the age of 65. Additionally, the US Department of Health and Human Services estimates that there are 398 electricity-dependent Medicare beneficiaries in the county. These individuals are extremely vulnerable during power outages, which commonly accompany severe winter storm events.

Property

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms. Businesses experience loss of income as a result of closure during power outages. In general, heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. High snow loads can cause damage to buildings and roofs. Most property damages with winter storms are related to the heavy snow loads and vehicle accidents. Older buildings are more at risk, as are buildings with large flat rooftops (often found in public buildings such as schools). Vulnerability is influenced both by architecture and type of construction material and should be assessed on a building-by-building basis.

Critical Facilities and Infrastructure

Roads are especially susceptible to the effects of a severe winter storm, which can temporarily hinder transportation and require resources for snow removal. As noted under the people section, heavy snow accumulation may also lead to downed power lines not only causing disruption to customers but also have potentially negative impacts on critical facilities in the county which may have cascading impacts on the local governments' ability to operate. Potential losses would include cost of repair or replacement of damaged facilities and lost economic opportunities for businesses. Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard.

Economy

Closure of major transportation routes during severe winter storms could temporarily isolate communities in Marshall County and further isolate the more remote areas of the County. Depending on the length of the closure it could also hinder the local economy by disrupting tourism and out of county visitors, and as well as the potential impacts to shipping delays from a closure of any of the highways which traverse the county. Snow removal costs can also impact budgets significantly. Power outages may lead to business closures as well, with impacts possibly lasting for multiple days. According to FEMA standard values for loss of service for utilities reported in the 2009 Benefit Cost Analysis Reference Guide, the economic impact as a result of loss of power is \$126 per person per day of lost service.

Historic, Cultural, and Natural Resources

Natural resources may be damaged by the severe winter weather, including broken trees and death of wildlife and livestock. Unseasonable storms may damage or kill plants and wildlife, which may impact

natural food chains until the next growing seasons. Most of these impacts would be short-term. As noted previously, older, historic buildings could potentially be more vulnerable to roof and structural damage from heavy snow. Cultural facilities in Marshall County can shut down as a result of severe winter weather. Cultural facilities include restaurants, parks, community centers, museums, and businesses.

Development Trends

Future development could potentially increase vulnerability to this hazard by increasing demand on the utilities and increasing the exposure of infrastructure networks.

3.3.8 Thunderstorm, Lightning, and Hail

Thunderstorm, Lightning, and Hail – Hazard Score Calculation					
Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
4	4	2	2	1	13

Description

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When the upper air which is cold sinks and the warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, in clusters or in lines. Severe thunderstorms most often occur in Iowa in the spring and summer, during the afternoon and evenings, but can occur at any time. Thunderstorms can result in heavy rains, high winds, tornadoes, and hail.

Thunderstorms are created from a combination of moisture, rapidly raising warm air, and the lifting mechanism such as that caused when warm and cold air masses collide. Thunderstorms are hazards unto themselves, but can cause other hazards such as flash flooding, river flooding, and tornadoes/windstorms. Hailstorms are a product of a severe thunderstorm in which pellets or lumps of ice (of most concern when greater than 1 inch in diameter) fall with rain.

The National Weather Service considers a thunderstorm severe if it produces hail at least $\frac{3}{4}$ inch in diameter, wind 58 mph or higher, or tornadoes. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes. Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm will carry water droplets to a height where freezing occurs. The size of hail ranges from 0.75 inches in diameter to 2.75 inches. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants and crops. Pets and livestock are particularly vulnerable to hail.

Lightning

All thunderstorms produce lightning which often strikes outside of the area where it is raining and is known to strike more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000 degrees Fahrenheit in a split second. This rapid heating, expansion, and cooling of air near the lightning creates thunder. According to the National Weather Service, lightning kills on average 49 people per year in the United States. Lightning strikes can also start building fires, wildland fires, and damage electrical systems and equipment.

Hail

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 mph, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States was found in Vivian, South Dakota on July 23, 2010, measuring eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea sized hail can do damage.

Hailstorms in Iowa cause damage to property, crops, and the environment and kill and injure livestock. In the United States, hail causes more than \$1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans, occasionally fatal injury.

Based on information provided by the Tornado and Storm Research Organization, Table 3-25 below describes typical damage impacts of the various sizes of hail.

Table 3-25 Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented; brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > Soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

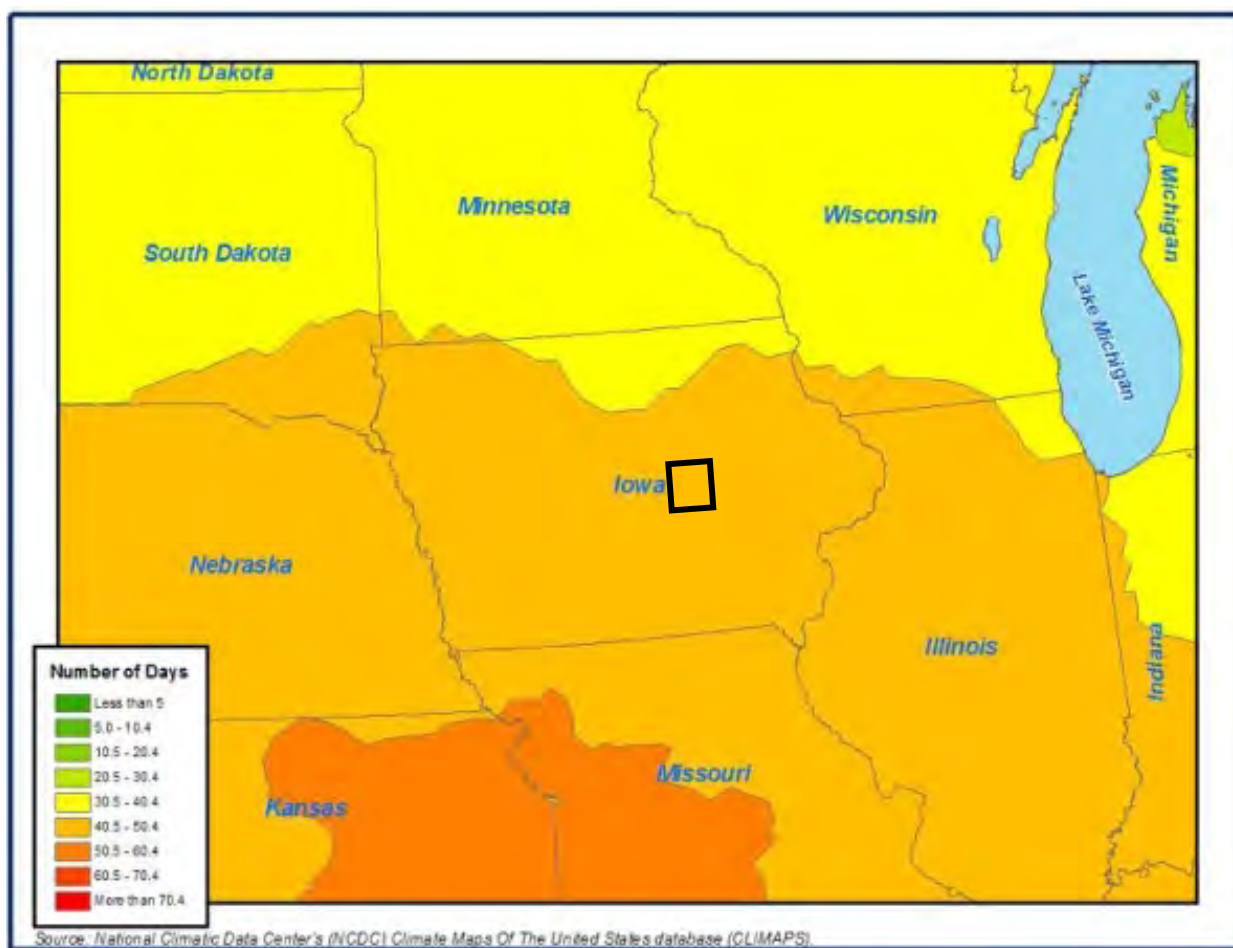
Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University

Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity

Location

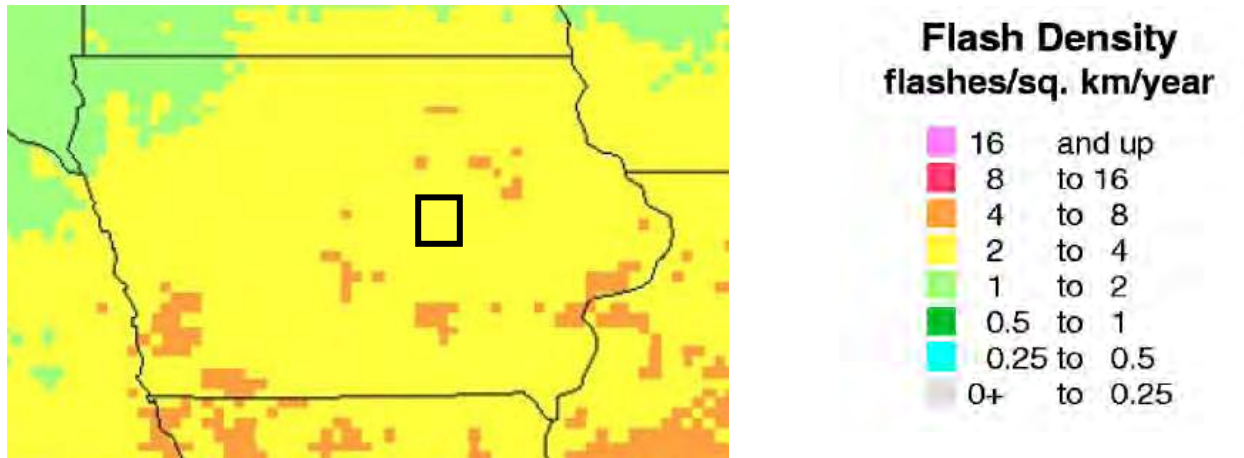
Thunderstorms and the associated hail and lightning impact the entire County with relatively similar frequency. Although, these events occur similarly throughout the planning area, they are more frequently reported in more urbanized areas. In addition, damages are more likely to occur in more densely developed urban areas. Figure 3-33 displays the average number of days with thunder experienced throughout different areas of the county each year, showing the County experiences between 40.5 to 50.4 days with thunder per year. Figure 3-34 shows 2 to 4 lightning strikes per square kilometer per year in the yellow shaded areas.

Figure 3-33 Distribution and Frequency of Thunderstorms



Note: Black Square indicates approximate location of Marshall County

Figure 3-34 Location and Frequency of Lightning in Iowa



Source: NWS, www.lightningsafety.noaa.gov/lightning_map.htm
Note: Black Square indicates approximate location of Marshall County

Historical Occurrences

Since 1970, Marshall County has been included in 11 Presidential Disaster Declarations that included severe storms (see Table 3-26). Some of the damages that resulted in the declarations were from tornadoes and flooding that accompanied the severe weather.

Table 3-26 Presidential Disaster Declarations for Severe Storms that included Marshall County (1970-2020)

Number	Declared	Incident Period	Description
4421	3/23/2019	3/12/2019 to present	Severe Storms and Flooding
4392	9/12/2018	7/19/2018 to present	Severe Storm and Tornadoes
4126	7/2/2013	5/19/2013 to 6/14/2013	Severe Storms, Tornadoes, and Flooding
4016	8/24/2011	7/9/2011 to 7/14/2011	Severe Storms, Straight-line Winds, and Flooding
1763	5/27/2008	5/25 to 8/13/2008	Severe Storms, Tornadoes and Flooding
1518	5/25/2004	5/19 to 6/24/2004	Severe Storms, Tornadoes, and Flooding
1230	7/2/1998	6/13 to 7/15/1998	Severe Weather, Tornadoes and Flooding
996	7/9/1993	4/13 to 10/1/1993	Flooding, Severe Storm
911	7/12/1991	6/1/1991 to 6/15/1991	Flooding, Severe Storm
868	5/26/1990	5/18 to 7/6/1990	Flooding, Severe Storm
443	6/24/1974	6/24/1974	Flooding, Severe Storm

Source: FEMA

According to NCEI data, Marshall County has experienced 79 events of hail or lightning from 1961 to 2020 (the time frame for which data was available). In total, these events have caused \$818,500 in property damages and \$628,000 in crop damages. From 1986 to 2020, the Iowa State Environmental Mesonet Database reported 514 Severe Thunderstorm Warnings from the National Weather Service issued for Marshall County. Overall, the county occurrence is high; however, there are variations among jurisdictions when it comes to the severity and impact of individual events.

Table 3-27 Historical Occurrence of Thunderstorms, Lightning, and Hail in Marshall County

Hazard type	Total Events	Events with Damage	Property Damage	Crop Damage	Injuries	Fatalities
Hail	76	43	\$818,500	\$638,000	0	0
Lightning	3	0	0	0	0	0
Totals	79	43	\$818,500	\$628,000	0	0

Data Source: NCEI Storm Events Database 2020

Historical Occurrence Score: 4**Probability of Future Occurrences**

Thunderstorms occur annually throughout the planning area, many times each year. However, the probability of events which cause significant damage, monetary losses, or death or injury is not necessarily as high.

NCEI reported no damaging lightning events. Since lightning accompanies thunderstorms, it can be assumed that lightning occurs more often than being reported. These rates of occurrence are expected to continue in the future.

Based on NCEI data, there have been 76 separate hail events producing hail 0.75 inches and larger in a 69-year period, producing an average of just over one hail event each year in Marshall County. When limiting the probability analysis to hail events producing hail 1.75 inches and larger, there have been 17 separate events (separate days) in a 50-year period. Based on this history, the probability of a destructive hail event in any given year is 34 percent. Based on this history, there can be a severe hail event every year making the probability for damaging hail “highly likely” in any given year. When considering the frequencies of severe thunderstorms, as discussed in the historical occurrences section, there are an average of 15 per year, meaning a severe thunderstorm occurring in a given year is certain.

Probability Score: 4—Highly Likely**Magnitude and Severity (Extent)****Severity of Impact**

It is possible for the entire county to be affected by a large thunderstorm and lightning event that moves across the entire county, but effects are often localized. Thunderstorms can bring large hail that can damage homes and businesses, break glass, destroy vehicles, and cause bodily injury to people, pets, and livestock. One or more severe thunderstorms occurring over a short period can lead to flooding and cause extensive damage, power and communication outages, and agricultural damage.

In extreme or isolated circumstances, severe thunderstorms can bring straight-line winds in excess of 100 mph. Straight-line winds are responsible for most thunderstorm damage. High winds can damage trees, homes (especially mobile homes), and businesses and can knock vehicles off of the road. The power of lightning’s electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures.

Communities considered these risks and common occurrences when scoring severity of impact. Communities that scored impacts lower (little to no, minimal property damage, minimal environmental impacts, short-term effects on critical facilities operation) considered the effects of an average storm for their city. Communities that scored impacts higher (significant property damage, serious injury, shutdown of critical facilities for days), they considered a worst-case scenario storm.

Severity of Impact Score: 2 – meaning that effects would generally cause only minor injuries or illness, minor property damage, and a shutdown of critical facilities for between 4 and 24 hours.

Speed of Onset

Some thunderstorms can be seen approaching, while others hit with minimal warning. The National Weather Service issues severe thunderstorm watches and warnings as well as statements about severe weather and localized storms. These messages are broadcast over NOAA All-hazard Radios and area television and radio stations. Advances in weather prediction and surveillance have increased warning times. Weather forecasting and severe weather warnings issued by the National Weather Service usually provide residents and visitors alike adequate time to prepare, but isolated problems arise when warnings are ignored. Warnings in the 20 to 30-minute range are usually available prior to the occurrence of the storm. Jurisdictions scored speed of onset as a 4, meaning that there is usually less than 6 hours warning time regarding the specific path, duration, or intensity of a thunderstorm, lightning, event, or hailstorm.

Speed of Onset Score: 1

Vulnerability

In general, assets in the County are vulnerable to thunderstorms winds, lightning and hail including people, crops, livestock, vehicles, and built structures. Although this hazard results in high annual losses, generally private property insurance and crop insurance cover the majority of losses. Considering insurance coverage as a recovery capability and therefore mitigation of devastating impacts to the economy, the overall impact on jurisdictions is reduced.

Hail can also do considerable damage to vehicles and buildings. Hail only rarely results in loss of life directly, although injuries can occur.

The county ranked vulnerability to a thunderstorm, lightning, or hail event as a 3, meaning that between 51-75% of people and property might be affected. Effects of such an event could range from minimal property damage that was not significant or widespread to significant property damage affects a large portion of a jurisdiction. In addition to routine damage, West Marshall Community School District do not currently have safe rooms available for their students and staff. The cities of Gilman and Albion also do not have safe rooms available for their residents, although some alternative locations in the community have been identified as informal places to shelter during inclement weather. These factors could affect each community' vulnerability to thunderstorm, lightning, and hail events.

Vulnerability Score: 2

People

People in unprotected areas, mobile homes, or automobiles during a storm are especially at risk of thunderstorm, lightning, and hailstorms. Sudden strong winds often accompany a severe thunderstorm and may blow down trees across roads and power lines. Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year. Floods and flash floods are the number one cause of weather-related deaths in the U.S. Agricultural crops such as corn and beans are particularly vulnerable to hailstorms stripping the plant of its leaves.

Livestock and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning. Hail can be very dangerous to people, pets, and livestock if shelter is not available. Flash floods and tornadoes can develop during thunderstorms as well.

People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile homes are vulnerable to the impacts of thunderstorms.

Property

Hail can also do considerable damage to vehicles and buildings. Hail only rarely results in loss of life directly, although injuries can occur. According to the NCEI Storm Events Database, between 1950 and 2020 approximately \$818,500 in property damages and \$638,000 in crop damages occurred in Marshall County from hail. Further detail on damage figures is provided in Table 3-27 above. As mentioned throughout this section, these damages are often insured.

Critical Facilities and Infrastructure

Hail can lead to the temporary incapacitation of roads when small hail stones build up so deep, they block roads. Hail has also been observed to block storm drains and prevent proper runoff, potentially resulting in flooding as a secondary hazard. Most structures, including the County's critical facilities, should be able to provide adequate protection from hail but the structures could suffer broken windows and dented exteriors. Those facilities with back-up generators are better equipped to handle a severe weather situation should the power go out. Critical facilities and infrastructure can potentially be damaged by a direct lightning strike. The effect of wind, combined with lightning, rain and hail, on power delivery is a significant factor when assessing current development exposure.

Economy

The economic impact of a severe thunderstorm is typically short term. Lightning and high wind events can cause power outages and fires. Generally, long-term economic impacts center more around hazards that cascade from a severe thunderstorm, including wildfires ignited by lightning. Similarly, with the previous sections, lightning can cause structural damage or damage to electrical systems to private buildings as well as critical infrastructure. Hail and high wind damage can also force the temporary or extended closure of businesses, resulting in lost income and wages in addition to the recovery costs of repairing damage.

Historic, Cultural, and Natural Resources

While hail is a natural environmental process, it can cause significant environmental damage, breaking tree limbs, damaging trees and other plants in bloom, and destroying crops. Some cultural and historic properties may also potentially be at risk of damage from hail.

Development Trends

All future development in Marshall County will be affected by thunderstorms, hail, and lightning. The ability to withstand and adapt to impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. Land use policies should be identified in master plans and enforced through zoning code and the permitting process as well to address the secondary impacts of this hazard. With these tools, the planning partnership will be well equipped to deal with future growth and the associated impacts of severe weather.

3.3.9 Tornado

Tornado – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	4	3	3	3	4	17
Clemons	4	3	3	3	4	17
Ferguson	4	3	3	3	4	17
Gilman	4	3	3	3	4	17
Haverhill	4	3	3	3	4	17
Laurel	4	3	3	3	4	17
Le Grand	4	3	3	3	4	17
Liscomb	4	3	3	3	4	17
Marshalltown	4	3	3	3	4	17
Melbourne	4	3	3	3	4	17
Rhodes	4	3	3	3	4	17
St. Anthony	4	3	3	3	4	17
State Center	4	3	3	3	4	17
Marshall County	4	3	3	3	4	17
East Marshall Community SD	4	3	3	3	4	17
GMG Community SD	4	3	3	3	4	17
Marshalltown Community SD	4	3	3	3	4	17
West Marshall Community SD	4	3	3	3	4	17

Description

The NWS defines a tornado as “a violently rotating column of air extending from a thunderstorm to the ground.” It is usually spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Often, vortices remain suspended in the atmosphere as funnel clouds. When the lower tip of a vortex touches the ground, it becomes a tornado and a force of destruction.

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also generate a tremendous amount of flying debris or “missiles,” which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Location

Tornadoes can occur in the entire planning area. Figure 3-36 shows the location of past tornado events in Marshall County between 1950 and 2018.

Historical Occurrence

According to the National Center for Environmental Information (NCEI) Storm Events Database, Marshall County has experienced a total of 30 tornadoes from 1950-2020. These events caused a total of \$231,459,000 in property damages and \$73,000 in crop damages as well as 49 injuries. As a whole, county-wide tornadic events in Marshall County received a score of 4, meaning that well over 12

tornadoes occurred during the time frame for which data was available. Individually, however, most communities in the county experience less than four tornado events. The Marshall County unincorporated area has the highest incidence of previous tornadic events with 20 events.

Table 3-28 Historical Occurrence of Tornadoes in Marshall County, 1951-2020

Date	Location	Magnitude	Fatalities	Injuries	Property Damage	Crop Damage
6/1/1951	Marshall Co.	F3	0	7	\$0	\$0
4/23/1961	Marshall Co.	F3	0	6	\$2,500,000	\$0
5/28/1962	Marshall Co.	F2	0	5	\$250,000	\$0
6/11/1966	Marshall Co.	F1	0	0	\$0	\$0
6/6/1969	Marshall Co.	F2	0	0	\$25,000	\$0
6/11/1969	Marshall Co.	F2	0	0	\$25,000	\$0
6/22/1969	Marshall Co.	F0	0	0	\$25,000	\$0
6/18/1974	Marshall Co.	F0	0	0	\$2,500	\$0
9/16/1978	Marshall Co.	F3	0	9	\$0	\$0
4/10/1981	Marshall Co.	F2	0	0	\$2,500,000	\$0
7/11/1987	Marshall Co.	F0	0	0	\$2,500	\$0
5/24/1989	Marshall Co.	F4	0	0	\$25,000,000	\$0
9/12/1991	Marshall Co.	F1	0	0	\$25,000	\$0
4/14/1994	State Center	F1	0	0	\$500,000	\$0
5/19/1996	Le Grand	F0	0	0	\$0	\$0
5/30/1998	Rhodes	F1	0	0	\$2,000	\$500
6/29/1998	Marshalltown	F1	0	0	\$20,000	\$5,000
6/13/2000	State Center	F1	0	0	\$150,000	\$5,000
4/11/2001	Rhodes	F0	0	0	\$1,000	\$0
5/22/2004	Ferguson Melbourne	F0	0	0	\$10,000	\$5,000
8/3/2004	Albion	F1	0	0	\$100,000	\$10,000
8/26/2004	Melbourne	F1	0	0	\$50,000	\$10,000
9/5/2004	State Center	F1	0	0	\$20,000	\$5,000
6/8/2008	Pickering	EF1	0	0	\$30,000	\$2,000
7/19/2008	Marshalltown	EF0	0	0	\$0	\$0
6/30/2014	St Anthony	EF1	0	0	\$150,000	\$20,000
6/30/2014	Bangor	EF0	0	0	\$50,000	\$5,000
11/11/2015	Pickering	EF0	0	0	\$1,000	\$0
7/19/2018	Bromley Marietta Marshalltown	EF3	0	22	\$200,000,000	\$4,000
3/28/2020	Rhodes	EF0	0	0	\$0	\$0
8/10/2020	La Moille Minerva Marietta	EFU	0	0	\$20,000	\$1,500
Total			0	49	\$231,459,000	\$73,000

Source: NCEI

Marshall County has had 5 federal disaster declarations for tornadoes since 1965. Most recently a disaster declaration (DR-4392) was approved for the June 19, 2018, tornado, the event of record for the County. The 2018 tornado caused widespread damages in Marshalltown, including the Town's main business district and damages to the County's historic courthouse and clocktower. In total the event caused

Figure 3-35 Path of 2018 Tornado

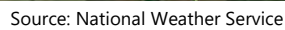
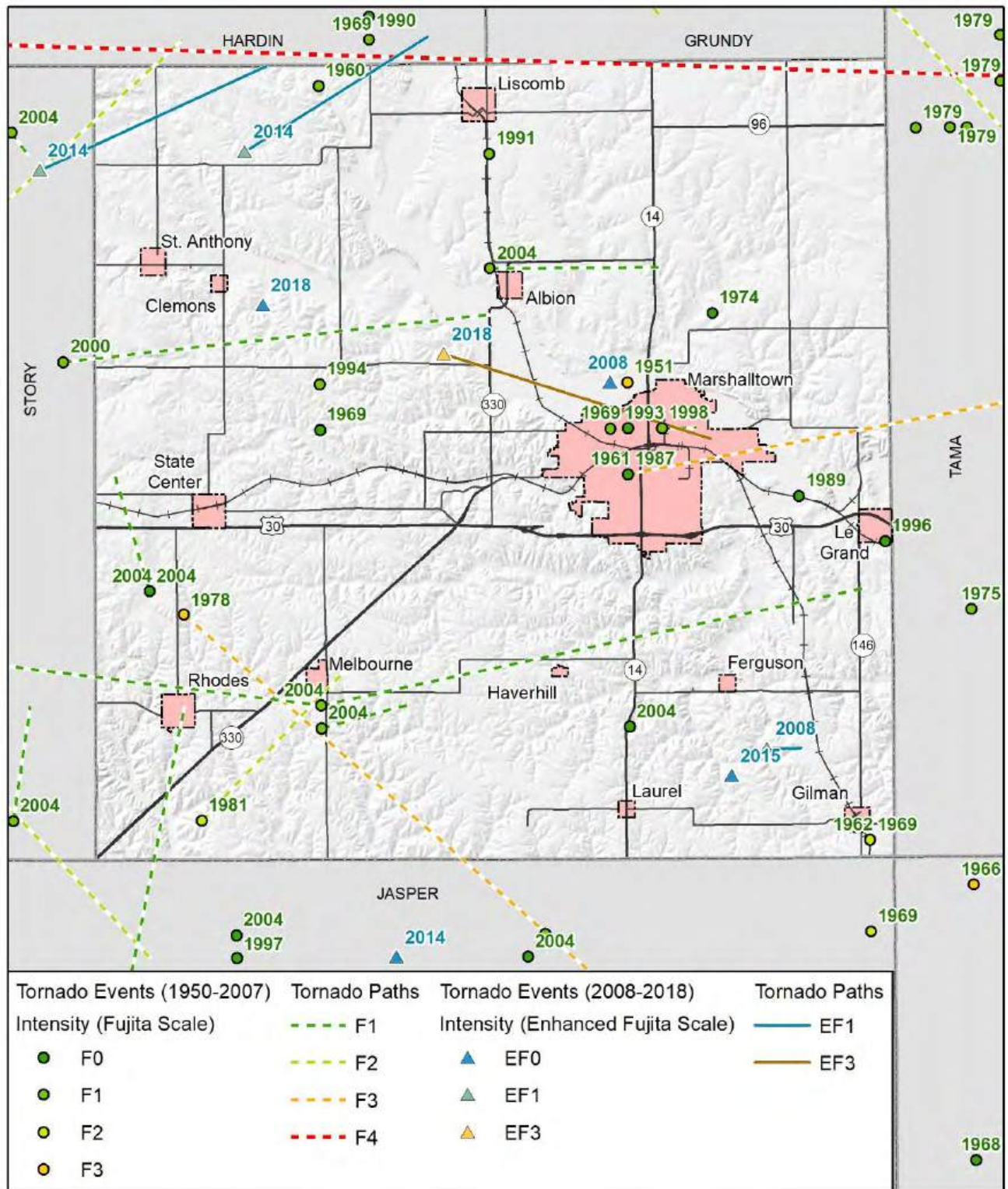


Figure 3-36 Past Tornado Events in Marshall County, 1950-2018



Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD, IDOT
NOAA, National Weather Service SVRGIS 2019

0 5 10 Miles



Probability of Future Occurrences

Iowa is located in a part of the United States where tornadoes are a common occurrence. Iowa has experienced 1,237 tornadoes from 2000 through 2020 (20-year period) with approximately 91 percent of them being rated EF0 and EF1, and 9 percent rated F2 through F5. Only one EF5 rated tornado has occurred in Iowa during this timeframe (Parkersburg in 2008). Since 2020, there have been on average 61 tornadoes per year in Iowa. Most tornadoes occurred in May and June but can occur during any month. Also, midafternoon until around sunset is the peak time of day for tornado activity.

The advancement in weather forecasting has provided for the ability to predict severe weather that is likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

The Iowa Environmental Mesonet through the Iowa State University Department of Agronomy tracks NWS watches, warnings, and advisories for counties and parishes across in the U.S. According to the database there has been 52 tornado warnings in Marshall County between 1986 and 2020 and 60 tornado watches between 2005 and 2020. On average the County experiences 4 tornado watches and 1.5 warnings per year.

Based on NCEI data, Marshall County is a 43% probability of a tornadic event occurring in any given year, which results in a score of 3. Even though the probability of an individual jurisdiction is low, there is almost always risk of a tornado event somewhere in the county every year. It can be difficult to pinpoint the exact location of a tornado, so risk remains high for a large area when conditions for tornadoes are present. Historically, 30-40 tornadoes are confirmed in Iowa per year.

Magnitude and Severity (Extent)

There have been 830 injuries and 30 deaths attributable to tornadoes from 1980 through 2019. (NWS, Iowa Tornado Climatology Report 1980-2019). The greatest rated tornado in Marshall County was a F4 on May 24, 1989 and resulted in \$25,000,000 in property damages (Table 3-28).

Tornadoes are classified according to the EF- Scale (the original F – Scale was developed by Dr. Theodore Fujita, a renowned severe storm researcher). The Enhanced F- Scale (see Table 3-29) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F scale was implemented in the U.S. on February 1, 2007. Tornadoes up through EF 5 are possible in the planning area.

Table 3-29 Enhanced F Scale for Tornado Damage

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Source: NWS, www.spc.noaa.gov/faq/tornado/ef-scale.html

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in Table 3-30. The damage descriptions are summaries. For the actual EF scale, it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees of damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3-30 Enhanced Fujita Scale with Potential Damage

Enhanced Fujita Scale			
Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center

Severity of Impact

The severity of damage from tornadoes can be very high. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows all the way to complete destruction and disintegration of well-constructed structures, infrastructure, and trees. Injury or death related to tornadoes most often occurs when buildings collapse; people are hit by flying objects or are caught trying to escape the tornado in a vehicle.

All communities in Marshall County ranked severity of impact as a 3 or a 4, recognizing the potential for serious injury or deaths. Some of these communities have lived through tornadoes that have caused serious property damage. While there are also more common, less severe damages that can result from tornadoes like broken tree branches and windows, the HMPC agreed that jurisdictions would like to consider the more severe impacts that tornadoes can cause.

Speed of Onset

Tornadoes strike with an incredible velocity. Wind speeds may approach 300 mph and the storm can travel across the ground at more than 70 mph. These winds can uproot trees and structures and turn harmless objects into deadly missiles, all in a matter of seconds. The advancement in weather forecasting has allowed tornado watches to be delivered to those in the path of these storms up to hours in advance. The best lead-time for a specific severe storm and tornado is about 30 minutes.

Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground due to blowing dust or driving rain and hail. Communities would have minimal to no warning time in the event of a tornado.

Climate Change Considerations

Climate change impacts on the frequency and severity of tornadoes are unclear at this time due to the events occur over a much shorter time periods and tend to impact smaller areas compared to other extreme events such as heat waves and droughts (U.S. Global Change Research Program 2018). NASA's Earth Observatory has conducted studies in 2013, which aim to understand the interaction between climate change and tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others don't, beyond knowing that they require a certain type of wind shear. Tornadoes spawn from approximately one percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation. Some studies show a potential for a decrease in wind shear in mid-latitude areas. The level of significance of this hazard should be revisited over time.

Vulnerability

Marshall County scored vulnerability to tornadoes as a 3, meaning that between 51- 75% of people and property might be affected. Communities in Marshall County considered the extent of their vulnerability to tornadoes in various ways depending on the extent of the tornado. Some jurisdictions considered their vulnerability low, noting that the destructive path of a tornado is often only a couple hundred feet in width and would not impact a large area of the community. While a large-scale event could be devastating, Marshall County has the highest probability of experiencing an F1 tornado based on past occurrences. Other communities considered large, destructive tornado events when scoring vulnerability. Stronger tornadoes can leave a path of devastation up to a mile wide. Normally, a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning and are associated with severe storms and may cause significant damage to a wider area. The county as a whole determined their vulnerability score to be a 3, meaning that between 51-75% of people and property might be affected.

People

It can be assumed that the entire planning area is exposed to some extent to tornadoes. Certain areas are more exposed due to geographic location and local weather patterns. Likelihood of injuries and fatalities would increase if warning time was limited before the event or if residents were unable to find adequate shelter.

Vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life-threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure after tornado events and could suffer

more secondary effects of the hazard. According to the U.S. Health and Human Services emPOWER database, 5% of Medicare Beneficiaries in the County rely on electricity-dependent medical equipment to be able to live independently in their homes. These populations face isolation and exposure after tornado events and could suffer more secondary effects of the hazard. These populations face isolation and exposure after tornado events and could suffer more secondary effects of the hazard.

Individuals caught in the path of a tornado who are unable to seek appropriate shelter are especially vulnerable. This may include individuals who are out in the open, in cars, or who do not have access to basements, cellars, or safe rooms.

Property

All property is vulnerable during tornado events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. The 2018 EF 3 tornado caused significant property damages to Marshalltown (Refer to Table 3-28). Mobile homes are more vulnerable to the impacts of a tornado event compared to housing types due to methods of construction. Statewide, mobile homes represent about 3.7% of total housing (U.S. Census). Haverhill is the only jurisdiction with no mobile homes although other cities including Albion and Gilman noted that former mobile home parks in the city no longer contained any mobile homes. Liscomb, St. Anthony, Le Grand and Rhodes have the greatest percentage of mobile homes. Table 3-31 shows the percentage of mobile homes in each jurisdiction.

Table 3-31 Percentage of Mobile Homes in Marshall County and Jurisdictions

Jurisdiction	Total Housing Units	Total Mobile Homes	Percentage of Mobile Homes
Liscomb	134	21	15.7%
St. Anthony	45	7	15.6%
Le Grand	433	54	12.5%
Rhodes	116	14	12.1%
Clemons	72	4	5.6%
Melbourne	354	18	5.1%
Ferguson	90	3	3.3%
Gilman	229	7	3.1%
Marshall County	16,793	509	3.0%
Marshalltown	11,173	257	2.3%
State Center	642	7	1.1%
Albion	250	2	0.8%
Laurel	123	1	0.8%
Haverhill	73	0	0.0%

Source: U.S. Census Bureau, American Community Survey 2015-2019

According to NCEI data (Refer to Table 3-28), Marshall County experienced 30 tornado events from 1951 – 2020. These events caused a total of \$231,459,000 in property damage and \$73,000 in crop damage. Using this data, an average annual countywide loss estimate was calculated as follows:

Total Tornado Damage History (\$231,459,000) / Number of Years of Record 69 years) = Average Annual Countywide Loss Estimate. Based on historic events, Marshall County may experience \$3,354,478 in damages related to tornadoes in any given year.

Critical Facilities and Infrastructure

All critical facilities and infrastructure are likely exposed to tornadoes, though the likelihood of damage to any critical facilities or infrastructures from a tornado is extremely limited. The most common problems

associated with this hazard are utility losses. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water, and sewer systems may not function. Roads may become impassable due to downed trees or other debris.

Tornadoes can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Any facility that is in the path of a tornado is likely to sustain damage.

Additionally, fires may result from damages to natural gas infrastructure. Hazardous materials may be released if a structure is damaged that houses such materials or if such a material is in transport.

Economy

Tornadoes can impact exposed critical infrastructure; depending on the impact and the function, this could cause a short-term economic disruption. The most common problems associated with tornadoes and damaging winds are loss of utilities. Downed power lines can cause power outages, leaving large parts of the County isolated, and without electricity, water, and communication. Damage may also limit timely emergency response and the number of evacuation routes.

Historic, Cultural, and Natural Resources

Environmental features are exposed to tornado risk, although damages are generally localized to the path of the tornado however, if tornadoes impact facilities that store HAZMAT areas impacted by material releases may be especially vulnerable. Historic buildings built prior to modern building codes would be more prone to damage. Cultural facilities could also be temporarily shut down until debris is cleaned and residents are accounted for. Some cultural facilities such as community centers, parks, or gas stations may be turned into impromptu emergency centers where emergency supplies can be distributed, and emergency personnel can organize

Development Trends

Development and population trends in the county have been decreasing in the county for the past 10-years. All future development will be affected by tornadoes, particularly development that occurs at lower elevations. Any future development will need to meet regulations that require safe rooms, basements, or other structures that reduce risk to people would decrease vulnerability.

3.3.10 Windstorm

Windstorm – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	4	4	4	2	4	18
Clemons	4	4	4	2	4	18
Ferguson	4	4	4	2	4	18
Gilman	4	4	4	2	4	18
Haverhill	4	4	4	2	4	18
Laurel	4	4	4	2	4	18
Le Grand	4	4	4	2	4	18
Liscomb	4	4	4	2	4	18
Marshalltown	4	4	4	2	4	18
Melbourne	4	4	4	2	4	18
Rhodes	4	4	4	2	4	18
St. Anthony	4	4	4	2	4	18
State Center	4	4	4	2	4	18
Marshall County	4	4	4	2	4	18
East Marshall Community SD	4	4	4	2	4	18
GMG Community SD	4	4	4	2	4	18
Marshalltown Community SD	4	4	4	2	4	18
West Marshall Community SD	4	4	4	2	4	18

Description

Windstorms for purposes of this plan refer to other non-tornadic damaging winds of thunderstorms including downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Straight-line winds are generally any thunderstorm wind that is not associated with rotation. It is these winds, which can exceed 100 mph, which represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase.

A derecho is a widespread, long-lived, straight-line windstorm. Derechos are associated with bands of rapidly moving showers or thunderstorms variously known as bow echoes, squall lines, or quasi-linear convective systems. Derecho's are capable of producing a similar level of destruction as a tornado, however the damage typically occurs in one direction along a relatively straight path. According to NOAA, if the swath of wind damage extends for more than 250 miles (about 400 kilometers), includes wind gusts of at least 58 mph (93 km/h) along most of its length, and also includes several, well-separated 75 mph (121 km/h) or greater gusts, then the event may be classified as a derecho. Because they occur most often during the warm season, derechos pose particular risk to those recreating outdoors, potentially overturning boats and recreational vehicles and leading to death or injury from falling trees, tree limbs, and other flying debris. Marshall County experienced a severe derecho in the summer of 2020 (Refer to Historical Occurrence below).

Strong winds can occur year-round in Iowa. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems are, (one high pressure, one low pressure) the stronger the pressure gradient, and therefore, the stronger the winds are. Objects such as trees, barns, outbuildings, high-profile vehicles, and power line/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. Downbursts can be particularly dangerous to aviation.

Location

All of Marshall County is susceptible to high wind events and tornadoes. The County is located in Wind Zone IV, which is susceptible to winds up to 250 mph. All of the participating jurisdictions are vulnerable to this hazard. Figure 3-37 shows the wind zones of the United States based on maximum wind speeds; the entire state of Iowa is located within wind zone IV, the highest inland category.

Figure 3-37 Wind Zones in the United States



Source: FEMA: http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm

Historical Occurrence

According to NCEI Storm Events Database, Marshall County has 143 severe wind events between 1961 and 2020. Of these events, 87 resulted in \$3,966,110 in property damage and \$754,500 in crop damage. Table 3-32 provides event details on past events that have resulted in property or crop damages.

The August 10, 2020, Derecho event is the greatest recorded wind event at 92 miles per hour (mph) in the Storm Events Database. The Derecho travelled a total of 770 miles in 14 hours from the southeast from

South Dakota to Ohio. Marshall County experienced countywide impacts, including an estimated over 2,000 homes damages in Marshalltown and millions of acres of corn and soybean crops damages. The event resulted in a Federal Disaster Declaration, DR-4557. The 2020 Derecho event is estimated to be the costliest (\$11.2 Billion) thunderstorm disaster in U.S. history (NOAA). The NCEI Storm Events Database did not list impacts from the 2020 Derecho.

Table 3-32 Impacts from Severe Wind Events in Marshall County

Date	Location	Magnitude (mph)	Property Damage	Crop Damages
8/14/1993	State Center	50	\$5,000	\$500
4/14/1994	State Center	60	\$50,000	\$0
	Melbourne	61	\$50,000	\$0
6/6/1994	Marshalltown	50	\$5,000	\$0
7/4/1995	Melborne	52	\$5,000	\$1,000
	Haverhill	50	\$3,000	\$1,000
	Bolton	50	\$1,000	\$0
	Marshalltown	50	\$10,000	\$1,000
	Melborne	52	\$5,000	\$1,000
	Haverhill	50	\$3,000	\$1,000
	Bolton	50	\$1,000	\$0
	Marshalltown	50	\$10,000	\$1,000
5/19/1996	State Center	52	\$2,000	\$0
4/5/1997	Haverhill	55	\$50,000	\$0
6/15/1997	Marshalltown Arpt	55	\$10,000	\$0
4/12/1998	Marshall (Zone)	Unknown	\$50,000	\$0
6/11/1998	Marshalltown	50	\$5,000	\$0
6/18/1998	State Center	56	\$20,000	\$0
6/27/1998	State Center	56	\$5,000	\$0
6/29/1998	Marshalltown	69	\$75,000	\$0
11/10/1998	Marshall (Zone)	61	\$300,000	\$0
3/17/1999	Marshall (Zone)	50	\$30,000	\$0
5/10/1999	Marshall (Zone)	50	\$25,000	\$0
5/16/1999	Marshalltown	56	\$10,000	\$0
3/8/2000	Marshall (Zone)	50	\$10,000	\$0
6/13/2000	Marshalltown	56	\$25,000	\$0
	State Center	69	\$75,000	\$0
9/14/2000	Marshalltown	69	\$100,000	\$0
4/7/2001	Marshall (Zone)	50	\$50,000	\$0
4/11/2001	State Center	53	\$5,000	\$3,000
6/12/2001	Gilman	52	\$5,000	\$0
7/8/2001	State Center	61	\$10,000	\$2,000
	Marshalltown	65	\$15,000	\$5,000
9/7/2001	Marshalltown	52	\$5,000	\$0
	State Center	57	\$10,000	\$3,000

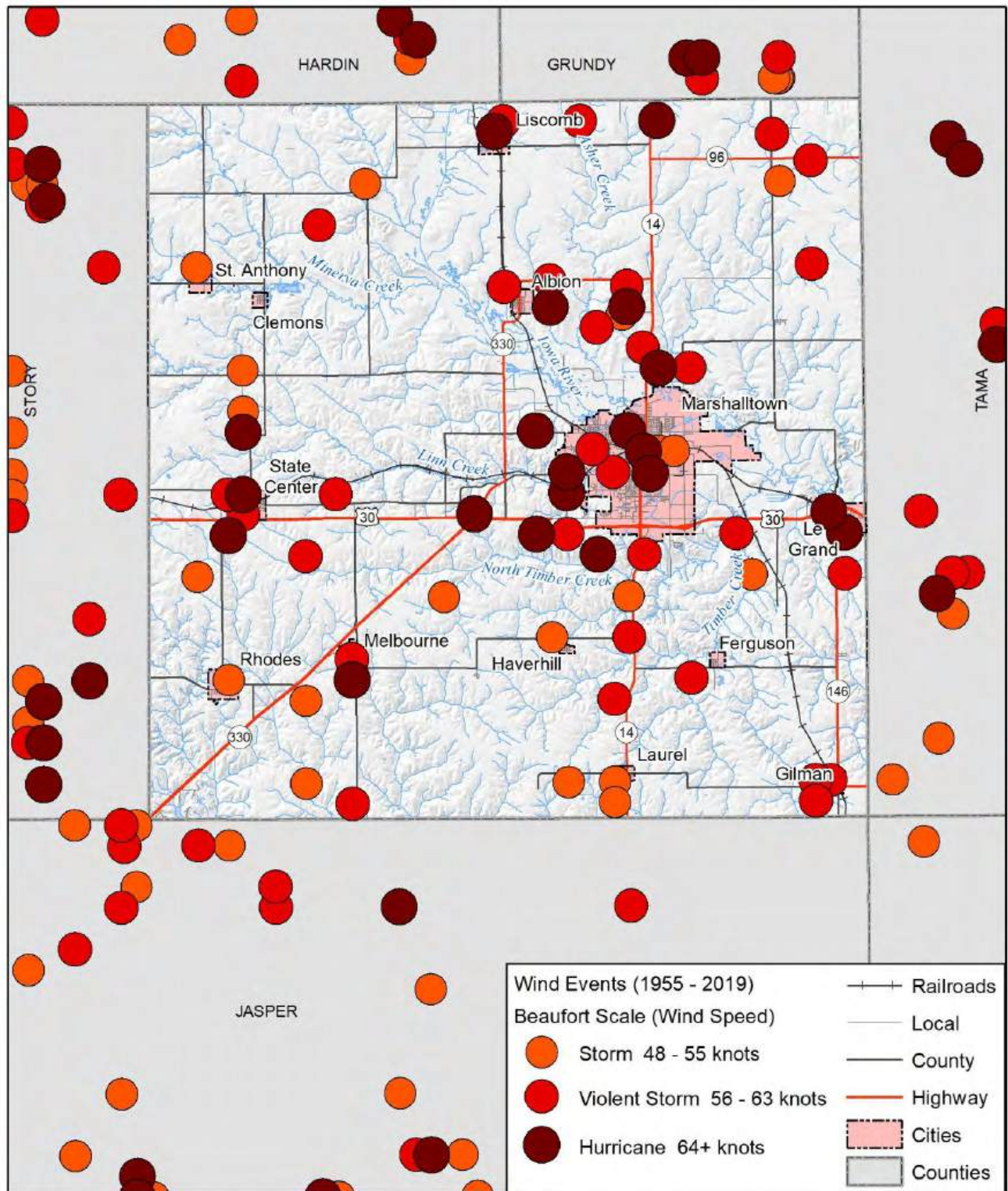
Date	Location	Magnitude (mph)	Property Damage	Crop Damages
3/9/2002	Marshalltown	61	\$30,000	\$0
	Ferguson	56	\$5,000	\$0
	Le Grand	70	\$50,000	\$0
	Marshall (Zone)		\$50,000	\$0
8/17/2002	Marshalltown	54	\$10,000	\$5,000
5/30/2003	Marshall (Zone)	35	\$25,000	\$0
6/25/2003	Marshalltown	50	\$3,000	\$0
8/25/2003	Clemons	52	\$2,000	\$0
11/12/2003	Marshall (Zone)	50	\$50,000	\$0
4/18/2004	Marshall (Zone)	35	\$80,000	\$0
4/27/2004	Marshall (Zone)	35	\$75,110	\$0
5/22/2004	Melbourne	80	\$25,000	\$0
	Rhodes	69	\$10,000	\$0
	Le Grand	61	\$10,000	\$0
5/24/2004	Marshall (Zone)	40	\$25,000	\$0
8/3/2004	State Center	54	\$5,000	\$0
	Marshalltown	57	\$50,000	\$5,000
	Marshalltown	57	\$100,000	\$5,000
	Albion	52	\$10,000	\$0
	Liscomb	57	\$25,000	\$5,000
	Marshalltown Arpt	57	\$5,000	\$0
8/26/2004	Gilman	52	\$2,000	\$0
	Ferguson	40	\$50,000	\$0
12/12/2004	Marshall (Zone)	52	\$10,000	\$0
1/22/2005	Marshall (Zone)	62	\$10,000	\$0
5/12/2005	Marshall (Zone)	52	\$5,000	\$0
6/4/2005	Laurel	50	\$20,000	\$0
6/8/2005	Marshall (Zone)	61	\$25,000	\$0
6/20/2005	State Center	57	\$5,000	\$0
6/29/2005	Laurel	52	\$10,000	\$0
9/8/2005	Marshalltown	35	\$50,000	\$0
11/12/2005	Marshall (Zone)	54	\$10,000	\$0
1/24/2006	Marshall (Zone)	54	\$5,000	\$0
3/30/2006	Clemons	57	\$5,000	\$0
4/18/2006	Melbourne	52	\$2,000	\$0

Date	Location	Magnitude (mph)	Property Damage	Crop Damages
5/27/2006	Marshall (Zone)	70	\$50,000	\$0
3/31/2007	State Center	56	\$10,000	\$0
	Marshalltown	55	\$3,000	\$0
7/18/2007	State Center	65	\$30,000	\$50,000
8/21/2007	Marshalltown	51	\$2,000	\$0
6/5/2008	Melbourne	57	\$15,000	\$0
	Marshalltown	67	\$20,000	\$0
6/6/2008	Gilman	61	\$15,000	\$0
7/12/2008	Marshalltown Arpt	52	\$1,000	\$0
10/26/2008	Marshall (Zone)	54	\$25,000	\$25,000
4/26/2009	Beaman	56	\$25,000	\$0
6/17/2009	Liscomb	57	\$15,000	\$0
6/19/2009	Luray	52	\$3,000	\$0
	Marshalltown	82	\$25,000	\$100,000
6/23/2009	Marshalltown	52	\$2,000	\$0
8/9/2009	Marshalltown	65	\$10,000	\$25,000
5/2/2010	Marshalltown Arpt	62	\$5,000	\$0
8/8/2010	Marshalltown	56	\$25,000	\$0
10/27/2010	Marshall (Zone)	51	\$25,000	\$0
6/13/2011	Marshall (Zone)	35	\$20,000	\$0
6/26/2011	Rhodes	52	\$5,000	\$0
7/11/2011	La Moille	70	\$50,000	\$50,000
	Luray	75	\$150,000	\$250,000
	Marshalltown	85	\$500,000	\$50,000
	Quarry	65	\$40,000	\$50,000
	Albion	75	\$50,000	\$100,000
1/1/2012	Marshall (Zone)	51	\$25,000	\$0
5/2/2012	State Center	61	\$15,000	\$0
6/20/2012	State Center	61	\$15,000	\$0
7/25/2012	Haverhill	56	\$5,000	\$10,000
9/7/2012	Laurel	52	\$10,000	\$0
5/19/2013	State Center	52	\$3,000	\$0
	Dillon	52	\$2,000	\$0
5/20/2013	Bangor	55	\$3,000	\$0
	State Center	52	\$5,000	\$0
	Luray	52	\$2,000	\$0
5/27/2013	Marshall (Zone)	61	\$5,000	\$0
5/29/2013	Marshalltown	59	\$5,000	\$0
6/24/2013	Marshalltown Arpt	55	\$5,000	\$0
7/22/2013	State Center	52	\$5,000	\$0

Date	Location	Magnitude (mph)	Property Damage	Crop Damages
	Marshalltown	56	\$15,000	\$0
	Albion	56	\$10,000	\$0
1/26/2014	Marshall (Zone)	53	\$25,000	\$0
6/27/2014	Marshalltown	65	\$200,000	\$0
6/30/2014	Liscomb	65	\$100,000	\$5,000
4/18/2015	Le Grand	61	\$50,000	\$0
7/28/2015	Melbourne	56	\$20,000	\$0
8/9/2015	Marshalltown Arpt	50	\$15,000	\$0
5/26/2016	Albion	65	\$20,000	\$0
	Marshalltown Arpt	61	\$15,000	\$0
5/17/2017	Marshalltown	60	\$20,000	\$0
	Albion	60	\$15,000	\$0
6/15/2019	Marshalltown	56	\$20,000	\$0
Total			\$3,645,110	\$754,500

Source: NCEI

Figure 3-38 Past Severe Wind Events in Marshall County, 1995-2019



Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, IDOT, NHD,
NOAA, National Weather Service SVRGIS 2019

Figure 3-39 shows the path of the 2020 Derecho through Iowa and Marshall County

Figure 3-39 Path of August 2020 Derecho

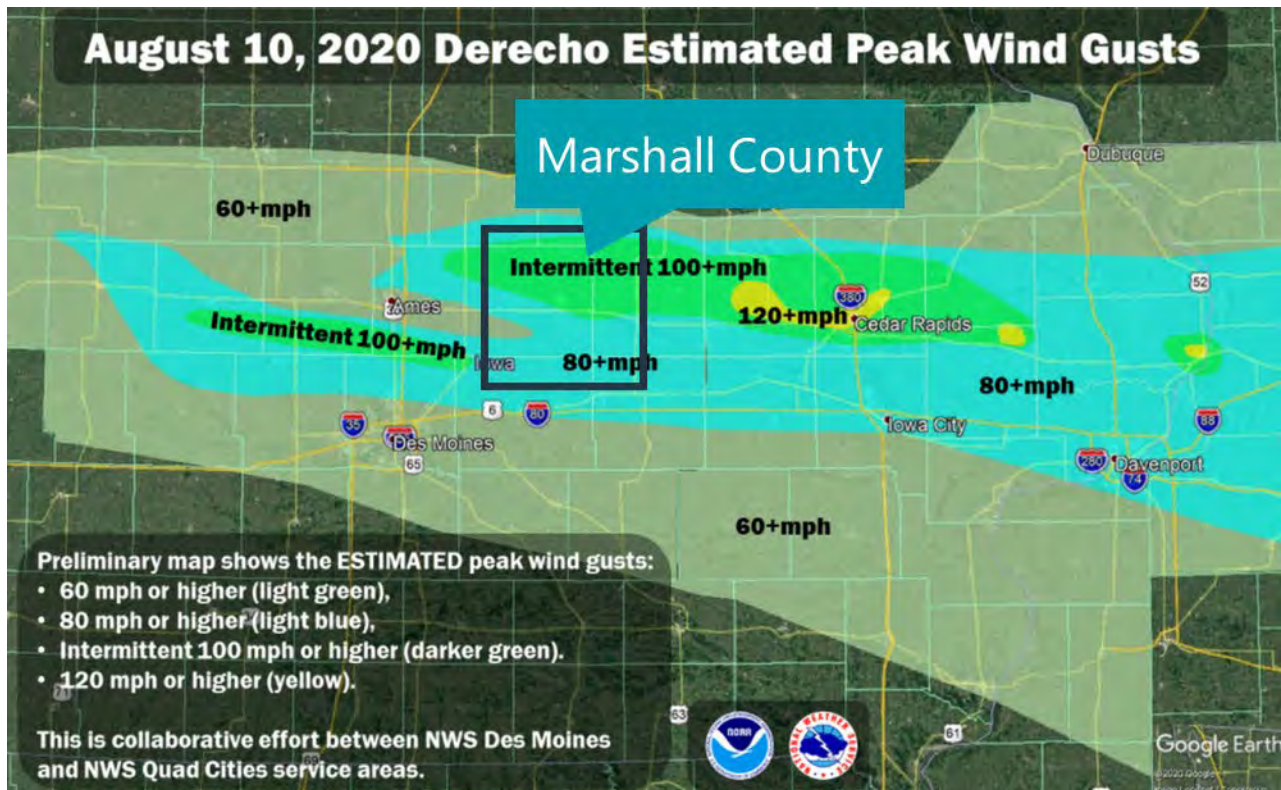


Table 3-33 shows the insurable crop insurance claims paid in Marshall County as a result of windstorms. Between 2007 and 2020 Marshall County lost 115,839 acres of crops and \$39,526,071 indemnity payments due to severe wind.

Table 3-33 Crop Insurance Claims Paid in Marshall County from Windstorms, 2007-2020

Crop Year	Crop Name	Cause Of Loss Description	Indemnity
2007	Corn	95.8	\$1,784
	Hybrid Corn Seed	462.19	\$51,200
	Hybrid Corn Seed	48.8	\$20,010
2008	Corn	109.3	\$46,334
2011	Corn	1199.6	\$190,546
	Corn	24.35	\$2,768
	Corn	15713.28	\$1,317,414
	Hybrid Corn Seed	2478.05	\$711,353
	Soybeans	78.4	\$2,456
2012	Corn	313.09	\$168,819

Crop Year	Crop Name	Cause Of Loss Description	Indemnity
	Hybrid Corn Seed	42	\$32,300
2013	Corn	158.5	\$34,023
	Hybrid Corn Seed	390.7	\$149,919
	Hybrid Corn Seed	33.05	\$41,478
2014	Corn	643.61	\$79,646
	Soybeans	129.1	\$3,482
2015	Corn	427.3	\$19,751
	Corn	131.3	\$27,881
	Soybeans	165.8	\$2,260
2016	Corn	144.4	\$16,733
2017	Corn	242.45	9852
	Soybeans	194.525	5946.5
2018	Soybeans	41.4	2728
2019	Corn	491	\$42,383
2020	Corn	428	\$284,617
	Corn	68	\$51,953
	Corn	105	\$5,352
	Corn	39,816	\$28,070,924
	Corn	150	\$14,537
	Corn	353	\$94,411
	Corn	63	\$34,956
	Corn	660	\$175,580
	Corn	579	\$343,434
	Corn	48,265	\$7,358,270
	Hybrid Corn Seed	196	\$31,747
	Soybeans	1,398	\$79,223
Total		115,839	\$39,526,071

Source: USDA Risk Management Agency 2007-2020

Probability of Future Occurrence

Based on historical data, Marshall County experiences an average of 2.4 severe wind events a year and a 41 percent annual chance of an event. Because it is difficult to separate a windstorm from other hazard events such as a thunderstorm there could be occurrences of high winds that may not necessarily be considered a windstorm.

Figure 3-40 shows the probability of a derecho in the U.S.. Marshall County is the region of the U.S. which can expect to experience a derecho every two years. A derecho of the severity of the 2020 event would occur less frequently.

Figure 3-40 Annual Derecho Probability in the United States



Source: National Weather Service https://www.weather.gov/jetstream/derecho_climo

Magnitude and Severity (Extent)

The NWS can issue High Wind Watch, High Wind Warning, and Wind Advisory to the public. The following are the definitions of these issuances:

- High Wind Watch—This is issued when there is the potential of high wind speeds developing that may pose a hazard or is are life-threatening.
- High Wind Warning—The 1-minute surface winds of 35 knots (40 mph) or greater lasting for one hour or longer, or winds gusting to 50 knots (58 mph) or greater, regardless of duration, that are either expected or observed over land.
- High Wind Advisory—This is issued when high wind speeds may pose a hazard. Sustained winds 25 to 39 mph and/or gusts to 57 mph.

Damage from windstorms can be difficult to quantify. Wind, by itself, has not historically caused high insured dollar losses. For the insurance industry to track a weather event, it must be a large enough storm that insurance companies may declare it a catastrophe, and then damage estimates for auto and homeowner claims are collected and published. This generally equates to damages in excess of \$25 million, though significant events impacting small communities are also tracked occasionally.

Table 3-34 shows The Beaufort Wind Scale. The replication of the scale only reflects land-based effects. The county planning area can experience up through Beaufort 12 events.

Table 3-34 The Beaufort Wind Scale

Beaufort Number	Description	Windspeed (Knots)	Land Conditions
0	Calm	<1	Calm. Smoke rises vertically.
1	Light air	1 – 3	Wind motion visible in smoke.
2	Light breeze	4 – 6	Wind felt on exposed skin. Leaves rustle.

Beaufort Number	Description	Windspeed (Knots)	Land Conditions
3	Gentle breeze	7 – 10	Leaves and smaller twigs in constant motion.
4	Moderate breeze	11 – 16	Dust and loose paper raised. Small branches begin to move.
5	Fresh breeze	17 – 21	Branches of a moderate size move. Small trees begin to sway.
6	Strong breeze	22 – 27	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	Near Gale	28 – 33	Whole trees in motion. Effort needed to walk against the wind.
8	Gale	34 – 40	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	Strong gale	41 – 47	Slight structural damage occurs; slate blows off roofs
10	Storm	48 – 55	Seldom experienced on land; trees uprooted or broken; considerable structural damage
11	Violent storm	56-63	
12	Hurricane	64+	

Source: National Oceanographic and Atmospheric Association

Severity of Impact

The severity of damage from windstorms can vary. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows, all the way to complete destruction and disintegration of well-constructed structures, infrastructure, and trees. The windstorms that Marshall County has experienced have caused minor injuries or illness and minor property damage. Crop damage is often associated with windstorms, laying down crops, breaking stalks, and twisting plants, thus reducing the yield and making it difficult to harvest.

Speed of Onset

Wind speeds may approach 120 miles per hour and the storm can travel across the ground at more than 30 mph. These winds can uproot trees and structures and turn harmless objects in to deadly missiles, all in a matter of seconds. The advancement of weather forecasting has allowed tornado watches to be broadcasted to those in the path of these storms hours in advance. The best lead-time for a specific severe storm is about 30 minutes.

Climate Change Considerations

The influence of climate change on wind is not fully understood at this time. While there have been several significant wind events in recent years, there is not enough observations to determine if there are any long-term trends in frequency of severity of events (U.S. Global Change Research Program 2018).

Vulnerability

Those most at risk from windstorms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to windstorms. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand broadcasted watches and warnings due to language barriers are also at risk. In general, the HMPD determined that more than 75% of the population in Marshall County might be affected by a windstorm. These effects include downed trees, power outages, and structural damage to houses and automobiles.

People

Windstorms can cause injury and death in Marshall County. The highest risk demographic is to first responders who are dealing with emergency situations resulting from the windstorm. Those working or recreating outdoors will be susceptible to injury from wind borne debris. Vulnerable populations also include the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. In Marshall County, 5% of Medicare Beneficiaries (399 of 8,500 total beneficiaries) rely on electricity to live independently in their homes. Isolation of these populations is a significant concern. These populations face isolation and exposure during wind events and could suffer more secondary effects of the hazard.

Property

All property is vulnerable during high wind events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Generally, damage is minimal and goes unreported. Property located at higher elevations and on ridges may be more prone to wind damage. Property located under or near overhead lines or near large trees may be damaged in the event of a collapse. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact the building's protective envelope (doors, windows, and walls), the result can be roof or building component failures and considerable structural damage.

Critical Facilities and Infrastructure

High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Of particular concern are roads providing access to isolated areas and to the elderly. Severe windstorms and downed trees can create serious impacts on power and above-ground communication lines. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

Economy

According to NCEI data, Marshall County experienced 143 windstorm events from 1961 – 2020. These events caused a total of \$3,966,110 in property damage and \$964,100 in crop damage. Using this data, an average annual countywide loss estimate was calculated as follows:

Total Windstorm Damage History (\$3,966,110) / Number of Years of Record (59 years) = Average Annual Countywide Loss Estimate (\$67,222)

Historic, Cultural, and Natural Resources

The environment is highly exposed to high winds. Environmental impacts include the downing of trees and localized flattening of plants by high wind. Natural habitats such as streams and trees risk major damage and destruction.

Development Trends

Windstorm is primarily a public safety and economic concern, and the planning area is located in a region with very high frequency of occurrence. Although windstorms occur frequently in the planning area and damages to property occur, much of the damage is generally covered by private insurance. This results in

less impact to individuals and the community since recovery is facilitated by insurance. Population trends and development trends have been decreasing the county in the past 10 years.

3.3.11 Grass or Wildland Fire

Grass or Wildland Fire – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	4	1	1	1	4	11
Clemons	4	1	1	1	4	11
Ferguson	4	1	1	1	4	11
Gilman	4	1	1	1	4	11
Haverhill	4	1	1	1	4	11
Laurel	4	1	1	2	4	12
Le Grand	4	1	1	2	4	12
Liscomb	4	1	1	2	4	12
Marshalltown	4	1	1	1	4	11
Melbourne	4	1	1	2	4	12
Rhodes	4	1	1	1	4	11
St. Anthony	4	1	1	1	4	11
State Center	4	1	1	2	4	12
Marshall County	4	1	1	2	4	12
East Marshall Community SD	4	1	1	1	4	11
GMG Community SD	4	1	1	1	4	11
Marshalltown Community SD	4	1	1	2	4	12
West Marshall Community SD	4	1	1	1	4	11

Hazard Description

Iowa's urban/rural interface (areas where development occurs within or immediately adjacent to wildland, near fire-prone trees, brush, and/or other vegetation), is growing as metro areas expand into natural forest, prairies, and agricultural areas that are in permanent vegetative cover through the Conservation Reserve Program (CRP). The State has the largest number of CRP contracts in the nation, totaling over 1.5 million acres. Most of this land is planted in cool and warm season grass plantings, tree plantings and riparian buffer strips. There is an additional 230,000 acres in federal ownership and conservation easements.

Wildfires are frequently associated with lightning and drought conditions, as dry conditions make vegetation more flammable. As new development encroaches into the wildland/urban interface more and more structures and people are at risk. On occasion, ranchers and farmers intentionally set fire to vegetation to restore soil nutrients or alter the existing vegetation growth. Also, individuals in rural areas frequently burn trash, leaves and other vegetation debris. These fires have the potential to get out of control and turn into wildfires.

The risk of wildfires is a real threat to landowners across the State. The NWS monitors the conditions supportive of wildfires in the State on a daily basis so that wildfires can be predicted, if not prevented.

The risk factors considered are:

- High temperature
- High wind speed
- Fuel moisture (greenness of vegetation)
- Low humidity

- Little or no cloud cover

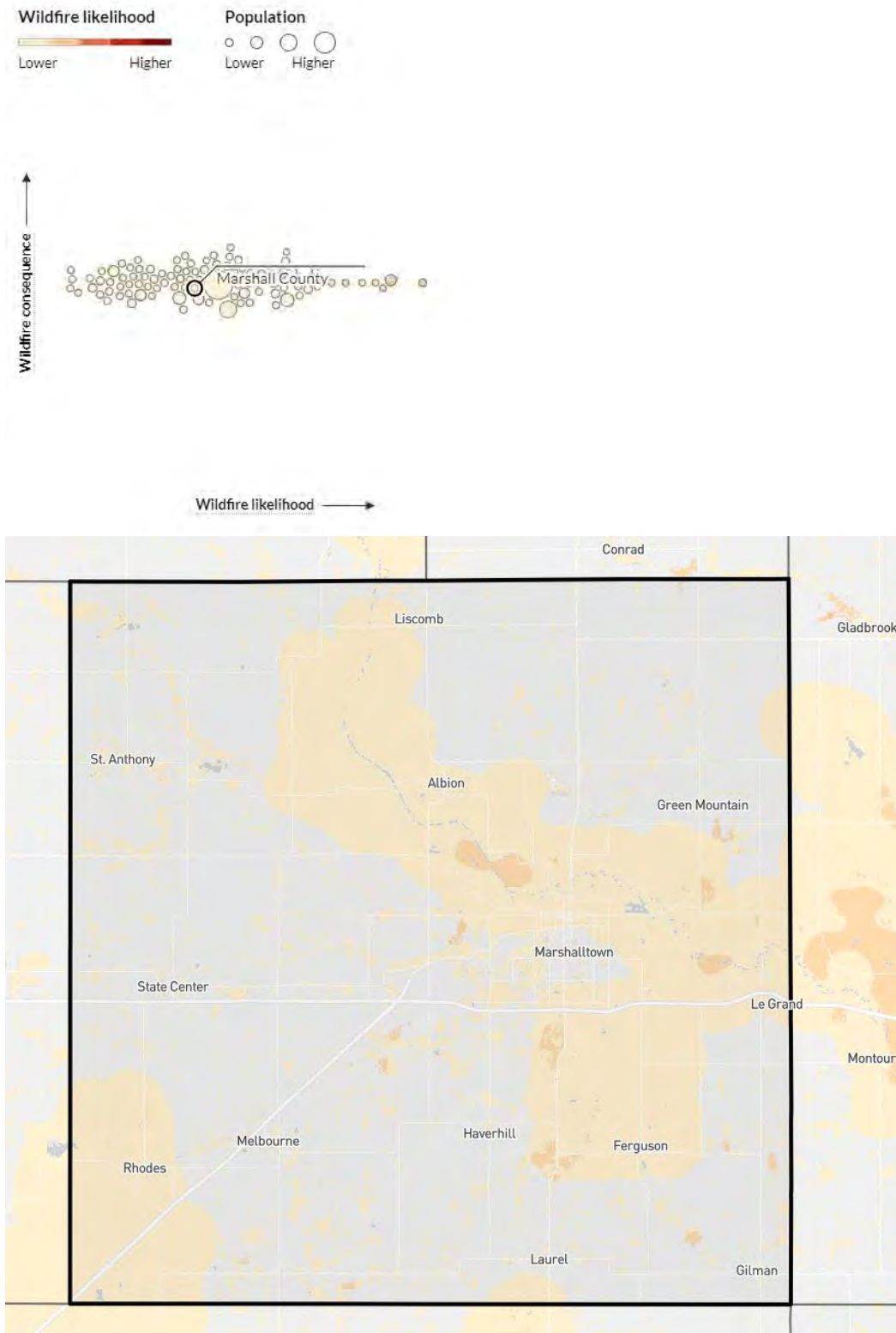
Grass and wildland fire can occur when conditions are favorable, such as during periods of drought when natural vegetation would be drier and more combustible. Most communities in Marshall County are completely surrounded by agricultural land. Parcels located on the outskirts of incorporated areas and parcels in unincorporated Marshall County are most likely to experience effects from this hazard.

Location

The USDA Forest Service, under the direction of Congress in the 2018 Consolidated Appropriations Act (H.R. 1625, Section 210), developed a nationwide wildfire risk assessment. The Wildfire Risk to Communities study results were used to assess risk to Wildfire in Marshall County. Wildfire Risk to Communities uses the best available science data to identify risk and provide resources for communities to manage and mitigate risk. This is a national analysis for comparing risk that varies across a state, region, or county to help prioritize actions to mitigate risk.

The Wildfire Likelihood and Risk to Homes wildfire analysis categories were reviewed to represent risk. Figure 3-41 shows the Wildfire Likelihood in Marshall County and the legend represents where the planning area is in relation to the other counties in Iowa. The size of the circles in the legend is a proportional representation of the county's population compared to other counties in the state.

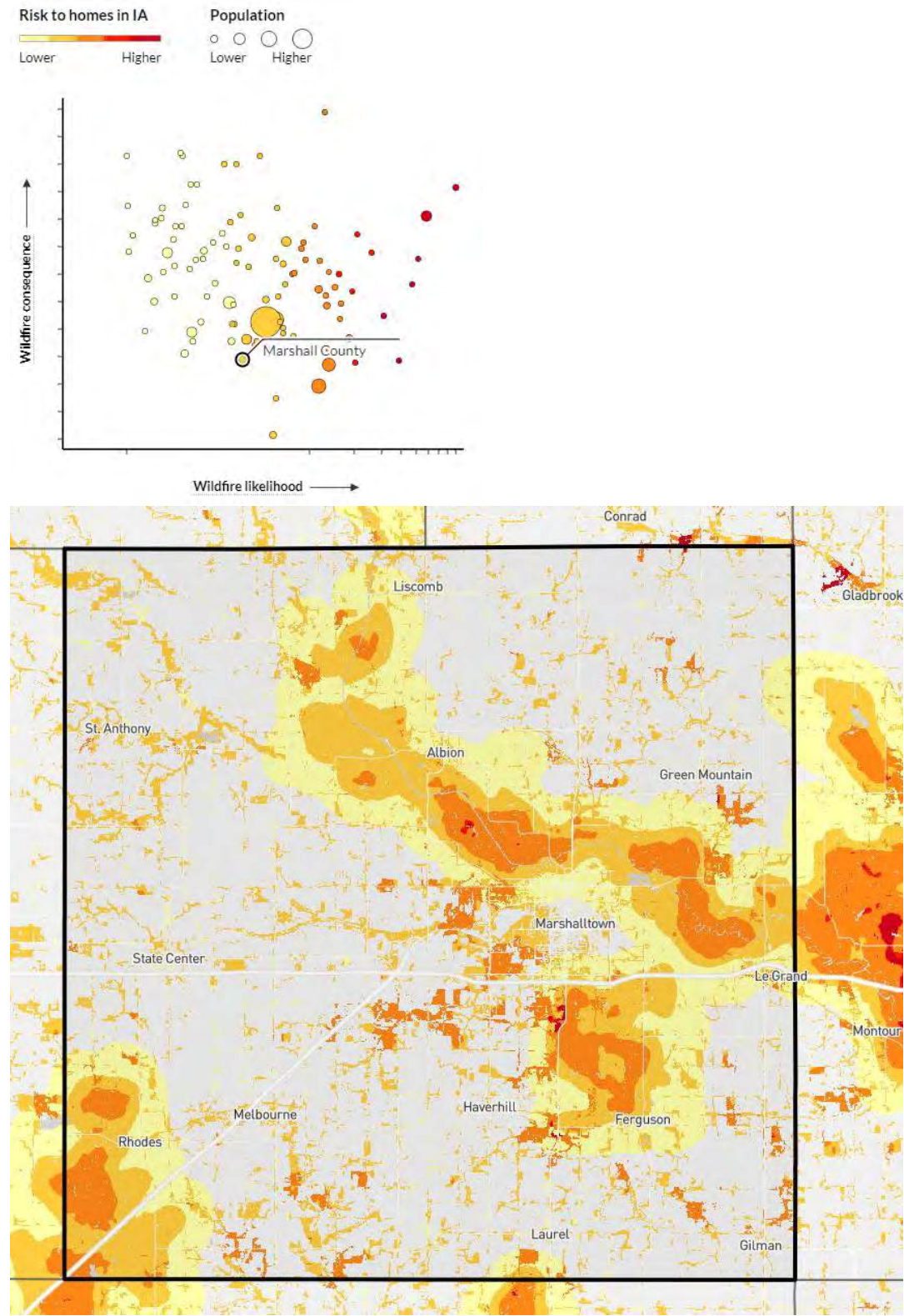
Figure 3-41 Marshall County Wildfire Likelihood Relative to Other Iowa Counties



Source: Wildfire Risk to Communities, <https://wildfirerisk.org/explore/0/19/19121/>

Figure 3-42 shows the Risk to Homes within Marshall County and the legend represents where the planning area is in relation to the other counties in Iowa. The size of the circles in the legend is a proportional representation of the county's population compared to other counties in the state. Marshall County has a lower Risk to Homes compared to other counties within the State. The size of the circles in the legend is a proportional representation of the county's population compared to other counties in the state. Risk to Homes combines wildfire likelihood and intensity with generalized results to a home within the planning area. The Risk to Homes data integrate wildfire likelihood and wildfire intensity from simulation modeling to represent wildfire hazard. Wildfire Risk to Communities uses a generalized concept of susceptibility that all homes that encounter wildfire will be damaged and the degree of damage is directly related to the fire's intensity.

Figure 3-42 Marshall County Wildfire Risk to Homes Relative to Other Iowa Counties



Source: Wildfire Risk to Communities, <https://wildfirerisk.org/explore/0/19/19121/>

Historical Occurrence

According to the NCEI database there were no wildland or forest fire events with significant impact that have been reported in Marshall County. This does not account for small or contained grass fires that may not have been reported. There is no available data to provide an accurate assessment of fires in the jurisdictions. While there is a lack of available data for the historical occurrences, it can be assumed that smaller fires brush fires which are regularly contained by the fire departments in the county occur annually throughout the planning area. These fires rarely result in any damage to property; however cropland is at a higher risk. In addition, many communities in Marshall County have adequate fire gear, or have standing mutual aid agreements, to respond to most grassland fires and do not consider small grassland fires significant hazard events. Unincorporated Marshall County is the jurisdiction with the highest historical occurrence (more than 12 occurrences in the last 10 years) because of the large amount of cropland and open space.

Historical Occurrence Score: 4

Probability of Future Occurrence

Updated historical data was not available to document the average number of wildland/grass fires per year. Since updated statistical data was unavailable to determine a quantitative probability, a qualitative probability is based on the anecdotal descriptions from the HMPC. Although grass/wildland fires do occur annually, the HMPC indicated that events that cause any notable damages occur less frequently. Based on this qualitative analysis, the probability of a damaging or severe grass or wildland fire in the future is unlikely. Wildfire probability as it varies across the county is depicted in Figure 3-41.

Probability Score: 1—Unlikely

Magnitude and Severity

Severity of Impact

Most grass fires burn only the grasses, crops, or other low land cover. Injuries and deaths from fighting the fire most often occur by natural causes such as heart attack or stroke. Property damage is usually limited to grass, small trees, and other vegetative matter. Occasionally, a house or outbuilding can be damaged or destroyed. Most jurisdictions in Marshall County scored severity of impact as a 1 or 2, meaning that little or minor property damage might occur or there may be a minor short-term environmental impact.

Severity of Impact Score: 1 – Negligible, 2 – Limited

Speed of Onset

Most grassfires occur without warning and travel at a moderate rate. This situation depends upon conditions at the time such as moisture, wind, and land cover. Generally, grass and wildland fires occur with minimal to no warning time. All jurisdictions in Marshall County scored speed of onset as a 4.

Speed of Onset Score: 4 – Minimal or no warning.

Climate Change Considerations

Iowa is already experiencing the effects of climate change. The Iowa Climate Change Impacts Committee's Report to the Governor and the Iowa General Assembly has highlighted many expected effects, many of which may impact the severity and frequency of grass or wildland fires in the coming years:

- 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 percent more atmospheric moisture than 35 years ago as indicated by a 3 - 5 degree F rise in dew-point temperature. This fuels convective thunderstorms that provide more summer precipitation.

The impacts of higher temperatures listed above could also impact the frequency and severity of drought, which in turn could help fuel more severe wildland fires. The complexities of the impacts of climate change related to wildland fires in Iowa will likely lead to many cascading hazards, such as increased erosion and flooding following fires.

Vulnerability

Most grass fires are contained to highway right-of-way and rail right-of-way ditches and are less than a few acres in size. High winds can turn a small flame into a multi-acre grass fire within a matter of minutes, but the extent is dependent upon conditions such as land use/land cover, moisture, and wind. Grass fires are equally likely to affect Marshall County communities where there is dense or high vegetation. Rural areas are much more likely to experience grass or wildland fires. Grass fires are often more easily contained and extinguished before there is damage to people or developed property. Fires often burn large portions of field crops in the fall when the crops are dry, and the harvesting equipment overheats or throws sparks. It should be noted that all communities stressed that their vulnerability to damage from grass or wildland fires is extremely low due to the ability of fire departments throughout the county to respond to and put out fires before they are able to spread. For most jurisdictions in Marshall County less than 25% of people and property would be affected by any grass or wildland fire.

Vulnerability Score: 1

People

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

Property

Direct property damage and losses of buildings due to wildland fire is a rare occurrence in Marshall County. According to the USDA Forest Service wildfire risk tool referenced above, populated areas in Marshall County have, on average, a greater risk to homes than 42% of counties in Iowa.

Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during grass or wildland fire events. Power lines in the unincorporated areas of the county are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers.

Some jurisdictions in Marshall County are more vulnerable to grass or wildland fires than others due to the large amount of cropland in the surrounding areas. The following jurisdictions have critical facilities that fall within the grass and wildland fire hazard area:

- Albion (City Shop in hazard area)
- Clemons (Fire Station in hazard area)
- Ferguson (Lift Station and Fire Station in hazard area)
- Gilman (no critical facilities in hazard area)
- Haverhill (Fire Station and Co-Op in hazard area)
- Laurel (City Hall, Maintenance Building/Community Center, Co-Op, and Lagoon in hazard area)
- Le Grand (School Bus Barn, Café, High School, Water Tower, and Sewer Lagoon in hazard area)
- Liscomb (Water/Sewer facility in hazard area)
- Melbourne (Water Tower and Water and Wastewater Plant in hazard area)
- Rhodes (Fire Station in hazard area)
- St. Anthony (no critical facilities in hazard area)
- State Center (County Government Facility, Potable Water Infrastructure, Electrical Infrastructure, and Outdoor Recreation Facilities are located in the hazard area)

Economy

Fire suppression may result in increased costs to local and state government for water acquisition and delivery, especially during periods of drought when water resources are scarce. Fires can also cause direct economic losses in the destruction of buildings and their contents, or indirectly through the forced closures of businesses.

Historic, Cultural, and Natural Resources

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, dictating in part the types, structure, and spatial extent of native vegetation. However, severe wildfires can cause negative environmental impacts:

- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species**—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat**—Catastrophic fires can have devastating consequences for endangered species.
- **Soil Sterilization**—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

Many ecosystems are adapted to historical patterns of fire occurrence. These patterns, called “fire regimes,” include temporal attributes (e.g., frequency and seasonality), spatial attributes (e.g., size and spatial complexity), and magnitude attributes (e.g., intensity and severity), each of which have ranges of natural variability. Ecosystem stability is threatened when any of the attributes for a given fire regime diverge from its range of natural variability.

Development Trends

As stated in the Hazard Description section, Iowa's urban/rural interface is generally growing, however specific to Marshall County the overall population is decreasing in recent years. Any future development in the wildland-urban interface/intermix areas could increase the planning areas vulnerability to this hazard, but not by a significant degree.

3.4 Other Hazards

3.4.1 Hazardous Materials Incident

Hazardous Materials Incident – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	2	2	1	1	4	12
Clemons	1	1	1	1	4	8
Ferguson	1	1	1	1	4	8
Gilman	1	2	1	1	4	11
Haverhill	1	1	1	1	4	9
Laurel	1	1	2	2	4	11
Le Grand	1	2	3	3	4	13
Liscomb	1	1	2	3	4	12
Marshalltown	4	4	4	4	4	20
Melbourne	2	1	1	4	4	15
Rhodes	1	1	1	1	4	9
St. Anthony	1	1	1	2	4	9
State Center	1	2	4	4	4	20
Marshall County	3	3	4	4	4	16
East Marshall Community SD	1	1	2	2	4	16
GMG Community SD	1	1	1	2	4	11
Marshalltown Community SD	1	1	2	4	4	18
West Marshall Community SD	1	1	1	1	4	14

Description

Hazardous materials incidents can occur with fixed hazardous materials, pipeline transportation, and transportation of hazardous materials. Incidents can include the accidental release of flammable or combustible, explosive, toxic, noxious, corrosive, oxidizable, irritant or radioactive substances or mixtures that can pose a risk to life, health, or property and possibly require an evacuation. A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced and transported across the county via semi-truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area, and the use of planning and zoning can minimize the area of impact.

The U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) all have responsibilities relating to the transportation, storage, and use of hazardous materials and waste. The Right to Know Network maintained by the U.S. Coast Guard's National Response Center (NRC) is a primary national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Location

According to the Iowa Department of Natural Resources, as of 2020, there were 32 sites in Marshall County that because of the volume or toxicity of the materials on site were designated as Tier II Facilities under the Superfund Amendments and Reauthorization Act. 37 sites reported materials that are considered to be “Extremely Hazardous Substances” (EHS).

Table 3-35 provides the number of Tier II Facilities, as well as the number with EHS for each jurisdiction in the planning area. The locations of the facilities were overlaid with the corporate boundaries provided by the Marshall County GIS Department to determine the number of facilities in each jurisdiction. Figure 3-43 that follows is a map showing the locations of Tier II Facilities, including those with EHS.

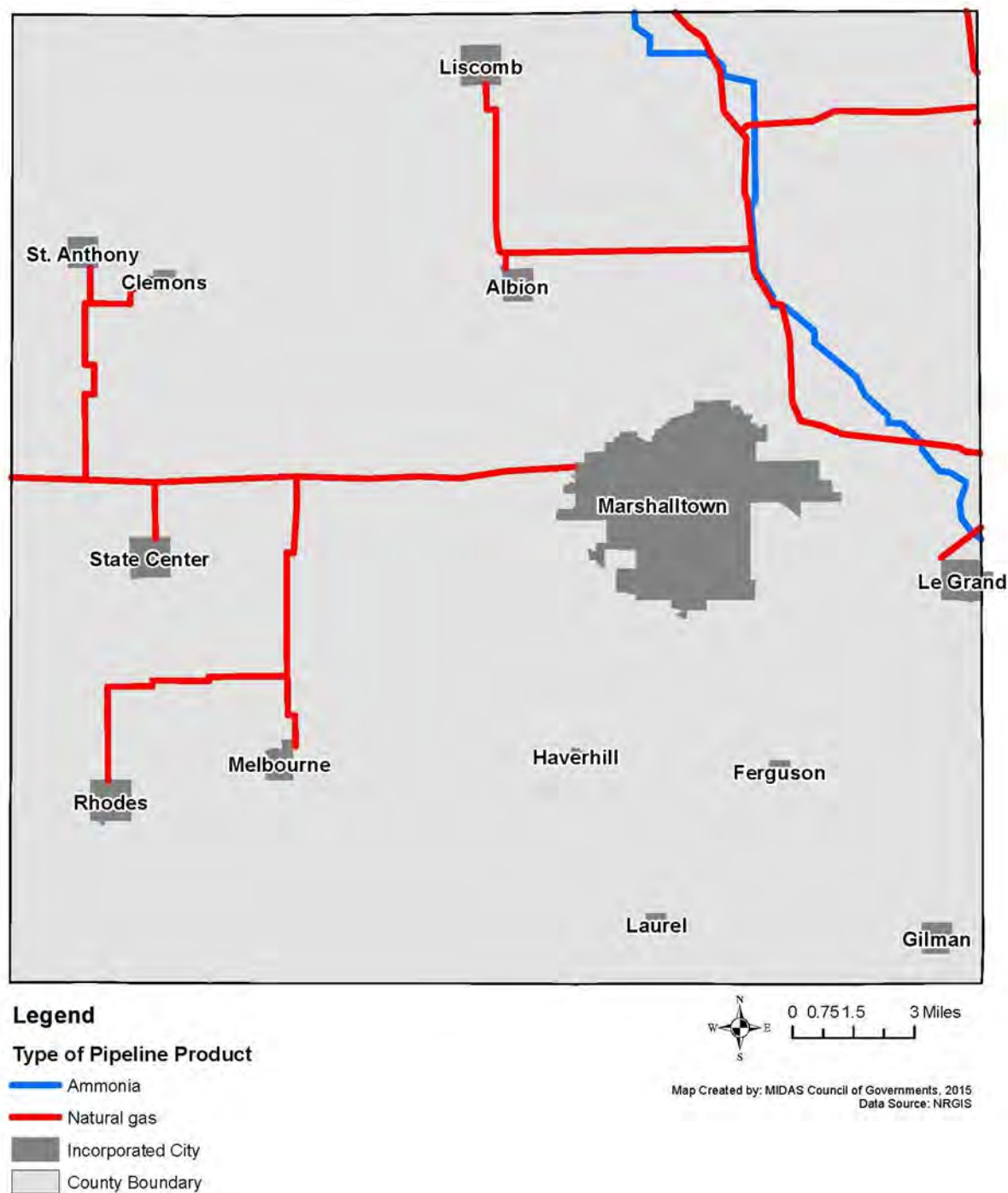
Marshall County has two different pipeline products that run through the county: ammonia and natural gas. Not all jurisdictions are at risk from a pipeline transportation incident. Four jurisdictions (Haverhill, Ferguson, Laurel, and Gilman) have no pipeline within five miles of their jurisdictional boundaries.

Table 3-35 Number of Tier II Facilities and EHS Facilities by Jurisdiction

Jurisdiction	Tier II Facilities	EHS Facilities
Albion	1	1
Ferguson	0	1
Haverhill	0	2
Laurel	0	1
Le Grand	1	0
Liscomb	1	1
Marshalltown	15	18
Melbourne	0	2
State Center	1	0
Unincorporated	13	11
Total	32	37

Source: Iowa Department of Natural Resources; Marshall County GIS Department

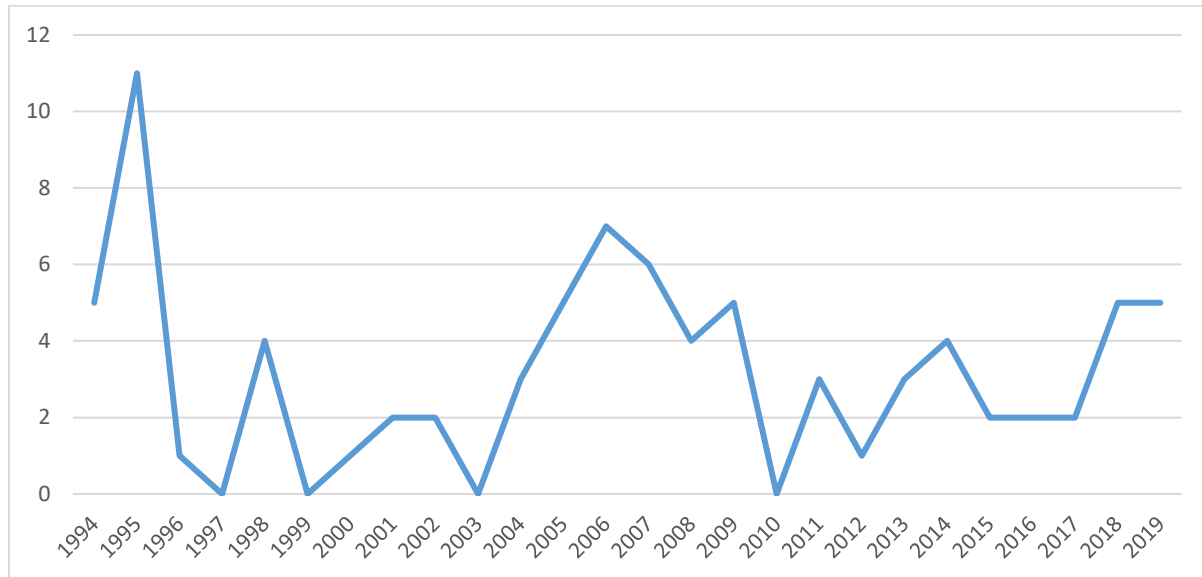
Figure 3-43 Pipelines in Marshall County



Historical Occurrence

According to the Iowa DNR, hazardous materials spills throughout Marshall County are fairly common. From 1994 through 2019, the county experienced a total of 83 reported hazardous spills, as shown in Figure 3-44. Of the total spills, 74% of these events involved fixed incidents and 24% involved transportation of hazardous materials.

Figure 3-44 Hazardous Materials Incidents in Marshall County, 1994-2019



Source: National Response Center

Certain jurisdictions are more prone to these types of hazards than others depending on the location of these facilities and the level or amount of hazardous materials these facilities handle. 86% (71) of these spills occurred in or near Marshalltown; therefore Marshalltown received a score of 4 for historical occurrences. Unincorporated Marshall County received a score of 3, because many of the incidents reported as "in or near Marshalltown" were likely outside the incorporated city limits. Melbourne received a score of 2 with occurrences ranging from 2 to 7. All other jurisdictions received a 1 for having 1 or fewer hazardous materials spills. A summary table illustrating the differences in historical occurrence of hazardous materials spills is included in Table 3-36.

Table 3-36 Summary of Hazardous Spills in Marshall County, 1994-2019

Jurisdiction	Time Period	# of Events	Incident Type					
			Fixed	Trans.	RR	Vessel	Unknown	Pipeline
Albion	1994 – 2019 (26 years)	1	1	0	0	0	0	0
Clemons		0	0	0	0	0	0	0
Ferguson		0	0	0	0	0	0	0
Gilman		0	0	0	0	0	0	0
Haverhill		0	0	0	0	0	0	0
Laurel		0	0	0	0	0	0	0
Le Grand		0	0	0	0	0	0	0
Liscomb		0	0	0	0	0	0	0
Marshalltown		71	54	7	7	1	2	0
Melbourne		5	2	3	0	0	0	0
Rhodes		0	0	0	0	0	0	0
St. Anthony		0	0	0	0	0	0	0
State Center		0	0	0	0	0	0	0

Jurisdiction	Time Period	# of Events	Incident Type					
			Fixed	Trans.	RR	Vessel	Unknown	Pipeline
Marshall County Uninc		6	4	0	2	0	0	0
East Marshall SD		0	0	0	0	0	0	0
GMG SD		0	0	0	0	0	0	0
Marshalltown SD		0	0	0	0	0	0	0
West Marshall SD		0	0	0	0	0	0	0

Source: National Response Center

According to the USDOT Pipeline and Hazardous Materials Safety Administration, Marshall County has experienced no pipeline incidents in the last 20 years.

Table 3-37 Top 5 Hazardous Materials Spilled in Marshall County, 1994-2019

Top 5 Materials	% of Incidents
Ammonia	41%
Oil, Various	17%
Nitrogen Oxides	6%
Sulfuric Acid	6%
Diesel	5%

Source: National Response Center

Of these 83 reported incidents listed in the NRC data from 1994 through 2019, only 8 (10%) resulted in any reported injuries, fatalities, evacuations, or property damage. Those 8 incidents are listed as resulting in 1 fatality, 9 injuries, and 9 evacuations (a total of 1,200 people). Averaging these numbers out over 26 years gives annualized rates of 1 damaging hazmat incident roughly every 3 years. However, it is important to note that the NRC counts all injuries or damages resulting from an accident where hazardous materials were involved, whether or not the injuries or damages were caused by exposure to the hazardous substance; closer analysis shows that all of the listed fatalities and a majority of the injuries and property damages were from the physical impacts of the accident that caused the release, rather from exposure to hazardous materials themselves.

Probability of Future Occurrence

Large quantities of hazardous materials are transported daily on Iowa streets, highways, interstates, and railways. Roadways are a common site for the release of hazardous materials. Railways are another source for hazardous materials releases. The Department of Transportation regulates routes and speed limits used by carriers and monitor the types of hazardous materials crossing state lines. Despite increasing safeguards, more and more potentially hazardous materials are being used for commercial, agricultural, and domestic uses and are being transported on Iowa roads and railways. Natural gas and ammonia pipelines exist in Marshall County, further adding to the risk of a hazardous materials spill event.

According to the NRC data cited above, hazardous materials incidents can be expected to happen in the County multiple times a year. There is a 30% each year of a hazardous materials incident resulting in injuries, damages, or evacuations.

Magnitude and Severity (Extent)

Severity of Impact

Severity of impact due to a hazardous materials spill is varied across jurisdictions. The severity of the impact depends first and foremost on the type and amount of material that is part of a spill.

Most hazardous materials incidents are localized and are quickly contained or stabilized by highly trained fire departments and hazardous materials teams. Marshall County depends on the Des Moines Fire Department for these incidents because their firemen are trained for hazardous materials incidents. Other jurisdictions are working with Marshall County Emergency Management to train their fire department for hazardous materials events. Depending on the characteristic of the hazardous or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more.

For most incidents, the severity of impact would be limited with minor injuries and illness, minor short-term property damage, and minor short-term environmental impacts. Albion, Clemons, Ferguson, Gilman, Haverhill, Rhodes, and West Marshall Community School District scored the severity of impact of a hazardous materials spill as a 1 due to the limited amount of hazardous materials facilities and/or their ability to quickly respond to hazardous materials incidents with their fire departments. These jurisdictions anticipate few injuries, little to no property damage, and a brief interruption of critical facilities (less than four hours) if a spill event occurred. Most of these cities have their own fire departments that can respond quickly to a hazardous materials situations and call for reinforcements from Waterloo if needed.

Laurel, St. Anthony, East Marshall Community School District, and GMG Community School District scored severity of impact as a 2, meaning that these jurisdictions might expect minor injuries, minor property damage, minor environmental impact, and a shutdown of critical facilities for 4 to 24 hours in the event of a hazard. Of these cities, St. Anthony is the only city to have a pipeline in or near the jurisdiction. Hazardous materials incidents involving a pipeline could cause minor property damage. Neither city has a Tier II hazardous materials facility within their jurisdictional boundaries or within two miles of the city. Overall, the three jurisdictions have a relatively small severity of impact.

Le Grand and Liscomb scored severity of impact as a 3, meaning that there could be serious injuries or major property damage in the event of a hazardous materials spill. Liscomb has a Tier II hazardous materials facility (the Co-Op). Both cities have a railroad line that runs through their jurisdictional boundaries. Both cities are also within close proximity to a pipeline.

Marshalltown, Melbourne, State Center, Marshall County, Marshalltown Community School District, and West Marshall Community School District scored severity of impact as a 4, meaning that property damage, multiple injuries, or even death could be possible. All of these cities except for Melbourne have Tier II hazardous materials facilities within their jurisdictional boundaries. All jurisdictions are within close proximity to pipelines. All jurisdictions except for Melbourne also have a railroad line that runs through the community.

Speed of Onset

When managed properly under current regulations, hazardous materials pose little risk. However, when handled improperly or in the event of an accident, hazardous materials can pose a significant risk to the population. Hazardous materials incidents usually occur very rapidly with little or no warning. Even if reported immediately, people in the area of the release have very little time to be warned and evacuated. During some events, sheltering in-place is the best alternative to evacuation because the material has already affected the area and there is no time to evacuate safely. Public address systems, television, radio, and the NOAA All-hazard Radios are used to disseminate emergency messages about hazardous materials incidents.

Vulnerability

The HMPC members representing Albion, Clemons, Ferguson, Gilman, Haverhill, Melbourne, Rhodes, St. Anthony, GMG Community School District, and West Marshall Community School District estimated that their jurisdiction's vulnerability to a hazardous spill is low with a score of 1, meaning that less than 25% of

people or property would be affected in the event of a hazardous materials event. Excepting Haverhill, none of these jurisdictions have a Tier II hazardous materials facility located within their jurisdictional boundaries. Haverhill's Co-Op is located on the southern portion of the city. Albion, Clemons, Melbourne, and Rhodes do have a natural gas pipeline runs to the edge of their jurisdictional boundary. If a pipeline incident occurred, however, the HMPC felt confident that less than 25% of people or property would be affected.

Liscomb, East Marshall Community School District, and Marshalltown Community School District estimated that their jurisdiction's vulnerability to a hazardous spill is somewhat low with a score of 2. These jurisdictions estimated that 25-50% of people or property would be affected in the event of a spill. Liscomb has a Co-Op (Tier II facility) in town. Liscomb also has a natural gas pipeline that stops very near to their jurisdictional boundaries, according to GIS data. While Marshalltown Community School District has facilities in Marshalltown with a large amount of hazardous facilities, the school district facilities are not particularly vulnerable to the effects of a hazardous spill. In addition, the school district noted that it had adequate emergency plans and other measures in place for such an event.

The HMPC members of Le Grand estimated that their jurisdiction's vulnerability to a hazardous spill is somewhat high with a score of 3. These jurisdictions estimated that 51-75% of people might be affected by a hazardous materials spill. Le Grand has both a natural gas pipeline and an ammonia pipeline running within a ½ mile of their jurisdictional boundaries. Le Grand does not have any Tier II facilities within their jurisdictional boundaries, but the city would fall within a two-mile buffer area of a facility that is approximately one mile to the north of the city (Cessford Construction Company).

The HMPC members of Marshalltown, State Center, and Marshall County estimated that their jurisdiction's vulnerability to a hazardous spill is high with a score of 4. These jurisdictions estimated that more than 75% of people might be affected by a hazardous materials spill. All of these jurisdictions have a natural gas pipeline located very near to their jurisdictional boundaries. Marshall County has several natural gas lines and an ammonia pipeline within the county. If a pipeline incident were to occur (especially with the ammonia line), the incident could impact more than 75% of people and property in the community through explosion, fumes, evacuation, or closed roads and railways. The location of these pipelines adds to the vulnerability of the county.

People

A hazardous materials incident can occur almost anywhere so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to transportation corridors, pipelines, and populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated may be harmed directly or through consumption of contaminated food and water.

Property

Property impacts are difficult to estimate and depends on the nature and type of incident. Property impacts are typically limited to contamination or fires that may result from an incident.

Critical Facilities and Infrastructure

Emergency service personnel would likely be tasked to respond to a hazardous materials incident. Specific critical facilities may be considered vulnerable to this hazard, depending on proximity to transportation routes or fixed facilities. Access to facilities and infrastructure in the area of the incident may be denied until decontamination is complete.

Economy

Workplace closures could also result from an incident and have temporary economic impacts.

Historic, Cultural, and Natural Resources

Natural and cultural resources and facilities could also be impacted by a hazardous materials incident. Everyday recreation activities that exist throughout the county such as a bike trails, recreation trails, city park recreation areas, aquatic centers, and Grimes Farm / Conservation Center could also be affected.

An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small slow leak that is not ignited, to a large rupture in which the gas is ignited, to a large rupture in which the gas is ignited. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those in proximity to the pipelines.

Development Trends

Development trends are not anticipated to increase vulnerability. The siting of new hazardous materials facilities should be considered carefully to avoid creating a new vulnerability. The siting of other new buildings with potentially vulnerable populations such as schools and nursing homes, should also consider the presence of hazardous materials facilities or routes to avoid creating a vulnerability.

3.4.2 Human Disease

Human Disease – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	2	2	2	2	1	9
Clemons	2	2	2	2	1	9
Ferguson	2	2	2	2	1	9
Gilman	2	2	2	2	1	9
Haverhill	2	2	2	2	1	9
Laurel	2	2	2	2	1	9
Le Grand	2	2	2	2	1	9
Liscomb	2	2	2	2	1	9
Marshalltown	2	2	3	4	1	12
Melbourne	2	2	2	2	1	9
Rhodes	2	2	2	3	1	9
St. Anthony	2	2	2	2	1	9
State Center	2	2	2	4	1	11
Marshall County	2	2	2	2	1	9
East Marshall Community SD	2	2	2	2	1	9
GMG Community SD	2	2	2	2	1	9
Marshalltown Community SD	2	2	2	4	1	11
West Marshall Community SD	2	2	2	2	1	9

Description

A human disease outbreak is a medical, health or sanitation threat to the general public (such as contamination, epidemic, plague and insect infestation). The outbreak may be spread by direct contact with an infected person or animal, ingesting contaminated food or water, vectors such as mosquitoes or ticks, contact with contaminated surroundings such as animal droppings, infected droplets, or by aerosolization.

Iowa's public health and health care communities work to protect Iowans from infectious diseases and preserve the health and safety of Iowans by rapidly identifying and containing a wide range of biological agents. Local public health departments and the Iowa Department of Public Health, Center for Acute Epidemiology investigate disease "outbreaks" of routine illnesses. There are a number of biological diseases/agents that are of concern to the State of Iowa such as vaccine preventable disease, foodborne disease and community associated infections having significant impact on the morbidity of Iowans. The following descriptions are general, and it should be noted that individuals may experience more or less severe consequences. Note, during the 2021 planning process the United States, including the State of Iowa, was continuing to be impacted by the COVID-19 pandemic.

Vaccine Preventable Disease

In the U.S., there are common infectious diseases that include polio, measles, diphtheria, pertussis, rubella, mumps, tetanus and Haemophilus influenzae type b that are now rare because of widespread use of vaccines. Routine childhood immunizations have helped protect both individuals and communities each year saving nearly \$14 billion in direct medical costs and \$69 billion in costs to society according to the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Vaccine

preventable diseases continue to threaten the health of Iowans when children, adolescents and adults are un-immunized or under-immunized.

Influenza

Influenza (flu) is a viral infection of the nose, throat, bronchial tubes, and lungs. There are two main types of virus: A and B. Each type includes many different strains, which tend to change each year. In Iowa, influenza occurs most often in the winter months. Illnesses resembling influenza may occur in the summer months, but these are usually the result of other viruses that exhibit symptoms commonly referred to as influenza-like illness or ILI.

Influenza is highly contagious and is easily transmitted through contact with droplets from the nose and throat of an infected person during coughing and sneezing. Typical symptoms include headache, fever, chills, cough, and body aches. Although most people are ill for only a few days some may have secondary infections, such as pneumonia, and may need to be hospitalized. Anyone can get influenza, but it is typically more serious in the elderly and people with chronic illnesses such as cancer, emphysema, or diabetes or weak immune systems. It is estimated that thousands of people die each year in the United States from flu or related complications.

Pandemic

A pandemic is a global disease outbreak. A pandemic flu is a human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine.

This disease spreads easily person-to-person, causing serious illness, and can sweep across the country and around the world in a very short time. The Centers for Disease Control and Prevention (CDC) has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation.

During 2009 and 2010 health professionals around the globe worked to combat the H1N1 influenza virus. This relatively mild and stable influenza virus circulated across the globe and caused one of the most robust worldwide vaccination campaigns since the 1970s. Health professionals continue to monitor the possibility of an avian (bird) flu pandemic associated with a highly pathogenic avian H5N1 virus. Since 2003, avian influenza has been spreading through Asia. A growing number of human H5N1 cases contracted directly from handling infected poultry have been reported in Asia, Europe, and Africa, and more than half the infected people have died. There has been no sustained human-to-human transmission of the disease, but the concern is that H5N1 will evolve into a virus capable of human-to-human transmission.

An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines.

Pandemics are generally thought to be the result of novel strains of viruses. Because of the process utilized to prepare vaccines, it is impossible to have vaccine pre-prepared to combat pandemics. A portion of the human and financial cost of a pandemic is related to lag time to prepare a vaccine to prevent future spread of the novel virus. In some cases, current vaccines may have limited activity against novel strains.

Since March 2020 and during the update of this plan, Marshall County, the nation, and the world were dealing with the COVID-19 pandemic, confirming that pandemic is a key public health hazard in the county. Unlike seasonal flu, an influenza pandemic has much greater potential for loss of life and

significant social disruption due to higher rates of transmission and more severe health impacts. The COVID-19 virus has a much higher rate of transmission than the seasonal flu, primarily by airborne transmission of droplets/bodily fluid. Common symptoms include fever, cough, fatigue, shortness of breath or breathing difficulties, and loss of smell and taste. While most people have mild symptoms, some people develop acute respiratory distress syndrome with roughly one in five requiring hospitalization and a fatality rate of approximately 1%. A key challenge in containing the spread has been the fact that it can be transmitted by people who are asymptomatic.

Foodborne Disease

There are several agents that can cause illness when consumer in contaminated food, beverages or water. Foodborne illness (food poisoning) can also be spread person-to-person as well as from contact with animals. Table 3-39 is a list of common foodborne diseases.

Location

A human disease outbreak has no geographic boundaries. Because of our highly mobile society, disease can move rapidly through a school, business and across the nation within days, weeks or months. Many of the infectious diseases that are designated as notifiable at the national level result in serious illness if not death. Some are treatable, for others only the symptoms are treatable.

The current COVID-19 pandemic has affected all 99 Iowa counties. Marshall County has reported 5,352 cases and 79 deaths, as of August 6, 2021. All communities in the county are likely to be impacted, either directly or indirectly. Some indirect consequences may be the diversion of resources that may be otherwise available.

Historical Occurrence

The World Health Organization tracks and reports on epidemics and other public health emergencies through the Global Alert and Response (see historic epidemics at www.who.int/en/).

There have been four acknowledged pandemics in the past century:

- 2020-Ongoing COVID-19: The COVID-19 or novel coronavirus pandemic began in December 2019 and was declared a pandemic in March of 2020. As of August 6, 2021, 201,237,468 cases have been reported around the world with over 4,272,786 deaths, including nearly 35,460,711 cases and 615,419 deaths in the U.S. Marshall County has reported 5,352 cases and 79 deaths. The pandemic is expected to continue through 2021, although vaccines were approved at the end of 2020 and were starting to be dispersed during this plan update process, variants of the COVID-19, specifically the delta variant, were beginning to become the main source of infection.
- 2009 H1N1 Influenza—The 2009 H1N1 Pandemic Influenza caused 659 hospitalizations with lab confirmed H1N1 since 9/1/09 and resulting in 41 fatalities. Typically, people who became ill were the elderly, the very young and people with chronic medical conditions and high-risk behaviors.
- 1968–69 Hong Kong flu (H3N2) —This strain caused approximately 34,000 deaths in the United States and more than 700,000 deaths worldwide. It was first detected in Hong Kong in early 1968 and spread to the United States later that year. Those over age 65 were most likely to suffer fatal consequences. This virus returned in 1970 and 1972 and still circulates today.
- 1957–58 Asian flu (H2N2) —This virus was quickly identified because of advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults and pregnant women. The elderly had the highest rates of death. A second wave developed in 1958. In total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between one and two million.

- 1918–19 Spanish flu (H1N1) —This flu is estimated to have sickened 20-40 percent of the world's population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection, others from secondary complications. The attack rate and mortality was highest among adults 20-50 years old; the reasons for this are uncertain.

Other Reportable Diseases

Table 3-38 shows the historical reported deaths in Marshall County from Influenza and Pneumonia.

Table 3-38 Influenza and Pneumonia Deaths by Year 2002-2019, Marshall County

Year	Influenza Number	Influenza Rate per 100,000 population	Pneumonia Number	Pneumonia Rate per 100,000 population
2019	<5	<5	6	15.2
2018	<5	<5	7	17.5
2017	<5	<5	8	19.9
2016	<5	<5	7	17.4
2015	6	14.7	6	14.7
2014	<5	<5	8	19.6
2013	<5	<5	12	29.3
2012	<5	<5	10	24.5
2011	<5	<5	12	29.3
2010	<5	<5	8	19.6
2009	<5	<5	6	15.3
2008	<5	<5	16	40.5
2007	<5	<5	7	17.8
2006	<5	<5	10	25.3
2005	<5	<5	11	27.9
2004	<5	<5	9	22.8
2003	<5	<5	9	23.0
2002	4	10.1	13	32.9

Source: Iowa Department of Public Health, Bureau of Health Statistics, Note: Counts of 5 or less are suppressed to protect confidentiality

Table 3-39 provides the number of common reportable diseases in Marshall County 2011-2017 from the Iowa Department of Public Health, Center for Acute Epidemiology Annual Reports. Note, reports were not available after 2018.

Table 3-39 Iowa Common Reportable Diseases by Year in Marshall County

Year	2017	2016	2015	2014	2013	2012	2011
Campylobacteriosis	9	8	8	9	5	10	11
Chlamydia	N/A	N/A	N/A	146	189	196	157
Cryptosporidiosis	1	1	0	0	5	0	1
Cyclosporiasis	3	0	0	N/A	N/A	N/A	N/A
Cholera	N/A	0	N/A	N/A	N/A	N/A	N/A
CRE	1	0	N/A	N/A	N/A	N/A	N/A
E. Coli	3	7	3	2	1	0	2
Giardia	2	1	2	0	2	3	1
Gonorrhea	N/A	N/A	N/A	14	14	11	15

Year	2017	2016	2015	2014	2013	2012	2011
Hemolytic Uremic Syndrome	0	0	0	0	0	0	0
Hep A	0	0	0	0	0	0	0
Hep B, Acute	0	0	0	0	0	0	1
Hep B, Chronic	6	9	12	5	8	8	5
Legionella	1	0	1	0	0	0	0
Listeria	1	0	0	0	0	0	0
Lyme Disease	2	2	5	0	1	2	0
Meningococcal Disease	N/A	1	0	0	0	0	1
Mumps	1	1	1	0	0	0	0
Pertussis	0	1	15	1	2	5	0
Q fever (acute)	0	0	0	N/A	N/A	N/A	N/A
Rabies (Animal)	N/A	N/A	N/A	0	0	2	0
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0
Salmonella	8	5	12	7	10	7	5
Shigella	1	1	0	0	0	0	0
Syphilis	N/A	N/A	N/A	1	3	0	0
Tuberculosis	N/A	N/A	N/A	0	0	1	0
Tularemia	0	0	N/A	N/A	N/A	N/A	1
West Nile Virus	0	0	0	0	0	0	0
Total by Year	39	37	59	185	240	245	200

Source: Iowa Department of Public Health, Center for Acute Disease Epidemiology Annual Reports. 2011-2017

<http://www.idph.state.ia.us/cade/default.aspx>

For all jurisdictions in the county, historical occurrence was scored as a 1, while the Covid-19 pandemic has been ongoing during this planning process, historically human disease epidemics occurred less than 4 time in the past 10 years.

Probability of Future Occurrences

For purposes of determining probability of future occurrence, the HMPC defined “occurrence” of human disease outbreak as a medical, health or sanitation threat to the general public (such as contamination, epidemic, or plague). Although legally reportable diseases occurred annually in Marshall County, none in have reached the threshold of being a medical, health, or sanitation threat to the general public that would warrant the classification of an outbreak occurrence. The COVID-19 Pandemic has changed the perceptions of the likelihood that a pandemic of that scale could occur in the United States. There is no definite way to predict when the next pandemic might happen. Some indicators will be present, but not every new virus turns into a pandemic. Based on the five pandemics that have affected the United States in roughly the last 100 years, a pandemic occurs on average roughly every 20 years. It is highly likely that human diseases will occur in Marshall County on an annual basis. However, it is far less likely that a human disease epidemic will result from these occurrences. Based on historical occurrence, the probability of a human disease epidemic occurring in most cities in Marshall County is an occasional event in any given year. Marshalltown and Marshall County ranked this risk slightly higher at 10-25% based on historical occurrence.

Magnitude and Severity (Extent)

The magnitude of a public health emergency will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is more easily transmitted from

person-to-person but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time.

Today, a much larger percentage of the world's population is clustered in cities, making them ideal breeding grounds for epidemics. Additionally, the explosive growth in air travel means the virus could literally be spread around the globe within hours. Under such conditions, there may be very little warning time. Most experts believe we will have just one to six months between the time that a dangerous new influenza strain is identified and the time that outbreaks begin to occur in the United States. Outbreaks are expected to occur simultaneously throughout much of the nation, preventing shifts in human and material resources that normally occur with other natural disasters. These and many other aspects make influenza pandemic unlike any other public health emergency or community disaster. Pandemics typically last for several months to 1-2 years.

The Pandemic Intervals Framework (PIF) is a six-phased approach to defining the progression of an influenza pandemic. This framework is used to guide influenza pandemic planning and provides recommendations for risk assessment, decision-making, and action. These intervals provide a common method to describe pandemic activity which can inform public health actions. The duration of each pandemic interval might vary depending on the characteristics of the virus and the public health response.

The six-phase approach was designed for the easy incorporation of recommendations into existing national and local preparedness and response plans. Phases 1 through 3 correlates with preparedness in the pre-pandemic interval, including capacity development and response planning activities, while Phases 4 through 6 signal the need for response and mitigation efforts during the pandemic interval.

Pre-Pandemic Interval

In nature, influenza viruses circulate continuously among animals (primarily birds). Even though such viruses might develop into pandemic viruses, in Phase 1 no viruses circulating among animals have been reported to cause infections in humans.

- Phase 1 is the natural state in which influenza viruses circulate continuously among animals but do not affect humans.
- In Phase 2 an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is thus considered a potential pandemic threat.
- Phase 2 involves cases of animal influenza that have circulated among domesticated or wild animals and have caused specific cases of infection among humans.

In Phase 3 an animal or human-animal influenza virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for examples, when there is close contact between an infected person and an unprotected caregiver. Limited transmission under these circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

- Phase 3 represents the mutation of the animal influenza virus in humans so that it can be transmitted to other humans under certain circumstances (usually very close contact between individuals). At this point, small clusters of infection have occurred.

Pandemic Interval

Phase 4 is characterized by verified human to human transmission of the virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upward shift in the risk for a pandemic.

- Phase 4 involves community-wide outbreaks as the virus continues to mutate and become more easily transmitted between people (for example, transmission through the air)

Phase 5 is characterized by verified human to human spread of the virus into at least two countries in one World Health Organization (WHO) region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

- Phase 5 represents human-to-human transmission of the virus in at least two countries.

Phase 6, the pandemic phase, is characterized by community-level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is underway.

- Phase 6 is the pandemic phase, characterized by community-level influenza outbreaks.

Severity of Impact

Improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs have decreased the number and severity of human diseases. IDPH also provides consultation to county and local health agencies on diseases requiring public health intervention, collaborates with Centers for Diseases Control and Prevention by weekly reporting of nationally reportable diseases, and offers health education opportunities. Programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious disease, provide early detection and treatment for infected persons, and ensure access to health care for refugees in Iowa. All of these safeguard work to limit the severity of impact of human disease epidemics.

Communities with a larger population have the risk of a highly communicable disease spreading more quickly. Jurisdictions that ranked severity of impact higher considered the worst-case scenario of a human disease epidemic. Most jurisdictions stated that the safeguards that the County and State departments of public health had in place would prevent most serious injuries of illnesses from occurring.

Speed of Onset

Generally, health care practitioners would be the first to know of a human disease epidemic. It is expected that, if a highly contagious disease were diagnosed in Marshall County, appropriate safety measures would be taken and further spread of the disease would be reduced. The community would be given at least 24 hours warning time.

Vulnerability

Although infectious diseases do not respect geographic boundaries, several populations in Marshall County are at specific risk to infectious diseases. Communicable diseases are most likely to spread quickly in institutional settings such as nursing home facilities, day care facilities, and schools. There are two nursing home facilities, four childcare centers and 9 school buildings in Marshall County.

Adverse impacts are expected to be severe for unprotected personnel and moderate to light for protected personnel. Medications may be limited to help prevent or treat the disease. Typically, it takes years to manufacture a vaccine and would likely become available in small quantities at first. It may become

necessary to ration limited amounts of medications, vaccinations, and other health care supplies. Risk groups cannot be predicted with certainty; the elderly, people with underlying medical conditions, and young children are usually at higher risk, but as discussed above this is not always true for all pandemics. People without health coverage or access to good medical care are also likely to be more adversely affected. Mental health of the public could also be impacted depending on the length of the event and public health guidance on prevention.

People

While everyone is vulnerable to human diseases, the elderly, young, and people with medical conditions tend to be affected most. The HMPC members in most jurisdictions estimated that fewer than 25% of the people in the community would be vulnerable to a pandemic human disease, which resulted in a score of 1 for vulnerability. Clemons, Laurel, Le Grand, Liscomb, Melbourne, St. Anthony, Marshall County, and West Marshall Community School District estimated that 25-50% of people or property might be affected.

As noted under Previous Occurrences, the COVID-19 pandemic, as of August 6, 2021, 201,237,468 cases have been reported around the world with over 4,272,786 deaths, including nearly 35,460,711 cases and 615,419 deaths in the United States. Marshall County has reported 5,352 cases and 79 deaths. In addition to the direct impacts, the pandemic has completely disrupted life for many people. Most large gatherings have had to be cancelled and sheltering in place and social distancing have been highly encouraged and, in some places, mandated, leaving some individuals isolated for months.

Property

Human disease epidemics generally do not cause structural damage, and there is no historical data for previous structural losses due to human disease epidemics. Therefore, a loss estimate was not completed for this hazard. This hazard was also not spatially analyzed because it does not typically cause structural damage.

Critical Facilities and Infrastructure

Health care facilities and emergency service personnel would likely be affected in the event of a human disease epidemic. While buildings, infrastructure, and critical facilities are not considered vulnerable to this hazard, access to facilities and infrastructure in the area of the incident may be denied until decontamination is complete. Workplace closures due to social distancing and quarantine requirements can make facility operation more difficult.

Economy

The economic impact of the COVID-19 pandemic and associated closures has been significant, triggering a recession and high unemployment; the unemployment rate jumped for 4.4% in March of 2020 to 14.7% in April and stayed in the double-digits through most of the summer. Some studies estimate that 1 in 5 renters are at risk of eviction. The stock market suffered major losses in the early days of the pandemic. The restaurant, retail, and oil and gas industries have been particularly hard hit, with numerous businesses closing or filing for bankruptcy. And among household with children, food insecurity – defined as when a household does not have sufficient food for its members to maintain healthy and active lives and lacks the resources to obtain more food – has more than doubled from 14% in 2018 to 32% in July 2020.

Local economy and finances may be adversely affected, possibly for an extended period of time. Unscheduled sick leave from a large portion of the workforce could result in millions of dollars lost in productivity. Business restrictions due to social distancing requirements can also be significant. In a normal year, lost productivity due to illness costs U.S. employers an estimated \$530 billion. During a

pandemic, that figure would likely be considerably high and could trigger a recession or even a depression.

Historical, Cultural and Natural Resources

Impacts to these resources are typically minimal. However, reduced tourism during outbreaks could lead to additional economic impacts.

Development Trends

Population growth and development contribute the greatest to pandemic exposure. As populations increase and the cost of health care climbs, potential losses can be expected to rise. It is possible that infrastructure may not be able to be maintained as necessary during a pandemic because of a significantly decreased workforce. While the population in Marshall County is not increasing with 17.7% percent of the population over 65 years old, the County has a large percent of population more susceptible to disease.

3.4.3 Infrastructure Failure

Infrastructure Failure – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	1	1	4	8
Ferguson	1	2	1	1	4	9
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	1	1	4	8
Le Grand	1	2	3	3	4	13
Liscomb	3	4	4	3	4	18
Marshalltown	1	1	4	4	4	14
Melbourne	1	2	1	2	4	10
Rhodes	1	1	1	1	4	8
St. Anthony	1	1	1	1	4	8
State Center	2	3	4	1	4	14
Marshall County	2	3	4	4	4	17
East Marshall Community SD	1	1	1	1	4	8
GMG Community SD	1	2	2	2	4	11
Marshalltown Community SD	1	1	1	2	4	9
West Marshall Community SD	1	1	1	3	4	10

Description

Critical infrastructure involves several different types of facilities and systems including: electric power, transportation routes, natural gas and oil pipelines, water and sewer systems, storage networks, and internet/telecommunications systems. Failure of utilities or other components of the infrastructure in the planning area can seriously impact public health, functioning of communities and the economy. Disruption of any of these services could result from the majority of the natural, technological, and manmade hazards described in this plan. In addition to a secondary or cascading impact from another primary hazard, utilities and infrastructure can fail as a result of faulty equipment, lack of maintenance, degradation over time, or accidental damage such as damage to buried lines or pipes during excavation.

Communications Failure

Communications failure is the widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, internet interruption, loss of cellular telephone service, loss of local government radio facilities, long-term interruption of electronic broadcast services, or emergency 911. Law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services which rely on communications systems to effectively protect citizens. In addition, business and industry rely heavily on various modes of communication. Mechanical failure, traffic accidents, power failure, line severance, and weather can all affect communications systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term.

The types of hazards and impacts to internet and telecommunications infrastructure are very similar to electric power supply. Land line phone lines often utilize the same poles as electric lines. So, when weather events such as windstorm or winter weather cause lines to break, both electricity and telephone services experience outages. With the increasing utilization of cellular phones, hazard events such as tornado that

can damage cellular repeaters can cause outages. In addition, during any hazard event, internet and telecommunications systems can become overwhelmed due to the surge in call/usage volume.

Energy Failure

Energy failure includes interruption of service to electric, petroleum, or natural gas. Disruption of electric power supply can be a cascading impact of several other hazards. Electric power is the type of energy failure that is most often a secondary impact of other hazard events. The most common hazards analyzed in this plan that disrupt power supply are: flood, tornado, windstorm, and winter weather as these hazards can cause major damage to power infrastructure. To a lesser extent, extreme temperatures, dam failure, lightning, and terrorism can disrupt power. Extreme heat can disrupt power supply when air conditioning use spikes during heat waves which can cause brownouts. Dam failure is similar to flood in that infrastructure can be damaged or made inaccessible by water. Lightning strikes can damage substations and transformers but is usually isolated to small areas of outage. Many forms of terrorism could impact power supply either by direct damage to infrastructure or through cyber-terrorism targeting power supply networks.

Primary hazards that can impact natural gas and oil pipelines are earthquake, expansive soils, land subsidence, landslide, and terrorism.

Other Utility Failure

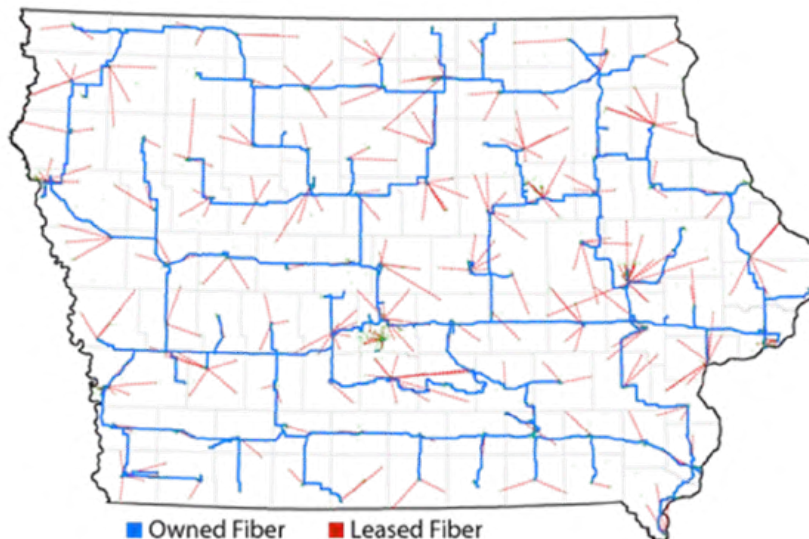
Interruption of other utilities such as water and sewer systems can be a devastating, costly impact. The primary hazards that can impact water supply systems are: drought, flood, hazardous materials, and terrorism. Winter storm can also impact water supply if low temperatures cause failure/breakage of water infrastructure. The primary hazard that impacts sewer systems is flood.

Location

The entire planning area is at risk to all types of infrastructure failure included in the hazard description section, either from primary failure due to malfunction, degradation, or accidental or intentional damage or as a result of a secondary impact related to another hazard event.

Figure 3-45 shows the Iowa Communications Network (ICN) that administers Iowa's statewide fiber optic telecommunications network.

Figure 3-45 Map of Iowa Communication Network



Source: <http://icn.iowa.gov/about-icn/agency-information-icn-story>

Historical Occurrence

Historical occurrence of infrastructure failure varies across jurisdiction. There is no NCEI data available for this hazard, but the HMPC was able to identify instances of infrastructure failure in the last 10 years. Most jurisdictions scored the historical occurrence of infrastructure failure as a 1, meaning that there were less than four events in the last 10 years that they could recall. State Center and Marshall County scored historic occurrence as a 2, meaning that 4 to 7 infrastructure failure events have occurred in the last 10 years. State Center has had issues with sewer backups into homes during heavy periods of rain. Marshall County has dealt with aging infrastructure, including roads and bridges, throughout the county. Liscomb scored historic occurrence as a 3, meaning that there were 8-11 infrastructure failure events over the last 10 years. Some of these events include extended power outages that lasted for multiple days, high wind events (100+ MPH) that damaged the community center and fire station, and sewer backups as a result of flash flooding.

Many cities in Marshall County expressed vulnerability to infrastructure failure due to power loss during wind and ice storms. In 2006, Gilman was affected by an ice storm that caused the city to lose power for an entire week. Now, the city has invested in backup generators for critical facilities such as City Hall, the sewer station, and for the emergency sirens. Clemons lost power for one day in July 2014 following a severe thunderstorm that caused tree damage. Liscomb recalled at least three extended power outages that lasted for multiple days. As noted under the Tornado subsection, the HMPC noted the 2018 tornado impacted critical infrastructure in the aftermath of the event including the overloading of cell networks and isolation of gas delivery that then took time to re-light during the restoration and recovery.

There are a variety of infrastructure failures that affect Marshall County. Water main breaks, sewer system backups, power failures, bridge failures, and infrastructure damaged by flooding are just a few of these issues. One of the most common causes of infrastructure failure in Marshall County is related to sewer and water systems. Many of the municipalities in Marshall County have older sewer systems. During prolonged wet weather periods with substantial rainfall, sewer systems can experience too much inflow and infiltration, which causes system overloading. This forces cities to bypass the treatment facility and pump untreated wastewater into open streams. Albion, Marshalltown, LeGrand, Liscomb, Gilman, and State Center all described some occurrences of sewer backup that caused system flooding in streets and low-lying areas or backup in home within the community. Albion's sewer system was built in the 1960's and the lift station sometimes cannot keep up with the inflow from the sewer system, so it has an overflow pipe built into the system.

LeGrand is in the process of upgrading their water distribution system and only has approximately 25% of the system remaining that needs to be upgraded. Marshalltown's water/sewer system is also in the process of long-term repairs. Gilman expressed that although backups occur, it takes an extreme rainfall event for backups to happen and fixing the system is not a city priority compared to other projects. Other cities in the county such as St. Anthony have already updated their sewer systems and no longer experience backup problems.

Marshall County at large experiences a risk of infrastructure failure due to the condition of old county bridges. These bridges would likely fail due to old age and poor condition; a disaster event may cause a weak structure to fail. Bridges are routinely inspected and closed if there are problems. Bridge failure could be aggravated due to flood events that affect the Iowa River and close roads and bridges in the county. Some county roads affected by flooding must be serviced more often because certain areas are extremely vulnerable to river flooding from the Iowa River. Some cities in Marshall County have infrastructure vulnerabilities related to key city services like power delivery, water delivery, and wastewater treatment; however, not all cities are financially capable of providing matching funds for large

infrastructure projects at this time. Therefore, even though infrastructure problems exist, not all problems described in this section were able to be addressed by the mitigation actions covered in this plan.

All four school districts included in the plan update rated historical occurrences as a 1. GMG Community School District mentioned downed power lines, water shutdowns, and water main breaks as potential events that could affect the school district.

Probability of Future Occurrences

Based on the number of historical occurrences, the HMPC determined the following scores for each jurisdiction. Albion, Clemons, Gilman, Haverhill, Laurel, Marshalltown, Rhodes, and St. Anthony received scores of 1, meaning that each jurisdiction had a less than 10% probability of occurring in any given year. East Marshall Community School District, Marshalltown Community School District, and West Marshall Community School District also determined their probability score to be 1. These jurisdictions had no events, or potentially one event that they could recall but weren't sure if it was significant enough to count as an occurrence.

Ferguson, Le Grand, Melbourne, and GMG Community School District received a probability score of 2, meaning that an infrastructure failure had a 10-25% chance of occurring. These jurisdictions had one to two events that they could remember occurring and that were significant.

Liscomb received a probability score of 4, meaning that a chance of an infrastructure failure occurring was greater than 60%. Liscomb recalled at least 10 instances of infrastructure failure that have occurred in the last 10 years. Mainly, these events are related to the sewer and water system issues that were described in previous paragraphs.

Magnitude and Severity (Extent)

Severity of Impact

Severity of impact is dependent on the event. Energy disruptions and communications failures generally do not result in injuries or illnesses, have a limited impact on property damage, and results in a brief interruption of essential facilities or services. Structural fires could potentially cause serious injury and major property damage that threatens structural stability.

Most jurisdictions scored severity of impact as a 1 or a 2, meaning that injuries and property damage would be very minor, if they would occur at all. Short term property damage might occur but would not threaten structural stability. Le Grand, Liscomb, Marshalltown, Marshall County, and West Marshall Community School District scored severity of impact as a 3 or a 4, meaning that impacts could be more severe such as major property damage and shut down of essential facilities for more than 24 hours. These jurisdictions ranked severity of impact higher because of sewer backups that affected homeowners. In the worst-case scenario, significant property damage has the possibility to occur.

Speed of Onset

Infrastructure failure cannot be predicted. There would be minimal or no warning time if an infrastructure failure occurred.

Climate Change Considerations

Refer to the Climate Change Considerations sections of the following primary hazards that can cause a cascading or secondary impact of infrastructure failure: Flood, Severe Winter Storm, Tornado/Windstorm, Thunderstorm, Lightning Thunderstorm, Lightning, Hail, and Extreme Heat.

Vulnerability

Albion, Clemons, Ferguson, Gilman, Haverhill, Laurel, Melbourne, Rhodes, and St. Anthony scored vulnerability as a 1, meaning that less than 25% of people and property would be affected in the event of infrastructure failure. Many of the homes that may be flooded due to sewer backups are the homes in lower areas of the city or along a certain path related to the infrastructure. For these communities, not all residents are affected by an event. For the average event, effects are localized. East Marshall Community School District, Marshalltown Community School District, and West Marshall Community School District also scored vulnerability as a 1.

LeGrand, Liscomb, Marshalltown, State Center, and Marshall County scored vulnerability as a 3 or a 4, meaning that 50% or more of people and property might be affected. These cities' sewer and water system issues could affect a larger amount of people. Road infrastructure may be vulnerable to failure which could cause road or bridge closures. Power failure from ice storms and windstorms can and have affected these communities and caused extended power losses than affect larger numbers of people.

In general, all critical facilities in all jurisdictions could be vulnerable to an infrastructure failure. A power failure could impact police stations and emergency service personnel's ability to respond to emergencies. Failure of bridges or other road infrastructure could increase response times or limit transportation options or affect delivery of emergency supplies for all residents. Cultural facilities in Marshall County are also vulnerable to infrastructure failures. Power losses and sewer backups can affect businesses and recreational facilities.

Development Trends

While population is decreasing and increase in future development may increase the demand for utilities and use of infrastructure as well as the level of impacts when the utilities or infrastructure fail.

3.4.4 Radiological

Radiological – Hazard Score Calculation					
Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
1	1	2	2	2	8

Description

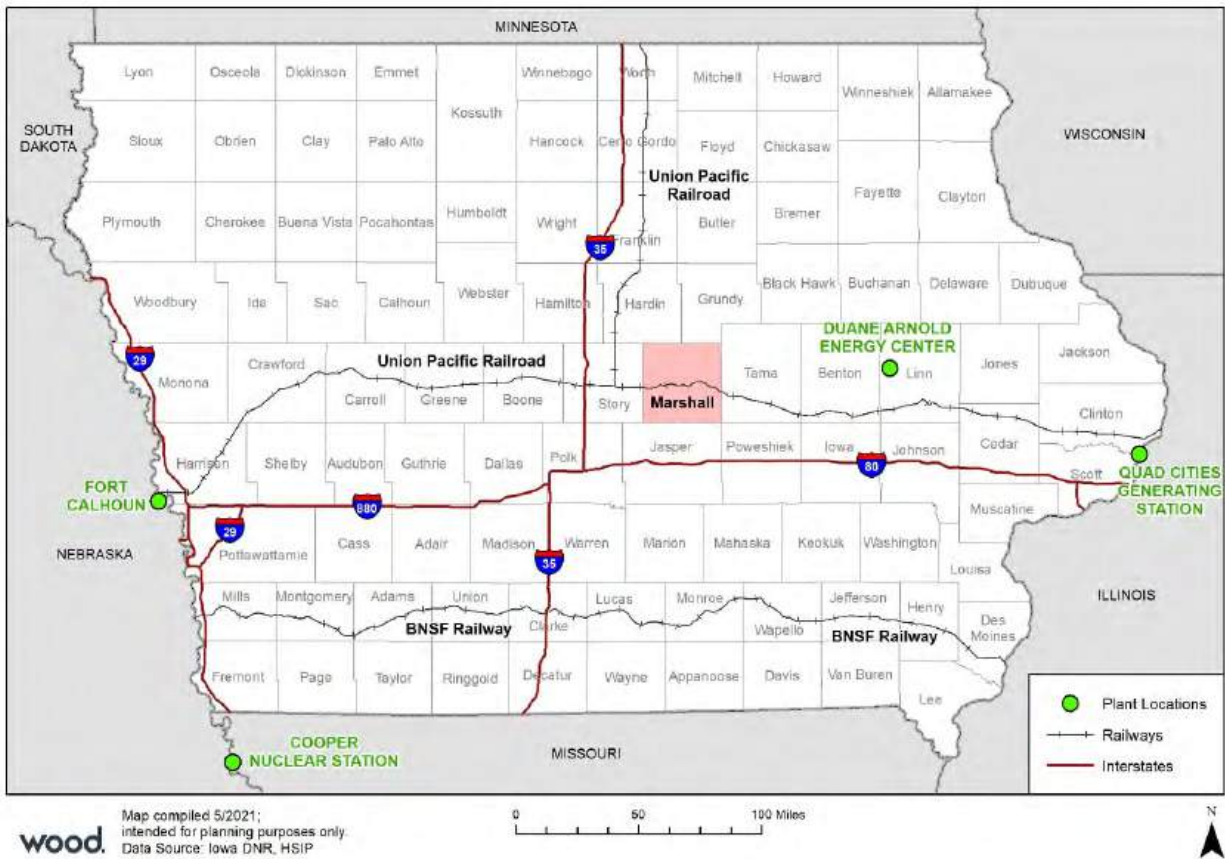
An incident resulting in the release of radiological material at a fixed facility or in transit. This hazard includes power plants, hospitals, and laboratories. Marshall County is located just outside a 50-mile buffer of the Duane Arnold Energy Center near Palo, Iowa in Linn County. Emergency classifications defined by the United States Nuclear Regulatory Commission are divided into four categories (Iowa Emergency Management Association 2014). Each calls for a certain level of response from plant and government personnel. From least to most severe, the classifications are:

- **Unusual Event** - Events that are in process or have occurred which indicate potential degradation in the level of safety of the plant. No release of radioactive material requiring offsite response or monitoring is expected unless further degradation occurs.
- **Alert** - Events are in process or have occurred that involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the Environmental Protection Agency (EPA) protective action guides (PAGs).
- **Site Area Emergency** - Events in process or which have occurred that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the EPA PAGs except near the site boundary.
- **General Emergency** - Actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs for more than the immediate site area.

Location

One of the primary nuclear waste generating facilities in Iowa, the Duane Arnold Energy Center ceased operations in 2021. Additionally, Marshall County is just outside the 50-mile buffer of Duane Arnold Energy Center in Linn County, however, the county still chose to consider radiological hazards in this plan. The risks associated with the radiological hazard in Marshall County are similar across jurisdictions. Regarding transportation of radiological waste, none of the highways in Marshall County are part of a nuclear transportation route; transportation of nuclear waste is only allowed on US Interstate Highways 35 and 80 in Iowa. According to the Council of State Governments Midwestern Office (2005), the Union Pacific railway line that runs through Marshall County may handle some radioactive materials transportation, but a majority of the high-level radioactive waste is shipped on another rail line that goes through the southern portion of Iowa. This change in rail shipping that does not use the Union Pacific Line for hazardous materials occurred in 1995. All jurisdictions in Marshall County could be affected if a mandatory evacuation is necessary from the areas surrounding the Duane Arnold Energy Center, as Highway 30 is a planned evacuation route.

Figure 3-46 Nuclear Sites in Iowa and Potential Transportation Routes for Nuclear Waste



Historical Occurrence

The Duane Arnold facility has experienced seven Unusual Events, one Alert, and no Site Area Emergencies or General Emergencies. None of these occurrences qualify as a radiological hazard event. There have been no occurrences of a radiological incident since the facility began operating in 1974.

Probability of Future Occurrence

The probability of a radiological incident occurring is very low in any given year (less than 10%).

Magnitude and Severity

Radiation is the main danger during radiological incidents. Gamma rays can result in acute and long-term illness, with significant enough doses leading to death. The Gray (Gy), which is the standard unit for measuring radiation, is equal to one joule of energy released per kilogram of matter. While any radiation absorption can be dangerous, any exposure of 8 Gy or greater will result in certain death within a few days or weeks. Figure 3-47 shows the effects of acute radiation illness.

Figure 3-47 Acute Radiation Illness Chart

Phase	Symptom	Whole-body absorbed dose (Gy)				
		1–2 Gy	2–6 Gy	6–8 Gy	8–30 Gy	>30 Gy
Immediate Effects	Nausea and vomiting	5–50%	50–100%	75–100%	90–100%	100%
	Time of onset	2–6 hours	1–2 hours	10–60 minutes	< 10 minutes	< 5 Minutes
	Duration	< 24 hours	24–48 hours	< 48 hours	< 48 hours	Patients die within 48 hours
	Diarrhea	None	None to mild (< 10%)	Moderate to Severe (> 10%)	Severe (> 95%)	Severe (100%)
	Time of onset	—	3–8 hours	1–3 hours	< 1 hours	< 1 hours
	Headache	Slight	Mild to moderate (50%)	Moderate (80%)	Severe (80–90%)	Severe (100%)
	Time of onset	—	4–24 hours	3–4 hours	1–2 hours	< 1 hours
	Fever	None	Moderate increase (10–100%)	Moderate to severe (100%)	Severe (100%)	Severe (100%)
	Time of symptom onset	—	1–3 hours	< 1 hours	< 1 hours	< 1 hours
	Central nervous system function	No impairment	Cognitive impairment 6–20 h	Cognitive impairment > 24 h	Rapid incapacitation	Seizures Tremor, Ataxia, Lethargy
Latent period		28–31 days	7–28 days	< 7 days	None	None
Overt Illness	Clinical Manifestations	Mild to moderate leukopenia	Moderate to severe leukopenia	Severe leukopenia	Nausea	Patients die within 48 hours
		Fatigue	Purpura	High fever	Vomiting	
		Weakness	Hemorrhage	Diarrhea	Severe diarrhea	
			Infections	Vomiting	High fever	
			Epilation after 3 Gy	Dizziness and disorientation	Electrolyte disturbance	
				Hypotension	Shock	
				Electrolyte disturbance		
Mortality	Without care	0–5%	5–95%	95–100%	100%	100%
	With care	0–5%	5–50%	50–100%	100%	100%
	Death	6 – 8 weeks	4 – 6 weeks	2 – 4 weeks	2 days – 2 weeks	1 – 2 days

Source: Merck Manuals Online, 2018

According to the US Nuclear Regulatory Commission, nuclear accidents and incidents are classified under three categories:

- **Criticality Incidents:** Involve nuclear assemblies, research, production or power reactors, and chemical operation. Worldwide, these incidents have resulted in fatalities, radiation exposure, and release of radioactivity into the environment.
- **Loss-of-Coolant:** Accidents result when a reactor coolant system experiences a breach large enough that coolant inventory can no longer be maintained by the normally operating makeup system.
- **Loss-of-Containment:** Accidents involve the release of radioactivity. Points of release this type of incident can be containment vessels at power facilities or damaged packages during transportation.

Vulnerability

Responding to the effects of a radiological incident in the planning area would be extensive and would require resources and assistance from several state and federal agencies to determine and evaluate the threat to life and the environment. Due to the variable nature of this hazard, it is not possible to quantify potential losses.

People and Property

While Marshall County is more than 50 miles away from the facility, communities in Marshall County are still vulnerable. HMPC members estimated that if a radiological event did occur, more than 75% of people and property would be affected in Marshall County.

Critical Facilities and Infrastructure

Effects would include increased vehicle traffic, as the portion of Highway 30 that runs through Marshall County is part of the emergency evacuation route in the event of a general emergency at the plant. Depending on the extent of the radiological incident, property in Marshall County could also be affected.

Economy

Radiological incidents are not likely to have a large effect on the economy but cleanup for a radiological incident could be extremely costly and take several years to complete. There may also be short term economic impacts to local business and the County as a whole, if people were unable to travel to or stop in Marshall County.

Historic, Cultural and Natural Resources

Impacts from a radiological incident would be long lasting for the natural environment. Radiological releases can pollute the environment and cause nearby plants and animals to get sick. Radioactive material that gets into the air or water supply can affect humans further away from the incident site.

Development Trends

Increased development near fixed facilities that house radioactive materials and along transportation corridors would increase the number of people vulnerable to this hazard in the planning area

3.4.5 Terrorism

Terrorism – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	3	3	4	12
Ferguson	1	1	1	1	4	8
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	4	4	4	14
Le Grand	1	1	1	1	4	8
Liscomb	1	1	1	3	4	10
Marshalltown	1	1	4	4	4	14
Melbourne	1	1	1	2	4	9
Rhodes	1	1	1	3	4	10
St. Anthony	1	1	1	2	4	9
State Center	1	1	2	3	4	11
Marshall County	1	2	2	2	4	11
East Marshall Community SD	1	1	4	4	4	14
GMG Community SD	1	1	3	2	4	11
Marshalltown Community SD	1	1	1	4	4	11
West Marshall Community SD	1	1	1	3	4	10

Description

This hazard encompasses the following sub-hazards: enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, cyber terrorism, radiological terrorism and public disorder. These hazards can occur anywhere and demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion or ransom in violation of the criminal laws of the United States. These actions may cause massive destruction and/or extensive casualties. The threat of terrorism, both international and domestic, is ever present, and an attack is likely to occur when least expected.

Enemy attack is an incident that could cause massive destruction and extensive casualties throughout the world. Some areas could experience direct weapons' effects: blast and heat; others could experience indirect weapons' effect. International political and military activities of other nations are closely monitored by our federal government and the State of Iowa would be notified of any escalating military threats.

The use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom can be described as biological terrorism. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point of line sources such as munitions, covert deposits and moving sprayers. Biological agents vary in the amount of time they pose a threat. They can be a threat for hours to years depending upon the agent and the conditions in which it exists.

Agro-terrorism consists of acts to intentionally contaminate, ruin, or otherwise make agricultural products unfit or dangerous for consumption or further use. Agriculture is an important industry in Iowa and Marshall County. A major attack involving the nation's food supply could be launched in a rural area that

has little capacity to respond. Potential terrorists' targets for livestock disease introduction would be concentration points, such as licensed feedlots or livestock markets.

Chemical terrorism involves the use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom. Effects of chemical contaminants are similar to biological agents.

Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidations, coercion, or ransom is conventional terrorism. Hazard affects are instantaneous; additional secondary devices may be used, lengthening the time duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences and incremental structural failures. Conventional terrorism can also include tactical assault or sniping from remote locations.

Electronic attack using one computer system against another in order to intimidate people or disrupt other systems is a cyber-attack. All governments, businesses and citizens that conduct business utilizing computers face these threats. Cyber-security and critical infrastructure protection are among the most important national security issues facing our country today. As such, the Iowa Division of Criminal Investigation has a Cyber Crime Unit tasked with analysis and retrieval of digital information for investigations.

Mass demonstrations, or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes are examples of public disorder. These are assembling of people together in a manner to substantially interfere with public peace to constitute a threat, and with use of unlawful force or violence against another person, or causing property damage or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target or institution. Most events are within the capacity of local law enforcement.

The Southern Poverty Law Center reported in 2021 there were three active hate groups in Iowa: Great Millstone (Black Separatist) in Des Moines, National Alliance (Neo-Nazi) and Patriot Front (White Nationalist); all identified as being statewide.

Location

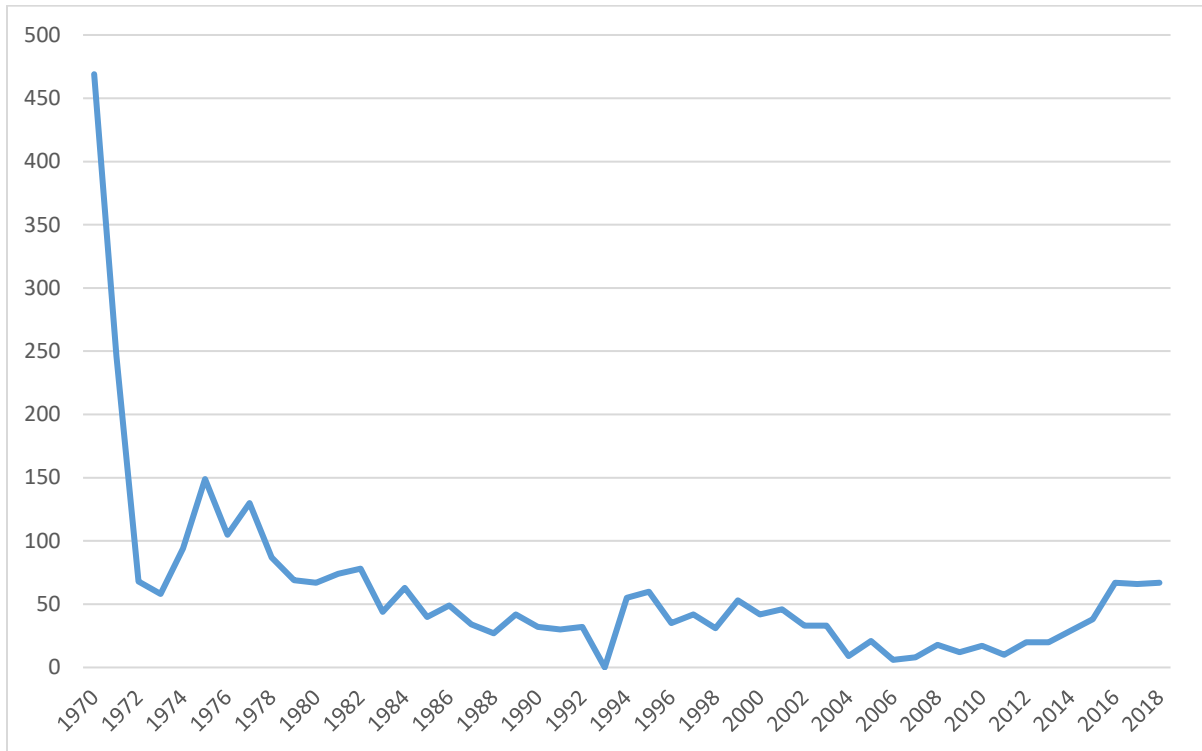
The entire planning area has a low potential for terrorist activity. However, there are various events throughout the County that include assembly of large crowds of people. Any venue with a large gathering of people could be a potential target for terrorists.

Historical Occurrence

For most jurisdictions in Marshall County, there have been no known incidences of terrorism. Marshall County at large identified approximately two events that occurred in the last 15 years as terroristic in nature. These events included shootings and general threats to the community that placed law enforcement on high alert and forced portions of the county to be at risk until the situation was resolved. All communities in Marshall County received a score of 1 for historical occurrence, meaning that they experienced less than four occurrences of terrorism in the last 10 years.

Nationally, the number of terrorist attacks in the U.S. declined sharply from the 1970s through the early 2000s, as shown in Figure 3-48; since 2006, the U.S. has experienced a steady increase in attacks, driven primarily by an increase in domestic terrorism as shown in Figure 3-49.

Figure 3-48 Terrorist Attacks in the U.S. 1970-2018



Source: Study of Terrorism and Responses to Terrorism (START) Global Terrorism Database (GTD) <https://www.start.umd.edu/gtd/>

Figure 3-49 Domestic Terrorist Attacks in the U.S. 1994-2021



Source: Center for Strategic & International Studies

Probability of Future Occurrence

Based on historical occurrence, the probability for a terroristic event in most communities in Marshall County is low in any given year (less than 10%). Marshall County at large has a slightly higher probability of between 10% and 25% of terrorism occurring based on historical occurrence.

Magnitude and Severity (Extent)

Severity of Impact

The severity of impact varies tremendously depending on the form of terrorism. The HMPC determined that, although some terroristic activity could result in serious injury and major property damage, the most likely terroristic threat that Marshall County would experience would involve little to no injuries, illness, or property damage, or minor injuries, illness, or property damage (scores of 1 or 2 for severity of impact).

Communities with heightened concern for severity of impact from terrorism included: Clemons, Liscomb, Rhodes, State Center, West Marshall Community School District with scores of 3, and; Laurel, Marshalltown, East Marshall Community School District, and Marshalltown Community School District with scores of 4. These jurisdictions considered significant terrorist events such as bomb detonations or agro-terrorism that may cause serious injuries or death.

Speed of Onset

Terrorism occurs with minimal or no warning. No jurisdiction in Marshall County would have advanced notice of a terrorism event.

Vulnerability

Potential losses and vulnerability from Terrorism include all infrastructure, critical facilities, crops, humans and animals.

People and Property

People would be the greatest vulnerability in the event of a terrorism incident in Marshall County. A terrorism event would inevitably also result in significant property losses. The HMPC from each jurisdiction considered their vulnerability to a terrorism event in their community and scored vulnerability in a variety of ways. Most jurisdictions decided that a terroristic event would affect less than 25% of people and property. They considered an event and determined that any likely event would be small and would affect only a small portion of the city if it happened at all. A protest was a common event that was cited as an example. Most cities in Marshall County have a small population and have never experienced unrest or terroristic threats.

State Center and Marshall County scored vulnerability to terrorism as a 2, meaning that 26-50% of people and property might be affected. State Center has a large event each summer, the Rose Festival that draws crowds of several thousand people over several days. This particular event increased State Center's vulnerability to terrorism.

Critical Facilities and Infrastructure

Critical facilities and infrastructure are vulnerable as these assets would be likely targets for a direct attack. Depending on the extent of damages or disruptions in the aftermath of an event, the ability of first responders and medical personnel to respond could be hindered.

Economy

Potential economic losses could include cost of repair or replacement of damaged facilities, lost economic opportunities for businesses, loss of food supplies, disruption of the food supply chain, and immediate damage to the surrounding environment.

Historic, Cultural, and Natural Resources

Agro-terrorism or chemical terrorism could result in significant damage to the environment in Marshall County. These events can pollute the environment and cause nearby plants and animals to get sick or die. Contaminated material that gets into the air or water supply can affect humans further away from the incident site.

Development Trends

As public events are held at the courthouse, county fair ground, and schools, the potential may exist for these locations to become targets of attack. With human-caused hazards such as this that can have multiple variables involved, increases in development is not always a factor in determining risk, although the physical cost of the event may increase with the increased or newly developed areas.

3.4.6 Transportation Incident

Transportation Incident – Hazard Score Calculation by Jurisdiction						
Jurisdiction	Historical Occurrence	Probability	Vulnerability	Severity of Impact	Speed of Onset	Total Score
Albion	1	1	1	1	4	8
Clemons	1	1	2	2	4	10
Ferguson	1	1	1	1	4	8
Gilman	1	1	1	1	4	8
Haverhill	1	1	1	1	4	8
Laurel	1	1	1	1	4	8
Le Grand	1	1	1	2	4	9
Liscomb	1	1	2	4	4	12
Marshalltown	1	2	1	4	4	12
Melbourne	1	1	1	2	4	9
Rhodes	1	1	2	1	4	9
St. Anthony	1	1	1	1	4	8
State Center	1	1	1	3	4	10
Marshall County	4	4	4	4	4	20
East Marshall Community SD	1	1	1	2	4	9
GMG Community SD	1	2	2	2	4	11
Marshalltown Community SD	1	1	1	1	4	8
West Marshall Community SD	1	1	1	3	4	10

Description

Transportation incidents include any transportation accident involving any mode of transportation that directly threatens life, property damage, injury, or adversely impacts a community's capabilities to provide emergency services. A transportation incident can occur with air transportation, highway transportation, railway transportation, and waterways.

An air transportation incident may involve a military, commercial, or private aircraft. Air transportation is playing a more prominent role in transportation as a whole; airplanes, helicopters, and other modes of air transportation are used to transport passengers for business and recreation as well as thousands of tons of cargo. A variety of circumstances can result in an air transportation incident; mechanical failure, pilot error, enemy attack, terrorism, weather conditions, and on-board fire can all lead to an incident at or near the airport.

A highway transportation incident can be a single or multi-vehicle requiring responses exceeding normal day-to-day capabilities. An extensive surface transportation network exists in Iowa; local residents, travelers, business, and industry rely on this network on a daily basis. Weather conditions play a major factor in the ability of traffic to flow safely in and through the state as does the time of day (rush hour) and day of week. Incidents involving buses and other high-occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.

A railway transportation incident is a train accident that directly threatens life and/or property, or adversely impacts a community's ability to provide emergency services. Railway incidents may include derailments, collisions, and highway/rail crossing accidents. Train incidents can result from a variety of causes; human error, mechanical failure, faulty signals, and/or problems with the track. Results of an incident can range from minor "track hops" to catastrophic hazardous material incidents and even

human/animal casualties. With the many miles of track in Iowa, vehicles must cross the railroad tracks at numerous at-grade crossings.

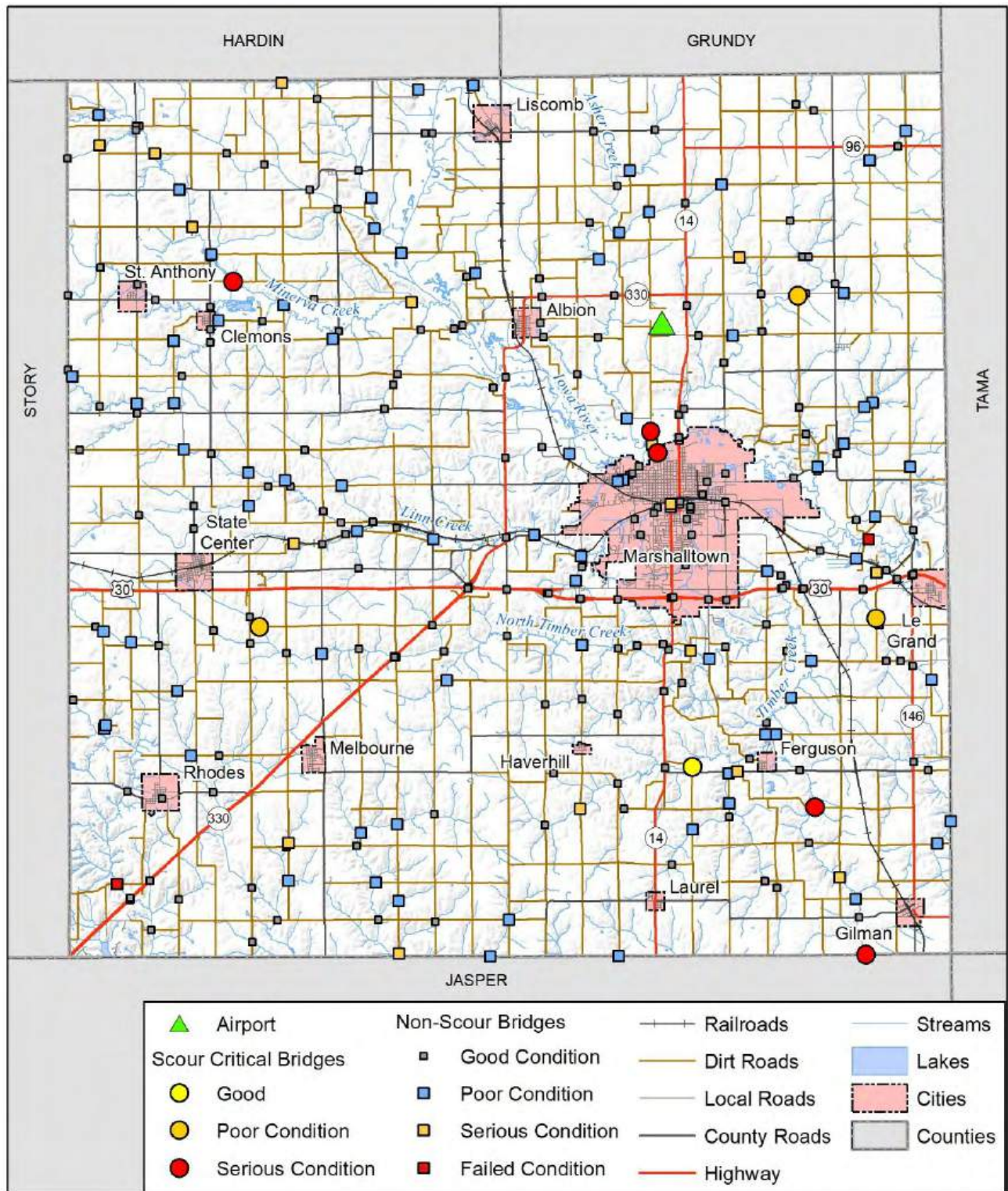
Location

The entire planning area is subject to transportation incidents and all participating jurisdictions are affected. The major transportation routes include US Highway 30 and State Highway 330. Four airports exist in Marshall County near or in the cities of Marshalltown, Melbourne, Albion, and Liscomb.

Railway incidents may include derailments, collisions, and highway/rail crossing accidents. Marshall County has one main rail line that runs throughout the county. The line runs directly through the communities of Le Grand, Marshalltown and State Center. An additional UP rail line also runs through Gilman. The Iowa River Railroad was abandoned in 2012 and is now owned by the City of Marshalltown for future development as a trail.

Figure 3-50 shows the major transportation routes including the locations of bridges in the planning area included in the National Bridge Inventory data set within the Homeland Infrastructure Foundation-Level Data (HIFLD) 2020 database. One of the database items in the National Bridge Inventory is a "scour index", which is used to quantify the vulnerability of a bridge to scour from flood or erosion. Bridges with a scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition. There are nine bridges identified as scour critical within the planning area. Of which 5 are considered to be in serious condition and 3 in poor condition.

Figure 3-50 Major Transportation Routes and Location of Bridges



Map compiled 5/2021;
intended for planning purposes only.
Data Source: Marshall County, NHD,
National Inventory of Bridges

0 5 10 Miles

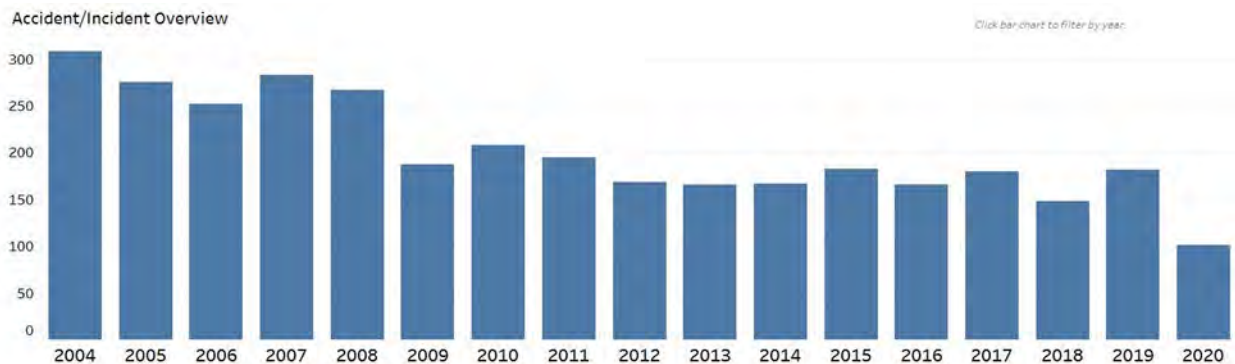


Historical Occurrence

Railway transportation incidents involving derailments have become a more common, and dangerous, occurrence with the increased shipment of oil and oil products. According to the Federal Railroad Administration, 32 railway accidents or incidents in the last 11 years in Marshall County. Of these incidents 4 were highway-rail incidents and 14 were not at grade-crossings. These incidents are represented in the county's overall risk assessment scores for historical occurrence and probability.

Throughout Iowa, rail car traffic has increased but the number of derailments in relationship to the traffic is trending downward according to the Iowa Department of Transportation (see Figure 3-51). Iowa has 5,157 public highway-rail crossings in the State on state, city and county highways.

Figure 3-51 Iowa Railway Accidents/Incidents, 2004-2020



Source: U.S. Department of Transportation Federal Railroad Administration, Overview Reports

There were five aviation incidents reported to the National Transportation Safety Board (NTSB) between 1982 and 2020 in Marshall County. The oldest record occurred in September 1982 outside of Liscomb. Three events took place at the Marshalltown Municipal Airport or nearby Marshalltown shortly after takeoff. One event was reported near Laurel in 2007. No reports were found after 2014.

Table 3-40 Air Transportation Incidents, 1982-2014

Date	Nearest City
September 6, 1982	Liscomb
August 6, 2005	Marshalltown
August 12, 2005	Marshalltown
July 16, 2007	Laurel
September 1, 2014	Marshalltown

Source: <http://plane crashmap.com/list/ia/>

Highway transportation incidents are likely throughout the county, although transportation incidents are more likely to occur in areas with higher annual average daily transportation (AADT) counts. AADT uses a formula and historic data to determine average traffic flows for a given area. The roads of Marshall County with the highest AADT numbers include US Highway 30, State Highway 330, several secondary roads in Marshalltown, and State Highway 14. According to vehicle crash data from the Iowa Department of Transportation, between 2009 and 2018, Marshall County experienced a total of 61 fatal traffic accidents.

Because this data does not measure the extent of each crash and how significantly it affected the community, the HMPC were asked to recall vehicle transportation incidents at planning meetings. They were asked how many crashes affected their community in the last 10 years that exceeded normal day-to-

day capacities of emergency personnel and/or caused significant road closures or injuries. Most jurisdictions could not recall a single incident in the last 10 years that caused significant road closures or overwhelmed the capacities of emergency personnel. The HMPC noted it was common with Highway 30 running through town to have, on average, one large accident per year that stopped traffic and affected the community.

When considering all forms of transportation incidents, most jurisdictions reported no transportation incidents. Marshall County reported more than 12 (a combination of railroad incidents and highway transportation incidents) and Marshalltown reported approximately 2 (highway transportation incidents).

Probability of Future Occurrences

There are 78 railroad crossings in Marshall County. The miles of railroad track in the county combined with the large number of street and highway crossings make Marshall County vulnerable to a potential highway/rail collision. Derailments are also possible, while a major derailment would occur less frequently.

Since probability is based on historical occurrence, most jurisdictions scored 1 for probability, meaning that there is a less than 10% chance of a transportation incident occurring in any given year. Marshalltown and GMG Community School District scored a 2, meaning that there is between a 10-25% chance of a transportation event occurring in any given year. Marshall County scored 4, meaning that there is a more than 60% chance of a transportation incident occurring.

Magnitude and Severity (Extent)

Severity of Impact

Highway incidents threaten the health and lives of people in the vehicles, pedestrians, and citizens of the community if hazardous materials are involved. Mass casualty events can occur if mass transit vehicles are involved. Community bus and school buses have a good safety record, but accidents can and do occur. Numerous injuries are a realistic possibility in situations involving mass transit vehicles. Property damage would be limited to vehicles and cargo involved; roads, bridges, and other infrastructure; utilities such as light and power poles; and third-party property adjacent to the accident scene such as buildings and yards.

Railway incidents can result in death, injury, and property damage. Deaths and injuries can range from those directly involved, to citizens in the community affected by hazardous materials.

Depending on the materials involved, evacuations may occur, moving residents away from dangerous products and the possibility of explosion. Gases, liquids, and solids can contaminate air, soil, and water in and near the incident scene. If a railway incident occurred in an urban area, the health and welfare of thousands of people could be put in jeopardy. Damage may be limited to the train, railcars, and cargo involved, but it can also include loss of production, business disruption due to evacuations, and business disruptions of those served by the railroad. Business and traffic disruptions could last several days until the clean-up efforts are complete.

Albion, Ferguson, Gilman, Haverhill, Laurel, Rhodes, St. Anthony, and Marshalltown Community School District scored severity of impact as a 1, meaning that injuries, damages, and impacts related to the shutdown of critical facilities would be minimal. These jurisdictions are not significantly vulnerable to transportation incidents. They have limited vehicle traffic on the roads and highways nearby. With the exception of Albion and Gilman, they are not located near railroad tracks.

Clemons, Le Grand, Melbourne, East Marshall Community School District, and GMG Community School District scored severity of impact as a 2, meaning that injuries, damages, and impacts related to the shutdown of critical facilities would be limited. Critical facilities could be impaired for up to 24 hours.

These communities have a slightly elevated risk to transportation incidents, and an accident could cause more damage in a community. A railway transportation incident in Le Grand could cause injuries. Melbourne could experience a highway car accident on Highway 330 that could cause multiple injuries and a shutdown of critical facilities or roads.

State Center and West Marshall Community School District scored severity of impact as a 3, meaning that the community anticipated a worst-case scenario if a transportation incident occurred. Serious injury and major property damage that threatens structural stability of buildings could be possible. State Center is located just off of a major thoroughfare through the county, US Highway 30. State Center also has a railroad line running through nearly the center of town. More serious impacts from a transportation incident could be possible. Finally, Liscomb, Marshalltown, and Marshall County scored severity of impact as a 4, meaning that major property damage or deaths could occur.

Speed of Onset

There is usually no warning of highway incidents. During snowstorms and other weather events that may impede travel, travelers, response agencies, and hospitals alike can be notified of hazardous travel conditions. All jurisdictions in Marshall County scored this hazard as a 4, meaning that there would be little to no warning time for a transportation incident.

Climate Change Considerations

If projections regarding milder winters come to fruition, climate change impacts may reduce the number of transportation incidents associated with some severe weather. However, if ice occurs, rather than snow, this could result in higher incidents of weather-related accidents.

Vulnerability

Most communities in Marshall County scored vulnerability as a 1 or a 2, meaning that less than 25% or 26-50% of people and property would be affected in the event of a transportation incident.

These jurisdictions viewed a transportation incident as affecting a small portion of the community. For some of these communities, highway accidents are fairly routine, and emergency personnel have the capability of handling most types and sizes of accidents that are likely to occur. Most of these communities do not have major highways or railways running through their communities, but they determined that a transportation incident on a road could impact at least 25% of the community.

The exception to this scoring was Marshall County, which scored vulnerability as a 4. A significant accident could affect more than 75% of people in the city through closed roads, detours, or hazardous materials. The county is a major responder and manager of significant transportation events, should they occur within the county.

People

Those who use the surface transportation system are most vulnerable. Travelers, truckers, delivery personnel, and commuters are at risk the entire time they are on the road. During high traffic hours and holidays the number of people on the road in Marshall County is higher. This is also true before and after major gatherings such as sporting events, concerts, and conventions. Pedestrians and citizens of the community are less vulnerable but still not immune from the impacts of a highway incident.

For railway transportation incidents, people and property in close proximity to the railway lines, crossing, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

Property

No countywide or jurisdictional loss estimate were calculated due to lack of data. Generally, property involved by such an event would likely be insured but impacts would be small, targeted, and would likely not last for a long period of time.

Critical Facilities and Infrastructure

Incidents involving highway accidents could result in injuries, fatalities, closed roads, rerouted traffic, and a strain on the capacity of emergency service personnel who must respond to the incident. In general, all critical facilities in all jurisdictions could be vulnerable to transportation incident. Highway accidents could affect the flow of traffic and ability of residents to travel within and out of the jurisdiction. For those cities vulnerable to railway transportation incidents, large areas of the city could be affected by a train derailment.

Economy

The U.S. Department of Transportation Federal Highway Administration issued a technical advisory in 1994 providing suggested estimates of the cost of traffic crashes to be used for planning purposes. These figures were converted from 1994 dollars to 2020 dollars; The costs are listed below in Table 3-41.

Table 3-41 Costs of a Traffic Crash

Severity	Cost per injury (in 2020 dollars \$)
Fatal	\$4,632,233
Evident Injury	\$64,139
Possible Injury	\$33,851
Property Damage Only	\$3,563

Source: U.S. Department of Transportation Federal Highway Administration Technical Advisory T 7570.2, 1994. Adjusted to 2020 dollars.

Estimated losses as a result of air transportation and railway transportation are not available for this analysis.

Historic, Cultural, and Natural Resources

Generally, all critical facilities and cultural facilities could be impacted by such an event, but impacts would be small, targeted, and would likely not last for a long period of time.

Development Trends

While development is not increased any increase in housing units in the future may increase the number of vehicles that cross the railroad at highway-railroad crossings in these jurisdictions.

Chapter 4 Mitigation Strategy

44 CFR Requirement §201.6(c)(3):

[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.

This section presents the mitigation strategy updated by the Hazard Mitigation Planning Committee (HMPC) based on the risk assessment. The mitigation strategy was developed through a collaborative group process and consists of updated general goal statements to guide the jurisdictions in efforts to lessen disaster impacts as well as specific mitigation actions that can be put in place to directly reduce vulnerability to hazards and losses. The following definitions are based upon those found in the FEMA Local Mitigation Planning Handbook, March 2013:

- Goals are general guidelines that explain what the planning committee wants to achieve with the plan. They are usually broad policy-type statements that are long-term and represent visions for reducing or avoiding losses from the identified hazards.
- Mitigation Actions are specific projects and activities that help achieve the goals.

4.1 Goals

44 CFR 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.

This planning effort is an update to an existing hazard mitigation plan. Therefore, the 4 goals from the 2016 Marshall County Hazard Mitigation Plan were reviewed to determine if they are still valid. Wood facilitated a discussion session with the HMPC during their second meeting to review and update the plan goals. To ensure that the goals are comprehensive and support State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. Wood also presented common categories of mitigation goals from other plans.

After discussion, the HMPC decided to maintain the 2016 goals as written, with the addition of 'Ensure' to Goal 4:

1. Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.
2. Protect the health and safety of Marshall County residents and visitors.
3. Educate Marshall County citizens about the dangers of hazards and how they can be prepared.
4. Ensure the continuity of county and local operations will not be significantly disrupted by disasters in Marshall County

4.2 Identification and Analysis of Mitigation Actions

44 CFR 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.

During the second meeting of the HMPC, the highlights of the risk assessment update were provided to the HMPC members for review and the key issues were identified for specific hazards. Meeting #2 concluded with an introduction to mitigation actions to prompt discussions within and among the jurisdictions about any new mitigation actions as well as on-going actions from the existing plans. In addition, Wood provided the HMPC with information on the Iowa Homeland Security and Emergency Management Division's funding priorities and the types of mitigation actions generally recognized by FEMA.

The focus of Meeting #3 was to update the mitigation strategy. For a comprehensive range of mitigation alternatives/actions to consider, the HMPC reviewed the following information during Meeting #3:

- Existing Actions submitted in the previous mitigation plan,
- Recap of Hazard Significance/Key Issues from Risk Assessment,
- Typical projects funded by Hazard Mitigation Assistance Grants,
- Other non-FEMA funding options
- Public opinion from the survey, and
- FEMA Mitigation Ideas, 2013.

In development of each jurisdiction's final mitigation strategy for submission to the plan, the jurisdictions were presented with a recap of the hazard significance levels and the key issues from the risk assessment to think about the vulnerabilities specific to their jurisdiction. They were also provided a link to the publication, FEMA Mitigation Action Ideas, 2013, and the 2020 FEMA Mitigation Action Portfolio (MAP). These documents were developed by FEMA to provide resources that communities can use to identify and evaluate a range of potential mitigation alternatives/actions for reducing risk to natural hazards and disasters. Then for comparison, the results of the public survey were provided, which included typical mitigation actions that the public might support.

4.2.1 Prioritization Process

The STAPLEE prioritization method in general is a tool used to assess the costs, benefits, and overall feasibility of mitigation actions. STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** Is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding, and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does your jurisdiction have the legal authority to implement the action?
- **Economic:** Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?

- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

Additional questions were added to the modified STAPLEE worksheet to include elements to consider mitigation effectiveness related to protection of life and reduction of damages as well as reduction in the need for response actions, and the potential for benefits to exceed the cost.

As part of the mitigation strategy meeting discussion, jurisdictions were instructed to consider STAPLEE as they reviewed existing and developed new actions, and the potential cost of each project in relation to the anticipated future cost savings. This type of discussion allowed the committee as a whole to understand the broad priorities and discussion of the types of projects most beneficial to all jurisdictions within Marshall County. With STAPLEE in mind new proposed actions were 'voted' on with sticky dots at HMPC meeting #3. This provided an initial prioritization that was subsequently converted to high, medium or low.

4.3 Progress on Previous Mitigation Actions

Prior to the third meeting, the HMPC was emailed an electronic spreadsheet with details of each jurisdiction's previous mitigation actions from the 2016 plan. The spreadsheet provided to members of the HMPC included the action titles and two open columns for the "2022 Action Status" and a column to provide notes of the progress of implementation, both to be completed by the jurisdiction. Each jurisdiction was instructed to complete the column titled "2022 Action Status" with one of the following status choices:

- Not Started
- In Progress
- Annual Implementation
- Continued
- Deleted

Based on updates from each jurisdiction, of the 151 actions in the previous plan, 20 have been completed, 8 were deleted, and 113 were continued in the plan update. Table 4-5 contains the actions that were either completed or deleted from the mitigation strategy, along with any applicable comments, from the 2016 plan.

The jurisdictions were encouraged to be comprehensive and include all appropriate actions to work toward becoming more disaster resilient. However, they were encouraged to maintain a realistic approach and were reminded that the hazard mitigation plan is a "living document". As capabilities, vulnerabilities, or the nature of hazards that threaten each jurisdiction change, the mitigation actions can and should be updated to reflect those changes, including addition or deletion of actions, as appropriate. Jurisdictions also revisited the priority ratings and adjusted where necessary. A concerted effort to ensure the mitigation strategy is realistic and achievable resulted in several actions being considered no longer relevant or realistic, and thus have been deleted. The continued actions are discussed in additional detail, along with the new actions in Section 4.4.

Table 4-1 Summary of Progress of Actions in Previous Plan and New Actions

Jurisdiction	Completed	Delete	Continue In-Progress	Continue Not Started	New Actions 2021
Unincorporated Marshall County	1	-	5	4	6
City of Albion	0	0	1	4	

Jurisdiction	Completed	Delete	Continue In-Progress	Continue Not Started	New Actions 2021
City of Clemons	2	0	0	4	
City of Ferguson	2	1	3	8	
City of Gilman	0	0	3	0	
City of Haverhill	1	0	0	4	
City of Laurel	0	0	0	8	
City of Le Grand	3	3	6	5	
City of Liscomb	1	0	8	0	
City of Marshalltown	1	2	6	6	1
City of Melbourne	0	0	9	1	
City of Rhodes	0	0	1	1	
City of St. Anthony	0	2	0	0	1
City of State Center	2	0	1	3	2
East Marshall Community School District	1	0	5	1	
GMG Marshall Community School District	0	0	0	3	
Marshalltown Community School District	1	0	7		
West Marshall Community School District	5	0	0	6	
Total	20	8	54	59	10

Table 4-2 Completed and Deleted Actions

Jurisdiction	Hazard(s) Mitigated	Mitigation Action Title	Goals Addressed	Comments
Marshall County	All	Purchase generators for critical facilities	4	Completed
Clemons	All	Ensure that people in the community have access to weather updates	2	Completed
Clemons	Hazardous Materials	Remove junk cars and farm machinery	2	Completed
Clemons	Infrastructural Failure, Flash Flooding, River Flooding, Thunderstorm/Lightning/Hail	Add lift station	1	Completed
Ferguson	Tornado, Thunderstorm/	Identify a storm shelter in the community	2	Completed

Jurisdiction	Hazard(s) Mitigated	Mitigation Action Title	Goals Addressed	Comments
	Lighting/Hail, Windstorm			
Ferguson	Grass and Wildland Fire, Infrastructure Failure	Enforce burn bans when they are issued	2	Completed
Ferguson	All	Add hazard inserts with public information like shelter schedule, meeting announcements, events, etc. to water bills and city newsletter	2	Deleted
Haverhill	Flooding, Infrastructure Failure, Thunderstorm/Lightning/Hail	Replace drainage tile lines in city limits	1	Completed
Le Grand	All	Identify each critical facility's function in a hazard event	1	Completed. 2020 Derecho determined that the Fire Station was the only functioning facility. All disaster relief functions were discussed, directed, and conducted from the Fire Station for 15 days.
Le Grand	Infrastructure Failure	Lagoon improvements	2	Completed. Wastewater facility upgrade is completed; final walk through to be completed before end of 2021. Cost to tax payers at this time, after utilizing a CDBG of \$300,000.00, is \$1,544,000.00
Le Grand	All	Research backup power source for emergency siren	2	Completed. Upgrade to tornado siren was completed; testing and activation of siren as a warning is controlled by E-911
Le Grand	Tornado, Thunderstorm/Lightning/Hail, Windstorm	Construct safe room	2	Deleted. Discussion in 2018 ended with a determination by property owner that the existing shelter was adequate.

Jurisdiction	Hazard(s) Mitigated	Mitigation Action Title	Goals Addressed	Comments
Le Grand	All	Promote NOAA weather radios to new residents through welcome packets	1	Deleted. Majority of residents prefer cell phone usage, weather radios appear to be personal choice
Le Grand	Infrastructure Failure, Flooding	Continued water tower updates and maintenance	4	Deleted. Water Tower is owned by Iowa Rural Utilities Association and they are required to maintain and test the tower.
Liscomb	Infrastructure Failure, Flash Flooding, Thunderstorm/Lightning/Hail	Reduce runoff and erosion	3	Completed.
Marshalltown	All	Backup power for water treatment plant	1	Completed. A 1875 kVA, 1500 kW generator was installed at the treatment plant as part of a larger project that was completed in 2018. The generator can power the treatment plant and wellfield.
Marshalltown	All	Purchase generator for the Central Iowa Healthcare facility	1	Deleted. This is not a City project
Marshalltown	Tornado	Construct safe rooms in Marshalltown	2	Deleted. No longer a project as no City facilities to be constructed in next 5 years
St. Anthony	All	Backup power for shelter and critical facilities	1	Deleted. City doesn't have a shelter and the city clerk has the ability to work from home (and has a generator).
St. Anthony	All	Recruiting emergency responders	1	Deleted. This is difficult for the size of town and available budget.
State Center	All	New warning siren	1	Completed. System Repaired with remote triggering via E911
State Center	All	Purchase new emergency response vehicle	1	Completed. Used a loaned vehicle for one year and have purchased one in 2021

Jurisdiction	Hazard(s) Mitigated	Mitigation Action Title	Goals Addressed	Comments
East Marshall CSD	Severe Winter Storm	Purchase/update snow removal equipment	2	Completed.
Marshalltown CSD	All	Update and review facility safety awareness program	2	Completed. The District had a complete analysis done of facilities by TSP Architects and FEH architects and have implemented an annual maintenance and long term facilities improvement plan (involving larger scale projects & expenses) to guide further decision-making.
West Marshall CSD	Severe Winter Storm, Wind Storm, Thunderstorm/Lightning/Hail	Perform roof improvements to district buildings	1	Completed.
West Marshall CSD	Terrorism	Plan for emergencies by installing card readers on district buildings	2	Completed. Installed district wide in 2019.
West Marshall CSD	Hazardous Materials	Remove asbestos when floors are replaced	2	Completed.
West Marshall CSD	Hazardous Materials	Address environmental concerns in high school and other district buildings	2	Completed.
West Marshall CSD	All	Improve communication systems in high school	4	Completed.

4.4 Mitigation Action Plan

44 CFR Requirement §201.6(c)(3)(ii):

The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(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 benefits review of the proposed projects and their associated costs.

Jurisdictions were encouraged to meet with others in their community to finalize the actions to be submitted to the updated mitigation strategy. Throughout the discussion of the types of projects that the committee would include in the mitigation plan, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act regulations state that benefit-cost

review is the primary method by which mitigation projects should be prioritized. Recognizing the federal regulatory requirement to prioritize by benefit-cost, and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Iowa State Hazard Mitigation Plan. Due to many variables that must be examined during project development, the benefit/cost review at the planning stage, will primarily consist of a qualitative analysis. For each action, the jurisdictions included a narrative describing the types of benefits that could be realized with implementation of the action. Where possible, the cost was estimated as closely as possible with further refinement to occur as project development occurs. Cost-effectiveness will be considered in additional detail when seeking FEMA Hazard Mitigation Assistance grant funding for eligible projects identified in this plan. At that time, additional information will be researched to provide for a quantitative benefit-cost analysis.

4.4.1 Continued Compliance with the National Flood Insurance Program

Given the flood hazard and risk in the planning area and recognizing the importance of the NFIP in mitigating flood losses, an emphasis is placed on continued compliance with the NFIP by Marshall County and all NFIP participating jurisdictions including Albion, Clemons, Ferguson, Le Grand, Marshalltown, Rhodes, and St. Anthony. As NFIP participants, these communities have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's standards for updating and adopting floodplain maps and maintaining and updating the floodplain zoning ordinance. There are several action items identified in Table 4-3 that address specifics related to NFIP continued compliance. Gilman, Laurel, Liscomb, Melbourne, and State Center do not participate in the NFIP but have mapped special flood hazard areas and are sanctioned in the NFIP. Sanction designation means that residents that have a federally-backed mortgage cannot get access to flood insurance. Reasons these communities do not participate has been due to the fact that they have minimal flood risk and are not facing development pressures in flood hazard areas. Other details related to NFIP participation are noted in Chapter 2 under the community capabilities section (Table 2-4 and Table 2-5) and the flood vulnerability discussion in Chapter 3.

4.4.2 Updated Mitigation Action Plan

The mitigation action summary table presenting the 2022 mitigation action plan, which includes continuing and new mitigation actions for each jurisdiction is provided in Table 4-3, and is representative of the current priorities of each jurisdiction. In addition to the 113 actions that were continued from the previous plan, 9 new actions were identified, for a combined total of 122 actions in this updated mitigation strategy. During the mitigation strategy update process communities were encouraged to develop new mitigation actions. Many chose to focus on implementation of existing actions that have not been completed yet. Each continued and new action has been assigned an Action ID for tracking purposes. Action ID's are in numerical order based on the jurisdiction proposing the action, with continued actions numbered lowest and new actions assigned the next sequential Action ID. The mitigation action plan includes description on how each action will be implemented and administered by the local jurisdiction.

Many of these mitigation actions are intended to reduce impacts to existing development. Those that protect future development from hazards, as required per the DMA 2000 regulations, are indicated by an asterisk '*' in the action identification number. These actions include those that promote wise development and hazard avoidance, such as building code, mapping, and zoning improvements, and continued enforcement of floodplain development regulations.

Table 4-3 Marshall County Mitigation Action Plan

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Marshall Co-01*	1	Thunderstorms/ Lightning/ Hailstorms	Laminated glass for use during hailstorms. - Secure funding to put up laminated glass to protect county buildings during hailstorms. The county just recently replaced their windows (just before the previous planning process began). If they need to be replaced again due to damage from a hazard event, the county will take that opportunity to replace the windows with laminated glass.	Marshall County	State/Federal Grants, FEMA HMGP, County Foundation	\$100,000 - \$299,999	Medium	2-3 years	Continue Not Started. Potential update, sheriff's office, waiting on ARPA funding for windows
Marshall Co-02*	1	Severe Winter Storm, Windstorm, Thunderstorm/ Lightning/Hail	Plant windbreaks - Plant windbreaks around the county and near county highways	County Conservation, Iowa DNR, Marshall County, Iowa DOT, others to be identified	County Conservation Fundraisers, Iowa DOT, USDA	\$9,999 or less	Low	Annual Implementation	Continue Not Started.
Marshall Co-03	2	Terrorism	Courthouse security. Purchase and install	Marshall County, Local Marshalltown	County General Funds,	\$100,000 -	High	2-3 years	Continue In-Progress. Over 50 new

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			security measures such as cameras	law enforcement	Federal/State Grants, others to be identified	\$299,999			cameras installed during courthouse remodel
Marshall Co-04	2	Drought	Create a public information session and conservation (water) program. Create a public information and conservation (water) program	Marshall County Conservation, Iowa DNR, others to be identified	Marshall County Conservation	\$9,999 or less	Low	Annual Implementation	Continue Not Started.
Marshall Co-05	3	all	Public education program. Update the current program to educate Marshall County residents about the dangers of hazards (thunderstorms and earthquakes) and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops. Marshall County EMA has also made this	All Marshall County Departments, Local businesses and churches, others to be identified	County General Funds, Marshall County EMA	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. Public programs given when allowed as part of the MCCB Environmental Education Program and as part of Emergency Management duties

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			information available online.						
Marshall Co-06*	4	flooding	Elevate roads. Elevate all County roads or those that are identified as problematic or critical during and immediately following flood events (Oaks street where it crosses Chicken and Asher Creeks).	County Secondary Roads, Iowa Department of Transportation, others to be identified	County General Funds, Federal/State Grants, Secondary Roads others to be identified	\$300,000 or more	Medium	5 years	Continue Not Started
Marshall Co-07	4	all	Improve communication systems. Invest in communication mechanisms to support coordination of all critical facilities. Marshall County EMA has made this an ongoing action item.	All Marshall County Departments, County emergency response, Others to be identified	Federal/State Grants, County General Funds, others to be identified	\$300,000 or more	High	5 years	Continue In-Progress; SARA system going online in 2022
Marshall Co-08	4	Severe Winter Storm	Purchase/update snow removal equipment. Purchase/update snow removal equipment for use following a severe winter storm.	County Secondary Roads, County, Others to be identified	County General Funds, Federal/State Grants	\$300,000 or more	High	Annual Implementation	Continue In-Progress. Purchase of skid loader but additional equipment is needed

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Marshall Co-09	4	Extreme Heat, Infrastructure Failure	Maintain quality of courthouse's technological equipment with temperature regulation. Add air conditioning units to technology departments and server closets	Marshall County Information Technology, Marshall County	County General Funds	\$100,000 - \$299,999	High	2-3 years	Continue In-Progress. New AC unit for server room
Marshall Co-10	4	Multi Hazard	Install Generators at VHF Radio Repeater Site and SARA sites and Base Stations	Emergency Management, E911 Board, Communications Commission, Marshall County Secondary Roads	County General Funds	\$10,000 to \$99,999	High	2-3 years	New Action
Marshall Co-11*	2	Wind	Debris/Vegetation Removal Plan After Wind Storms Aka-Derecho, Chain Saw Supply, Trucking, Disposal Sites	Emergency Management Secondary Roads	County General Funds	\$10,000 to \$99,999	Medium	1 year	New Action
Marshall Co-12	1	Wind	For Wind Mitigation Help Farmers to Plant More Trees as wind breaks	Marshall County, Farm Bureau, NRCS	County Conservation, Iowa DNR, Marshall	\$10,000 to \$99,999	Low	2-3 years	New Action

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
					County, Iowa DOT				
Marshall Co-13	1	Tornado, Wind	Demolish Hazardous Buildings to reduce potential for further debris in wind events	Marshall County Buildings & Grounds	County General Funds	\$300,000 or more	High	1-2 years	New Action
Marshall Co-14	2	Tornado	Storm Shelters at Parks / Camping Areas / Large Outdoor Venues	Emergency Management and individual departments	FEMA HMA	\$300,000 or more	Medium	5 years	New Action
Marshall Co-15	2	Tornado	Countywide Tornado / Hazardous Weather Warning Sirens to include PA Systems for high population venues and NOAA Weather Radios for Marshall County residents, departments, education for all on above and weather alert meaning / actions	Emergency Management and individual departments	FEMA HMA	\$300,000 or more	Low	5 years	New Action
Albion-01	1	Drought, Infrastructure Failure	Bigger Rural Water line for backup water. Install a large water line for backup water in case of	City of Albion Water	CDBG, SRF	\$300,000 or more	Medium	2-3yrs	Continue – Not Started.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			emergency. The current water line is only 2 inches wide.	Department, TBD					
Albion-02	1	River flood, infrastructure failure	Water Well improvements. Raise existing wellhead above flood level; dig additional well in high elevation location; build a new treatment building.	City of Albion Water Department, TBD	CDBG, SRF, others to be identified	\$300,000 or more	High	2022	Continue - In Progress.
Albion-03	1	All hazards	Construct a safe room that doubles as communications storage and backup. Add safe room to City Hall and outfit with capabilities to administer communications.	City of Albion Public Safety Department, TBD	FEMA HMGP, others to be identified	\$100,000 - \$299,000	High	2-3 yrs	Continue – Not Started.
Albion-04	1	All hazards	Purchase warning siren with backup power and remote triggering. Purchase new warning siren with backup power capability and remote triggering so no manual switch is needed, as is the current situation. The current siren now has	City of Albion Public Safety Department, Marshall County Emergency Management, others to be identified	City of Albion General Funds, FEMA HMGP, others to be identified	\$10,000 to \$99,999	Medium	2-3 yrs	Continue – Not Started.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			backup power through a generator that powers the fire station. The city will work with Marshall County EMA to get remote triggering capabilities for the siren in the future.						
Albion-05*	1	Infrastructure Failure, Flash Flooding	Address sewer backup issues. The city needs to replace a sewer line that is prone to flash flooding. When flash flooding occurs after 2-4 inches of rain at a time, an area of the sewer line backs up and must be drained by the city. Two houses are affected by this backup and have sewer shutoff valves that they can close until the city drains the flooded area.	City of Albion Marshall County Emergency Management , others to be identified	City of Albion, others to be identified	\$100,000 - \$299,000	Medium	2-3 yrs	Continue – Not Started.
Clemons-01*	1	Flash/River Flooding	Maintain existing culverts and add new culverts. Keep existing culverts in good condition and add new culverts where they	City of Clemons Maintenance	City General Funds, County Roads	\$10,000 to \$99,999	Medium	Annual Implementation	Continue – In Progress. Several of the culverts need to be dug out

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			are needed in the city. There are two areas in the city where new culverts need to be added. One area of the city near Market Avenue needs a new culvert because flooding occurs and affects one house, driveway, and the road. This area is right along the boundaries of where county maintenance ends and city maintenance begins.	Department, TBD	Department, FEMA HMGP				and regraded for water drainage
Clemons-02*	1	River Flooding	Flood-proof wastewater treatment facility. The wastewater treatment facility is prone to flooding. Water has gotten as far as the edge of the driveway of the facility and the access road to the plant is also prone to flooding. The city will meet with an engineer to determine what can be done about the problem.	City of Clemons City Maintenance, Water Department, TBD	FEMA HMGP, CDBG, Budget (sewer line item)	\$10,000 to \$99,999	High	2-3 yrs	Continue – In Progress. The road that goes out to the wastewater facility has had one ditch dug out and graded which has helped. Would like to see the other side dug out and possibly have 2 culverts

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
									put in. The city needs to talk with the county engineer to see what can be done
Clemons-03	2	Hazardous Materials	Address derelict houses and buildings. The city will work with homeowners and property owners in the city to decrease derelict houses and materials being stored in yards. This action will decrease future risk of hazardous materials and unnecessary debris.	City of Clemons Mayor, Fire Department, Iowa DNR, others to be identified	USDA, City General Funds	<\$10,000	Medium	Annual Implementation	Continue – In Progress. Working with the city attorney to try and purchase abandoned houses and properties so that the city can condemn them and dispose of derelict houses and sell the properties
Ferguson-01	1	All	Upgrade and purchase new emergency sirens. A new siren needs to be purchased and installed on a pole at the fire station. Ideally, the siren	City of Ferguson City Council, TBD	City of Ferguson, FEMA HMGP, City Grants,	\$10,000 to \$99,999	Medium	2023	Continue - Not Started. Ferguson Council is currently considering

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			would have audio capabilities. Upgrading and purchasing new sirens would greatly improve public safety.		others to be identified				purchasing and installing new emergency sirens.
Ferguson-02	1	All	Electronically connect city emergency sirens to the command center. The city would like to add electronic activation of warning sirens through the command center	City of Ferguson City Council, TBD	City of Ferguson, FEMA HMGP, City Grants, others to be identified	\$10,000 to \$99,999	Medium	2024	Continue - Not Started.
Ferguson-03	1	All	Purchase generator for Ferguson's Community Center which doubles as a shelter.	City of Ferguson Community Center Board, Emergency Services, others to be identified	City of Ferguson City Grants, Community Foundation, FEMA HMGP, others to be identified	\$10,000 to \$99,999	High	2023	Continue – In Progress. The Council is considering purchasing a standby generator with ARPA funds.
Ferguson-04	1	Infrastructure Failure, Windstorm	Tear down dilapidated structures in the city. These structures could easily be damaged by fire or wind.	City of Ferguson City Council, TBD	City of Ferguson City Council	\$10,000 to \$99,999	High	Annual Implementation	Continue – In Progress. The council has purchased one such property and is currently

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
									considering next steps.
Ferguson-05	2	Grass and Wildland Fire, Infrastructure Failure, Hazardous Materials, Terrorism	Continue mutual aid with other fire departments by making sure that all 28E agreements are kept up to date.	City of Ferguson Fire Department, TBD	City of Ferguson Property Tax	\$10,000 to \$99,999	Low	Annual Implementation	Continue – In Progress.
Ferguson-06	2	Tornado, Thunderstorm/Lighting/Hail, Windstorm	Post signs in the parks to notify the public where to go during severe weather. Signs will be posted at the park at the community center and at the little league park	City of Ferguson City Council, TBD	City of Ferguson Property Tax, City General Funds	<\$10,000	Low	2022	Continue - Not Started.
Ferguson-07	3	Grass and Wildland Fire	Public education on open burning. Create a program to educate Ferguson residents about the dangers of open burning and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops.	City of Ferguson Fire Department, City Council, To be identified, possibly other Marshall County jurisdictions	City of Ferguson General Funds	<\$10,000	Medium	Annual Implementation	Continue – In Progress.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Ferguson-08	3	Animal/Plant/Crop Disease	Educate the public on the Emerald Ash Borer. The city will include items in their newsletter warning residents of the Emerald Ash Borer and what they can do to spot, treat, and prevent problems associated with it.	City of Ferguson City Council, TBD	City of Ferguson General Fund	<\$10,000	High	Annual Implementation	Continue – In Progress. The Council is considering a program to cut down diseased ash trees
Ferguson-09	3	All	Encourage citizens to enroll in weather alerts. The city will post a sign at the post office concerning the Alert Iowa system.	City of Ferguson Fire Department, City Council, TBD	City of Ferguson General Fund	<\$10,000	Medium	Annual Implementation	Continue – In Progress.
Ferguson-10	3	Hazardous Materials, Infrastructure Failure	Build public awareness to “Call Before You Dig”. Be sure people are aware they need to call 811 on Iowa One before they dig.	City of Ferguson City Council, TBD	City of Ferguson General Fund	<\$10,000	Medium	Annual Implementation	Continue – In Progress. This is done through Iowa Regional Utilities Association and Heart of Iowa Communications Co-op

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Ferguson-11	4	All	Further emergency education and training opportunities between jurisdictions. Hold sessions to train emergency personnel of all jurisdictions to identify weather-related hazards and proper response and identify ways to cooperate – mutual aid	City of Ferguson Fire Department, City Council, Marshall County Emergency Management, Marshall County jurisdictions, others to be identified	City of Ferguson General Fund	<\$10,000	Medium	Annual Implementation	Continue – In Progress.
Gilman-01	1	All	Update fire rescue equipment. Purchase new and update equipment as needed for fire department, including fire truck pumper. The city purchased a new fire truck 2 to 3 years ago and is still looking for additional equipment.	City of Gilman City Council, Fire Department, Marshall County Emergency Management, others to be identified	City of Gilman General Funds, Townships, Assistance to Firefighters Grants	\$10,000 to \$99,999	Low	1 year	Continue In-Progress. In the process of purchasing the new emergency radio communication equip.
Gilman-02	2	Hazardous Materials, Infrastructure Failure	Remove debris from abandoned properties. Remove blight in town that contains hazardous waste to prevent an	City of Gilman City Council, Clerk, Local fire and EMS,	City of Gilman General Funds, others	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. This is an ongoing matter. Properties are

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			incident. The city currently maintains these properties by providing lawn mowing service and general upkeep. Additional steps can be made on removing debris with the cooperation of homeowners	others to be identified	to be identified				viewed on a regular basis noting any potential hazards whether debris, possible hazardous materials, etc. that might interfere with day to day safety of Gilman's residents. We also have a hazardous material 'waste day' once a year for residents to dispose of hazardous materials safely and properly.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Gilman-03	3	all	Public education sessions on warning siren. Create a program to educate Gilman residents about the warning siren and procedures to follow through informational flyers, meetings, or other interactive media like drills and workshops	City of Gilman City Clerk, To be identified, possibly other Marshall County jurisdictions	City of Gilman General Funds, others to be identified	\$9,999 or less	High	Annual Implementation	Continue In-Progress. We now have a website which we hope to post information regarding warning siren info/procedures/etc. Also discussed at times during council meetings. School district and local library also provide safety instruction/programs to its students/young patrons.
Haverhill-01	2	All	Emergency equipment upgrades for first responders. Update or replace substandard emergency equipment in emergency departments. The city will purchase	City of Haverhill Fire Department, Local EMS, others to be identified	City of Haverhill General Funds, others to be identified	<\$10,000	High	Annual Implementation	Continue – In Progress.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			equipment on an as needed basis.						
Haverhill-02*	2	River Flooding, Infrastructure Failure	Improve roads that are identified as problematic or critical during and immediately following flood events. Regular road maintenance is also included in this action. A main street running through Haverhill is a "farm to market" road; the county helps maintain this road.	City of Haverhill City Council, Iowa Department of Transportation, Marshall County Engineer, City Road Use Tax, others to be identified	FEMA HMGP, Marshall County, and others to be identified	<\$10,000	Medium	Annual Implementation	Continue – In Progress
Haverhill-03	3	All	Public education sessions on hazard procedures. Create a program to educate Haverhill residents about how to be warned during hazard events and procedures to follow through informational flyers, meetings, or other interactive media like drills and workshops	City of Haverhill mayor, To be identified, possibly other Marshall County jurisdictions	City of Haverhill General Funds	<\$10,000	Medium	Annual Implementation	Continue – In Progress

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Haverhill-04	4	All	Mutual aid for disaster clean-up. Hold sessions to coordinate mutual aid between jurisdictions for disaster cleanup. The city will maintain all current 28E agreements. To aid in disaster cleanup, the city also received help from farmers in the surrounding area who use their equipment to remove debris. Farmers played a big role in cleanup from the 2011 episode of straight line winds in the area.	City of Haverhill Mayor, City Council, Marshall County Emergency Management, Marshall County jurisdictions, Others to be identified	City of Haverhill General Funds	<\$10,000	Medium	Annual Implementation	Continue – In Progress
Laurel-01*	1	River Flooding	Continue to participate in the NFIP and continue to update and enforce the floodplain ordinance	City of Laurel City Clerk, TBD	City General Funds	\$9,999 or less	Low	Annual Implementation	Continue – In Progress
Laurel-02	2	All	New emergency siren (Purchase and install a new warning siren with backup power.	City of Laurel Public Works, Fire Department, TBD	City of Laurel, FEMA HMGP, State/Federal Grants, and others to be identified	\$10,000 to \$99,999	Low	2022	Continue - Not Started

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Laurel-03	2	All	Continue to participate in Alert Iowa. The city will continue to participate in the Alert Iowa system with the help of Marshall County EMA.	City of Laurel City Clerk, Marshall County EMA, others to be identified	No Cost	No Cost	High	Annual Implementation	Continue – In Progress
Laurel-04	2	Hazardous Materials	The city will continue its work in hosting a community household hazardous materials drop-off program	City of Laurel City Clerk, TBD	No Cost	No Cost	Low	Annual Implementation	Continue – In Progress
Laurel-05	3	All	Purchase portable generators for Laurel's identified critical facilities (ie: fire station, lift station, wastewater facilities, shelters, other critical facilities).	City of Laurel City Utility, Emergency Services, others to be Identified	City of Laurel, FEMA HMGP, State/Federal Grants, and others to be identified	\$10,000 to \$99,999, possibly around \$35,000	High	2022	Continue - Not Started
Laurel-06	3	All	Continue mutual aid agreements with other fire departments.	City of Laurel Fire Department, Other fire departments,	No Cost	No Cost	High	Annual Implementation	Continue – In Progress

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
				others to be identified					
Laurel-07	3	All	Ensure that fire personnel are properly trained	City of Laurel Fire Department Chief, TBD	City General Funds	\$9,999 or less, possibly around \$1,200	High	Annual Implementation	Continue – In Progress
Laurel-08*	3	Infrastructure Failure, Flash Flooding, Thunderstorms/Lightning/Hail	Improve aging water/sewer lines	City of Laurel City Utility, Region 6 Planning Commission, others to be identified	State/Federal Grants and Loans	\$100,000 to \$299,999	Medium	5-10 years	Continue - Not Started
Le Grand-01*	1	All	Improve and update all city buildings. Improve and update all city buildings to current structural and technological standards.	City of Le Grand City Council, Mayor, Clerk, Marshall County Emergency Management, others to be identified	City of Le Grand Local Options Sales Tax, City General Fund, Fundraisers, others to be identified	\$100,000 to \$299,999	Low	5-10 years	Continue Not Started

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Le Grand-02	2	Hazardous Materials, Infrastructure Failure	Purchase generators for all critical facilities. Purchase generators for all critical facilities	City of Le Grand City Council, Mayor, Clerk, Public Works, Maintenance Supervisor, TBD	City of Le Grand Local Options Sales Tax, FEMA/HUD/HSEMD, Federal/State Grants, others to be identified	\$10,000 to \$99,999	High	5 years	Continue Not Started
Le Grand-03	3	All	Install alternate communication devices in all critical facilities. Purchase and install alternate communication devices (besides phones) for city use in all critical facilities	City of Le Grand City Council, Mayor, Clerk, Marshall County Emergency Management	City of Le Grand General Fund, Local Options Sales Tax, others to be identified	\$9,999 or less	High	1-3 years	Continue Not Started
Le Grand-04	2	Infrastructure Failure	Hydrant improvements. Update water hydrants as needed when water distribution line project is complete	City of Le Grand City Council, Mayor, Clerk, Water/Sewer, TBD	Water/Sewer, Local Options Sales Tax, FEMA/HUD/HSEMD, others to be identified	\$100,000 to \$299,999	Low	1-3 years	Continue In-Progress. 5 new hydrants have been installed; three replacing damaged or poor performance hydrants, 2 in

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
									a new subdivision
Le Grand-05	2	All	Encourage residents to purchase weather radios. The city will use their monthly newsletter, local electronic sign, and the city website to educate the public and encourage discussion about the importance of weather radios.	City of Le Grand City Council, Mayor, Clerk, TBD	City of Le Grand General Fund, FEMA/HUD/HSEMD	\$9,999 or less	Low	2-3 years	Continue not started
Le Grand-06	2	All	Locate grants and subsidies for NOAA weather radios. The city would like to provide weather radios for residents in the community by locating grants, subsidies, or other funding sources. The city will aim to successfully write grants and securing the ability to provide weather radios for residents.	City of Le Grand City Council, Mayor, Clerk, TBD	City of Le Grand General Fund, FEMA/HUD/HSEMD	\$9,999 or less	Low	2-3 years	Continue not started

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
Le Grand-07	3	All	Public education program. Create a program to educate Le Grand residents about the dangers of hazards, how to prepare, and about the Le Grand Emergency Plan through informational brochures and the welcome packet	City of Le Grand Clerk, To be identified, possibly other Marshall County jurisdictions	City General Funds, Local Options Sales Tax, others to be identified	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. Keep in 2022 plan
Le Grand-08	3	All	Create online forms of hazard information. Update the city webpage to include the emergency procedures for the city	City of Le Grand Clerk, To be identified, possibly other Marshall County jurisdictions	City of Le Grand General Funds, others to be identified	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. Keep in 2022 plan
Le Grand-09	3	All	Create an emergency phone tree and encourage residents to use Alert Iowa, NOAA Weather Radio, and cell phone applications. Hold a meeting for all those who wish to be included on the phone tree,	City of Le Grand Clerk, Marshall County Emergency Management, others to be identified	City of Le Grand General Funds, other to be identified	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. Keep in 2022 plan

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			especially the elderly and those with small children.						
Le Grand-10	4	All	Ensure online emergency system is working. Continually test "E 911" system to make sure it is communicating with city officials and county sheriff.	City of Le Grand Clerk, Marshall County Sheriff, Le Grand City officials, Communications Commission	City General Fund, SRF, CDBG, others to be identified	\$9,999 or less	High	Annual Implementation	Continue In-Progress. Keep in 2022 plan
Le Grand-11	4	All	Mutual aid for disaster relief. Hold sessions to coordinate mutual aid between jurisdictions and county for disaster relief and aid	City of Le Grand Clerk, City Council, Mayor, Marshall County Emergency Management, Marshall County jurisdictions, Others to be identified	City General Fund, others to be identified	\$9,999 or less	High	Annual Implementation	Continue In-Progress. Keep in 2022 plan
Liscomb-01	1	All	New automatic emergency siren. Purchase and install a	City of Liscomb Fire Department,	City of Liscomb Fire	\$9,999 or less	High	1-2 years	Continue In-Progress. The automatic

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			new warning siren with backup power and remote activation.	Marshall County EMA, others to be identified	Department, FEMA HMGP				portion is on the old siren, the council is looking at getting a new siren
Liscomb-02	2	Hazardous Materials, Infrastructure Failure	Tornado/wind shelter. The city would like to build a tornado shelter to protect residents from tornadoes and other severe weather. The city will look into a location.	City of Liscomb City Council, Marshall County EMA, others to be identified	Federal/State Grants, City of Liscomb General Funds	\$100,000 - \$299,999	Medium	2026	Continue In-Progress
Liscomb-03	3	All	Tear down dilapidated structures. The city would like to tear down dilapidated structures and develop a property maintenance ordinance.	City of Liscomb City Council, Iowa DNR, others to be identified	Iowa DNR	\$10,000 - \$99,999	High	Annual Implementation	Continue In-Progress
Liscomb-04	2	Infrastructure Failure	Remind residents about current and potential hazards. Publish reminders in monthly Mayor's newsletter	City of Liscomb Mayor, TBD	N/A	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress

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Liscomb-05	2	All	CERT awareness. Periodic notes regarding CERT in monthly Mayor's newsletter	City of Liscomb Mayor, TBD	N/A	\$9,999 or less	Low	Annual Implementation	Continue In-Progress
Liscomb-06*	2	All	Minimize flooding potential. Review storm drainage paths. Maintain and improve these paths if necessary.	City of Liscomb City Council, Contractor, others to be identified	Federal/State Grants, City of Liscomb General Funds	\$10,000 - \$99,999	High	Annual Implementation	Continue In-Progress
Liscomb-07	4	All	Ensure fire department response capacity. Add training related to actions taken when Chief, Assistant Chief, or Officers are not available.	City of Liscomb Mayor, TBD	N/A	\$9,999 or less	Low	Annual Implementation	Continue In-Progress
Liscomb-08	4	All	Encourage participation in local volunteer fire department/first responders. Increase recruiting efforts and public awareness regarding the fire department and first responders.	City of Liscomb Mayor, TBD	N/A	\$9,999 or less	Low	Annual Implementation	Continue In-Progress

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Marshalltown-01*	1	All	Flood protection and repairs for sewer lift station and levees. Identify repairs and construct flood protection for critical sewer infrastructure and levees	City of Marshalltown Sewer/Public Works Department, Engineering firm, County Engineer, others to be identified	City Bonds, Utility Revenue, FEMA HMGP, others to be identified	\$300,000 or more	Medium	Annual Implementation	Continue In-Progress. A retaining wall has been constructed by the pump station at the Iowa River where erosion was becoming a concern; other pump stations reviewed on an ongoing basis; currently in discussions with ACOE and FEMA about freeboard of levee and project needed to raise the levee.
Marshalltown-02*	2	Hazardous Materials, Infrastructure Failure	Structural inspections of levee. Hire a consultant to complete a structural study to survey the state	City of Marshalltown Public Works, Engineering Companies, County	None	None	Low	Annual Implementation	Continue In-Progress. This is a requirement of

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			of the levee in Marshalltown	Engineer, others to be identified					levee certification
Marshalltown-03*	3	Flooding	Floodproof or relocate water treatment plant. The Marshalltown water treatment plant was built in 1977 in a floodplain. A study is being conducted to determine if there is a way to safely maintain the water treatment plant in the floodplain or if it should be relocated outside of the floodplain.	City of Marshalltown Water Works, TBD	City Bonds, Utility Revenue, FEMA HMGP	\$300,000 or more	Low	Study in 2021	Continue – Not Started. A study is underway to determine the costs of making upgrades to the current water treatment plant in the floodplain versus building a new treatment plant outside of the floodplain.
Marshalltown-04	2	Infrastructure Failure, Wind	Purchase generator for Marshalltown Airport. The Marshalltown Airport is located north of the community and is	City of Marshalltown Public Works, FAA, Iowa DOT	GO Bonds	\$9,999 or less	Low	1-2 years	Continue In-Progress. New terminal under construction with a transfer switch for a portable

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			susceptible to wind damage.						generator to be connected.
Marshalltown-05	2	All	Purchase generator for Marshalltown Public Safety Building, Marshalltown Public Library. Multiple City facilities have no ability to continue operations in a power outage	City of Marshalltown Public Works	GO Bonds, Building Maintenance Fund	\$80,000 for library	Medium	2022	Continue In-Progress. Police and Fire Building was built with a natural gas powered generator; still desire a diesel generator to power additional parts of the facility. Library generator is being purchased in fiscal year starting 7/1/22
Marshalltown-06*	2	Flood	Acquisition of flood-prone properties within Marshalltown city limits. Purchase properties to maintain green space rather than rebuilding in the floodplain	City of Marshalltown Administration	FEMA Hazard Mitigation Grant	\$100,000	Low	5-10 years	Continue Not Started. ; Will utilize if and when necessary depending

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									availability of funding.
Marshalltown-07	4	All	Purchase a generator for the Veterans Memorial Coliseum for sheltering purposes. The Coliseum is the designated City shelter location but has no back-up power source to operate	City of Marshalltown Parks & Rec	FEMA Hazard Mitigation Grant	\$150,000	High	2022	Continue In-Progress. Hazard Mitigation grant pending; will proceed with other sources in 2023 if not awarded
Marshalltown-08	4	Flooding	Create boat ramps for emergency rescue. Create boat ramps above and below the low head dam at Center Street on the Iowa River.	City of Marshalltown Public Works, TBD	City Bonds, FEMA HMGP	\$100,000 - \$299,999	Medium	5 year	Continue Not Started. This is still a project to keep on the list but the project is not currently planned in the 5 year CIP
Marshalltown-09*	4	Wind	Removal of dead and diseased trees from right of way. Removal of known hazardous trees prevents damage in severe weather events	City of Marshalltown Parks and Rec	Road Use Tax; General Fund	\$100,000 annually	Medium	Annual Implementation	Continue In-Progress. Many trees removed with FEMA assistance following

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									tornado and derecho; new project to remove 78 dying ash trees underway. More trees identified annually for removal
Marshalltown-10	2	Tornado/Wind	Construct a tornado shelter in West End Park. West End Park is a very popular location, hosting large events. No shelter exists in the park presently.	City of Marshalltown Parks and Rec, 13th Street District	FEMA Hazard Mitigation Grant; GO Bonds; local grants	\$500,000	Medium	2023	Continue Not Started. Included in five year CIP; planning to pursue FEMA hazard mitigation funding
Marshalltown-11	3	All	Public education program. Create a program to educate Marshalltown residents about the dangers of hazards and how to prepare through informational flyers, meetings, or other	City of Marshalltown - Multi-Agency, To be identified, possibly other Marshall	Marshall County EMA, City General Funds, others to be identified	\$9,999 or less	High	1-2 years	Continue Not Started. No active educational plans developed but remains a high priority.

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			interactive media like drills and workshops	County jurisdictions					
Marshalltown-12	4	All	Further education and training opportunities between jurisdictions. Hold meeting to establish cooperation between different city services and county on proper response to hazards	City of Marshalltown, Marshall County Emergency Management, Marshall County jurisdictions, Others to be identified	Marshall County, others to be identified	N/A	Medium	Annual Implementation	Continue In-Progress. Emergency Management, Fire and Police do county-wide trainings regularly, but other areas do not.
Marshalltown-13	2	Tornado, Windstorm	Safe Room in Riverview Park, (150 Acre Park with Only One Shelter by Campground)	Marshalltown Parks and Recreation	FEMA HMA	\$100,000 to \$299,999	Low	2022-2025	New Action
Melbourne-01	1	Infrastructure Failure	Sewer improvements. Improve existing storm & sanitary sewer, In-place lining of sewer infrastructure	City of Melbourne Public Works, City Council, TBD	SRF, CDBG, others to be identified	\$300,000 or more	Medium	2025	Continue In-Progress. Working on I&I to improve and reduce unnecessary flow to lagoon.

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Melbourne-02	1	Infrastructure Failure	Demolish hazardous buildings in town. Demolition of an old school building with asbestos	Private Property Owners with City of Melbourne's Involvement, Region 6 Planning Commission, others to be identified	State/Federal Grants, others to be identified	\$100,000 to \$299,999	High	Annual Implementation	Continue In-Progress. Residents working on it, all asbestos removed, good progress made.
Melbourne-03	1	Infrastructure Failure, Hazardous Materials	Update lagoon. Update lagoon system per new DNR requirements as they arise.	City of Melbourne Public Works, City Council, TBD	SRF, CDBG, others to be identified	\$300,000 or more	High	2025	Continue In-Progress. Working with Veenstra & Kimm engineering company to comply with NPDES permit. Have qualified twice for disadvantaged community status.
Melbourne-04	1	All	Purchase backup generator for critical facilities. The city does not currently have a	City of Melbourne City Clerk, City Council,	State/Federal Grants, FEMA HMGP, others	\$10,000 to	High	2021-2022	Continue In-Progress. City Hall has generator, fire

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			backup generator for City Hall, and a new generator is needed for the fire station.	Fire Department, TBD	to be identified	\$99,999			station has not yet purchased a new one. Look into purchasing additional generator for lagoon wastewater facility to run aerators.
Melbourne-05	1	Hazardous Materials	Hazardous materials pickup program. Set up a hazardous materials pickup program with waste management every 3-5 years.	City of Melbourne City Clerk, City Council, TBD	City of Melbourne General Fund	\$9,999 or less	Low	2022	Continue In-Progress. We are due to schedule another one in 2022
Melbourne-06	1	Infrastructure Failure	Continue to identify I and I sources and repair.	City of Melbourne Public Works, City Council, TBD	City of Melbourne Water/Sewer Fund	\$10,000 - \$99,999	Medium	2025	Continue In-Progress. Replacing one block of water main 2021.
Melbourne-07	2	All	Add hazard information articles to quarterly newsletter. Add hazard articles to newsletter with public information like shelter schedule, meeting	City of Melbourne City Clerk, TBD	City of Melbourne General Fund	\$9,999 or less	Medium	Annual Implementation	Continue In-Progress. Post frequently to FB page Melbourne Happenings

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			announcements, events, etc.						and also to city website
Melbourne-08	2	All	Encourage more residents to sign up for Alert Iowa. Continue publicizing to community how to sign up for program.	City of Melbourne City Clerk, TBD	City of Melbourne General Fund	\$9,999 or less	High	Annual Implementation	Continue In-Progress. On FB page and website
Melbourne-09	2	All	Develop public shelter plan and public information plan for shelter. Set up a plan for who is responsible for opening shelters, staffing shelters, and getting out information to the public.	City of Melbourne City Clerk, City Council, Fire Department, TBD	City General Fund, Fire Department	\$9,999 or less	High	1-2 years	Continue In-Progress. Opened during derecho 2020 and as needed for heat, storms, etc.
Melbourne-10	2	All	Post signs at park/city locations that inform residents of shelter locations. Post signs at park/city locations that inform residents of shelter locations	City of Melbourne City Clerk, City Council, Public Works, TBD	City General Fund, County Foundation	\$9,999 or less	Medium	1-2 years	Continue In-Progress. Will order new signs to place in park and at pool. They are in place at rec center.
Rhodes-01	1	All	Inform residents of shelter areas in town. Create a program to	City of Rhodes City Clerk,	City of Rhodes General Funds, others	\$9,999 or less,	Medium	2-3 years	Continue – In Progress. Emergency

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			educate Rhodes citizens of shelter locations as well as about the dangers of hazards and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops.	Marshall County Emergency Management , possibly other Marshall County jurisdictions	to be identified	Less than \$500			Management provides related education.
Rhodes-02	1	All	Purchase and install signs that direct residents to shelter location. Inform Rhodes residents where their community shelter location is by purchasing and installing signs throughout the community that could direct residents to the shelter. The city clerk will also send out letters informing community members where to go for the shelter.	City of Rhodes City Clerk, Marshall County Emergency Management , others to be identified	City of Rhodes General Funds, others to be identified	\$9,999 or less, Less than \$500	High	1 year	Continue In-Progress. Shelter is in the basement of the local church. There is already a sign posted on the door leading to the basement shelter. Have requested the Church board to get permission to erect signs in the church yard to identify the

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									location of the shelter.
St. Anthony-01	3	All	Coordinate city public awareness. Create a communication strategy between city and citizens regarding hazards	City of St Anthony Council, Marshall County Emergency Management	City General funds, others to be identified	\$9,999 or less	Medium	2022-2025	New Action
State Center-01	1	All	New fire station. It is difficult to store all of the city equipment in the current fire station. Often, trucks must be moved to respond to different emergencies. The current building is also too close to the train tracks	City of State Center Fire Department, TBD	City Bonds, FEMA HMGP	\$300,000 or more	Medium	2020	Continue - In Progress. Land Acquired, basic design completed, funding unknown
State Center-02	2	All	Backup power for critical facilities. Purchase portable generators for use in city hall, the police station, the fire station, the water treatment plant, and West Marshall Schools. The city has its own power plant with	City of State Center Utilities, West Marshall School District, others to be identified	Utility Revenue, FEMA HMGP, others to be identified	\$9,999 or less	Low	2022	Continue - Not Started. Portable generators still desired for critical facilities

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			large generators for power if there is a power outage outside of the city; State Center is the only town in the county that can generate their own power. In addition, most of the city's power lines are underground, but some lines still exist above ground. If these lines go down, it could cause issues in some locations. The city has mitigated the risk of a power failure, but generators could still help with additional circumstances.						
State Center-03	2	All	Construct a safe room	City of State Center City Council, Marshall County Emergency Management, Others to be identified	FEMA HMGP, State Grants, others to be identified	\$100,000 - \$299,999	Medium	2022	Continue - Not Started. This project is tentatively being considered as we work on the new Fire/EMS building

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State Center-04	3	All	Coordinate city public awareness. Create a communication strategy between city and citizens. Educate citizens on use of Alert Iowa.	City of State Center Police Department, Marshall County Emergency Management, others to be identified	City of State Center General funds, others to be identified	\$9,999 or less	Medium	2022	Continue - Not Started. Our police department currently uses Facebook to get critical information out to as many people as possible. City still needs a written policy
State Center-05	4	Human Disease	Disease management preparedness for city government, city employees. Create a policy/plan for future pandemics such as COVID-19. Covering procedures for working remote, off/on scheduling, PPE for employees to ensure continuity of city operations.	City Council, City Clerk's office, local telecommunication company, other city departments	Local funds	\$9,999 or less	Low	2022	New Action
State Center-06	4	Severe Winter Storm, Tornado, Windstorm	Develop systematic plan and timeline for State Center Public Works and	State Center Public Works, State Center	Local Funds, other	\$10,000-	Low	2025-2027	New Action

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			Electric to remove dead trees and limbs. The city is not being proactive with dead or dangerous trees in public areas. Could limit damage from storms.	Electric Department		\$50,000			
East Marshall CSD-01*	1	Infrastructure Failure	Reinforce school buildings. Maintain structural integrity of school buildings for the students, staff and public.	East Marshall Community School District Board, Marshall County Engineer, others to be identified	Bonds, School District Funds, Federal/State Grants, others to be identified	\$300,000 or more	High	2025	Continue In-Progress.
East Marshall CSD-02	1	All	Complete required hazard drills every year. Complete required practice drills for the school district, including: bus evacuation, tornado, and fire drills.	East Marshall Community School District Board, Marshall County Emergency Management, local fire, law enforcement,	School District Funds, Federal/State Grants, others to be identified	\$9,999 or less	High	Annual Implementation	Continue In-Progress. Emergency Management provides/offers training.

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				and emergency response personnel					
East Marshall CSD-03	3	All	Ensure proper grounding of facilities during hazard events. Have study done and properly ground any school facilities out of regulation for hazard events.	East Marshall Community School District Board, Marshall County Engineer, Others to be identified	School District Funds, others to be identified	\$100,000 - \$299,999	Medium	Annual Implementation	Continue In-Progress.
East Marshall CSD-04	3	All	Retrofit school buildings as shelters. Retrofit 3 school buildings as community shelters for hazard events	East Marshall Community School District Board, East Marshall Community School District, Others to be identified	School District Funds, Federal/State Grants, FEMA HMGP	\$100,000 - \$299,999	Medium	2025	Continue In-Progress.
East Marshall CSD-05	4	All	Public education sessions on safe room procedures. Create a	East Marshall Community School	School District Funds, Federal/State	\$9,999 or less	Medium	1-2 years	Continue Not Started

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			program to educate students and residents about school shelters and procedures to follow through informational flyers, meetings, or other interactive media like drills and workshops.	District Board, Marshall County Emergency Management, other Marshall County schools	Grants, others to be identified				
East Marshall CSD-06	4	All	Coordinate city public awareness and emergency plan. Create a communication strategy between schools and public as well as write an emergency plan	East Marshall Community School District Board, City Council, City Clerk, Marshall County Emergency Management, Others to be identified	School District Funds, Federal/State Grants, others to be identified	\$9,999 or less	Low	Annual Implementation	Continue In-Progress.
GMG CSD-01	1	All	Provide elementary school as a shelter and place to coordinate emergency personnel during an emergency. The school district would	GMG Elementary School Principal, Marshall County EMA,	N/A	N/A	Medium	2-3 years	Continue - Not Started.

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			like to work with the city to use the elementary school as a shelter during an emergency and a place to coordinate emergency personnel. The school building is located near an anhydrous ammonia facility in Green Mountain. The school should be far enough away from the facility to be out of danger but close enough to provide a good location for emergency personnel to organize.	others to be identified					
GMG CSD-02	1	All	Purchase of a generator for elementary school. The school district would like to purchase a generator to provide electricity to the school in the event of a power loss. The generator will be particularly important if the school is used as an emergency shelter.	GMG School Board and Superintendent, TBD	State/Federal Grants, Local Options Sales Tax, FEMA HMGP	\$10,000 - \$99,999	High	5 years	Continue - Not Started.

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GMG CSD-03	1	Drought, Extreme Heat, Infrastructure Failure	Increase tree planting around school. The school district would like to plant trees near the school to provide shade and protection from other weather events.	GMG Elementary School Principal, TBD	State/Federal Grants, Local Options Sales Tax, School District Funds	\$10,000 - \$99,999	Medium	5 years	Continue - Not Started.
Marshalltown CSD-01	1	All	Maintain facility standards and safe code compliance. Maintain structural integrity and safety of school buildings for the students, staff and public	Marshalltown Community School District Director of Buildings and Grounds, Marshall County Engineer, others to be identified	School District General Funds, CDBG, others to be identified	Less than \$10,000	High	Annual Implementation	Continue In-Progress. The District has implemented an annual maintenance plan based on a facilities need analysis that will ensure appropriate ongoing maintenance and upkeep of existing facilities.
Marshalltown CSD-02	1	All	Purchase backup power generators. Expand backup power supply at all facilities to ensure power availability to	Marshalltown Community School District Director of	School District General Funds, FEMA HMGP, Life	\$10,000 to \$99,999	Medium	Annual Implementation	Continue In-Progress. We have generator backup at

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			facility and possibly rescue shelters. The school district is working with the Iowa Veterans Home on their catastrophic plan and partnering with the home to take residents in during a catastrophe.	Business Operations, TBD	and Fire Safety Grants				Marshalltown High School but will continue to seek cost effective ways to enhance the high school's backup capacity to include the Kitchen/Freezers and also provide generator power backup at Miller Middle School and Lenihan Intermediate School.
Marshalltown CSD-03	2	Thunderstorms, Lightning, and Hail, Wind Storms, Tornado, Terrorism	Build safe room shelters. Nine school locations need infrastructure to assist with securing facilities in the event of an environmental disaster. If a hazard event were to occur, these nine locations currently have	Marshalltown Community School District Director of Equity. Director of Buildings and Grounds,	School District General Funds, FEMA HMGP, others to be identified	\$100,000 to \$299,999	High	2022-2025	Continue In-Progress. The District has prepared a tornado safe room FEMA HMA application for submittal in

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			no safe place for students	Director of Business Operations, TBD					2021. All of our school building have secured entrances with video monitoring. We've implemented internal security cameras at Marshalltown High School, Miller Middle School and Lenihan Intermediate School and external cameras at each of our elementary schools.
Marshalltown CSD-04	3	All	Create a hazard/safety information session for students. Create an information session for students to learn proper	Marshalltown Community School District Director of Equity,	Marshalltown Community School District General Funds, others	Less than \$10,000	High	Annual Implementation	Continue In-Progress. We provide education and training related to fire,

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			safety procedures in hazard events	Marshall County Emergency Management , others to be identified	to be identified				tornado and active shooters for all students and/or staff annually. Emergency Management provides/offers training.
Marshalltown CSD-05	3	All	District-wide training. Hold session to train district employees and staff on hazard identification, proper response and facility safety procedures. The district has EMC insurance, which offers free training videos online. These videos cover a wide range of topics, including hazardous materials, blood-borne pathogens, among others. The school district will work on the logistics of which trainings should be	Marshalltown Community School District Director of Equity, Marshall County Emergency Management , others to be identified	Marshalltown Community School District General Funds, others to be identified	Less than \$10,000	High	Annual Implementation	Continue In-Progress. We have annual training requirements for all employees related to hazardous materials, blood borne pathogens and active shooters. Differentiated additional training mandates and/or expectations are placed on

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			mandatory for which staff.						a variety of employee groups based on their specific roles and responsibilities.
Marshalltown CSD-06	3	All	K-12 education on hazards. Assist with education of youth and future Marshalltown residents.	Marshalltown Community School District Director of Equity, Director of Buildings and Grounds, TBD	School District General Funds	Less than \$10,000	Medium	Annual Implementation	Continue In-Progress. The District has invested heavily in the life safety education of staff and have included students and parents as it has recently related to life safety related to the recent pandemic. Further determinations need to be made on how and where to

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									improve in this regard.
Marshalltown CSD-07	4	All	Write an emergency plan for city, emergency response, and schools. Complete a cooperative plan for use between the city, emergency responders, and school	Marshalltown Community School District Director of Equity, Police Chief, Marshall County Emergency Management, local fire, law enforcement, and emergency response personnel	Marshalltown Community School District General Funds, Marshalltown Police Funds	Less than \$10,000	High	Annual Implementation	Continue In-Progress. The District has a crisis management plan that was collaboratively developed and amended to meet the minimum requirements of current Iowa State law. Further enhancements are being made to enhance and improve the quality and quantity of information covered within the plan, including addressing social and

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									emotional health of students and staff.
West Marshall CSD-01	2	Transportation Incident, Terrorism	Install security cameras in buildings and on buses. The district would like to install security cameras in the high school and on district buses to improve building security.	West Marshall CSD Board, Transportation Manager, Superintendent, TBD	Grants, School District General Fund	Buses - \$70,000 to \$99,999, Whole Project - \$100,000 to \$299,999	Medium	3 years	Continue - Not Started.
West Marshall CSD-02	2	Hazardous Materials Incident	Perform radon testing in pre-school. Radon testing is currently required in the pre-school building. The district is currently using their pre-school funds but would like to find another source to fund this required testing.	West Marshall CSD Board, TBD	One Cent Sales Tax SAVE Fund, School District General Fund	\$9,999 or less	Medium	1-2 years	Continue - Not Started.

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West Marshall CSD-03	3	All	Address safety education during crisis planning and drills. The district will address safety education during its crisis planning and drills. The district will work with public safety, CPR, and ED's to incorporate the appropriate materials into drills and plans.	West Marshall CSD Board, TBD	School District General Fund	\$9,999 or less	Low	1-2 years	Continue - Not Started.
West Marshall CSD-04	4	All	Review crisis plan and update bi-annually	West Marshall CSD Board, Superintendent, Marshall County Emergency Management, others to be determined	School District General fund	\$9,999 or less	Low	1-2 years	Continue - Not Started.
West Marshall CSD-05	4	Transportation Incident	Improve vehicle access to elementary and pre-school. The district would like to add a parking lot by the elementary school to improve vehicle access to the elementary school and the pre-school.	West Marshall CSD Board, TBD	Grants, School District General Fund, One Cent Sales Tax SAVE Fund	\$10,000 - \$99,999	Low	5 years	Continue - Not Started.

ID	Goal	Hazard(s) Mitigated	Action Description/Background/Benefits	Lead Agency and Partners	Potential Funding	Cost Estimate	Priority	Timeline	Status/Implementation Notes
			Improved access will be especially important during regular drop-off and pick-up times and during emergencies.						
West Marshall CSD-06	4	All	Purchase generators for the high school so that the facility can operate during a power loss or other emergency	West Marshall CSD Board, TBD	Grants, School District General Fund	\$10,000 - \$99,999	High	1-2 years	Continue - Not Started.

Chapter 5 Plan Maintenance Process

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4):

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.

5.1.1 Hazard Mitigation Planning Committee (HMPC)

With adoption of this plan, the HMPC will be tasked with plan monitoring, evaluation, and maintenance. The participating jurisdictions and agencies, led by the Marshall County Emergency Management Coordinator, agree to:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the Marshall County Board of Supervisors and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The HMPC is an advisory body and can only make recommendations to county, city, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

5.1.2 Plan Maintenance Schedule

The HMPC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Marshall County Emergency Management Coordinator will be responsible for initiating the plan reviews in conjunction with the County Commissioner's meeting and also invite the school superintendents to the meeting.

Between 2017 and 2020 the HMPC did not meet on an annual basis, but on an ad-hoc basis during the recovery from the 2018 tornado and 2020 derecho event.

In coordination with the other participating jurisdictions, a five-year written update of the plan will be submitted to the Iowa Homeland Security and Emergency Management Department and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. *It is recommended that during the third interim annual meeting that the HMPC outline necessary steps to begin the next plan update process so that the effort can be completed during year four and five, to allow time for completion, approval, and re-adoption within the five-year time frame so there is not a lapse in the plan, which could jeopardize grant funding.*

5.1.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to action implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will follow the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting on an annual basis to the jurisdictional HMPC member on action status and providing input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional HMPC member will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the Marshall County HMPC deems appropriate and necessary, and as approved by the Marshall County Board of Supervisors and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR 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.

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. This plan builds upon the some of the previous related efforts and recommends implementing actions, where possible, through the following means:

- General or mater plans of participating jurisdictions
- Ordinances of participating jurisdictions
- Building codes
- Capital improvements plans and budgets
- School district facilities plans
- Mutual aid agreement (28E Agreement)
- Other community plans within the county either in existence or developed in the future such as water conservation plans, storm water management plans, and parks and recreation plans

The governing bodies of the jurisdictions adopting this plan will encourage all other relevant planning mechanism under their authority to consult this plan to ensure minimization of risk to natural and manmade hazards as well as coordination of activities.

The Board of Supervisors or the governing board of the participating jurisdictions involved in the plan update will be responsible for encouraging the integration of the findings actions of the mitigation plan as appropriate. The Board of Supervisors is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the plan.

In the period since adoption of the 2016 Marshall County Multi-jurisdictional Hazard Mitigation Plan, it was not incorporated into existing planning mechanisms. With the update of this plan, committee members have made a renewed commitment to use existing plans and/or programs to implement hazard mitigation actions, where possible. Based on the capability assessments of the participating jurisdictions, communities in Marshall County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans and mechanisms listed in Table 5-1.

Table 5-1 Integration Strategies for Other Planning Mechanisms

Jurisdiction	Integration Process/Opportunities
Unincorporated County	- Incorporate into annual emergency management training, planning, and purchasing plans. - Integrate risk information in future updates of the Local Emergency Plan. - Integrate risk information into future updates to the Floodplain Ordinance. - Integrate risk information into future updates to the Capital Improvement Plan. - Integrate risk information into subdivision ordinances and site plan review requirements.

Jurisdiction	Integration Process/Opportunities
Albion	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
Clemons	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
Ferguson	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
Gilman	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
Haverhill	- Integrate mitigation strategy and risk information into future updates to the Local Mitigation Plan. - Integrate risk information into zoning and building permit ordinances. - Integrate risk information into debris management plan and tree trimming ordinance.
Laurel	- Integrate risk information into floodplain ordinance. - Integrate risk information into building permit ordinance. - Integrate risk information into site plan review requirements.
Le Grand	- Integrate risk information into building permit ordinances. - Integrate mitigation strategy into tree trimming program. - Integrate risk information into site plan review requirements.
Liscomb	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
Marshalltown	- Integrate risk information into future updates to the Comprehensive Plan. - Integrate risk information and mitigation strategy into the zoning, subdivision, building permit, and floodplain ordinances. - Integrate risk information in future updates of the Local Emergency Plan. - Integrate risk information into site plan review requirements. - Integrate mitigation strategy into the Capital Improvements Plan. - Integrate risk information into Debris Management Plan and Tree Trimming Ordinance.
Melbourne	- Integrate risk information into zoning ordinance. - Integrate mitigation strategy into the annual budget planning process.
Rhodes	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
St. Anthony	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances.
State Center	- Integrate mitigation strategy into the annual budget planning process. - Integrate risk information into the development of zoning, subdivision, and floodplain ordinances. - Integrate mitigation strategy into the Capital Improvements Plan. - Integrate risk information into site plan review requirements.
East Marshall CSD	- Integrate risk information and mitigation strategy into Capital Improvement Plan.
GMG Marshall CSD	- Integrate risk information and mitigation strategy into Capital Improvement Plan.

Jurisdiction	Integration Process/Opportunities
Marshalltown CSD	- Integrate risk information and mitigation strategy into District Strategic Plan updates.
West Marshall CSD	- Integrate risk information and mitigation strategy into Capital Improvement Plan.

5.3 Continued Public Involvement

44 CFR 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.

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted on the County website following each annual review of the mitigation plan. When the HMPC reconvenes for the update, it will coordinate with all stakeholders participating in the planning process, including those who joined the HMPC after the initial effort, to update and revise the plan. Public notice will be posted, at a minimum, through available website postings, social media and press releases to local media outlets, primarily newspapers. Public participation in the next plan update will be done in accordance with DMA 2000 requirements, by providing an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval. This may be accomplished through public surveys, social media notices, public meetings, discussing the plan at public forums etc.

Appendix A: References

- American Meteorological Society
- Census of Agriculture, 2017
- Centers for Disease Control and Prevention (CDC)
- Climate Change in the Midwest: A Synthesis Report for the National Climate Assessment
- Council of State Governments Midwestern Office
- Data Collection Guides completed by each jurisdiction
- Environmental Protection Agency
- Federal Emergency Management Agency (FEMA)
- Federal Railroad Administration
- FEMA 320, Taking Shelter from the Storm, 3rd edition
- FEMA BCA Reference Guide, June 2009
- FEMA Community Information System (CIS)
- Flood Insurance Administration
- Hazards and Vulnerability Research Institute
- Hazards US (HAZUS) 2.1
- High Plains Regional Climate Center
- Homeland Security Infrastructure Program Freedom, 2011, bridge inventory
- Iowa Climate Change Advisory Council
- Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
- Iowa Department of Agriculture and Land Stewardship, Pesticide Bureau
- Iowa Department of Education, Bureau of Information and Analysis Services
- Iowa Department of Natural Resources; Dam Safety Program
- Iowa Department of Natural Resources; Emergency Response and Homeland Security Unit, Tier II Chemical Facilities
- Iowa Department of Natural Resources; Deer Disease Information; Deer Disease Monitoring in Iowa
- Iowa Department of Public Health, Bureau of Health Statistics
- Iowa Department of Public Health, Center for Acute Disease Epidemiology
- Iowa Department of Public Safety, State Fire Marshal Division
- Iowa Department of Transportation, Office of Traffic and Safety, Crash Facts Reports
<https://iowadot.gov/mvd/factsandstats>
- Iowa
- Iowa Homeland Security and Emergency management
- Iowa Hospital Association
- Iowa Specialty Crop Site Registry, <https://ia.driftwatch.org/map>
- Iowa State Fire Marshal Division
- Iowa State University Department of Agronomy, Iowa Environmental Mesonet
- Iowa State University of Science and Technology, Population Statistics
- Iowa Utilities Board
- Iowa Hazard Mitigation Plan (2018)
- Johns Hopkins University 2021 Coronavirus Resource Center, COVID-19 Dashboard by the Center for Systems science and Engineering.
- Johns Hopkins University 2006 Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS)
- Marshall County Soil Survey, 1981
- Marshall County Digital Flood Insurance Rate Maps
- Marshall County Emergency Management
- Marshall County GIS Department
- Marshall County Multi-jurisdictional Hazard Mitigation Plan (2016);

-
- Marshall County, Iowa Resource Enhancement and Protection Plan, 2009
 - National Drought Mitigation Center Drought Reporter;
 - National Fire Incident Reporting System (NFIRS)
 - National Hydrography Dataset
 - National Center for Environmental Information (NCEI), Storm Events Database
 - National Oceanic and Atmospheric Administration's (NOAA) National Weather Service, Des Moines Weather Forecast Office
 - National Levee Database
 - National Severe Storms Laboratory
 - National Response Center (NRC)
 - National Weather Service
 - NFIP Community Status Book
 - Pipeline and Hazardous Materials Safety Administration
 - <http://plane crashmap.com/list/ia/>.
 - Southwest Climate and Environmental Information Collaborative (SCENIC)
 - State Historical Society of Iowa
 - Tornado and Storm Research Organization (TORRO)
 - U.S. Census Bureau
 - U.S. Department of Agriculture National Agricultural Statistics Service, 2017
 - U.S. Department of Agriculture National Agricultural Statistics Service, Upper Midwest Regional Office, Iowa Agricultural Statistics, 2020
 - U.S. Department of Agriculture, Cooperative Emerald Ash Borer Project
 - U.S. Department of Agriculture, CropScape, 2019
 - U.S. Department of Agriculture, Forest Service
 - U.S. Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
 - U.S. Department of Agriculture's Animal and Plant Health Inspection Service. Bovine Spongiform Encephalopathy (BSE) June 2, 2020. <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/cattle-disease-information/cattle-bse/cattle-bse>
 - U.S. Department of Agriculture's Animal and Plant Health Inspection Service. Virulent Newcastle Disease (vND) June 2, 2020. <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/virulent-newcastle/vnd>
 - U.S. Department of Agriculture, National Scrapie Eradication Program, Fiscal Year 2020 Report, December 30, 2020. https://www.aphis.usda.gov/animal_health/animal_diseases/scrapie/downloads/annual_report.pdf
 - U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
 - U.S. Department of Transportation
 - U.S. Fish and Wildlife Service
 - U.S. Geological Survey
 - U.S. Global Change Research Program, 2018
 - U.S. Health and Human Services, emPOWER Database
 - U.S. Nuclear Regulatory Commission
 - Vaidyanathan A, Malilay J, Schramm P, Saha S. Heat-Related Deaths — United States, 2004–2018. MMWR Morb Mortal Wkly Rep 2020;69:729–734. DOI: <http://dx.doi.org/10.15585/mmwr.mm6924a1>

Appendix B: Documentation of the Planning Process

From: Kimberly D Elder <kelder@marshallcountytia.gov>
Sent: Tuesday, February 23, 2021 8:58 PM
To: Melanie A Ewalt; Todd Apfel; Pamela Kasten - Salvation Army Marshalltown (pamela.kasten@usc.salvationarmy.org); Lynn Olberding Marshalltown Chamber of Commerce; region6@region6resources.org; Director; karen.connell@ivh.state.ia.us; 6winters@mchsi.com; Albion EMS McRill; Angie.gibbs@davita.com; bmauseth427@gmail.com; brad@jpins.net; citymelb@partnercom.net; gilmanfd@partnercom.net; jkhoy120@gmail.com; Junior Prusha; legrandems@gmail.com; Liscomb EMS; marie Thoms; njmercer98@yahoo.com; pdcorn@heartofiowa.net; philscpt@yahoo.com; Shawn Card; twestendorf@meskwaki.com; vicky@daters.net; wensyue@aol.com; weldridge@storymedical.org; Anderson, Superintendent's Office East Marshall; Ben Petty BCLUW GMG Elementary; Edler, Superintendent's Office West Marshall; J Wyant Marshalltown HS Principal; JC Large West Marshall; Kristian Einsweiler West Marshall HS; Marshalltown Christian School; mccinfo@iavalley.edu; P Newbold Marshalltown Schools; St. Francis School; St. Francis School Marshalltown Office; Theron Schutte; Tony Ryan East Marshall; bigjohnohvac@gmail.com; ccross@ci.marshalltown.ia.us; Dick Stalzer (rsrrstalzer@heartofiowa.net); dloff2000@yahoo.com; drierson@ci.marshalltown.ia.us; dtgibbs@partnercom.net; Ferguson Fire Department (chief); Grant Benson - Conrad FD Chief; joescovill@gmail.com; Justin Lovig; larryfricke@netins.net; legrandfire@gmail.com; Liscomb Fire Chief - Larry Olson; melbfire@partnercom.net; porkyram@yahoo.com; Randy Mommer personal; rjamonroe@partnercom.net; rusty.laurelfire@yahoo.com; smitty_31@live.com; smmills82@q.com; strawn@partnercom.net; Bill T. Patten; Board of Supervisors; Chad Affeldt - Mayor Clemons; chuckfinders@heartofiowa.net; City Clerk Rhodes - Nancy Youker-Raney; clerk@legrandiowa.com; Cyril Thill work; Dale Thompson Ferguson City Mayor; Evan Folk; Haverhill City Clerk; Jay Wyatt; Jessica Kinser; Joel Greer; John White Melbourne Mayor ; Kimberly D Elder; Laurel City Clerk; liscocit@heartofiowa.net; Liscomb Mayor; lunsplace@heartofiowa.net; Madaleine Welton Haverhill City Mayor; Madaleine Welton Haverhill City Mayor work ; Marshalltown City Clerk; Mayor of Rhodes - Cyril Thill; Richard Irish - Gilman Mayor; Sam Bryant - St. Anthony Mayor; Shari Coughenour Marshalltown City Clerk; St. Anthony Mayor - Sam Bryant; State Center City Clerk; Steve Sadders State Center Mayor; Steven W Hoffman; Aaron Fairchild; Alliant Energy; batterson_brian@yahoo.com; Becks Hybrids - Jason Neus; Bob Ranson; bortonlr@gmail.com; Brett Schnathorst; Brian Tibbits; Bruce Kempf Mid Iowa Coop; Bryan McGlothlin; Charles Piwowarski; Cherelle Hatcher (Koch); Christopher Hicks; clemonsclerk@netins.net; craig.lovig@lennoxind.com; Donna Peterson; galeknudson@yahoo.com; Harris Crumrine; hpenner; Jarod Gunderson; Jay Duncan; Jeremy McGrue; Jesse Bolle; jgunderson@heartofiowa.net; John Leptien Lennox; John Schuler; jperin@live.com; Kay Lampe Lennox; Kevinschaefer@alliantenergy.com; Lance Greazel; lee thede; legrandfd@yahoo.com; LEM Commission; Lindsay Van Woert; loran@visroof.com; mark stephens; Matthew Loehr - Emerson; Matthew Thompson; Michael Steven; Michael Tupper Marshall PD Chief; Mike Ball, Melbourne PD; Mike Gleason; Mike Harris; Mike McNulty; mkingery@heartlandcoop.com; mlkmar@aim.com; New Century FS - Walls, Kayla; Nu Star Energy (Valero) (Feil, Bob; Patricia Thompson; Ramiro Pesina

Emerson; Randy Ritsema; rebecca palmer; Rhonda Braudis Marshall County Communications Center Manager; roads william; Sam Ramsey; steve brant; Thomas Cappucci; Tim Brown; Tom McWilliams work; Tyson Long; Weary, Troy ; Weillbrenner, Tami alliant

Cc: Brislawn, Jeff P; Kimberly D Elder
Subject: Marshall County Multi-jurisdictional Hazard Mitigation Plan Update

Importance: High

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

You are invited to the first of three planning meetings to update the Marshall County Multi-jurisdictional Hazard Mitigation Plan.

Note, this is not part of the Recovery Plan that we are currently working on, it just happens that the mitigation plan is also due to be updated.

The existing plan was last updated in 2017 in accordance with the Disaster Mitigation Act of 2000, which requires all local governments and special districts to develop a plan to assess their risks to hazards and identify actions that can be taken in advance to reduce future losses. Hazard mitigation plans are to be updated every five years in order to maintain eligibility for FEMA Hazard Mitigation Assistance grants.

Marshall County Multi-jurisdictional Hazard Mitigation Plan Update

Kickoff Meeting/Webinar

Date: Thursday, March 11, 2021

Time: 1:30—3:00 pm

Remote Webinar Teams Meeting Link:

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

[+1 281-810-1627,,1379039333#](#) United States, Houston

[\(866\) 670-1764,,1379039333#](#) United States (Toll-free)

Phone Conference ID: 137 903 933#

The hazard mitigation planning process is heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee will be re-convened to support this project and will include representatives from the County, cities, school districts, private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies in or that serve Marshall County. The participating jurisdictions are expected to include (but not limited to):

City of Albion
City of Clemons
City of Ferguson
City of Gilman
City of Haverhill
City of Laurel
City of LeGrand
City of Liscomb
City of Marshalltown

City of Rhodes
City of St. Anthony
City of State Center
Marshall County (Unincorporated)
East Marshall Community School District
GMG Community School District
Marshalltown Community School District
West Marshall Community School District
Marshall County LEPC members

At the kickoff meeting, we will discuss the benefits of updating the hazard mitigation plan, the project schedule, and all of the hazards that affect Marshall County, such as tornadoes, wildfire, floods, winter storms, hazardous materials, and more. Marshall County requests your assistance in forwarding this invitation to others in your jurisdiction. Appropriate persons to be a part of the planning committee include, but are not limited to: emergency responders, county clerks, city clerks, elected officials, public works directors, floodplain managers, county and city planners, economic development directors, GIS staff, business partners, private-non-profit representatives, school principals, school facilities directors, and school superintendents. Each participating jurisdiction must have at least one representative at the meetings to meet participation requirements. There will be 3 total primary planning meetings held during the update process over the next 3-4 months, with submittal of the updated plan for State and FEMA review within 7 months.

As the Marshall County Emergency Management Coordinator I will be taking the lead in updating this plan. The County is working with a consultant, Wood Environment & Infrastructure Solutions, Inc., to manage the planning project. Wood will facilitate the planning process, collect the necessary data, and perform other technical services, including updating the risk assessment and plan document. However, to successfully complete this project and ensure your organization is eligible for FEMA hazard mitigation assistance funding, we need your participation and input.

A Microsoft Outlook meeting invitation/calendar item will be sent out soon, please confirm your attendance or provide contact information for your designated alternate. Looking forward to your input and participation during the process.

Please share with your departments, partners, and anyone that you feel would be a benefit to this planning process.

Thank you so much for working as part of the team in this planning process.

Kimberly Elder, CEM

Marshall County Emergency Management
Coordinator
2369 Jessup Avenue Floor 3 Admin Bldg
Marshalltown, Iowa 50158

641-754-6385 office
641-754-6389 fax

**MARSHALL COUNTY
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN UPDATE
*VIRTUAL KICKOFF MEETING***

**Thursday, March 11, 2021
1:30-3:00 pm CST**

Remote Webinar link: [Click here to join the meeting](#)

Or call in (audio only)

[+1 281-810-1627,,137903933#](#) United States, Houston
[\(866\) 670-1764,,137903933#](#) United States (Toll-free)

Phone Conference ID: 137 903 933#

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- 1. Introductions**
- 2. Hazard Mitigation Overview**
- 3. Hazard Mitigation Planning Process and Requirements**
- 4. Role of the Hazard Mitigation Planning Committee**
- 5. Plan Update Requirements, Key Elements, and Schedule**
- 6. Review of Identified Hazards and 2017 Mitigation Plan**
- 7. Coordinating with Other Agencies/Related Planning Efforts/Planning for Public Involvement**
- 8. Initial Information Needs**
- 9. Next Steps/Adjourn**

Marshall County, Iowa Multi-Jurisdictional Hazard Mitigation Plan 2021 Update

Kick-Off Meeting/Webinar Summary

Thursday, March 11, 2021

1:30-3:00 am CST

MS Teams Virtual Meeting

Introductions and Opening Remarks

This document summarizes the kickoff meeting for the Marshall County Hazard Mitigation Plan update in 2021. The meeting was a webinar/conference call facilitated by Wood Environment & Infrastructure Solutions, Inc. (Wood), the consulting firm working under a contract with the Iowa Department of Homeland Security and Security and Emergency Management (IA HSEMD), to facilitate the planning process and develop the updated County plan. Kimberly Elder began the meeting by explaining the importance of the plan update and thanked everyone for attending. Kimberly then introduced Jeff Brislawn, project manager at Wood. Jeff began by asking those attending to virtually introduce themselves by stating their name, title, and agency/jurisdiction using the Chat feature in MS Teams. Thirty-seven (37) persons representing a mix of county departments, cities, and school districts.

1. Jeff Brislawn, Wood E&IS
2. Christopher Johnson, Wood E&IS
3. Jessica Kinser, City of Marshalltown, City Administrator
4. Melanie Ewalt, Marshall County GIS
5. David Rierson, Marshalltown Fire Dept., Fire Chief
6. Karen Connell, Iowa Veterans Home, Operations Administrator
7. Pat Thompson, Marshall County, PH (Public Health?)
8. Jenny Fogle, Haverhill, City Clerk
9. Tyler Schilling, Lennox Distribution, Operations Manager
10. Lori Bearden, State Center City Clerk
11. Amanda Accola, Alliant Energy, Key Account Manager
12. Wendy Witt, City of Le Grand, Interim Clerk
13. Jodi Abrahams, City of Le Grand, Clerk/treasurer
14. Kay Lampe Hannasch, Lennox Industries, Senior Safety & Health Manager,
15. Kimberly Elder, Marshall County Emergency Management, Coordinator
16. Brian Minser, Koch Fertilizer operations
17. Bob Ranson, Water Pollution Control Plant Superintendent, Marshalltown
18. David Atcher, City of Laurel Public Works
19. Cherelle Hatcher, Koch Fertilizer, Terminal Leader
20. Mechiele Winters, Lead EMS Green Mountain EMS/Secretary GM Fire Dept
21. Tom Pritts, Koch Fertilizer, H&S Leader
22. Steve Sadders, Mayor of State Center
23. Ben Petty, BCLUW and GMG Schools, Superintendent
24. Tony Ryan, East Marshall CSD, Superintendent
25. Jacy Large, West Marshall Schools, Superintendent
26. Josh Stombaugh, CenturyLink, Supervisor of Operations
27. Steve Salasek, Marshall County Supervisor

28. Todd Goulding, Marshall County SD, Director of Buildings and Grounds
29. Jordan Hoy, Liscomb EMS/FD
30. Kristi
31. Larry Fricke, Clemons FD
32. Matthew Loehr, Emerson
33. Michael Tupper, Marshalltown PD
34. Theron Schutte, Marshalltown CSD, Superintendent
35. Vicky Daters, Haverhill City Council
36. Wendy Eldridge Rhodes
37. Tom McWilliams, Green Mountain Fire – Retired Chief

Following introductions Jeff discussed the agenda items; the key discussion is summarized below, and additional details are within the meeting PowerPoint presentation.

Hazard Mitigation Overview

Mitigation is any sustained action taken to reduce or eliminate long-term risk to human life and property from natural or human-caused hazards. Mitigation Planning guides mitigation activities in a coordinated and economic manner to make communities more disaster resilient. The U.S. Disaster Mitigation Act of 2000 requires state and local governments to adopt a hazard mitigation plan, updated every five years, to maintain eligibility for FEMA mitigation assistance grants.

Jeff (Wood) explained the Disaster Mitigation Act of 2000 which requires having an updated plan in place to ensure the County is eligible for pre- and post-disaster hazard mitigation grant funds. There are trends resulting in increased costs for disaster response and recovery related to population growth and the increase in the types of events we experience as a community. The COVID-19 Pandemic is a good example of a circumstance that can cause disruption in our community and to the economy. Jeff explained we need these plans for several reasons because the reduce future recovery costs, we can plan around predictive events, and they guide mitigation activities in a coordinated manner.

Jeff stated there are two main types of benefits a community gains from having a FEMA approved hazard mitigation plan (HMP); (1) bringing people together in the community; (2) having an HMP approved by FEMA makes a community eligible for FEMA grants (Pre-Disaster Mitigation, Flood Mitigation Assistance, Hazard Mitigation Grant Program-Post-Disaster). He noted that any funding requests from FEMA needs to be based on the hazards and mitigation strategy in the HMP. He added that information from the hazard mitigation plan, specifically the vulnerability assessment and mitigation strategy, can be used in other hazard related plans such as emergency operations plans.

Hazard Mitigation Planning Process and Requirements

Jeff continued the meeting with the specific planning requirements the County will have to meet in order to have a FEMA approved plan. Jeff reviewed the Disaster Mitigation Act (DMA) of 2000 Requirements and explained that the Marshall County Multi-Jurisdictional Hazard Mitigation Plan (HMP) will be updated in accordance with these requirements. The planning process involves a 4 Phase approach with 9 tasks per

FEMA guidance updated in 2013. The kickoff meeting is the first step in the process and also covers tasks 1-3 (Determine the planning area and resources; Build the planning team; Create an outreach strategy).

Jeff presented a slide with the 18 jurisdictions that participated in the previous update in 2017. These same jurisdictions are expected to participate in 2021 and will need to re-adopt the plan.

- Unincorporated Marshall County
- City of Albion
- City of Clemons
- City of Ferguson
- City of Gilman
- City of Haverhill
- City of Laurel
- City of Le Grand
- City of Liscomb
- City of Marshalltown
- City of Melbourne
- City of Rhodes
- City of St. Anthony
- City of State Center
- East Marshall Community School District
- GMG Community School District
- Marshalltown Community School District
- West Marshall Community School District

Role of the Hazard Mitigation Planning Committee (HMPC)

The first step in getting organized is to determine the hazard mitigation planning committee members, which has already started with those in attendance at the kickoff meeting. Jeff presented a slide with a summary of those invited to be on the committee, based on the previous HMP and input from the County.

Jeff emphasized that local input, and participation from the county, municipalities, and special districts is required for full approval from FEMA. Participation includes the following:

- Attend meetings and participate in the planning process
- Provide requested information to update or develop jurisdictional information
- Review drafts and provide comments
- Identify mitigation projects specific to jurisdiction, provide status
- Assist with and participate in the public input process
- Coordinate formal adoption

Stakeholders include other local, state and federal agencies with a stake in hazard mitigation in the County or may include academic institutions and local business and industry. Neighboring counties were also notified about the update and will be given an opportunity to provide input into the process. Stakeholders have various options and levels of participation including:

- Attend HMPC meetings or stay in loop via email list

- Provide data/information
- Partner on mitigation efforts
- Review draft plan

Plan Update Requirements, Key Elements and Schedule

Aspects of the planning process include:

- Engage the participants to take part in planning process and efforts
- Raise awareness and engage the public
- Update hazards and baseline development data to reflect current conditions
- Update the mitigation strategy
- Document progress and note changes in priorities

Conducting a risk assessment is a key aspect of a hazard mitigation plan and involves two components; hazard identification (what can happen here) and the vulnerability assessment (what will be affected). The HMP update will be based on existing documents and studies, with the Marshall County Hazard Mitigation Plan (2017) providing the baseline for identified hazards and the groundwork for goals, policies and actions for hazard mitigation.

The HMP will be updated over the next six months, with at least two more meetings with the Hazard Mitigation Planning Committee. Wood will be updating the Hazard Identification and Risk Assessment (HIRA) in the next couple of months, with input from the HMPC. Three drafts of the HMP will be created: the first for review by HMPC committee, a second for public review, and a third for state and FEMA review. The first draft for HMPC review is targeted for August 2021, a public review draft in September followed by a review by Iowa DHSEM in late September and then tentatively approved by FEMA in December 2021.

Review of Identified Hazards

Based on hazards from the 2017 County HMP, the list of potential hazards was reviewed. Jeff showed a slide that listed the hazards in the 2017 HMP.

- Animal/Crop/Plant Disease
- Dam/Levee Failure
- Drought
- Earthquake
- Extreme Heat
- Flash Flood
- Grass or Wildland Fire
- Hazardous Materials Incident
- Human Disease Epidemic
- Infrastructure Failure
- Radiological Incident
- Riverine Flooding
- Severe Winter Storm
- Terrorism
- Thunderstorm/Lightning/Hail
- Tornadoes

- Windstorm

The group thought that the original list of hazards was still valid although there was discussion that the levels of significance may have changed since 2017. Jeff showed a slide of how the hazards were ranked by significance in the 2017 plan. Kimberly Elder spoke on the ranking of Low for River Flooding, pointing to the relative lack of exposure in the county, in part due to wise floodplain management combined with some levee protection. However, she pointed out that in the event of a significant flood the county is often cut in half, and the committee may want to rank the hazard higher. There was discussion amongst the committee about moving several hazards higher in ranking, such as human disease, drought, and hazardous materials incidents, and lowering several in ranking, such as earthquake, terrorism, and radiological hazards. Grass fires were noted as a hazard that occurs very frequently. Water supply impacts as a consequence of infrastructure failures and dam/levee failure was also noted. Ice jams are sometimes an issue. A levee failure could be bad for Marshalltown, but the City noted it has a detailed Operations and Maintenance plan for the levee that includes regular inspections. Additional comments were noted in the meeting chat log.

Jeff noted that Flash Flood and Riverine Flooding would be combined in one hazard profile align with the State's 2018 Hazard Mitigation Plan hazard list. Jeff noted that every hazard profiled must have at least one mitigation action identified, and each jurisdiction will need at least one new action added to the updated plan.

Jeff asked the group to review the list of hazards and comment on how they could be enhanced or updated with:

- Historic incidents
- Incident logs
- Public perception
- Scientific studies
- Other plans and reports (e.g., flood and drainage studies, incident damage assessments, Internet databases)
- Recent disasters

Recent disaster events in the past 5 years include the 2018 tornado, 2020 Derecho, and flooding events; it was noted that damage assessments associated with the events could inform the HMP update.

Coordinating with Other Agencies\Related Planning Efforts\Recent Studies

A discussion on recent studies of hazards in other documents and reports followed the identified hazards discussion. Opportunities for coordinating and cross-referencing the HMP were discussed.

Jeff asked if any plans cross-reference the HMP. Kimberly noted the County is preparing a Recovery Plan that will acknowledge the HMP. She also mentioned the Emergency Operations Plan references the HMP. Grant applications for post disaster improvements have referenced the HMP. Specific grant applications noted included a generator application submitted by Marshalltown for the Veteran's Memorial Coliseum, and Marshalltown School District in process of applying for a safe room grant.

Planning for Public and Stakeholder Involvement

Jeff noted that a Public survey will be developed to gather input from the public on hazard concerns and mitigation ideas. Advertisement of public survey will be through public information channels, official websites, social media, email blasts etc. He asked for opportunities for outreach at scheduled public meetings or events. Suggestions included discussing the HMP update at City Council and County Commission meetings. Kimberly noted that COVID has made public outreach difficult. Jeff suggested the possibility of using vaccination centers for outreach.

Jeff asked for ideas on additional stakeholders to be made aware of the plan update effort. Rural water was suggested in the chat.

Initial Information Needs and Next steps

Jeff discussed a slide with initial information needs and next steps. Jeff encouraged the group to send by email information on:

- Recent hazard events (since 2017) – damages, incident logs, damage assessments, etc.
- Growth and development trends
- Recent updated plans and policies

Where available online, Wood will try to obtain the updated plans previously noted. Jeff encouraged the group to send other information that might not be readily accessible online.

A GIS needs list was provided to the County to assist with data collection, which is already in progress. The County will provide the meeting summary, handouts, presentation and sign in sheet by email so that other HMPC members that could not attend today's meeting could get up to speed. Jeff noted that he will be in touch to followup on some of the previously identified data sources and plans. Wood will begin work on the Hazard Identification and Risk Assessment update and develop a public survey that can be used online.

The next HMPC meeting will be following the update of the Hazard Identification and Risk Assessment section of the plan. The specific date will be shared when available.

Adjourn

The meeting adjourned at 2:50 pm.

Attachments:

MS Teams Meeting chat log

Sign in sheet as recorded by Kimberly Elder, County Emergency Management

Attachment: Marshall County Hazard Mitigation Plan Update

Kickoff Meeting Chat Log

[Tuesday 11:53 AM] Johnson, Christopher A was invited to the meeting.
 [12:30 PM] Unknown User "Bob Ranson (Guest)" was invited to the meeting.
 [12:30 PM] Unknown User "David Rierson (Guest)" was invited to the meeting.
 [12:30 PM] Unknown User Bob Ranson (Guest) was invited to the meeting.
 [12:30 PM] Unknown User "Karen Connell (Guest)" was invited to the meeting.
 [12:30 PM] Unknown User Accola, Amanda was invited to the meeting.
 [12:30 PM] Unknown User Mechiele Winters was invited to the meeting.
 [12:30 PM] Unknown User City of Haverhill (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Schilling, Tyler was invited to the meeting.
 [12:30 PM] Unknown User Lampe Hannasch, Kay was invited to the meeting.
 [12:30 PM] Unknown User Larry Fricke--Clemons Fire Dept (Guest) was invited to the meeting.
 [12:30 PM] Unknown User David Atcher (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Pat Thompson (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Lori Bearden, City of State Center (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Kimberly Elder (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Wendy Witt (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Pritts, Thomas C was invited to the meeting.
 [12:30 PM] Unknown User Melanie (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Jessica Kinser (Guest) was invited to the meeting.
 [12:30 PM] Unknown User Wendy Eldridge (Guest) was invited to the meeting.
 [12:31 PM] Unknown User Minser, Brian L (External) was invited to the meeting.

[12:32 PM] Brislawn, Jeff P
 Jeff Brislawn, Hazard Mitigation Lead, Wood

[12:32 PM] Jessica Kinser (Guest)
 Jessica Kinser, City of Marshalltown, City Administrator, jkinser@marshalltown-ia.gov

[12:32 PM] Melanie (Guest)
 Melanie Ewalt, Marshall County GIS

[12:32 PM] "David Rierson (Guest)"
 David Rierson

[12:32 PM] "Karen Connell (Guest)"
 Karen Connell, Iowa Veterans Home, Operations Administrator

[12:32 PM] Pat Thompson (Guest)
 Pat Thompson, Marshall Co, PH

[12:32 PM] City of Haverhill (Guest)
 Jenny Fogle, Haverhill, City Clerk

[12:32 PM] Schilling, Tyler (Guest)
 Tyler Schilling Operations Manager Lennox Distribution

[12:32 PM] Unknown User Ben Petty (Guest) was invited to the meeting.

[12:32 PM] Lori Bearden, City of State Center (Guest)
Lori Bearden, State Center City Clerk, sccityclerk@partnercom.net

[12:33 PM] Accola, Amanda (Guest)
Amanda Accola, Key Account Manager, Alliant Energy, amandaaccola@alliantenergy.com

[12:33 PM] Unknown User "Bob Ranson (Guest)" no longer has access to the chat.

[12:33 PM] Wendy Witt (Guest)
Wendy Witt City of Le Grand interim Clerk clerk@legrandiowa.com

[12:33 PM] Unknown User Steve Salasek was invited to the meeting.

[12:33 PM] "David Rierson (Guest)"
David Rierson - Fire Chief Marshalltown Fire Dept.

[12:33 PM] Jodi Abrahams (Guest)
Jodi Abrahams clerk/treasurer City of Le Grand

[12:33 PM] Lampe Hannasch, Kay (Guest)
Kay Lampe Hannasch, Sr Safety & Health Manager
Lennox Industries, Inc.
kay.lampehannasch@lennoxind.com

[12:34 PM] Kimberly Elder (Guest)
Kimberly Elder, Coordinator Marshall County Emergency Management

[12:34 PM] Minser, Brian L
Brian Minser, Koch Fertilizer operations brian.minser@kochind.com
Edited

[12:34 PM] Bob Ranson (Guest)
Bob Ranson Superintendent @ Water Pollution Control Plant in Marshalltown

[12:34 PM] Unknown User Jacy (Guest) was invited to the meeting.

[12:34 PM] Kimberly Elder (Guest)
kelder@marshallcountya.gov

[12:35 PM] Melanie (Guest)
mewalt@marshallcountya.gov

[12:35 PM] Unknown User Stombaugh, Joshua M was invited to the meeting.

[12:36 PM] David Atcher (Guest)
Laurel public works laurelcitypublicworks@gmail.com

[12:36 PM] Unknown User Tony (Guest) was invited to the meeting.

[12:36 PM] Minser, Brian L
Cherelle Hatcher, Terminal Leader, Koch Fertilizer

[12:36 PM] Unknown User Todd Goulding (Guest) was invited to the meeting.

[12:36 PM] Mechiele Winters (Guest)
Mechiele Winters EMT-B,E Lead EMS Green Mountain EMS/Secretary GM Fire Dept

[12:37 PM] Pritts, Thomas C (Guest)
Tom Pritts Koch Fertilizer, H&S Leader, thomas.pritts@kochind.com

[12:37 PM] Unknown User Steve Soddors (Guest) was invited to the meeting.
[12:39 PM] Unknown User Theron Schutte (Guest) was invited to the meeting.

[12:40 PM] Steve Soddors (Guest)
Steve Soddors, Mayor State Center

[12:40 PM] Ben Petty (Guest)
Ben Petty, Superintendent BCLUW and GMG Schools

[12:40 PM] Tony (Guest)
Tony Ryan, Superintendent, East Marshall CSD

[12:40 PM] Jacy (Guest)
Jacy Large-West Marshall Schools Superintendent

[12:40 PM] Stombaugh, Joshua M (Guest)
Josh Stombaugh Supervisor of Operations CenturyLink.

[12:42 PM] Unknown User Vicky Daters, Haverhill was invited to the meeting.

[12:42 PM] Steve Salasek (Guest)
Steve Salasek. Marshall County Supervisor.

[12:42 PM] Unknown User Kristi was invited to the meeting.

[12:44 PM] Todd Goulding (Guest)
Todd Goulding- Director of Buildings and Grounds for MCSD

[12:47 PM] Unknown User Stombaugh, Joshua M no longer has access to the chat.
[12:50 PM] Unknown User Michael Tupper (Guest) was invited to the meeting.

[1:11 PM] Kimberly Elder (Guest)
Not able to get into chat: Jordan Hoy, Liscomb EMS/FD and Matt Loehr, Emerson

[1:11 PM] Kimberly Elder (Guest)
Not able to get into chat: Wendy Eldridge Rhodes

[1:13 PM] Theron Schutte (Guest)
Theron Schutte, Supt. Marshalltown CSD

[1:13 PM] Michael Tupper (Guest)
Michael Tupper, Marshalltown PD, mtupper@marshalltown-ia.gov

[1:13 PM] Unknown User Tom McWilliams was invited to the meeting.
[1:14 PM] Unknown User Ben Petty (Guest) no longer has access to the chat.
[1:15 PM] Unknown User "Ben Petty (Guest)" was invited to the meeting.

[1:22 PM] Kimberly Elder (Guest)

If you have not already please share your name, e-mail address, entity you are with and your title in the chat. thank you.

[1:25 PM] "David Rierson (Guest)"

I think radiological hazards can be lowered.

[1:25 PM] Tom McWilliams (Guest)

Tom McWilliams, tom.mcwilliams@remingtonseeds.com, retired from Green Mountain Fire, retired chief.

[1:31 PM] Steve Sodders (Guest)

clearn water supply

[1:32 PM] Bob Ranson (Guest)

Dam and levee failure and flooding could put the City of Marshalltown specifically in a situation like Cedar Rapids with regards to the Water Pollution Control Plant and sanitation services.

[1:41 PM] Steve Sodders (Guest)

what about new fd state center

[1:46 PM] Steve Sodders (Guest)

Rural Water?

[1:52 PM] Vicky Daters, Haverhill (Guest)

Vicky Daters, Haverhill city council, vicky@daters.net

[1:53 PM] Kimberly Elder (Guest)

Thank you all for your participation. These meetings and your participation and coordination with the planning team is extremely important on development of our update to the plan.

[1:55 PM] Minser, Brian L

Thank You!!

[1:58 PM] Mechiele Winters (Guest)

Mechiele Winters 6winters@mchsi.com Lead EMS Green Mountain EMS, secretary GM Fire

[1:59 PM] Wendy Eldridge (Guest)

Wendy Eldridge, City of Rhodes

City Council

Fire & EMS

RhodesFireDept@gmail.com, RhodesFirstResponders@gmail.com, & cityofrhodes.ia.50234@gmail.com

Meeting ended 1h 20m 2:50 PM

1h 20m

Meeting Recorded by: Johnson, Christopher

Meeting: Mitigation initial meeting		Session:		Teams Mtg.	
Day: Thursday		Date: 03-11-2021		Time: 1330	
If we already have this information you are not required to fill this section out:					
	<u>Name</u>	<u>Agency/City</u>	<u>Email</u>	<u>Mailing address</u>	<u>phone number</u>
1	Lori Bearden	City State Center	Clerk		
2	Kim Elder	EMA			
3	Wendy Witt	LeGrand City	Clerk		
4	Thomas Pritts	KOCH	H&S leader		
5	Melanie Ewalt	GIS	MCOUNTY		
6	Jessica Kinser	MTown	City Admin		
7	Wendy Eldridge	Rhodes-City	EMS/Fire		
8	Brian Minser	KOCH	Ops		
9	Jeff Brislaw	Wood Inc.	Mitigation Planner		
10	David Rierson	MTown	FD		
11	Karen Connell	IVH	Ops Admin		
12	Pat Thompson	PH	MC		
13	City of Haverhill	Jenny Fogle	Clerk		
14	Tyler Schilling	Lennox	Ops Mgr		
15	Ben Petty	GMG			
16	Amanda Accola	Alliant	Key Acct Mgr		
17	Bob Ranson	Superint.	Water Pollution Control	MTown	
18	Steve Salasak	BOS	MCOUNTY		
19	Jodi Abrahams	LeGrand City	Clerk		
20	Kay Lampe Hannasch	Sr. Safety & Health	Mgr Lennox		
21	Jacy Large	WM	Schools		

	<u>Name</u>	<u>Agency</u>	<u>E-mail</u>	<u>Mailing address</u>	<u>phone number</u>
22	Joshua Stombaugh	CenturyLink	Supervisor Ops		
23	David Atcher	Laurel Public Works			
24	Tony Ryan	E Marshall Schools			
25	Cherelle Hatcher	Koch	terminal leader		
26	Todd Goulding	- Box 6	MCSD		
27	Mechielle Winters	Green Mtn	EMS/FD		
28	~~Thomas Pritts~~ Steve Sadders	SC	City		
29	Theron Schutte	Mtown	Schools		
30	Vicky Daters	CERT	Haverhill		
31	Mike Tupper	MPD	Chief		
32	Matt Loehr	Emerson	matthew.loehr@emerson.com		
33	Jordan Hey	Liscomb	FD/EMS		
34	Tom McWilliams	Mycogen Seed	Green Mtn Fire Dept		
35	Larry Fricke	Clemens	FD		
36	Kristi	@@ Liscomb	City		
37	Christopher Johnson	-	?		
38					
39					
40					

Marshall County

Multi-Jurisdictional Hazard Mitigation Plan Update

Risk and Goals Webinar Agenda

Date: Tuesday May 11, 2021
3:00 – 5:00 pm CT

Remote Webinar link:
Join on your computer or mobile app
[Click here to join the meeting](#)
Or call in (audio only)
[+1 281-810-1627,,711411505#](#) United States, Houston
[\(866\) 670-1764,,711411505#](#) United States (Toll-free)
Phone Conference ID: 711 411 505#
[Find a local number](#) | [Reset PIN](#)

Subject/Purpose

The purpose of the meeting is to review the highlights of the updated Hazard Identification and Risk Assessment and revisit the plan's goals. The meeting will be delivered as a web meeting with Microsoft Teams. *To ensure the best experience for this meeting, please join via the Desktop or mobile Teams application. The use of the dial-in audio conferencing number is discouraged and should only be used if other options do not work or are not available.*

Attendees: Hazard Mitigation Planning Committee

1. Introductory remarks
2. Review of the planning process
3. Review of identified hazards and vulnerability assessment update highlights
4. Capabilities Assessment Update
5. Updating Goals for the Mitigation Plan and updating Mitigation Actions
6. Update on Public Involvement Activities
7. Next Steps
8. Questions and Answers

**Summary of the Marshall County, Iowa
Multi-Jurisdictional Hazard Mitigation Plan Update
Risk Assessment and Goals Meeting**

**Tuesday, May 11, 2021
3:00-5:00 pm CST
Virtual Webinar via Teams**

Subject/Purpose

The purpose of the meeting was to review the highlights of the updated Hazard Identification and Risk Assessment and revisit the plan's goals. The meeting was delivered as a web meeting with Microsoft Teams.

Attendees

- Hazard Mitigation Planning Committee
- 24 people attended including:
 1. Jeff Brislawn, Wood E&IS
 2. Christopher Johnson, Wood E&IS
 3. Justine Hart, Wood E&IS
 4. Jessica Kinser, City of Marshalltown, City Administrator, jkinser@marshalltown-ia.gov
 5. Pat Thompson, Marshall County, Public Health
 6. Jenny Fogle, Haverhill, City Clerk
 7. Lori Bearden, State Center City Clerk, sccityclerk@partnercom.net
 8. Amanda Accola, Alliant Energy, Key Account Manager, amandaaccola@alliantenergy.com
 9. Kay Lampe Hannasch, Lennox Industries, Senior Safety & Health Manager, kay.lampehannasch@lennoxind.com
 10. Kimberly Elder, Marshall County Emergency Management, Coordinator kelder@marshallcountytia.gov
 11. Bob Ranson, Water Pollution Control Plant Superintendent, Marshalltown
 12. Tom Pritts, Koch Fertilizer, H&S Leader, Thomas.pritts@kochind.com
 13. Steve Sadders, Mayor of State Center
 14. Todd Goulding, Marshall County SD, Director of Buildings and Grounds
 15. Michael Tupper, Marshalltown PD, mtupper@marshalltown-ia.gov
 16. Theron Schutte, Marshalltown CSD, Superintendent
 17. Mary Pothast, City Clerk, City of Melbourne
 18. Kathy Nissen, Mayor Pro Tem, City of Gilman
 19. Paul Geilenfeldt, Engineer, Marshall County
 20. Todd Apfel, Zoning/Env Health, Marshall County
 21. Shari Coughenour, Administrative Assistant, Marshall County
 22. Mike Gleason, Regional Operations Manager, Lennox
 23. James Nehring

24. Wendy Witt, Interim Clerk, City of Le Grand

Introductory Remarks/Review of the planning process

- Kimberly Elder and Jeff Brislawn, gave a brief introduction of the meeting and its purpose
- General overview given by Jeff of the following topics:
 - A review of the planning process and steps completed so far
 - Review of the hazard identification and risk assessment update

Review of identified hazards and vulnerability assessment update highlights

- Ag pest/disease:
 - Kimberly Elder mentioned with the impacts of drought and derecho, some hazards are/should be probably higher ranking
 - A representative for the city of Marshalltown noted that they are looking to remove ash trees which have been damaged by the emerald ash borer.
- Drought:
 - Kimberly asked if anyone from the municipalities had experience with infrastructure damage, due to the possibility of pipe damage from soil expansion
- Radiological Incident
 - Kimberly noted that the Duane Arnold energy center will be closing in June but storing hazardous waste on site
 - Fort Calhoun is closed
- Hazardous Materials
 - An industrial plant with ammonia was mentioned.
- Human Disease:
 - Kimberly stated the rating of this hazard should be moved up from Low to High. The impacts from the current COVID pandemic, considering how impactful it has been on many facets of the County operation. Steve with city of State Center voiced agreement.
 - Decision to move the ranking to High
- Flood:
 - Previous plan separated flood and flash flood as separate hazards; update will consolidate them into one profile
 - Wood is recommending increasing flood hazard ranking from low to medium
 - Kimberly asked if any of the jurisdictions have any projects on flood reduction
 - Jessica Kinser mentioned that a grant funded project to hold additional stormwater is underway in conjunction with the Edgewood industrial park project, using an EDA grant.
- Severe Winter Storm
 - Amanda w/ Alliance Energy – noted that ice build up on overhead transmission lines is always an issue, and the company is working to

- underground utilities. Jeff asked about eligibility for FEMA funding, which Amanda noted they are not eligible for
 - Kimberly noted that during particularly severe cold spells, ice build up on rivers and creeks may cause bridge damage
 - Secondary roads affected
 - State Center has municipal-owned electrical; they are discussing undergrounding utility lines.
- Tornado
 - Kimberly noted that there was significant warning in the 2018 tornado event. Also that the county needs to look into improved communications system redundancy, the 2018 tornado resulted in overloading of the cell networks in the aftermath
 - Jessica Kinser stated that the city of Marshalltown has looked into mitigation grant funding specifically for buildings after this event, but were unable to secure specific projects
 - Amanda w/ Alliance Energy reiterated that under-grounding utilities here would help significantly; gas delivery had to be isolated and it took time to re-light during the restoration.
- Transportation Incident
 - Paul with Secondary Roads noted that they have an updated bridge list and maps; several bridges have been replaced over the years.
- Wildfire
 - It was noted that some croplands have been burned by wildfires

Capabilities Assessment Update

- Jeff went over highlights of the capability assessment update, and provided examples of some current projects in the County which are considered capabilities
 - A focus has been on enhancing communications
 - Kim noted that the Emergency Operations Plan is regularly updated
- Jeff also asked if the HMP has been integrated or cross-referenced with other plans.
 - Kimberly noted the EOP cross-references the HMP
 - The Marshalltown Flood Plan was noted as not referencing the HMP

Goals Update

- Jeff led discussion on current goals and asked if any changes/updates/additions to the current goals were needed:
 - Jessica Kinser mentioned that the wording for Goal 4 should be revised to be more consistent with the rest of the goals, which all begin with verbs and are presented as more actionable
 - Kathy Nissen suggested using the word “ensure” for Goal 4
 - A suggestion was made that Goal #2 could be re-ordered to #1 due to its importance.

Update on Public Involvement Activities

- Jeff reminded folks of the public survey; please push this out/advertise through your normal public information mechanisms
- Comment period will be open through May 31st

Next Steps/Adjourn

- The meeting concluded with an overview of outstanding work to be done and next steps on the plan update, involving drafting of an updated HIRA chapter for review and the third and final planning meeting

Marshall County Hazard Mitigation Plan Update Risk and Goals Meeting Chat Log

[4/14 4:58 PM] Johnson, Christopher A was invited to the meeting.

[1:53 PM] Unknown User Kimberly Elder, EMA (Guest) was invited to the meeting.

[1:53 PM] Unknown User Steve Soddors (Guest) was invited to the meeting.

[1:55 PM] Unknown User Shari (Guest) was invited to the meeting.

[1:55 PM] Brislawn, Jeff P

Welcome everyone we will be getting the meeting underway shortly..

[1:56 PM] Unknown User Mary Pothast - Melbourne (Guest) was invited to the meeting.

[1:56 PM] Unknown User Kathy Nissen (Guest) was invited to the meeting.

[1:57 PM] Unknown User "\"\\\"Todd Apfel (Guest)\\\"\\\" was invited to the meeting.

[1:57 PM] Brislawn, Jeff P

Please type your name, title and affiliation in the chat for documentation purposes.

[1:57 PM] Unknown User Pat Thompson (Guest) was invited to the meeting.

[1:58 PM] Unknown User Paul Geilenfeldt (Guest) was invited to the meeting.

[1:59 PM] Unknown User Lori Bearden, City of State Center (Guest) was invited to the meeting.

[1:59 PM] Unknown User Theron Schutte (Guest) was invited to the meeting.

[2:00 PM] Unknown User Gleason, Mike (Guest) was invited to the meeting.

[2:01 PM] Unknown User Accola, Amanda (Guest) was invited to the meeting.

[2:01 PM] Unknown User Bob Ranson (Guest) was invited to the meeting.

[2:01 PM] Unknown User Jessica Kinser (Guest) was invited to the meeting.

[2:02 PM] Unknown User Lampe Hannasch, Kay (Guest) was invited to the meeting.

[2:03 PM] Unknown User CityofHaverhill (Guest) was invited to the meeting.

[2:04 PM] Mary Pothast - Melbourne (Guest)

Mary Pothast, City Clerk - City of Melbourne

[2:04 PM] Unknown User Todd Goulding MCSD (Guest) was invited to the meeting.

[2:05 PM] Unknown User Theron Schutte (Guest) no longer has access to the chat.

[2:05 PM] Steve Soddors (Guest)

Steve Soddors, Mayor State Center

[2:05 PM] Unknown User Theron Schutte (Guest) was invited to the meeting.

[2:05 PM] Kimberly Elder, EMA (Guest)

Kimberly Elder, Coordinator Marshall County Emergency Management

[2:05 PM] Unknown User Mike Tupper (Guest) was invited to the meeting.

[2:05 PM] Jessica Kinser (Guest)

Jessica Kinser, City Administrator, City of Marshalltown

[2:05 PM] Lori Bearden, City of State Center (Guest)

Lori Bearden, City Clerk, City of State Center

[2:05 PM] Pat Thompson (Guest)

Pat Thompson, Marshall County Public Health

[2:05 PM] Todd Goulding MCSD (Guest)
Todd Goulding MCSD

[2:05 PM] Lampe Hannasch, Kay (Guest)
Kay Lampe Hannasch
Sr Safety & Health Manager
Lennox Industries

[2:05 PM] Kathy Nissen (Guest)
Kathy Nissen Gilman Mayor Pro Tem/ Cityb

[2:05 PM] Paul Geilenfeldt (Guest)
Paul Geilenfeldt, Marshall County Engineer

[2:05 PM] CityofHaverhill (Guest)
Jenny Fogle, City Clerk - City of Haverhill

[2:05 PM] "\"\\\"Todd Apfel (Guest)\\\"\\\""
Todd Apfel
Marshall County Zoning/Environmental Health

[2:05 PM] Theron Schutte (Guest)
Theron Schutte, MCSD Superintendent

[2:06 PM] Mike Tupper (Guest)
Mike Tupper, Chief of Police, Marshalltown Police Department

[2:06 PM] Shari (Guest)
Shari Coughenour, Marshall County Administrative Assistant

[2:06 PM] Bob Ranson (Guest)
Bob Ranson, Superintendent, City of Marshalltown Water Pollution Control Plant

[2:06 PM] Accola, Amanda (Guest)
Amanda Accola - Key Account Manager, Alliant Energy

[2:06 PM] Kathy Nissen (Guest)
Kathy Nissen Gilman City Council & Mayor Pro - Tem

[2:07 PM] Gleason, Mike (Guest)
Mike Gleason, Regional Operations Manager, Lennox

[2:08 PM] Unknown User Hart, Justine was invited to the meeting.

[2:14 PM] Kimberly Elder, EMA (Guest)
with the drought, derecho and others I am sure it is higher now.

[2:15 PM] Unknown User James R Nehring (Guest) was invited to the meeting.

[2:28 PM] Steve Soddors (Guest)
you can type on the exposure Type

[2:36 PM] Unknown User City of Le Grand (Guest) was invited to the meeting.

[2:37 PM] Unknown User Theron Schutte (Guest) no longer has access to the chat.
 [2:42 PM] Unknown User CityofHaverhill (Guest) no longer has access to the chat.
 [2:43 PM] Unknown User City of Le Grand2 (Guest) was invited to the meeting.
 [2:43 PM] Unknown User City of Le Grand (Guest) no longer has access to the chat.
 [2:44 PM] Unknown User Lori Bearden, City of State Center (Guest) no longer has access to the chat.
 [2:44 PM] Unknown User Lori Bearden, City of State Center (Guest) was invited to the meeting.
 [2:47 PM] Unknown User City of Le Grand 1 (Guest) was invited to the meeting.
 [2:52 PM] Unknown User City of Haverhill (Guest) was invited to the meeting.
 [3:01 PM] Unknown User Mary Pothast - Melbourne (Guest) no longer has access to the chat.
 [3:04 PM] Unknown User Wendy Witt (Guest) was invited to the meeting.
 [3:05 PM] Unknown User Wendy Witt (Guest) no longer has access to the chat.
 [3:07 PM] Unknown User Wendy Witt (Guest) was invited to the meeting.
 [3:07 PM] Unknown User City of Le Grand2 (Guest) no longer has access to the chat.
 [3:14 PM] Unknown User Lampe Hannasch, Kay (Guest) no longer has access to the chat.
 [3:24 PM] Unknown User Steve Soddors (Guest) no longer has access to the chat.
 [3:25 PM] Unknown User Theron Schutte (Guest) was invited to the meeting.
 [3:26 PM] Unknown User Accola, Amanda (Guest) no longer has access to the chat.
 [3:28 PM] Unknown User "\\\\"Todd Apfel (Guest)\\\\" no longer has access to the chat.
 [3:30 PM] Unknown User City of Haverhill (Guest) no longer has access to the chat.

[3:32 PM] Kathy Nissen (Guest)
 how about using the word "ensure" for #4

[3:36 PM] Kimberly Elder, EMA (Guest)
 Thank you all for participating.
 (1 liked)

[3:41 PM] Lori Bearden, City of State Center (Guest)
 Thank you!

[3:41 PM] Unknown User Theron Schutte (Guest) no longer has access to the chat.

[3:41 PM] Kathy Nissen (Guest)
 Thank You for an informational presentation.

[3:41 PM] Unknown User Lori Bearden, City of State Center (Guest) no longer has access to the chat.
 [3:41 PM] Unknown User Wendy Witt (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Bob Ranson (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Todd Goulding MCSD (Guest) no longer has access to the chat.

[3:42 PM] Gleason, Mike (Guest)
 Thank you! Great presentation!

[3:42 PM] Unknown User Shari (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Kimberly Elder, EMA (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Gleason, Mike (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Kathy Nissen (Guest) no longer has access to the chat.
 [3:42 PM] Unknown User Mike Tupper (Guest) no longer has access to the chat.
 [3:43 PM] Unknown User City of Le Grand 1 (Guest) no longer has access to the chat.
 [3:44 PM] Unknown User Jessica Kinser (Guest) no longer has access to the chat.
 [3:45 PM] Unknown User Pat Thompson (Guest) no longer has access to the chat.
 [3:45 PM] Unknown User Paul Geilenfeldt (Guest) no longer has access to the chat.
 [3:45 PM] Unknown User Hart, Justine and James R Nehring (Guest) no longer have access to the chat.

Meeting ended 1h 57m 3:45 PM

1h 41m

Meeting Recorded by: Johnson, Christopher A

Marshall and Tama County Multi-Jurisdictional Hazard Mitigation Plan Updates Mitigation Strategy Meeting Agenda

Date: Tuesday July 27, 2021
5:00 – 7:00 pm CT

Meeting at: Meskwaki Casino Convention
Center
1504 305th St, Tama, IA 52339

Subject/Purpose

The purpose of the meeting is to jointly discuss the update of the mitigation action strategy for each jurisdiction participating in the Marshall and Tama County Hazard Mitigation Plan updates. This will be an interactive workshop and an opportunity to identify new actions to include in the updated plans.

Attendees: Marshall and Tama Hazard Mitigation Planning Committees and Wood (Consultant)

1. Introductions
2. Brief Review of the Planning Process and Risk Assessment Key Issues
3. Review of updated Goals
4. Review of Mitigation Action Categories and Alternatives
5. Progress on Mitigation Actions
6. Identification of New Mitigation Actions
7. Plan Implementation and Maintenance
8. Next Steps/Questions and Answers

Marshall County Multi-Jurisdictional Hazard Mitigation Plan 2021-2022 Update

Mitigation Strategy Webinar July 27, 2021, 5:00 – 7:00 PM

Introductions and Opening Remarks

This meeting was held in person as a joint meeting between Marshall and Tama Counties for the purpose of updating the mitigation strategies of each county's respective multi-jurisdictional hazard mitigation plan. Jeff Brislawn, Project Manager from Wood Environment and Infrastructure Solutions (Wood) kicked off the webinar and thanked everyone for their participation. Jeff asked attendees to introduce themselves. In total ten individuals from Marshall County and fourteen from Tama County participated in the meeting representing the County departments and participating jurisdictions including municipalities and special districts as well as stakeholders and partner organizations. This summary focuses on the details of the plan update process specifically for Marshall County. A separate summary documents the Tama County details of the mitigation strategy meeting.

Review of the Planning Process and Progress to Date

The FEMA planning process steps were recapped; Wood is currently wrapping up the Risk Assessment process and beginning the mitigation strategy portion. This webinar addressed mitigation strategizing and goal review/development aspects.

The roles of the participating jurisdictions in the HMPC vs. Stakeholders were reviewed, as differentiated under FEMA's eyes. Only the participating jurisdictions, will be specifically addressed in the plan and will be required to meet certain criteria such as attending planning meetings, identifying mitigation actions, and tracking other aspects in order to qualify for funding in the future. While other entities (i.e. everyone else) were key stakeholders that would provide useful input and feedback as well as review the Hazard Mitigation Plan (HMP) drafts.

The progress on the plan update process to date was reviewed. Highlights include:

- Kickoff meeting held March 11th, 2021
- Risk Assessment meeting held May 11th, 2021
- Online Public Survey closed May 31st, 2021
- HIRA Update completed with an HMPC review draft upcoming

Update on Public Involvement Activities/public meeting.

Jeff noted that the online public survey which was sent out had closed on May 31st. Results included responses from 56 respondents. The top five hazards of concern based on this public survey were:

- Severe Winter Storm

- Tornado
- Windstorm
- Human Disease
- Infrastructure Failure

Mitigation Goals and Objectives

The goals from the 2016 Hazard Mitigation Plan were revisited with the group. The group reaffirmed to keep the goals as is and carry them forward in the 2021-2022 Plan Update.

Goals:

- Goal 1: Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.
- Goal 2: Protect the health and safety of Marshall County residents and visitors.
- Goal 3: Educate Marshall County citizens about the dangers of hazards and how they can be prepared.
- Goal 4: Ensure the continuity of county and local operations will not be significantly disrupted by disasters in Marshall County.

Mitigation Actions

Jeff led a discussion on the Mitigation Actions portion of the plan. One way to think of mitigation actions is the four A's:

- Altering a hazard,
- Averting a hazard,
- Avoiding a hazard,
- Adapting to a hazard

FEMA suggests these four categories for mitigation actions:

- Plans and Regulations,
- Structure and Infrastructure Projects,
- Education and Awareness, and
- Natural Systems Protection.

Resources for more details on mitigation action types, categories, and example projects were provided, including a short discussion on climate change and adaptation considerations. Example hazard-specific mitigation projects were discussed including FEMA funding-eligible projects for winter weather, flood, and other hazards.

Review of Progress on Existing Mitigation Actions

Prior to the webinar, a Mitigation Action Tracker was sent to the HMPC listing each jurisdictions' 2017 mitigation actions. Each HMPC representative was asked to provide status to provide comments on the status of each action. The Tracker was emailed again following the webinar to fill in some of the missing statuses, as some jurisdictions had not yet returned the Tracker at the time of the webinar. The mitigation

action statuses are categorized as one of the following: Completed, Continue-In Progress, Not Started and Deleted.

Jurisdictions who had not already done so were asked to return completed action trackers no later than July 31st.

Developing New Mitigation Actions

Each participating jurisdiction is required to develop at least one new action for the 2021-2022 plan update. Ideally, jurisdictions should develop actions that address all the hazards addressed in the plan, or at least the High significance hazards, but FEMA Region VIII does not require this. All jurisdictions that participate in the National Flood Insurance Program (NFIP) will need to have a mitigation action addressing continued NFIP compliance.

A New Mitigation Action worksheet was shared during the meeting and emailed after. Each HMPC member was asked to fill out the worksheet with at least one mitigation action by August 10th.

Next Steps

Jurisdictions:

- Complete and Send Mitigation Tracker July 30th
- Return New Mitigation Action worksheet August 10th
- Convene small or jurisdictional specific groups to discuss mitigation actions as needed.

Wood

- Provide draft of updated HIRA for reference and review.
- HMPC Review Draft Late August 2021
- Public Review Draft September 2021
- Final Plan for State Review September 2021
- FEMA Review November-December 2021
- Final Approved Plan for Local Adoption January 2022

Adjourn

The meeting adjourned at 7:00 pm

SIGN-IN SHEET

MARSHALL COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE

HMPC Meeting #3: Mitigation Strategy Meeting

Tuesday, July 27, 2021 5:00-7:00 PM CT

Meskwaki Casino Convention Center, 1504 305th St, Tama, IA 52339

[illegible]

SIGN-IN SHEET

TAMA COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE

HMPC Meeting #3: Mitigation Strategy Meeting

Tuesday, July 27, 2021 5:00-7:00 PM CT

Meskwaki Casino Convention Center, 1504 305th St, Tama, IA 52339

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SIGN-IN SHEET

TAMA COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE

HMPC Meeting #3: Mitigation Strategy Meeting

Tuesday, July 27, 2021 5:00-7:00 PM CT

Meskwaki Casino Convention Center, 1504 305th St, Tama, IA 52339

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SIGN-IN SHEET

MARSHALL COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE

HMPC Meeting #3: Mitigation Strategy Meeting

Tuesday, July 27, 2021 5:00-7:00 PM CT

Meskwaki Casino Convention Center, 1504 305th St, Tama, IA 52339

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Example Mitigation Actions by FEMA categories with Hazards Identified in the Marshall County Hazard Mitigation Plan Update 2021

Alternative Mitigation Actions	Dam Incident	Floods	Human Hazards: Pandemic; Transportation Incident; HAZMAT; Terrorism; Radiological	Weather Extremes: (drought, hail, lightning, wind and tornado, extreme temps)	Earthquakes	Grass/Wildland Fire	Severe Winter Storm
PLANS and REGULATIONS							
Building codes and enforcement		■		■	■	■	■
Comprehensive Watershed Tax		■					
Density controls	■	■				■	
Design review standards		■			■	■	
Easements		■				■	
Environmental review standards		■			■	■	
Floodplain development regulations	■	■					
Hazard mapping	■	■				■	
Fluvial Hazard Zone mapping and regulations		■					
Floodplain zoning	■	■					
Forest fire fuel reduction						■	
Housing/landlord codes				■			
Slide-prone area/grading/hillside development regulations						■	
Manufactured home guidelines/regulations		■		■	■		
Multi-Jurisdiction Cooperation within watershed	■	■					
Open burning regulations						■	
Open space preservation	■	■				■	
Performance standards	■	■		■	■	■	■
Special use permits	■	■				■	
Stormwater management regulations		■					
Subdivision and development regulations	■	■			■	■	
Surge protectors and lightning protection				■			
Tree Management				■		■	■

Alternative Mitigation Actions	Dam Incident	Floods	Human Hazards: Pandemic; Transportation Incident; HAZMAT; Terrorism; Radiological	Weather Extremes: (drought, hail, lightning, wind and tornado, extreme temps)	Earthquakes	Grass/Wildland Fire	Severe Winter Storm
Transfer of development rights		■				■	
Utility location		■		■		■	■
STRUCTURE AND INFRASTRUCTURE PROJECTS							
Acquisition of hazard prone structures	■	■				■	
Facility inspections/reporting	■	■			■		
Construction of barriers around structures	■	■	■				
Elevation of structures	■	■					
Relocation out of hazard areas	■	■	■			■	
Structural retrofits (e.g., reinforcement, floodproofing, bracing, etc.)		■		■	■	■	■
Channel maintenance		■					
Dams/reservoirs (including maintenance)	■	■					
Levees and floodwalls (including maintenance)		■					
Safe room/shelter				■	■		■
Secondary containment system							
Site reclamation/restoration/revegetation		■					
Snow fences							■
Water supply augmentation				■			
Debris Control		■					
Defensible Space						■	
Stream stabilization		■					
EDUCATION AND AWARENESS							
Flood Insurance	■	■					
Hazard information centers	■	■	■	■	■	■	■
Public education and outreach programs	■	■	■	■	■	■	■
Real estate disclosure	■	■		■	■	■	■
Crop Insurance				■	■		

Alternative Mitigation Actions	Dam Incident	Floods	Human Hazards: Pandemic; Transportation Incident; HAZMAT; Terrorism; Radiological	Weather Extremes: (drought, hail, lightning, wind and tornado, extreme temps)	Earthquakes	Grass/Wildland Fire	Severe Winter Storm
Lightning detectors in public areas				■			
NATURAL SYSTEMS PROTECTION							
Best Management Practices (BMPs)		■		■		■	
Forest and vegetation management	■	■		■		■	■
Hydrological Monitoring	■	■		■			
Sediment and erosion control regulations	■	■					
Stream corridor restoration		■					
Stream dumping regulations		■					
Urban forestry and landscape management		■		■		■	■
Wetlands development regulations		■				■	
EMERGENCY SERVICES							
Critical facilities protection	■	■	■	■	■	■	■
Emergency response services	■	■	■	■	■	■	■
Facility employee safety training programs	■	■	■	■	■	■	■
Hazard threat recognition	■	■	■	■	■	■	■
Hazard warning systems (community sirens, NOAA weather radio)	■	■	■	■	■	■	■
Health and safety maintenance	■	■	■	■	■	■	■
Post-disaster mitigation	■	■		■	■	■	■
Evacuation planning	■	■	■			■	

Mitigation Action Selection and Prioritization Criteria

Does the proposed action protect lives or vulnerable populations?

Does the proposed action address hazards or areas with the highest risk?

Does the proposed action protect critical facilities, infrastructure, or community assets?

Does the proposed action meet multiple objectives (multi-objective management)?

STAPLE/E

Developed by FEMA, this method of applying evaluation criteria enables the planning team to consider in a systematic way the social, technical, administrative, political, legal, economic, and environmental opportunities and constraints of implementing a particular mitigation action. For each action, the HMPC should ask, and consider the answers to, the following questions:

Social

Does the measure treat people fairly (different groups, different generations)? Does it consider social equity, disadvantaged communities, or vulnerable populations?

Technical

Will it work? (Does it solve the problem? Is it feasible?)

Administrative

Is there capacity to implement and manage project?

Political

Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?

Legal

Does your organization have the authority to implement? Is it legal? Are there liability implications?

Economic

Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?

Environmental

Does it comply with environmental regulations or have adverse environmental impacts?

																				Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies:	Mitigation is actions that can be taken to reduce or eliminate the long-term risk to hazards. The following types of mitigation actions may be considered in Marshall County. Please indicate the...	Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters:	Please indicate the community where you live	How long have you lived in this community?
Animal/ Plant/ Crop Disease	Dam/ Levee Failure	Drought	Earthquake	Extreme Heat	Flash Flood	Grass or Wildland Fire	Hazardous Materials Incident	Human Disease	Infrastructure Failure	Radiological Incident	Riverine Flooding	Severe Winter Storm	Terrorism	Thunderstorm/ Lightning/Hail	Tornado	Transportation Incidents	Windstorm	How many times has a natural hazard disrupted your daily life in the last five years?						
Low	Low	Medium	Low	Medium	Medium	Low	Low	Medium	Low	Low	Low	Medium	Medium	High	Medium	Medium	Medium	3-5			Critical Facilities Resiliency;Generators for Critical Facilities;Hazardous tree management;Public health incident preparedness;		City of Marshalltown	Over 10 years
Medium	Low	Medium	Low	Medium	Medium	Medium	Medium	High	High	Low	Medium	High	Low	Medium	High	Medium	High	1-2			Expanded Indoor/Outdoor Warning;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Education and Discounts on Flood Insurance;Improve reliability of communications systems;		City of Marshalltown	5-10 years
High	Low	Low	Low	Low	High	Low	Medium	Low	Medium	Low	High	High	Low	Medium	Medium	High	Medium	1-2		It would be nice if the emergency management committee would get back to mass casualty events outside of active shooter. As we've seen in the past five years, Marshall county is not prepared for natural disaster and from front line experience no one wanted to be in charge for the tornado and I can't believe any one stepped up for the derecho.	Critical Facilities Resiliency;Generators for Critical Facilities;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Evacuation route development;Levees or Levee Improvements;		City of Marshalltown	Over 10 years
High	Medium	High	Low	High	High	High	High	High	High	Low	Medium	High	High	High	High	High	High	3-5			Generators for Critical Facilities;Public Education/Awareness on hazards;Evacuation route development;Public health incident preparedness;Improve reliability of communications systems;Additional snow fences;Hazardous tree management;Stormwater Drainage Improvements;Critical Facilities Resiliency;		City of Marshalltown	Over 10 years

																			Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Stormwater Drainage Improvements;	City of Marshalltown	Over 10 years
Low	Low	Low	Low	Low	Medium	Low	Medium	Medium	Low	Low	High	High	Low	High	High	Low	Medium	3-5	Expanded Indoor/Outdoor Warning;Stormwater Drainage Improvements;Flood Mitigation for residential properties;Water Conservation;Dam safety;Hazardous tree management;	City of Marshalltown	Over 10 years
Medium	Medium	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Low	Medium	High	Medium	1-2	Expanded Indoor/Outdoor Warning;Wildfire/Grass Fire Fuels Treatment projects;Forest Health/Watershed Protection;Evacuation route development;Public health incident preparedness;Improve reliability of communications systems;Lightning protection for critical facilities;Levees or Levee Improvements;Addition	City of State Center	Less than 1 year
Medium	High	High	Medium	High	Low	High	Medium	High	Medium	Medium	Low	High	Medium	Low	Medium	Medium	High	1-2	al snow fences;	City of State Center	Less than 1 year
																			Generators for Critical Facilities;Forest Health/Watershed Protection;Floodprone Property Buyout;Water Conservation;	Unincorporated County	Over 10 years
Low	Low	Low	Low	Low	Medium	Low	Medium	Low	High	Low	Medium	Low	Low	Low	Low	Medium	Low	More than 5 times	Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;	City of Marshalltown	1-5 years
Medium	Low	Low	Low	Medium	Medium	High	Medium	Medium	Low	Low	Medium	High	Medium	High	High	High	High	3-5	Expanded Indoor/Outdoor Warning;Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Generators for Critical Facilities;Public Education/Awareness on hazards;Public health incident preparedness;	Unincorporated County	Over 10 years
Medium	Low	Medium	Low	Medium	Medium	Medium	Low	Medium	Low	Low	Low	High	Low	High	Medium	Low	High	3-5			

																			Tornado Safe Rooms;Critical Facilities Resiliency;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Public health incident preparedness;Lightning protection for critical facilities;			
High	High	High	Low	High	High	Medium	High	High	High	Low	Medium	High	Medium	Medium	High	High	High	3-5	Helping citizens with long power outages. Food, water, power.	Citizen education.	City of Marshalltown	5-10 years
																			All jurisdictions: Ability to get, retain volunteers. Small communities are now what we call "bedroom" communities, people work outside of the communities they sleep in and typically no longer volunteer. We need to be considering a realignment and possibly merging of the volunteer organizations.	Wildfire/Grass Fire Fuels Treatment projects;Tornado Safe Rooms;Critical Facilities Resiliency;Generators for Critical Facilities;Floodprone Property Buyout;Public health incident preparedness;Improve reliability of communications systems;		
Medium	Medium	Medium	Low	Medium	Medium	Medium	High	High	High	Low	Medium	High	Low	Medium	High	Medium	High	3-5			Unincorporated County	Over 10 years
																				Flood mitigation for commercial properties;Lightning protection for critical facilities;Improve reliability of communications systems;Public health incident preparedness;Evacuation route development;Water Conservation;Floodprone Property Buyout;Education and Discounts on Flood Insurance;Forest Health/Watershed Protection;Stormwater Drainage Improvements;Planning /Zoning to avoid impacts to future development;Generators for Critical Facilities		
High	Low	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	Medium	Medium	High	High	High	3-5			City of Marshalltown	Over 10 years
																			Resiliency;Tornado Safe Rooms;Wildfire/Grass			

																			Continued Participation in the National Flood Insurance Program;Planning/Zoning to avoid impacts to future development;Forest Health/Watershed Protection;Stormwater Drainage Improvements;Improve reliability of communications systems;Public health incident preparedness;Lightning protection for critical facilities;Critical Facilities Resiliency;	Strategies that address a critical mass event resulting in catastrophic loss of utilities, communications, transportation, etc. Planning for the worst & including in that plan the phases of recovery will help us move forward without the divisiveness we've seen in addressing SARS-CoV-2/COVID-19.	City of State Center	Over 10 years	
Low	Medium	Medium	Low	Medium	Low	Medium	Medium	High	High	Medium	Low	Medium	Low	Medium	High	Low	Medium	More than 5 times	Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Generators for Critical Facilities;Improve reliability of communications systems;Lightning protection for critical facilities;Hazardous tree management;				
Low	Medium	Low	Low	Low	Low	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Medium	Low	Medium	More than 5 times					City of Marshalltown
																			Tornado, windstorm, flash flooding with Marshalltown. City of Marshalltown. Typically include power outages at Water Pollution Control causing the greatest issue. High water during wet weather events, presents treatment issues also.	Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Stormwater Drainage Improvements;Improve reliability of communications systems;	This is how we make it through hard things.	City of State Center	Over 10 years
Low	Medium	Low	Low	Low	High	Medium	Low	Low	Medium	Low	Medium	Medium	Low	Low	Medium	Low	Medium	3-5					
Low	Low	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium	Low	Medium	High	Medium	Medium	Medium	Medium	Medium	1-2					City of Marshalltown
																			Generators for Critical Facilities;Public Education/Awareness on hazards;Water Conservation;Public health incident preparedness;Improve reliability of communications systems;	Electric system improvements to prevent power loss for long periods.	City of Marshalltown	1-5 years	

																			Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Public health incident preparedness;Improve reliability of communications systems;Flood Mitigation for residential properties;Public Education/Awareness on hazards;Critical Facilities Resiliency;Continued Participation in the National Flood Insurance Program;Expanded Indoor/Outdoor Warning;	Unincorporated County	Over 10 years	
Medium	Medium	Medium	Low	Medium	High	High	Low	High	High	Low	High	High	Medium	Medium	High	Medium	High	3-5	Dangerous buildings as a result of the tornado and derecho.	Tornado Safe Rooms;Expanded Indoor/Outdoor Warning;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Public Education/Awareness on hazards;Education and Discounts on Flood Insurance;Evacuation route development;Improve reliability of communications systems;Hazardous tree management;	City of Marshalltown	Over 10 years
Low	Low	Medium	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium	Medium	Medium	Low	Medium	Medium	Medium	1-2		Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Stormwater Drainage Improvements;Flood Mitigation for residential properties;Evacuation route development;Public health incident preparedness;Improve reliability of communications systems;	City of Marshalltown	Over 10 years
High	Medium	Medium	Low	Medium	Medium	Medium	Medium	Low	Low	Low	Medium	Medium	Low	High	Medium	Medium	Medium	3-5			City of Marshalltown	Over 10 years

																			Flooding, it seems we still have a problem with Hwy 14 flooding several times.	Tornado Safe Rooms;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Evacuation route development;Levees or			Tornado and dercho drills.	City of Marshalltown	Over 10 years
Medium	Medium	Medium	Low	Medium	High	High	Low	Medium	Medium	Low	High	High	Low	High	High	Medium	High	3-5		Levee Improvements;					
																			Critical Facilities Resiliency;Generators for Critical Facilities;Public Education/Awareness on hazards;Water Conservation;Public health incident preparedness;Improve reliability of communications systems;				City of Marshalltown	Over 10 years	
Low	Low	Low	Low	Low	Low	Medium	Low	High	Medium	Low	Low	Medium	Low	High	Medium	Low	Low	1-2							
																			Continued participation in the National Flood Insurance Program;Generators for Critical Facilities;Critical Facilities Resiliency;Planning/Zoning to avoid impacts to future development;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Water Conservation;Hazardous tree management;Lightning protection for critical facilities;Improve reliability of communications systems;Education and Discounts on Flood Insurance;	Hazardous roads, as in pot holes and roads that have become deteriorated.			City of Marshalltown	Over 10 years	
High	Medium	Medium	Low	High	High	High	High	High	High	Low	High	High	Low	High	High	Low	High	3-5							
																			Generators for Critical Facilities;Critical Facilities Resiliency;Tornado Safe Rooms;				City of Marshalltown	Over 10 years	
Low	Low	Medium	Low	Medium	Medium	Medium	Low	Medium	Low	Low	Low	High	Low	High	High	Medium	High	1-2							

																			Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Improve reliability of communications systems;Levees or Levee Improvements;	City of Marshalltown	Over 10 years
Medium	Medium	Medium	Low	Medium	Medium	Medium	Medium	High	Medium	Low	Low	Medium	Medium	Medium	Medium	Medium	Medium	1-2	Making sure immigrants are up on vaccinations... not just covid but required vaccinations such as polio, measles, mumps, rebella		
																			Generators for Critical Facilities;Critical Facilities Resiliency;Public Education/Awareness on hazards;Public health incident preparedness;Hazardous tree management;Planning/Zoning to avoid impacts to future development;	City of Marshalltown	1-5 years
																			Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Education and Discounts on Flood Insurance;Water Conservation;Evacuation route development;Public health incident preparedness;Improve reliability of communications systems;Lightning protection for critical facilities;	City of Marshalltown	Over 10 years
High	High	High	Low	Medium	High	Medium	Medium	Medium	High	Low	Medium	Medium	High	Medium	High	High	High	1-2			
Low	Medium	Medium	Low	Medium	Medium	Medium	Low	Low	Medium	Low	Low	Medium	Low	Medium	Medium	Medium	Medium	3-5			

																				Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Generators for Critical Facilities;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Education and Discounts on Flood Insurance;Floodprone Property Buyout;Water Conservation;Public health incident preparedness;Lightning protection for critical facilities;Additional snow fences;Hazardous tree management;Improve reliability of	City of Melbourne	Over 10 years	
Low	Low	Medium	Low	High	Medium	Medium	Low	Medium	Medium	Low	Low	High	Low	Medium	High	Medium	High	More than 5 times		Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Stormwater Drainage Improvements;Education and Discounts on Flood Insurance;Water Conservation;Public health incident preparedness;Improve reliability of communications systems;	rural flooding county wide and plowing of snow early in the morning for people trying to get to work in rural Marshall county	Southern Hardin County	Over 10 years
Low	High	Low	Low	Low	Medium	Low	Medium	Medium	Medium	Low	Medium	High	Low	Medium	High	Low	High	3-5					
																				Melbourne either cannot or does not use the tornado sirens in event of a tornado/derecho. There's no warning unless I find it while on my phone. More warning would be beneficial out in rural areas. If the sirens do not work, we need to remedy that. Otherwise someone needs access to the fire station to set them off when needed.	City of Marshalltown	Over 10 years	
High	High	High	Low	High	High	High	High	High	High	Medium	High	High	High	High	High	High	High	3-5					

																			Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Critical Facilities Resiliency;Planning/Zoning to avoid impacts to future development;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Flood Mitigation for residential properties;Evacuation route development;Dam safety;Public health incident preparedness;Lightning protection for critical facilities;Levees or		City of Marshalltown	Over 10 years																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Low	High	Low	Low	Medium	High	Medium	Medium	High	High	Low	High	High	High	Medium	High	Medium	Medium	1-2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

																			Derecho, tornado, and flooding in recent years caused a lot of major traffic confusion after initial incidents.	Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Education and Discounts on Flood Insurance;Evacuation route development;		City of Marshalltown	5-10 years
Low	Low	Medium	Low	Low	Medium	Low	Low	Medium	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Low	3-5		Wildfire/Grass Fire Fuels Treatment projects;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Lightning protection for critical facilities;Improve reliability of communications systems;		City of Melbourne	Over 10 years
High	Low	Medium	Low	Medium	Medium	High	Medium	Medium	High	Low	Low	High	Low	Low	High	Medium	High	3-5		Public health incident preparedness;Improve reliability of communications systems;			
Low	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Low	Low	Medium	Low	Medium	Medium	Low	Medium	1-2		N/A		City of Marshalltown	Over 10 years
																				Wildfire/Grass Fire Fuels Treatment projects;Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Public Education/Awareness on hazards;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Education and Discounts on Flood Insurance;Water Conservation;Public health incident preparedness;		City of Marshalltown	Over 10 years
Medium	Medium	High	Low	Medium	Medium	High	Medium	High	Medium	Medium	Medium	Medium	Low	High	High	Medium	High	1-2		Generators for Critical Facilities;Public health incident preparedness;Improve reliability of communications systems;Public Education/Awareness on hazards;	Educate citizens of safety plans following your committee outcomes		
Low	Low	Medium	Low	Medium	Low	High	Medium	Medium	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium	Medium	3-5		Expanded Indoor/Outdoor Warning;Tornado Safe Rooms;Generators for Critical Facilities;Public health incident preparedness;		City of Marshalltown	Over 10 years
Medium	Low	Low	Low	High	Low	Medium	High	High	Medium	Low	Low	High	Medium	Medium	High	Medium	Medium	1-2				City of Marshalltown	Over 10 years
																				Wildfire/Grass Fire Fuels Treatment projects;Generators for Critical Facilities;Public Education/Awareness on hazards;Forest Health/Watershed Protection;		City of Marshalltown	Over 10 years
Low	Medium	Low	Low	Low	Low	High	Medium	Medium	Medium	Low	Low	High	Low	Medium	Medium	High	High	3-5					

																			Expanded Indoor/Outdoor Warning;Generators for Critical Facilities;Water Conservation;Improve reliability of communications systems;Lightning protection for critical facilities;Levees or		City of Marshalltown	Over 10 years
Low	Low	Low	Low	Medium	Low	Medium	Low	Medium	High	Low	Low	Medium	Low	High	Medium	Medium	Medium	3-5	Indoor/Outdoor Warning;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Stormwater Drainage Improvements;Public Education/Awareness on hazards;Planning/Zoning to avoid impacts to future development;Flood Mitigation for residential properties;Water Conservation;Public health incident preparedness;Improve reliability of communications systems;Lightning protection for critical facilities;Levees or	Removal of derecho debris from wooded areas in and around cities to prevent West coast style wild fires.	City of Marshalltown	Over 10 years
Medium	High	High	Low	Medium	High	Medium	High	High	High	Medium	High	High	Medium	High	Medium	High	High	3-5	Generators for Critical Facilities;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Water Conservation;Public health incident preparedness;Additional snow fences;Planning/Zoning to avoid impacts to future development;	Gas line severed in the tornado. Left community without power for weeks.	City of Marshalltown	Over 10 years
Medium	Low	High	Low	Medium	Low	Medium	High	High	Medium	Low	Low	High	High	Medium	High	High	High	More than 5 times	Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Public Education/Awareness on hazards;Floodprone Property Buyout;Public health incident preparedness;Hazardous tree management;		City of Gilman	Over 10 years
Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Medium	Low	Low	Medium	Low	Medium	Medium	Medium	Medium	1-2			City of Marshalltown	Over 10 years

																				Tornado Safe Rooms;Generators for Critical Facilities;Continued Participation in the National Flood Insurance Program;Planning/Zoning to avoid impacts to future development;Forest Health/Watershed Protection;Public health incident preparedness;Improve reliability of communications systems;Hazardous tree management;	Train derailment of hazardous material	City of Marshalltown	Over 10 years
Low	Low	Medium	Low	Low	Low	Medium	Low	Medium	Medium	Low	Medium	Medium	Low	Medium	High	Low	High	1-2		Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Generators for Critical Facilities;Planning/Zoning to avoid impacts to future development;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Education and Discounts on Flood Insurance;Floodprone Property Buyout;Evacuation route development;Public health incident preparedness;Improve reliability of communications systems;Levees or Levee Improvements;Flood Generators for Critical Facilities;Forest Health/Watershed Protection;Public Education/Awareness on hazards;Additional snow fences;Improve reliability of communications systems;			
Low	Low	Low	Low	Low	Medium	Low	High	High	High	Low	Medium	Medium	Low	Low	High	High	High	1-2	Last years derecho showed that even after the tornado 3 years ago, we're still not prepared for a wind event			Unincorporated County	1-5 years
Medium	Low	Medium	Low	High	Medium	Medium	Low	Low	Medium	Low	Low	High	Low	High	High	Medium	High	3-5				City of Gilman	Over 10 years

																			Expanded Indoor/Outdoor Warning;Wildfire/Grass Fire Fuels Treatment projects;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Public Education/Awareness on hazards;Stormwater Drainage Improvements;Flood Mitigation for residential properties;Evacuation route development;Dam safety;Public health incident preparedness;Improve reliability of communications systems;Hazardous tree management;	Flooding and more disease preparedness	Unincorporated County	Over 10 years	
Low	Low	High	Low	High	High	High	High	High	Medium	Low	High	High	Low	High	Medium	High	High	1-2	Derecho tornado wind and hail -Washington township	Expanded Indoor/Outdoor Warning;Continued Participation in the National Flood Insurance Program;Floodprone Property Buyout;Public health incident preparedness;Improve reliability of communications systems;		Unincorporated County	Over 10 years
Low	Medium	Low	Low	Medium	Medium	Medium	Low	Medium	Medium	Low	Low	Medium	Low	Medium	Medium	Low	Low	3-5		Tornado Safe Rooms;Generators for Critical Facilities;Stormwater Drainage Improvements;Lightnin g protection for critical facilities;		City of Marshalltown	Over 10 years
Medium	High	High	Low	Medium	High	High	Medium	High	High	Medium	High	High	Low	High	High	Medium	High	3-5					
Medium	High	High	Low	High	High	High	Medium	Medium	High	Low	Medium	High	Low	High	High	Medium	High	1-2					
																			Expanded Indoor/Outdoor Warning;Continued Participation in the National Flood Insurance Program;Critical Facilities Resiliency;Generators for Critical Facilities;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Water Conservation;Public health incident preparedness;Improve reliability of communications systems;		Unincorporated County	Over 10 years	

																			Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Stormwater Drainage Improvements;Flood Mitigation for residential properties;Public health incident preparedness;Improve reliability of communications systems;	City of Marshalltown	Over 10 years
Medium	High	Medium	Low	High	High	High	Medium	High	Low	Low	High	High	Medium	High	High	High	High	3-5	Generators for Critical Facilities;Critical Facilities Resiliency;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Dam safety;Levees or Levee Improvements;Hazardous tree management;	City of Marshalltown	Over 10 years
Low	Medium	Medium	Low	Medium	Low	Low	Low	Low	High	Low	Low	Medium	Low	Medium	Medium	Low	Medium	3-5	Generators for Critical Facilities;Hazardous tree management;	City of Marshalltown	Over 10 years
Low								Medium								Medium	Medium	1-2	Wildfire/Grass Fire Fuels Treatment projects;Generators for Critical Facilities;Critical Facilities Resiliency;Planning/Zoning to avoid impacts to future development;Forest Health/Watershed Protection;Hazardous tree management;Public health incident preparedness;Water Conservation;Continued Participation in the National Flood Insurance Program;Evacuation route development;Levees or Levee Improvements;Additional snow fences;	City of Marshalltown	Over 10 years
Low	High	High	Low	High	High	High	High	High	High	Medium	High	High	Medium	Medium	High	High	High	3-5	Aging viaducts and bridges countywide and the center street viaduct in Marshalltown.	City of Marshalltown	Over 10 years

Low	High	Low	Low	Low	High	Medium	Medium	Medium	High	Low	High	High	Low	High	Medium	Medium	High	3-5	Expanded Indoor/Outdoor Warning;Wildfire/Grass Fire Fuels Treatment projects;Tornado Safe Rooms;Continued Participation in the National Flood Insurance Program;Generators for Critical Facilities;Stormwater Drainage Improvements;Forest Health/Watershed Protection;Flood Mitigation for residential properties;Improve reliability of communications systems;Lightning protection for critical facilities;Levees or Levee Improvements;Additional snow fences;Hazardous tree management;	City of Marshalltown	5-10 years

Marshall County Multi-Jurisdictional Hazard Mitigation Plan 2021 Update

Public Survey

Background Text

Marshall County in collaboration with 17 participating jurisdictions is updating their Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) pursuant to the five year update cycle requirements of the Disaster Mitigation Act of 2000 and to obtain approval from the Federal Emergency Management Agency (FEMA). This update is a prerequisite to enable the County and participating jurisdictions to remain eligible for federal pre- and post-disaster Hazard Mitigation Assistance grants.

"Hazard Mitigation" is defined as sustained actions taken to reduce or eliminate long-term risk to life and property from hazards. The Marshall County MJHMP update will revisit the County's vulnerabilities to natural, human-health, and human-caused hazards and identify proactive mitigation actions the County, the participating jurisdictions, and stakeholders can take to minimize impacts to people, property, and critical facilities.

The County is leading the effort with assistance from a consultant. Jurisdictions participating in the plan update include: City of Albion, City of Clemens, City of Ferguson, City of Gilman, City of Haverhill, City of Laurel, City of Le Grand, City of Liscomb, City of Marshalltown, City of Melbourne, City of Rhodes, City of St. Anthony, City of State Center, East Marshall Community School District, GMG Community School District, Marshalltown Community School District, and West Marshall Community School District.

Survey Post

Take the Marshall County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update Survey!

Marshall County is in the process of updating their MJHMP. A public survey has been published online as part of this effort. The survey is intended to gauge the public's concern about natural, human-health, and human-caused hazards in the County, identify specific issues, and gauge interest on hazard mitigation options. The survey should only take about 5 minutes to complete. The survey can be found at the link below and will be open through May 31, 2021.

Survey link: <https://bit.ly/2QjAqdo>

Thank you for your participation!

From: [Kimberly D Elder](#)
To: [Keith W. Morgan](#); em@jasperema-hls.org; rgoodenbour@ema.tamacountyiowa.gov; aj.mumm@polkcountyiowa.gov; ema@poweshiekcosherriff.com; roger.carr@grundycountyiowa.gov; tcraigton@hardincountyia.gov
Cc: [Brislawn, Jeff P](#)
Subject: FW: press release
Date: Friday, November 5, 2021 12:18:55 PM
Attachments: [Marshall County HMP 10292021 Draft.pdf](#)
Importance: High

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Please review the attached document and comment in the link below.

Share far and wide, on your social media and websites. Thank you for all your hard work getting to this point.

FOR IMMEDIATE RELEASE

MARSHALL COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE AVAILABLE FOR PUBLIC REVIEW AND COMMENT

October 29, 2021 – Would you like to learn more about what Marshall County is doing to minimize the impacts of severe weather, floods, and other hazards before they occur? A draft of the County's updated Multi-Jurisdictional Hazard Mitigation Plan is being made available for public review and comment. The plan assesses risks posed by natural and human caused hazards, identifies ways to reduce those risks, and allows the County to be eligible for mitigation funding from FEMA. A Hazard Mitigation Planning Committee (HMPC) consisting of representatives from various county departments, the municipalities including Albion, Clemons, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Liscomb, Marshalltown, Melbourne, Rhodes, St. Anthony, State Center, East Marshall Community School District, GMG Marshall Community School District, Marshalltown Community School District and West Marshall Community School District developed the plan update over the past nine months with assistance from a consultant and input from stakeholders and the public. The plan identifies hazard mitigation goals and a variety of mitigation projects with the intent of reducing losses from hazard events before they occur again. The planning committee is now soliciting public comment on the plan before it is finalized and submitted for FEMA review and approval.

The comment period will be October 29th – November 15th, 2021. The plan can be accessed at the website below:

<https://www.facebook.com/groups/317988319687842/permalink/317990563020951/>

or

<https://protectingmarshallcountyiowa.org/wp-content/uploads/2021/11/Marshall-County-HMP-10292021-Draft.pdf>

A link to a comment form can be accessed at the following website:

<https://forms.office.com/r/S7rfxHNA9w>

OPTIONAL: Hardcopies will also be available for review at the Marshall County Emergency

Management office by appointment. For more information, contact: Kimberly Elder, Coordinator 641-754-6385 or kelder@marshallcountyiowa.gov

Kimberly Elder, IA-CEM FFI EMT, Coordinator
Marshall County Emergency Management
2369 Jessup Avenue Floor 3 Admin Bldg.
Marshall County Sheriff's Office
Marshalltown, Iowa 50158

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641-754-6389 (fax)

Like us on Facebook <https://www.facebook.com/marshallcountyiowaemergencymanagement>
Visit us online <https://protectingmarshallcountyiowa.org/>

It wasn't raining when Noah built the ark.

Emergency preparedness is a team sport.

From: Kimberly D Elder <kelder@marshallcountytia.gov>
Sent: Monday, April 19, 2021 2:56 PM
To: Bill T. Patten; Board of Supervisors; Chad Affeldt - Mayor Clemons;
chuckfinders@heartofiowa.net; City Clerk Rhodes - Nancy Youker-Raney;
citymelb@partnercom.net; clerk@legrandiowa.com; Cyril Thill work; Dale
Thompson Ferguson City Mayor; Evan Folk; Haverhill City Clerk; Jay Wyatt;
Jessica Armstrong - City Council Rhodes; Jessica Kinser; Joel Greer; John White
Melbourne Mayor ; Karen Buchanan Gilman City Clerk; Laurel City Clerk;
lisocit@heartofiowa.net; Liscomb Mayor; linsplace@heartofiowa.net;
Madaleine Welton Haverhill City Mayor; Madaleine Welton Haverhill City Mayor
work ; Marshalltown City Clerk; Mayor of Rhodes - Cyril Thill; Richard Irish -
Gilman Mayor; Sam Bryant - St. Anthony Mayor; Shari Coughenour Marshalltown
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Michael Tupper Marshall PD Chief; Mike Ball, Melbourne PD; Anderson,
Superintendent's Office East Marshall; Ben Petty BCLUW GMG Elementary; Edler,
Superintendent's Office West Marshall; J Wyant Marshalltown HS Principal; JC
Large West Marshall; Kristian Einsweiler West Marshall HS; Marshalltown
Christian School; mccinfo@iavalley.edu; P Newbold Marshalltown Schools; St.
Francis School; St. Francis School Marshalltown Office; Theron Schutte; Tony
Ryan East Marshall; Aaron Fairchild; Alliant Energy;
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Coop; Bryan McGlothlin; Charles Piwowarski; Cherelle Hatcher (Koch);
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mkingery@heartlandcoop.com; mlkmar@aim.com; New Century FS - Walls,
Kayla; Nu Star Energy (Valero) (Feil, Bob; Patricia Thompson; Ramiro Pesina
Emerson; Randy Ritsema; rebecca palmer; Rhonda Braudis Marshall County
Communications Center Manager; roads william; Sam Ramsey; steve brant;

Thomas Cappucci; Tim Brown; Todd Apfel; Tom McWilliams work; Tyson Long;
Weary, Troy ; Weilbrenner, Tami alliant
Cc: Brislawn, Jeff P
Subject: RE: Mitigation Plan Survey

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Please replace the link on the old e-mail. It had a fault and was not working. New link is <https://bit.ly/2QjAqdo>

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Thank you for your participation!

Kimberly Elder, CEM FFI EMT, Coordinator
Marshall County Emergency Management
2369 Jessup Avenue Floor 3 Admin Bldg.
Marshall County Sheriff's Office
Marshalltown, Iowa 50158

641-754-6385 (office)
641-754-6389 (fax)

Like us on Facebook <https://www.facebook.com/marshallcountyiowaemergencymanagement>
Visit us online <https://protectingmarshallcountyiowa.org/>

From: Kimberly D Elder

Sent: Monday, April 19, 2021 2:42 PM

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Subject: Mitigation Plan Survey

Please share widely. Thank you.

Marshall County in collaboration with 17 participating jurisdictions is updating their Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) pursuant to the five year update cycle requirements of the Disaster Mitigation Act of 2000 and to obtain approval from the Federal Emergency Management Agency (FEMA). This update is a prerequisite to enable the County and participating jurisdictions to remain eligible for federal pre- and post-disaster Hazard Mitigation Assistance grants.

"Hazard Mitigation" is defined as sustained actions taken to reduce or eliminate long-term risk to life and property from hazards. The Marshall County MJHMP update will revisit the County's vulnerabilities to natural, human-health, and human-caused hazards and identify proactive mitigation actions the County, the participating jurisdictions, and stakeholders can take to minimize impacts to people, property, and critical facilities.

The County is leading the effort with assistance from a consultant. Jurisdictions participating in the plan update include: City of Albion, City of Clemens, City of Ferguson, City of Gilman, City of Haverhill, City of Laurel, City of Le Grand, City of Liscomb, City of Marshalltown, City of Melbourne, City of Rhodes, City of St. Anthony, City of State Center, East Marshall Community School District, GMG Community School District, Marshalltown Community School District, and West Marshall Community School District.

Survey Post

Take the Marshall County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update Survey! Marshall County is in the process of updating their MJHMP. A public survey has been published online as part of this effort. The survey is intended to gauge the public's concern about natural, human-

health, and human-caused hazards in the County, identify specific issues, and gauge interest on hazard mitigation options. The survey should only take about 5 minutes to complete. The survey can be found at the link below and will be open through May 31, 2021.

Survey link: <https://bit.ly/2OE4ShM>

Thank you for your participation!

Kimberly Elder, CEM FFI EMT, Coordinator
Marshall County Emergency Management
2369 Jessup Avenue Floor 3 Admin Bldg.
Marshall County Sheriff's Office
Marshalltown, Iowa 50158

641-754-6385 (office)

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Like us on Facebook <https://www.facebook.com/marshallcountyiowaemergencymanagement>

Visit us online <https://protectingmarshallcountyiowa.org/>

FOR IMMEDIATE RELEASE

MARSHALL COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE AVAILABLE FOR PUBLIC REVIEW AND COMMENT

October 29, 2021 – Would you like to learn more about what Marshall County is doing to minimize the impacts of severe weather, floods, and other hazards before they occur? A draft of the County's updated Multi-Jurisdictional Hazard Mitigation Plan is being made available for public review and comment. The plan assesses risks posed by natural and human caused hazards, identifies ways to reduce those risks, and allows the County to be eligible for mitigation funding from FEMA. A Hazard Mitigation Planning Committee (HMPC) consisting of representatives from various county departments, the municipalities including Albion, Clemons, Ferguson, Gilman, Haverhill, Laurel, Le Grand, Liscomb, Marshalltown, Melbourne, Rhodes, St. Anthony, State Center, East Marshall Community School District, GMG Marshall Community School District, Marshalltown Community School District and West Marshall Community School District developed the plan update over the past nine months with assistance from a consultant and input from stakeholders and the public. The plan identifies hazard mitigation goals and a variety of mitigation projects with the intent of reducing losses from hazard events before they occur again. The planning committee is now soliciting public comment on the plan before it is finalized and submitted for FEMA review and approval.

The comment period will be October 29th – November 15th, 2021. The plan can be accessed at the website below:

<https://www.facebook.com/groups/317988319687842/permalink/317990563020951/>

or

<https://protectingmarshallcountyiowa.org/wp-content/uploads/2021/11/Marshall-County-HMP-10292021-Draft.pdf>

A link to a comment form can be accessed at the following website:

<https://forms.office.com/r/S7rfxHNA9w>

OPTIONAL: Hardcopies will also be available for review at the Marshall County Emergency Management office by appointment. For more information, contact: Kimberly Elder, Coordinator 641-754-6385 or kelder@marshallcountya.gov

Kimberly Elder, IA-CEM FFI EMT, Coordinator
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Visit us online <https://protectingmarshallcountyiowa.org/>



Marshall County Iowa Emergency Management uploaded a file.

November 1 at 2:13 PM · 🌐

FOR IMMEDIATE RELEASE

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This content isn't available right now

When this happens, it's usually because the owner only shared it with a small group of people, changed who can see it or it's been deleted.

Appendix C: Adoption Resolutions

<placeholder for resolutions after FEMA provides approval pending adoption letter>

MODEL RESOLUTION

Resolution # _____

Adopting the Marshall County Multi-Jurisdictional Local Hazard Mitigation Plan

Whereas the (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

Whereas an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas the (Name of Government/District/Organization) fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas the Iowa Homeland Security and Emergency Management Department and the Federal Emergency Management Agency Region VII officials have reviewed the "Marshall County Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Marshall County Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas adoption by the governing body for the (Name of Government/District/Organization) demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan

Whereas adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the "Marshall County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, the (Name of Government/District/Organization) will submit this Adoption Resolution to the Iowa Homeland Security and Emergency Management Department and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Date: _____

Certifying Official: _____