

# **Dubuque County, Iowa**

## **Multi-Jurisdictional Hazard Mitigation Plan**



### **2024 Plan Update**

Developed by Dubuque County with professional assistance from  
East Central Intergovernmental Association, Dubuque, Iowa.

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## SPECIAL THANKS AND ACKNOWLEDGEMENTS

### Dubuque County Hazard Mitigation Planning Committee

Name	Title	Jurisdiction / Stakeholder
Bonz, Beth	City Administrator	City of Asbury
Mauer, Loras	City Clerk	City of Balltown
Sigwarth, Sherri	Mayor	City of Balltown
Mausser, Betty	City Clerk	City of Bankston
Stoffel, Rick	Mayor	City of Bankston
Stoll, Kaitlyn	City Clerk	City of Bernard
Hartke, Danielle	City Clerk	City of Cascade
Kotter, Lisa	City Manager	City of Cascade
Hostert, Matt	City Clerk	City of Centralia
Burbach, Cori	Assistant City Manager	City of Dubuque
Murphy, Mark	Emergency Preparedness/Public Health	City of Dubuque
Wernimont, Wally	Planning Services Director	City of Dubuque
Datisman, Marge	City Clerk	City of Durango
Michel, Mick	City Administrator	City of Dyersville
Berger, Janet	City Clerk	City of Epworth
Ludwig, Kelly	Director of Finance & Development	City of Farley
Chipperfield, Kurt	City Clerk	City of Graf
Maiers, Brian	Mayor	City of Holy Cross
Vonderharr, Amy	City Clerk	City of Holy Cross
Oberbroeckling, Roger	Mayor	City of Luxemburg
Knapp, Mary Ann	City Clerk	City of Rickardsville
Schmitt, Kevin	Mayor	City of Sageville
Smock, Larry	Mayor	City of Worthington
Powers, Rob	Manager of Building & Grounds	Dubuque Community School District
Berger, Tom	EMA Director	Dubuque County
McDonough, Ann	Supervisor	Dubuque County
Raber, Ed	Planning & Development Director	Dubuque County
Weber, Russell	County Engineer	Dubuque County
Bahl, Craig	Executive Director of Facilities and Operations	NICC
Hingtgen, Bob	Building & Grounds Director	Western Dubuque Community School District

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## EXECUTIVE SUMMARY

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The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Dubuque County and participating jurisdictions developed this Multi-Jurisdictional local hazard mitigation plan update to reduce future losses to the County and its communities because of 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 Dubuque County Multi-Jurisdictional Hazard Mitigation Plan covers the following jurisdictions that participated in the planning process and have submitted a resolution adopting the plan:

- Unincorporated County
- Asbury
- Balltown
- Bankston
- Bernard
- Cascade
- Centralia
- Dubuque
- Durango
- Dyersville
- Epworth
- Farley
- Graf
- Holy Cross
- Luxemburg
- New Vienna
- Peosta
- Rickardsville
- Sageville
- Sherrill
- Worthington
- Zwingle
- Dubuque Community School District (DCSD)
- Western Dubuque Community School District (WDCSD)
- Northeast Iowa Community College (NICC)



Dubuque County, the incorporated areas, and public-school districts listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on May 7, 2013 (hereafter referred to as the *2013 Dubuque County Hazard Mitigation Plan*). The plan was updated in 2019 and is again following a similar update format. Therefore, this current planning effort serves to update the previous plan.

The plan update process followed a methodology prescribed by FEMA, which began with the formation of a Hazard Mitigation Planning Committee (HMPC) comprised of representatives from Dubuque County, participating jurisdictions, and stakeholders. The HMPC updated the risk assessment that identified and profiled hazards that pose a risk to the Dubuque 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.

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

- Goal 1: Increase capabilities within Dubuque County entities to mitigate the effects of hazards by enhancing existing or designing and adopting new policies that will reduce damaging effects of hazards.
- Goal 2: Protect the most vulnerable populations, buildings, and critical facilities within Dubuque County through the implementation of cost effective and technically feasible mitigation projects.
- Goal 3: Improve the level of responder, government, business and citizen awareness and preparedness for disasters.
- Goal 4: Develop programs to assure that response agencies, governments, educational institutions, and local businesses can operate during times of disaster.

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.

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## PREREQUISITES

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**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.**

***Note to Reviewers:*** When this plan has been reviewed and approved pending adoption by FEMA Region VII the adoption resolutions will be signed by the participating jurisdictions and added to Appendix D. A model resolution is provided.

All jurisdictions participated in the development of this plan and have adopted the Multi-Jurisdictional plan. Resolutions of Adoptions are included in Appendix D.

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## Model Resolution

Resolution # \_\_\_\_\_

### **Adopting the Dubuque 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 “Dubuque 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 Dubuque 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 “Dubuque 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: \_\_\_\_\_



# 1 INTRODUCTION AND PLANNING PROCESS

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## 1.1 Purpose

Dubuque County and its 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 Dubuque County and the participating jurisdictions eligible for certain federal grant programs, specifically the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grants including the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, 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. According to the *National Institute of Building Sciences'* 2019 report, every \$1 in federal grants invested in mitigation can save up to \$6. Mitigation can:

- Protect public safety and prevent loss of life and injury.
- Build resilience to current and future disaster risks.

- 
- Prevent damage to a community's economic, cultural, and environmental assets.
  - Reduce operational downtime and speed up the recovery of government and business after disasters.
  - Reduce the costs of disaster response and recovery, as well as the exposure to risk for first responders.
  - Help achieve other community goals, such as protecting infrastructure, preserving open space, and boosting economic resilience.

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. Dubuque County and the participating incorporated cities and public-school districts that participated in this plan update developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on February 28, 2019 (hereafter referred to as the *2019 Dubuque County Hazard Mitigation Plan*). Therefore, this current planning effort serves to update the previous plan.

This plan documents the hazard mitigation planning process undertaken by the Dubuque 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 Dubuque County.

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

- |                                 |   |
|---------------------------------|---|
| • Unincorporated Dubuque County | • City of Luxemburg                                 |
| • City of Asbury                | • City of New Vienna                                |
| • City of Balltown              | • City of Peosta                                    |
| • City of Bankston              | • City of Rickardsville                             |
| • City of Bernard               | • City of Sageville                                 |
| • City of Cascade               | • City of Sherrill                                  |
| • City of Centralia             | • City of Worthington                               |
| • City of Dubuque               | • City of Zwingle                                   |
| • City of Durango               | • Dubuque Community School District (DCSD)          |
| • City of Dyersville            | • Northeast Iowa Community College (NICC)           |
| • City of Epworth               | • Western Dubuque Community School District (WDCSD) |
| • City of Farley                |   |
| • City of Graf                  |   |
| • City of Holy Cross            |   |

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.) Additionally, this plan is prepared in accordance with the 2023

While the Disaster Mitigation 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 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 Dubuque 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.

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## 1.3 Plan Organization

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This Dubuque County Multi-Jurisdictional Hazard Mitigation Plan update is organized as follows:

- Executive Summary
- 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 the same general format that was used for the 2019 Dubuque County Hazard Mitigation Plan.

## 1.4 Planning Process

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**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.**

In February 2023, Dubuque County contracted with ECIA to facilitate the update of the Dubuque County Multi-Jurisdictional Local Hazard Mitigation Plan. ECIA'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 Department and FEMA plan reviews.

### 1.1.1 Multi-Jurisdictional Participation

**44 CFR Requirement §201.6(a)(3): Multi-Jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.**

Dubuque County invited the incorporated cities, public school districts, and various other stakeholders in mitigation planning (identified in Appendix B) to participate in the Dubuque County Multi-Jurisdictional Hazard Mitigation Plan update process. The jurisdictions that elected to participate in this plan are listed above in section 1.2. 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 the three HMPC planning meetings by either direct representation or authorized representation;
- Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact their jurisdiction;
- Provide data to describe current capabilities;
- Develop/update mitigation actions (at least one) specific to each jurisdiction;
- Provide comments on plan drafts as requested;
- Inform the public, local officials, and other interested parties about the planning process and provide opportunities for them to comment on the plan; and
- Formally adopt the mitigation plan.

All the jurisdictions listed as official participants in this plan met all these participation requirements. **Table 1.1** shows the representation of each participating jurisdiction at the planning meetings, provision of Data Collection Guides, and update/development of mitigation actions. Sign-in sheets are included in Appendix B: Planning Process Documentation.

**Table 1.1. Jurisdictional Participation in Planning Process**

Jurisdiction	Kick-off Meeting	Planning Meeting #2	Planning Meeting #3	Data Collection Guide	Status of Previous Actions	Mitigation Action Plans
Dubuque County	•	•	•	•	•	•
Asbury	•	•	•	•	•	•
Balltown	•		•	•	•	•
Bankston	•		•	•	•	•
Bernard	•		•	•	•	•
Cascade	•		•	•	•	•
Centralia	•			•	•	•
Dubuque	•	•	•	•	•	•
Durango	•		•	•	•	•
Dyersville	•	•		•	•	•
Epworth	•		•	•	•	•
Farley	•		•	•	•	•

Jurisdiction	Kick-off Meeting	Planning Meeting #2	Planning Meeting #3	Data Collection Guide	Status of Previous Actions	Mitigation Action Plans
Graf	•		•	•	•	•
Holy Cross	•		•	•	•	•
Luxemburg	•	•		•	•	•
New Vienna	•		•	•	•	•
Peosta	•		•	•	•	•
Rickardsville	•	•		•	•	•
Sageville	•	•	•	•	•	•
Sherrill	•	•		•	•	•
Worthington	•	•	•	•	•	•
Zwingle	•			•	•	•
Dubuque CSD	•	•	•	•	•	•
Western Dubuque CSD	•	•	•	•	•	•

### 1.1.2 The Planning Steps

ECIA and Dubuque County worked together to establish the framework and process for this planning effort using FEMA's *Local Mitigation Planning Handbook* (March 2023). 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, ECIA 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 Assistance grants and Community Rating System. **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 2023 *Local Mitigation Planning Handbook* and the 10-step CRS process.

**Table 1.2. Mitigation Planning Process Used to Develop the Dubuque County Multijurisdictional 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 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 conference call and survey review on July 10, 2023. Participants of the meeting included the Dubuque County Emergency Management Coordinator, ECIA Senior Planner and the ECIA Director of Special Programs. The purpose of this meeting was to determine the jurisdictions and other stakeholders that would be invited to participate on the HMPC (Step 1), set tentative planning meeting dates, identify GIS needs and resources, discuss the hazards to be included in the plan update and options for the flood risk assessment methodology, and develop an initial public participation strategy. Detailed meeting minutes are included in Appendix B.

After the initial coordination meeting, a formal kick-off planning email was sent on July 19, 2023 followed by two additional planning meetings held on August 30 and September 18, 2023. A complete list of all representatives of the agencies and organizations that participated on the Dubuque County HMPC is provided in Appendix B.

The HMPC communicated during the planning process with a combination of face-to-face meetings, survey platforms, phone interviews, and email correspondence. The meeting schedule and topics are listed in **Table 1.3**.

**Table 1.3. Schedule of HMPC Meetings**

Meeting	Topic	Date
Informational Meeting	General overview of planning process/requirements and schedule.	July 10, 2023
Kick-off Meeting /Survey Sent	Introduction to DMA, the planning process, hazard identification and public input strategy. Distribution of data collection guide to jurisdictions. Preliminary hazard data. Discussion of compiled GIS data for critical facility inventory.	July 19, 2023
Planning Meeting #2	Review of draft Risk Assessment, update plan goals, instructions to update status of previous mitigation actions	August 30, 2023
Planning Meeting #3	Development of new mitigation actions, mitigation action planning and prioritization. Determine process to monitor, evaluate, and update plan.	September 28, 2023

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During the kick-off meeting ECIA 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. ECIA 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 Dubuque County. The hazard ranking methodology utilized by Iowa Homeland Security and Emergency Management Department in the State Hazard Mitigation Plan was introduced preliminary information was presented for each hazard identified.

Participants were given the ECIA Data Collection Guide 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 Data Collection Guide to ECIA. ECIA integrated this information into the plan, supporting the development 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 kick-off 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. The survey was announced via email to all county supervisors and appropriate personnel, city administrators, managers, clerks, mayors, and councils.

The survey was developed specific to the Dubuque County Mitigation Plan and provided a brief plan summary as well as a questionnaire to capture public and stakeholder input. The survey was made available online as well as in hard copy at the Dubuque County Courthouse, local city halls, and local fire stations. A copy of the survey is provided in Appendix B.

Committee members distributed the survey to members of the public and key stakeholders in their own jurisdiction. In all, 55 surveys were completed.

The survey asked the public and stakeholders to indicate their opinion on the likelihood for each hazard to impact their jurisdiction. They were asked to rate the probability of each hazard profiled in this plan as 1-unlikely, 2-occasional, 3-likely, and 4-highly likely. The summary results of this question are ranked from highest to lowest rounded weighted average and are provided in **Figure 1.1**.

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**Figure 1.1. Survey Results—Probability of Hazards**

Hazard	Unlikely	Occasionally	Likely	Highly Likely	Rounded Weighted Average
Severe Winter Storm	1	11	11	28	3.29
Thunderstorm/Lightning/Hail	2	8	14	27	3.29
Tornado/Windstorm	3	11	13	24	3.14
Extreme Heat	6	18	9	18	2.76
Flash Flood	8	14	11	18	2.76
Drought	5	18	15	13	2.71
Transportation Incident	13	10	14	14	2.57
River Flooding	16	9	11	15	2.49
Hazardous Materials	15	19	10	7	2.18
Human Disease	13	23	9	6	2.16
Grass/Wildland Fire	13	24	10	4	2.10
Infrastructure Failure	18	20	6	7	2.04
Sinkholes	24	17	7	3	1.78
Animal/Plant/Crop Disease	23	21	6	1	1.71
Expansive Soils	30	13	5	3	1.63
Terrorism	37	7	4	3	1.47
Radiological Incident	44	4	2	1	1.22
Dam/Levee Failure	44	7	0	0	1.14
Landslide	46	5	0	0	1.10

Source: SurveyMonkey Results/ECIA, 2023.

The survey also asked the public and stakeholders to indicate their opinion on the potential magnitude of each hazard on their jurisdiction. They were asked to rate the probability of each hazard profiled in this plan as 1-negligible, 2-limited, 3-critical, and 4-catastrophic. The summary results of this question are ranked from highest to lowest weighted rounded average, provided in **Figure 1.2**.

**Figure 1.2. Survey Results—Magnitude of Hazards**

Hazard	Negligible	Limited	Critical	Catastrophic	Rounded Weighted Average
Animal/Plant/Crop Disease	33	13	4	1	1.47
Dam/Levee Failure	30	7	4	10	1.88
Drought	20	21	9	1	1.82
Expansive Soils	34	14	3	0	1.39
Extreme Heat	18	24	6	3	1.88
Flash Flood	11	19	19	2	2.24
Grass/Wildland Fire	26	20	5	0	1.59
Hazardous Materials	19	21	10	1	1.86
Human Disease	14	16	16	5	2.24
Infrastructure Failure	18	18	11	4	2.02
Landslide	37	12	2	0	1.31
Radiological Incident	24	15	4	8	1.92
River Flooding	21	11	19	0	1.96
Severe Winter Storm	9	27	14	1	2.14
Sinkholes	32	17	2	0	1.41
Terrorism	22	11	6	12	2.16
Thunderstorm/Lightning/Hail	12	28	9	2	2.02
Tornado/Windstorm	6	17	19	9	2.61
Transportation Incident	22	15	9	5	1.94

Source: SurveyMonkey Results

The public was also given an opportunity to provide input on the final draft of the complete plan. The entire plan draft was made available on the County's website as a PDF document. In addition, hard copies were made available at the Dubuque County Courthouse and the Epworth City Hall.

Dubuque County announced the availability of the entire final draft plan and the two-week final public comment period on the County website. A copy of the announcement is provided in Appendix B. The final public comment period was from October 15 – November 14, 2023; **X comments were received and incorporated into the final plan.**

The HMPC invited other targeted stakeholders 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. Minor comments were received and incorporated.

***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 numerous organizations whose goals and interests' interface with hazard mitigation in Dubuque County. Coordination with these organizations and other community planning efforts is vital to the success of this plan. Dubuque County invited neighboring counties, other local, state, and federal departments, and agencies as well as institutions of higher learning to the second planning meeting to learn about the hazard mitigation plan update initiative. In addition, the HMPC developed a list of additional stakeholders involved in hazard mitigation activities, to invite by e-mail letter to review and comment on the final draft of the Dubuque County Multi-Jurisdictional Hazard Mitigation Plan prior to submittal to the State and FEMA. The stakeholders that were invited to comment on the final plan draft included in **Table 1.4.**

**Table 1.4. Stakeholder Involvement**

<b>Stakeholder</b>	<b>Type</b>	<b>Provided Data for Risk Assessment</b>	<b>Invited to Comment on Final Draft</b>
Iowa State University, Iowa Flood Center	Academia		X
Clayton County Emergency Management	Adjacent County		X
Jackson County Emergency Management	Adjacent County		X
Jones County Emergency Management	Adjacent County		X
Delaware County Emergency Management	Adjacent County		X
Grant County, Wisconsin Emergency Management	Adjacent County		X
Jo Daviess County, Illinois Emergency Management	Adjacent County		X
Environmental Protection Agency	Federal Agency		X
Federal Emergency Management Agency	Federal Agency		X
National Weather Service	Federal Agency		X
U.S. Army Corps of Engineers	Federal Agency		X
U.S. Geological Survey	Federal Agency		X
East Central Intergovernmental Association	Regional Planning		X
Iowa Department of Agriculture and Land Stewardship	State Agency		X
Iowa Department of Natural Resources	State Agency	X	X
Iowa Homeland Security and Emergency Management	State Agency	X	X

Several additional stakeholder agencies were contacted to obtain data in preparation of the Risk Assessment. This included contact with specific representatives of stakeholder

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agencies, as well as accessing stakeholder data that has been made available to the public via the internet.

### **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 (September 2018);
- Dubuque County Hazard Mitigation Plan (February 2019);
- Iowa Watershed Approach, Bee Branch Watershed Flood Mitigation Project, and Bee Branch Healthy Homes Resiliency Program (BBHHRP);
- National Flood Insurance Program Policy and Loss data;
- Flood Insurance Rate Maps for all of Dubuque County;
- Iowa Department of Natural Resources, Dam Safety Program Inventory of Dams for Dubuque County, available inundation maps;
- National Inventory of Dams
- National Levee Inventory levee protected areas
- Wildland/Urban Interface and Intermix areas from the SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin;
- Various local plans such as Comprehensive Plans, Economic Development Plans, Capital Improvement Plans, etc. For a complete list of local plans that were reviewed and incorporated, see Chapter 2;
- US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics.

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.

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## **Phase 2 Assess Risk (Handbook Task 5)**

### ***Step 4: Assess the Hazard: Identify and Profile Hazards***

ECIA assisted the HMPC in a process to identify the hazards that have impacted or could impact communities in Dubuque County. At the kick-off meeting, the HMPC examined the history of disaster declarations in Dubuque County, the list of hazards considered in the 2018 Iowa State Hazard Mitigation Plan, and the hazards identified in the previous hazard mitigation plan. The committee then worked through this list of all potential hazards that could affect the planning area. They discussed past hazard events, types of damage, and where additional information might be found. The committee identified 19 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 discussed past events and impacts on a county-wide basis to contribute to the risk assessment update. After the kick-off meeting, each jurisdiction completed a Data Collection Guide, including information on previous hazard events in their community. Utilizing the information from the Data Collection Guides as well as existing plans, studies, reports, and technical information as well as information available through internet research and GIS analysis, a profile was developed for each hazard identified. 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 through a combination of several resources. The Dubuque County GIS Department and Assessor's Office provided access to datasets with parcel and building data as well as corporate boundaries, school district boundaries, and other available GIS layers. Population data was obtained from the U.S. Census Bureau. The critical facility inventory was compiled from data layers available from Dubuque County. Methodologies and results of the critical facility analysis are provided in Chapter 3 and Appendix E.

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 since the last plan update and future development trends from data provided by each jurisdiction on the Data Collection Guide as well as data available from the U.S. Census Bureau and obtained from jurisdictions through other planning mechanisms such as Comprehensive Plans and Future Development Plans.

After profiling the hazards that could affect Dubuque County and identifying assets, the HMPC collected information to describe the likely impacts of future hazard events on the participating jurisdictions. For each hazard, there is a discussion regarding future development as well as climate change impacts regarding how vulnerability to that specific hazard might be impacted in the future.

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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, and where sufficient information was available, a variety of methods was used to estimate losses for each profiled hazard. For geographic hazards such as river flooding, dam failure, levee failure, and hazardous materials (fixed facilities) specific assets/areas at risk and loss estimates were determined through GIS analysis. For other hazards such as weather-related hazards, loss estimates were developed based on statistical analysis of historic events. For some human-caused hazards, 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 and the Draft Risk Assessment (Chapter 3) was provided to the HMPC for review and comment. Several comments, corrections, and suggestions were provided to ECIA and incorporated into the risk assessment as appropriate.

## **Phase 3 Develop the Mitigation Plan (Handbook Task 6)**

### ***Step 6: Set Goals***

ECIA 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. As a result, the goals from the *2019 Dubuque County Hazard Mitigation Plan* were reviewed.

The validated goals for this plan update are provided below:

- Goal 1: Increase capabilities within Dubuque County entities to mitigate the effects of hazards by enhancing existing or designing and adopting new policies that will reduce damaging effects of hazards.



- 
- Goal 2: Protect the most vulnerable populations, buildings, and critical facilities within Dubuque County through the implementation of cost effective and technically feasible mitigation projects.
  - Goal 3: Improve the level of responder, government, business and citizen awareness and preparedness for disasters.
  - Goal 4: Develop programs to assure that response agencies, governments, educational institutions, and local businesses can operate during times of disaster.

### ***Step 7: Review Possible Activities***

At meeting #2, a handout of previous actions was provided to all jurisdictions with instructions to provide updates for each action. 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. The focus of Meeting #3 was to update the mitigation strategy by discussing relevant new actions considered necessary as a result of the updated risk assessment. The HMPC reviewed the following: plan goals, previous actions from the 2019 plan, key issues from the risk assessment, Iowa Homeland Security and Emergency Management's HMA funding priorities, public opinion survey results on types of actions desired, and FEMA's Mitigation Action Ideas publication.

The group discussed the types of mitigation actions/projects that could be done by the jurisdictions in Dubuque County. Consideration was given to the analysis results provided in the risk assessment and the anticipated success for each project type. Projects relating to emergency response were discussed, but participants were encouraged to focus on long-term mitigation solutions since response-related mitigation actions occur on a routine basis as requirements of other plans. Complex projects that would necessitate use of large numbers of county resources were also discussed. This opportunity to discuss a broad range of mitigation alternatives allowed the jurisdictions to understand the overall priorities of the committee and to allow for discussion of the types of projects most beneficial to each jurisdiction. As part of this discussion, consideration was given to the potential cost of each project in relation to the anticipated future cost savings.

The jurisdictions were also provided instructions for completing the Mitigation Action Plan for each continuing and newly developed action. A modified form of the STAPLEE prioritization tool was also provided to assist jurisdictions in determining the prioritization that should be assigned to each action. To provide a current, comprehensive, and consistent prioritization approach, all continuing and new actions were evaluated using the modified STAPLEE prioritization tool for the plan update. The details from the Action Plan for each Continuing and New action are provided in Chapter 4. The completed and deleted actions are provided in Appendix C. Chapter 4 provides additional details regarding the process undertaken to refine the mitigation strategy to make Dubuque County and its jurisdictions more disaster resistant.

### ***Step 8: Draft an Action Plan***

A complete draft of the plan was made available online and in hard copy for review and comment by the public, other agencies and interested stakeholders. This review period

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was from November 1 – 15, 2023. 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. Comments were integrated into a final draft for submittal to the Iowa Homeland Security and Emergency Management Division and FEMA.

## **Phase 4 Implement the Plan and Monitor Progress**

### ***Step 9: Adopt the Plan (Handbook Task 8)***

To secure buy-in and officially implement the plan, the governing bodies of each participating jurisdiction adopted the plan. Scanned copies of resolutions of adoption are included in Appendix D 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 strategy is described in Chapter 5, Plan Maintenance Process.

## 2 PLANNING AREA PROFILE AND CAPABILITIES

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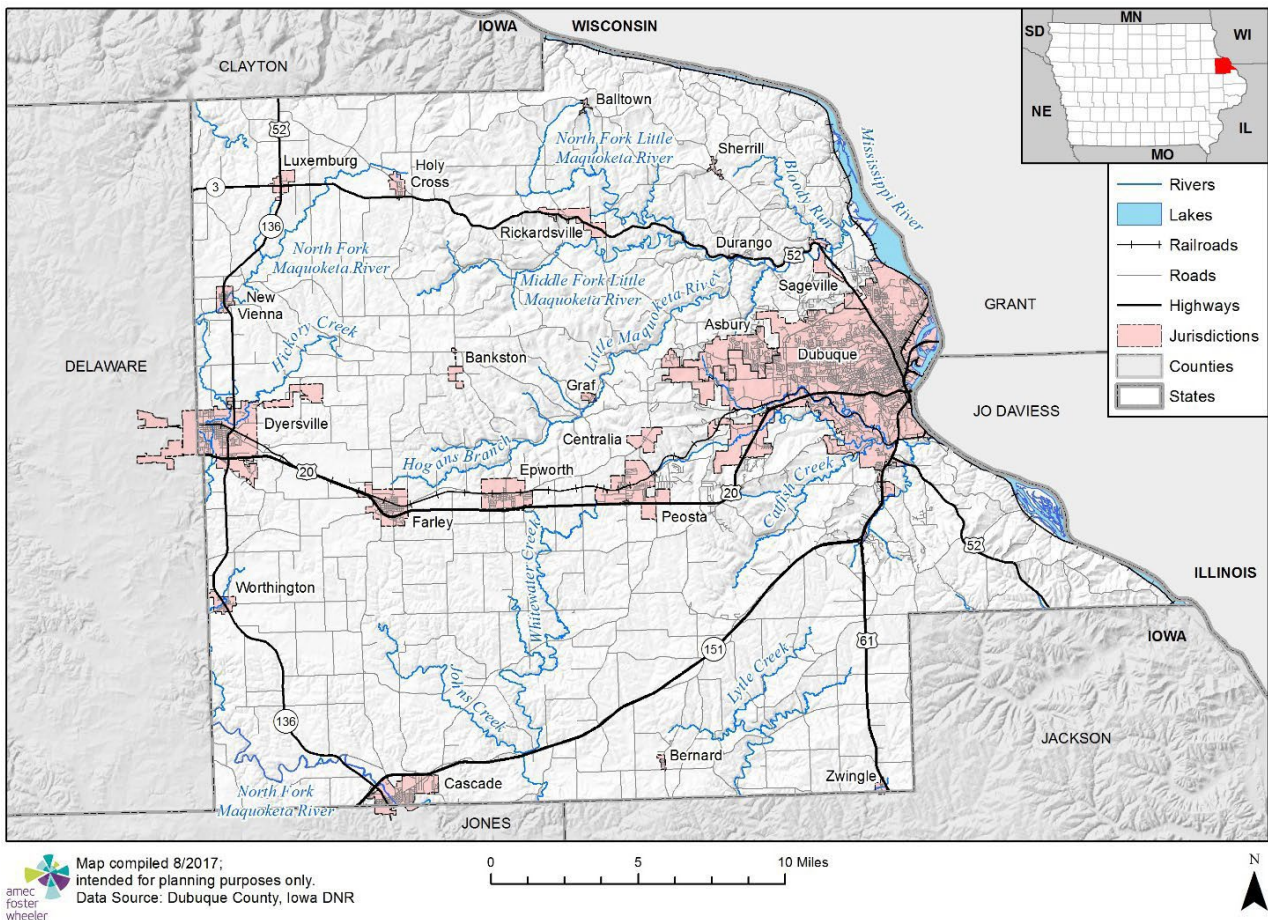
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This chapter provides a general profile of Dubuque County, followed by individual sections for each participating jurisdiction. The sections for each jurisdiction provide an overview profile as well as details on existing capabilities, plans, and programs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

## 2.1 Dubuque County Planning Area Profile

**Figure 2.1** provides a map of the Dubuque County planning area. The planning area boundaries include the unincorporated areas of Dubuque County as well as the following incorporated cities: Asbury, Balltown, Bankston, Bernard, Cascade, Centralia, Dubuque, Durango, Dyersville, Epworth, Farley, Graf, Holy Cross, Luxemburg, New Vienna, Peosta, Rickardsville, Sageville, Sherrill, Worthington, and Zwingle. The following school districts that participated in development of this plan are also included in the planning area: Dubuque Public School District and Western Dubuque Public School District. The school districts are discussed separately in **Section 2.3**.

**Figure 2.1. Dubuque County Planning Area**



### 2.1.1 Geography and Topography

Dubuque County is in the northeastern part of Iowa, where the borders of Iowa, Wisconsin, and Illinois meet, separated by the Mississippi River. The County is bordered by Jackson and Jones counties on the south, Delaware County on the west, and Clayton County on the north. The County contains a land area of 617 square miles, or 391,680 acres. The County has 17 townships and 21 incorporated cities, the most incorporated cities of any other county in Iowa.

The county seat is Dubuque, Iowa, which is located along the Mississippi River in the east-central portion of the county. Eastern Dubuque County is markedly different from the western portion in that its topography is very uneven. The city of Dubuque and surrounding areas adjacent to the Mississippi River have many steep hills, bluffs, and ravines. Also, the eastern portion is more heavily wooded than the west, which is mostly rolling farmland.

Dubuque County is widely known for its impressive bluffs along the Mississippi River, which run along the entire length of the county's riverbanks. These form part of Iowa's Coulee Region, otherwise known as the Driftless Area.

Adjacent counties:

- Clayton County (north)
- Grant County, Wisconsin (northeast), across the Mississippi River
- Jo Daviess County, Illinois (east), across the Mississippi River
- Jackson County (southeast)
- Jones County (southwest)
- Delaware County (west)

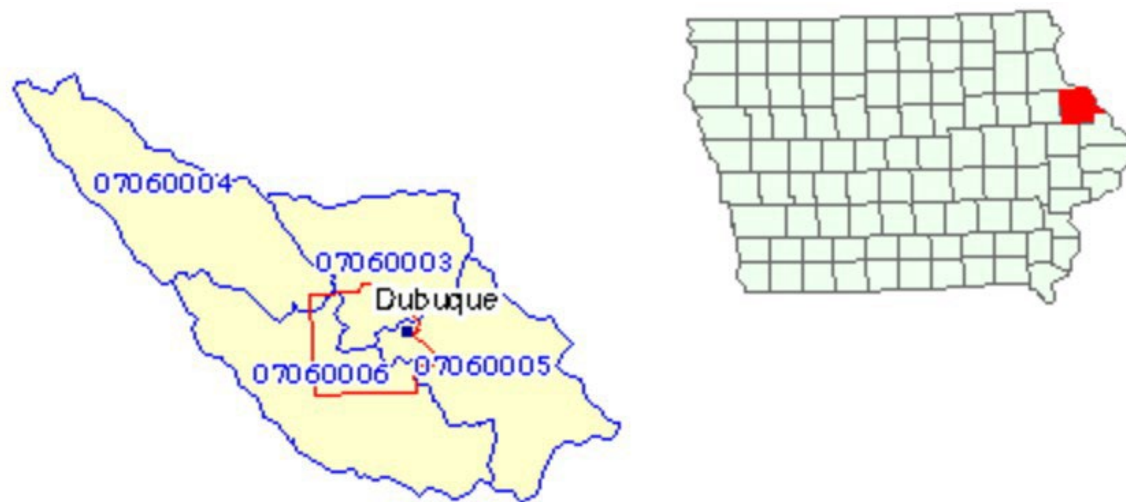
## **2.1.2 Major Rivers and Watersheds**

The four major watersheds in Dubuque County are Grant-Little Maquoketa, Turkey, Apple-Plum, and Maquoketa. Major rivers in Dubuque include Mississippi River; Catfish Creek; South Fork, Middle Fork, and North Fork Catfish Creek; Little Maquoketa River.

There are four hydrologic unit codes level 8, or HUC-8, watersheds that Dubuque County crosses (see **Figure 2.2**):

- Grant-Little Maquoketa, 0706003
- Turkey, 0706004
- Apple-Plum, 07060005
- Maquoketa, 07060006

**Figure 2.2. Dubuque County Major Watersheds Map**



Source: EPA Surf Your Watershed Website,  
[https://cfpub.epa.gov/surf/county.cfm?fips\\_code=19061](https://cfpub.epa.gov/surf/county.cfm?fips_code=19061)

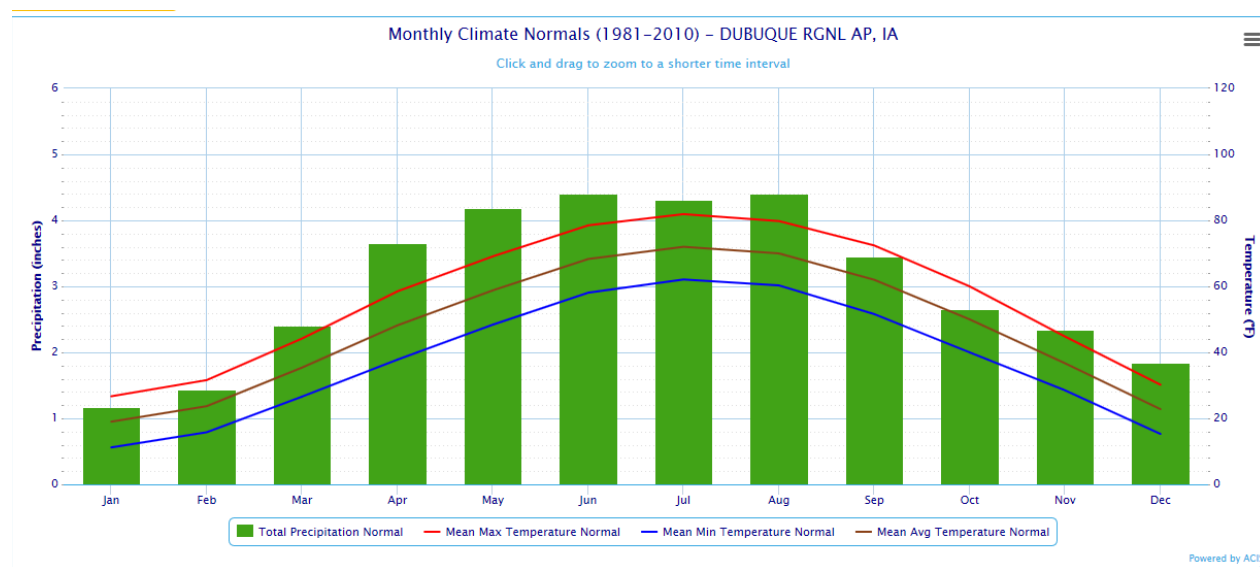
### 2.1.3 History

Dubuque County is coterminous with the Dubuque, Iowa Metropolitan Statistical Area, and is the seventh largest county by population in the state. It is named for Julien Dubuque, the first European settler of Iowa. It is one of Iowa's two original counties along with Des Moines County; both were organized by the Michigan Territorial legislature in 1834. The city of Dubuque, the county seat, was chartered in 1833 as the first city in Iowa.

### 2.1.4 Climate

Dubuque County, like the entire state of Iowa, is within the humid continental zone. The mean temperature of the county in the summer months is 70.1 degrees Fahrenheit and 21.8 degrees Fahrenheit in the winter. Seasons fluctuate from being very wet to very dry, and temperatures can fluctuate greatly in spring and autumn months. Average annual precipitation is approximately 36 inches. **Figure 2.3** and **Table 2.1** provide monthly climate normals for Dubuque, Iowa from 1981 to 2010.

**Figure 2.3. Monthly Climate Normals (1981-2010), Dubuque Regional Airport, IA**



Source: High Plains Regional Climate Center, <http://www.hprcc.unl.edu/onlineataservices.php#data> (ACIS-CLIMOD)

**Table 2.1. Monthly Climate Normals (1981-2010), Dubuque Regional Airport, IA**

Month	Total Precipitation Normal (inches)	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	1.32	26.5	11.1	18.8
February	1.57	30.9	15.0	22.9
March	2.25	44.1	26.3	35.2
April	4.06	57.7	37.2	47.4
May	4.30	69.2	48.5	58.8
June	5.19	78.5	58.6	68.5
July	4.80	81.5	62.0	71.7
August	3.95	79.6	60.0	69.8
September	3.82	72.9	51.8	62.3
October	2.93	59.9	39.9	49.9
November	2.21	44.8	28.1	36.4
December	1.80	31.8	17.2	24.5
Annual	38.20	56.4	38.0	47.2

Source: High Plains Regional Climate Center, <http://www.hprcc.unl.edu/onlineataservices.php#data> (ACIS-CLIMOD)

## 2.1.5 Population/Demographics

The 2020 population of Dubuque County was 99,266. This was an 11.36% increase from the 2000 census population of 89,143. **Table 2.2** provides the populations for each city, the unincorporated county, and the State of Iowa for 2000, 2010, and 2020 with the number and percent change from 2000 to 2020. The unincorporated areas population was determined by subtracting the populations of the incorporated areas from the overall county population.

**Table 2.2. Dubuque County Population 2000 – 2020 by City**

<b>Jurisdiction</b>	<b>2000 Population</b>	<b>2010 Population</b>	<b>2020 Population</b>	<b># Change 2000-2020</b>	<b>% Change 2000-2020</b>
Asbury	2,450	4,170	5,943	3,493	142.57%
Balltown	73	68	79	6	8.22%
Bankston	27	25	23	-4	-14.81%
Bernard	97	112	114	17	17.53%
Cascade	1,958	2,159	2,386	428	21.86%
Centralia	101	134	116	15	14.85%
Dubuque	57,686	57,637	59,667	1,981	3.43%
Durango	24	22	10	-14	-58.33%
Dyersville	4,035	4,058	4,477	442	10.95%
Epworth	1,428	1,860	2,023	595	41.67%
Farley	1,334	1,537	1,766	432	32.38%
Graf	73	79	76	3	4.11%
Holy Cross	339	374	356	17	5.01%
Luxemburg	246	240	245	-1	-0.41%
New Vienna	400	407	382	-18	-4.50%
Peosta	651	1,377	1,908	1,257	193.09%
Rickardsville	191	182	202	11	5.76%
Sageville	203	122	95	-108	-53.20%
Sherrill	186	177	189	3	1.61%
Worthington	381	401	382	1	0.26%
Zwingle	100	91	84	-16	-16.00%
Dubuque County	89,143	93,653	99,266	10,123	11.36%
Iowa	2,926,324	3,046,355	3,190,369	264,045	9.02%

Source: U.S. Census Bureau, Iowa State Data Center.

According to the 2022 U.S. Census Bureau Quick Facts for Dubuque County, 5.9 percent of the population is under age 5 and 19.5 percent of the population is over age 65 in Dubuque County. There are fewer children under age five and more people over the age of 65 since 2015. In the 2022 Quick Facts, there were 39,534 households with an average household size of 2.40 people.

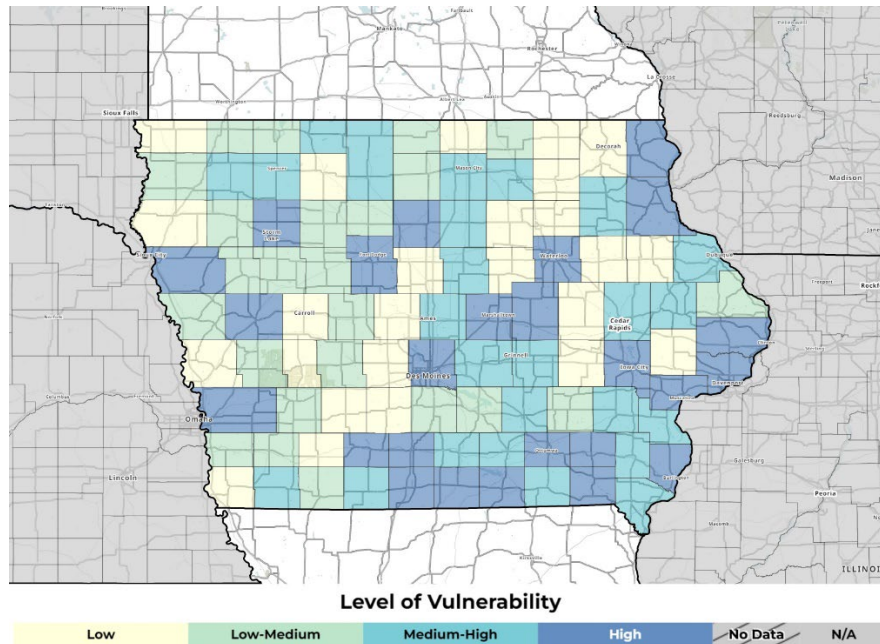
The Hazards and Vulnerability Research Institute at the University of South Carolina developed the Social Vulnerability Index (SoVI ®) to evaluate and rank the ability to respond to, cope with, recover from, and adapt to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. The CDC/ATSDR Social Vulnerability Index (CDC/ATSDR SVI 2020) County Map depicts the social vulnerability of communities, at census tract level within a specified county. The index synthesizes 30 socioeconomic variables, which the research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI ®



data sources include primarily those from the United States Census Bureau.

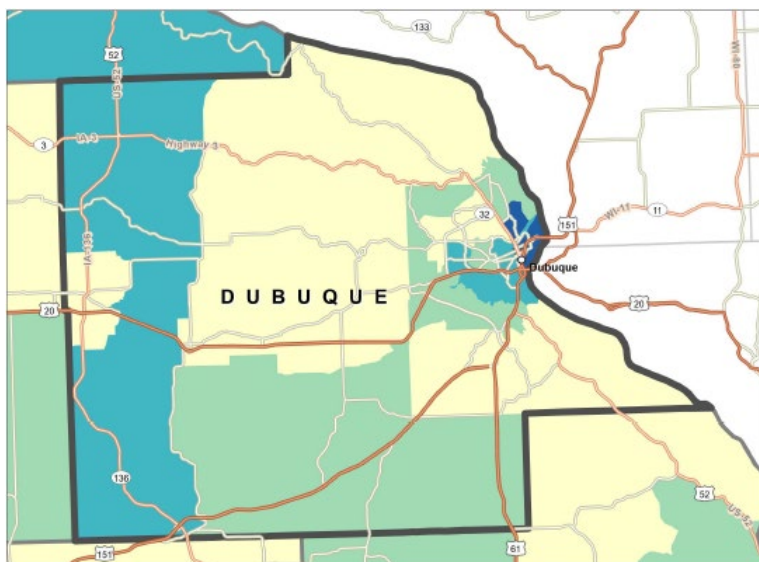
**Figure 2.4a** shows that Dubuque County has a Medium-High Social Vulnerability Index, which indicates that Dubuque County populations will probably need help to recover from disasters. Further, when the data is broken down to census tracts within the county, we see greater variability. In the oldest section of the City of Dubuque, the SVI is in the highest category, and therefore, the most vulnerable.

**Figure 2.4a CDC/ATSDR Iowa Statewide SVI Comparison 2020**



Source: CDC/ATSDR Social Vulnerability Index

**Figure 2.4b CDC/ATSDR Social Vulnerability Index 2020 – Dubuque County, Iowa**



Source: CDC/ATSDR Social Vulnerability Index, [https://www.atsdr.cdc.gov/placeandhealth/svi/interactive\\_map.html](https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html)

Dubuque County values in Table 2.3 are for all of Dubuque County, including the incorporated cities. The percentage of people below poverty level remains less at the County level than at the State level, but several communities are considerably higher than the State or overall County poverty levels. Cascade, Centralia, Dubuque, Sageville, Worthington, and Zwingle are all above the County and State averages, while Worthington is also above the County average.

**Table 2.3. Unemployment, Income, and Poverty Demographics, Dubuque County, Iowa**

Jurisdiction	Civilian Labor Force - Percent Unemployed	Median Household Income (\$)	Percentage of People Below Poverty Level	Population 16 Years and Over
Asbury	2.1%	\$101,818	2.9%	4,036
Balltown	0.0%	\$83,750	0.0%	34
Bankston	**	**	**	**
Bernard	0.0%	\$56,250	0.7%	116
Cascade	1.0%	\$69,737	16.8%	1,529
Centralia	1.0%	\$65,417.000	13.1%	98
Dubuque	3.3%	\$58,691.000	12.3%	48,904
Durango	0.0%	\$91,250.000	0.0%	9
Dyersville	2.1%	\$66,081.000	3.7%	3,434
Epworth	1%	\$61,208.000	5.0%	1,393
Farley	2.5%	\$81,736.000	5.0%	1,298
Graf	0.0%	\$48,750.000	4.4%	36
Holy Cross	0.4%	\$68,889.000	2.6%	257
Luxemburg	0.0%	\$73,438.000	4.9%	165
New Vienna	1.1%	\$80,625.000	4.3%	364
Peosta	1.3%	\$94,438.000	6.9%	1,553
Rickardsville	0.0%	\$83,750.000	3.0%	151
Sageville	1.7%	\$61,250.000	11.4%	58
Sherrill	2.5%	\$84,167.000	4.9%	157
Worthington	1.1%	\$65,313.000	10.6%	270
Zwingle	5.6%	\$51,786.000	29.2%	72
Dubuque County	2.7%	\$68,198.000	9.3%	78,928
Iowa	2.6%	\$65,429.000	11.0%	2,523,649
	2017-2021 ACS	2017-2021 ACS	2017-2021 ACS	2017-2021 ACS

Source: U.S. Census Bureau 2017-2021, American Community Survey

## 2.1.6 Occupations

**Table 2.4** provides occupation statistics for the incorporated cities and the county for the civilian employed population 16 years and over as of the 2020 U.S. Census.

**Table 2.4. Occupation Statistics, Dubuque County, Iowa**

Jurisdiction	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Asbury	54.2%	12.6%	19.6%	2.7%	10.8%
Balltown	15.0%	5.0%	20.0%	30.0%	30.0%
Bankston	0.0%	0.0%	0.0%	0.0%	100.0%
Bernard	25.3%	21.2%	14.1%	10.1%	29.3%
Cascade	28.0%	15.6%	19.1%	12.7%	24.7%
Centralia	32.9%	12.7%	16.5%	5.1%	32.9%
Dubuque	36.8%	17.7%	22.7%	5.2%	17.6%
Durango	0.0%	50.0%	33.3%	0.0%	16.7%
Dyersville	23.5%	8.8%	29.2%	13.6%	24.9%
Epworth	26.0%	18.6%	27.0%	10.3%	18.1%
Farley	33.3%	18.6%	14.9%	11.2%	22.0%
Graf	32.0%	12.0%	8.0%	40.0%	8.0%
Holy Cross	29.0%	15.5%	18.7%	21.2%	15.5%
Luxemburg	36.1%	8.2%	20.6%	14.4%	20.6%
New Vienna	20.1%	19.0%	16.1%	9.5%	35.2%
Peosta	39.9%	12.5%	21.8%	9.7%	16.1%
Rickardsville	27.2%	1.9%	23.3%	30.1%	17.5%
Sageville	56.3%	21.9%	18.8%	3.1%	0.0%
Sherrill	33.0%	16.5%	17.4%	9.6%	23.5%
Worthington	20.8%	11.5%	16.4%	13.1%	38.3%
Zwingle	17.9%	1.8%	16.1%	25.0%	39.3%
Dubuque County	36.7%	17.0%	21.9%	8.3%	16.1%
Iowa	39.0%	14.8%	19.7%	9.7%	16.8%

Source: U.S. Census

[https://data.census.gov/table?t=Occupation&q=040XX00US19\\_050XX00US19061\\_160XX00US1903160,1904375,1904510,1906085,1911305,1912630,1922395,1922935,1923115,1925725,1926760,1931845,1936885,1947460,1956550,1962130,1966810,1969690,1972660,1987060,1987690](https://data.census.gov/table?t=Occupation&q=040XX00US19_050XX00US19061_160XX00US1903160,1904375,1904510,1906085,1911305,1912630,1922395,1922935,1923115,1925725,1926760,1931845,1936885,1947460,1956550,1962130,1966810,1969690,1972660,1987060,1987690)

## 2.1.7 Agriculture

Because of the fertility of the soils in Dubuque County and the climate conditions, agricultural crops and livestock are important contributors to the economy of Dubuque County.

According to the 2017 Census of Agriculture there were 1,402 farms in the County (down 60 from 2012), covering 313,476 acres of land (up 8% since 2012). Crop (82% of farmland) and livestock production (7%) 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. Farms on average were 224 acres, representing a 12% increase from 2012. Family farms account for 96% of farms in Iowa, and of the 2,448 total producers in Iowa, 2,445 are White.

County agriculture and economy contributions are summarized in additional detail in Section 3.2.2 of Chapter 3.

## 2.1.8 FEMA Hazard Mitigation Assistance Grants in Planning Area

Since 2004, nearly \$9.5 million in Hazard Mitigation Assistance grants has been awarded to subgrantees in Dubuque County. **Table 2.5** provides details on the previous FEMA Hazard Mitigation Assistance grants in the planning area.

**Table 2.5. FEMA HMA Grants in Dubuque County from 1993-2024**

Project Type	Sub applicant	Closeout Date	Total Cost
Property Acquisition	City of Dyersville	Open Now	\$250,000
Generator	City of Dubuque		\$24,718
Property Acquisition	City of Dyersville	8/17/2015	\$2,616,374
Property Acquisition	City of Sageville	4/9/2015	\$1,517,536
Property Acquisition	Dubuque County	9/2/2014	\$740,229
Property Acquisition	City of Dubuque	7/1/2014	\$274,279
Generator	City of Bernard	1/6/2014	\$49,412
Tornado Safe Room	Western Dubuque	9/11/2013	\$989,354
Infrastructure	City of Dubuque	2/1/2013	\$1,914,249
Property Acquisition	City of Dyersville	3/25/2005	\$676,126
Property Acquisition	City of Dubuque	1/21/2005	\$268,795
Property Acquisition	City of Sageville	1/21/2005	\$121,498
Property Acquisition	City of Dyersville	4/19/2004	\$138,776
Property Acquisition	City of Dubuque	3/15/2004	\$118,585
Property Acquisition	City of Dyersville	3/15/2004	\$53,991
<b>Total</b>			<b>\$9,753,922</b>

Source: Iowa Homeland Security and Emergency Management Department.

## 2.1.9 Iowa Watershed Approach – Flood Resilience Program

The Bee Branch Watershed that encompasses parts of Dubuque County is included in the Flood Resilience Program under the Iowa Watershed Approach (IWA). Dubuque's 6.5 square mile Bee Branch Watershed drains to the Bee Branch Creek and is located entirely within the city limits of Dubuque. This watershed area includes the city's most developed areas where over 50% of Dubuque residents either live or work. The watershed encompasses historic neighborhoods offering some of the community's most affordable workforce housing. This area is also hit hardest by flash flooding during significant rain events with much more than "just a

little water in the basement.”

In January 2016, the U.S. Department of Housing and Urban Development (HUD) announced an award of nearly \$97 Million to the state of Iowa for its proposal titled, *The Iowa Watershed Approach for Urban and Rural Resilience*. The award was made under HUD’s National Disaster Resilience Competition designed to fund cutting-edge projects that address unmet needs from past disasters while addressing the vulnerabilities that could put Americans in harm’s way during future disasters.

The Iowa Watershed Approach (IWA) represents a program through which Iowans are working together to address factors that contribute to floods. This approach is consistent with other statewide programs in Iowa to reduce flooding and improve water quality, such as the Iowa Flood Mitigation Program and the Iowa Nutrient Reduction Strategy.

Nine distinct watersheds representing different Iowa landforms will serve as project sites for the IWA. Each will form a Watershed Management Authority, develop a hydrologic assessment and watershed plan, and implement projects in the upper watershed to reduce the magnitude of downstream flooding and to improve water quality during and after flood events. Flood resilience programs will be implemented in each watershed to help increase community resilience to future floods. The nine project watersheds are:

- Upper Iowa River Watershed—includes a portion of Howard County
- Upper Wapsipinicon River Watershed—includes a portion of Howard County
- Bee Branch Creek (Dubuque) Watershed
- Middle Cedar River Watershed
- Clear Creek Watershed
- English River Watershed
- North Raccoon River Watershed
- East Nishnabotna River Watershed
- West Nishnabotna River Watershed

The IWA will accomplish six specific goals in each watershed: 1) reduce flood risk; 2) improve water quality; 3) increase flood resilience; 4) engage stakeholders through collaboration and outreach/education; 5) improve quality of life and health, especially for susceptible populations; and 6) develop a program that is scalable and replicable throughout the Midwest and the United States.

Through the IWA Flood Resilience Program, a Flood Resilience Action Plan will be created for each watershed about how to prepare, mitigate, respond, and recover from flood events. This will help communities qualify for disaster mitigation funding during the 5-year project as well as recurring planning efforts required by the federal government.

No one organization in Iowa has the capacity to implement the entire IWA program. Thus, IWA’s success is dependent on the collaboration of many partners who helped to conceptualize the program and the many more who will help to develop and implement its many components. Funded partners and their roles or expertise include:

- Iowa Economic Development Authority: Direct recipient of the HUD grant funds and overall program administration
- Homeland Security and Emergency Management: Aid in outreach and education activities for public resilience programs and development of planning documents and technical assistance
- City of Dubuque: Implementation of watershed projects and Healthy Homes program in the Bee Branch
- University of Iowa: Program lead for watershed projects implementation and monitoring (water quantity and quality), resilience programming, and assessment
- Iowa State University: IWA outreach programming and monitoring of watershed projects success (soil erosion and transportation)
- University of Northern Iowa: IWA outreach programming
- Iowa Department of Natural Resources: Direct resource to watersheds for formation of watershed management authorities and capacity building
- Iowa Department of Agriculture and Land Stewardship: Direct resource to watersheds for assistance with implementing watershed projects.
- Cities of Coralville and Storm Lake: Implementation of built projects in their cities
- Benton, Buena Vista, Fremont, Iowa, Johnson, Mills, Winneshiek, and Howard Counties: Fiscal agents for the work in their respective watersheds.

### **Dubuque/Bee Branch Watershed Approach Details**

The Bee Branch Creek Watershed experienced significant flooding from stormwater during heavy rain events, including six Presidential Disaster Declarations since 1999. Many homeowners experienced flooding on such a regular basis that they had fallen behind on repairs, suffered from chronic mold and mildew problems, and live with residual structural issues. The Bee Branch Healthy Homes Resiliency Program (BBHHRP) will provide support and resources for residential properties to make repairs and implement onsite stormwater management principles. The BBHHRP will improve housing conditions and make homes more resilient to future flooding. The Bee Branch Healthy Homes BBHH) Resiliency Program includes \$8.4 million in the form of 5-year forgivable loans to improve 320 housing units, including owner-occupied homes, single-unit rentals, and small, multi-family residential units. Funds will be awarded to properties where low- to moderate- income residents reside and used to make repairs and renovations to decrease environmental health and safety issues from flooding.

In addition to the BBHHRP, the Bee Branch Watershed will also include infrastructure improvements in the watershed that will help to mitigate flood damage including storm sewer capacity improvements and tunneling culverts through a railroad right-of-way to complete the restoration of the Bee Branch Creek. This project consists of several infrastructure improvements that will reduce the volume of stormwater, slow the rate of stormwater through the upper watershed, increase the safe conveyance of stormwater through the flood-prone area, and provide floodwater protection to the City's water treatment plant on Hawthorne Street.

In December 2013, the project was awarded \$98.5 million from the Iowa Flood Mitigation Board in the form of state sales tax increment financing spread over the next 20 years. This is the



largest amount ever awarded to the City of Dubuque and will enable the City to issue debt to implement the comprehensive flood mitigation plan much sooner than previously anticipated at a lower cost to Dubuque citizens and businesses.

In January 2016, the U.S. Department of Housing and Urban Development (HUD) awarded the City of Dubuque \$31.5 million in disaster resiliency funds for the Bee Branch Healthy Homes Resiliency Program and stormwater infrastructure improvements. When combined with other state and federal grants and local donations, the City has received \$160 million to help fund the \$219 million project. Additional funding sources are being explored.

Project Lead: City of Dubuque

The timeline for this program ran from the award in 2016 through 2021. For more information, see <https://www.iihr.uiowa.edu/iwa/>

As recently as September 2023, improvements in the Bee Branch continue. A \$7.7 million grant from the U.S. Economic Development Administration will go toward the nearly \$30 million needed to complete a project that includes the replacement of a more-than-50-year-old flood pumping station at the 16<sup>th</sup> Street detention basin, the construction of new floodgates and updates to the flood-control system's electrical infrastructure. The project aims to further reduce the risk of flooding for the nearly 1,400 properties in the Bee Branch Watershed as part of a \$250 million initiative to improve Dubuque's flood resiliency.



The area near the bottom of the Bee Branch Creek near the intersection of Kaufmann Avenue and 22<sup>nd</sup> Street saw some of the worst flooding prior to the project.



The Bee Branch as of 2023.

## 2.1.10 Dubuque County Major Highways

U.S. Highway 20 crosses east west generally parallel to the south border. U.S. Highways 61 and 151, running north south, enter from the south and cross the Mississippi on the east. U.S. Highway 52 enters from the south near the Mississippi and runs northwest through the county. State Highway 136 runs north and south close to the western border. Numerous paved county roads connect all the incorporated cities and unincorporated villages throughout the county.

- U.S. Highway 20
- U.S. Highway 52
- U.S. Highway 61
- U.S. Highway 151
- Iowa Highway 3
- Iowa Highway 32
- Iowa Highway 136

Additional details of transportation systems in Dubuque County are provided in Section 3.5.19, Transportation Incident.



## **2.2 City/County Capabilities**

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Unincorporated Dubuque County is governed by a three-member Board of Supervisors. Each incorporated city is governed by a five-member Mayor/City Council. Dubuque County has an active Emergency Management Commission that coordinates emergency management capabilities in the County. Dubuque County participates in the Emergency Notification System (CCENS), part of the Alert Iowa system contracted with WENS Inspiron. All jurisdictions within the County can utilize this service.

### **2.2.1.1 Unincorporated Dubuque County**

#### **Description**

The unincorporated areas of Dubuque County are primarily agriculturally based. The topography varies through the County and the associated land capabilities drive the type of farm-based enterprises that operate in each location.

Numerous major U.S. and state highways run through Dubuque County. The City of Dubuque is the major hub for the four-lane US Highway 20 that runs east west through Dubuque County extending into Iowa and Illinois. Four-lane US Highway 61 extends north and south from the City of Dubuque, extending into Wisconsin on the north and to the Quad Cities and beyond to the south. Four-lane U.S. Highway 151 extends from the City of Dubuque and into Wisconsin on the north and to Cedar Rapids and beyond to the southwest. U.S. Highway 52 runs north-south generally following the Mississippi River and extending north from Dubuque County through Iowa into Minnesota and to the south through Bellevue and Sabula before entering Illinois.

#### **Land Use and Development**

Dubuque County contains a land area of 617 square miles, or 391,680 acres. The County has 17 townships and 21 incorporated cities. The City of Dubuque is the county seat and is located on the east edge of the county along the west bank of the Mississippi River. Dubuque County is ranked as the seventh most populated county in Iowa.

There are three four-lane highways that provide access into the county: US Highway 20, US Highway 151, and U.S. Highway 61 South. Additionally, there are two main two-lane highways that provide access into and around the county: U.S. Highway 52 and Iowa Highway 136 which is on the west end of the county. These five highways provide access to three-quarters of the cities in the County. The Dubuque Regional Airport is in the County, south of the City of Dubuque. It is accessed by U.S. Highway 61 South and recently underwent a \$40 million renovation for a new terminal and access road.

There are seven county parks, six preserves and one state park and one preserve in the County. The County also operates one golf course and maintains 26 miles of a hike and bike

trail called Heritage Trail that was part of an abandoned railroad right of way. Flooding occurs frequently in the County and affects mostly farm fields, roads, and bridges, including bridges along the Heritage Trail. These floods can be very costly so some of the old railroad bridges along Heritage Trail have been replaced by newer designs that allow the water to flow more freely and reduce flood damage.

### **Agricultural Land Use**

The County's primary land use is agricultural and is found throughout the unincorporated areas of the County. The topography ranges from gently undulating relief in the southwest portion of the County, to hilly and steep relief in the north and eastern portions of the County. Along the Mississippi River and its tributaries, the topography is very steep and rugged, with high limestone bluffs and outcrops. Much of this area containing the steep terrain is heavily wooded. The steep landscape has restricted development and farming activities to some extent. About 20% of the single-family homes that have recently been built in the County have been placed on agricultural land.

### **Residential Land Use**

Residential development in the County's unincorporated areas have generally occurred according to previously established development patterns and most recently is following the Future Land Use Development Map. Residential uses are primarily located near incorporated cities, along major highway and roadway corridors and are found in clusters up and down the Mississippi River. Most of the new residential growth in the County is occurring within 2-4 miles of the City of Dubuque and near the larger cities in the county, such as Cascade, Dyersville, Epworth, Farley and one of the fastest growing cities in the state, Peosta.

### **Commercial Land Use**

Commercial development is located mostly along the highway corridors with most of the commercial uses found along U.S. Highways 151 and 61 south from the City of Dubuque to the Airport, along U.S. Highway 20 from the Dubuque City limits to Peosta and along U.S. Highway 52 from the City of Dubuque to Mud Lake Road.

### **Industrial Land Use**

Industrial uses in Dubuque County are primarily located in three areas around the City of Dubuque. The first area is to the south along Highways 52, 151 and 61. New development is occurring in Tamarak Park and near the airport. Another industrial area is located west of the City of Dubuque along Highway 20. This area is mostly developed from the Dubuque city limits to Peosta. The third area is along Highway 52 North in the Couler Valley and Little Maquoketa River outlet to the Mississippi River. John Deere Dubuque is located just outside the flood plain of the Little Maquoketa River.

Both the South and West commercial and industrial corridors have been affected by the recent opening of the four-lane highway, the Southwest Arterial that connects U.S. Highways 151/61 and U.S. Highway 20. Residential, commercial, and industrial development is occurring from the city limits on the southwest side of the City of Dubuque to beyond the Southwest Arterial,

and on the north side of U.S. Highway 20, where the SW Arterial become Seippel Road. This change in land use has been noted in the Future Land Use Development Map.

## **Comprehensive Land Use Development Plan and Map**

Dubuque County's Comprehensive Land Use Development Plan and Map is the community's guide to future development of the unincorporated areas of Dubuque County. The development plan and map guide development decisions made by the Board of Supervisors. The Comprehensive Land Use Development Plan is not an ordinance. It contains the long-range goals and objectives for the County that were compiled after several public meetings and hearings to determine a community vision for the future of Dubuque County.

The first Comprehensive Plan for the County was adopted on January 21, 1969, and was updated and readopted on September 23, 2002. The Comprehensive Plan was updated again in 2011-2012 to incorporate the 10 Smart Planning Principles and 13 Comprehensive Planning Elements adopted by the State of Iowa during their last legislative session. This update aimed to further protect property in the County from flood hazards.

The elements of the current Comprehensive Plan include:

- Planning and Land Use Development
- Natural, Environmental and Resource Management
- Public Facilities and Services
- Transportation
- Future Land Use Development Map

## **Land Use & Development Reported by Jurisdictions 2019 – 2023**

- City of Dubuque
  - 2019 - Annexations Resolution 101-19: 28.5 acres of land west of English Mill Road, south of Southwest Arterial, and north of English Ridge subdivision.
  - 2019 – Annexations Resolution 210-19: 108.0 acres of land
- City of Dyersville
  - Field of Dreams annexation, residential development, Field of Dreams development and Phase 3 of Industrial Park.
- City of Epworth
  - Development south of Highway 20, both residential and commercial
- City of Farley
  - No annexations since 2019, but the Wildcat Subdivision with 25 residential lots was developed. About 50% have homes on lots. Some businesses have expanded, and there are still lots available in the industrial park.
- City of Luxemburg
  - Phase 3 of city residential development and development of commercial area.
- City of Peosta
  - 144 acres annexed east of Thunder Valley Road. And a 40-acre development along Highway 20, west of Cox Springs Road.
- City of Worthington
  - Currently working with subdivision development located in the NW corner of the city

on eight acres.

**Table 2.6** provides summary capability information for the unincorporated county and incorporated cities.

**Table 2.6. Mitigation Capabilities This Is ready but needs to be proofed.**

	County	Asbury	Bankston	Balltown	Bernard	Cascade	Centralia	Dubuque	Durango	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle
<b>Planning Capabilities</b>																						
How many Full Time employees?	450	20	0			14		599			5	6	0	0	1	1	17	0	0	0	2	0
Comprehensive Plan	X	X				X		X		X	X	X		X	X		X					
Capital Improvement Plan	X	X						X		X		X		X	X		X				X	
Local Emergency Plan		x						X		X	X			X	X		X					
County Emergency Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Local Recovery Plan																						
County Recovery Plan	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X
Local Mitigation Plan								X			X			X	X		X					
County Mitigation Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Debris Management Plan										X							X					
Economic Development Plan						X		X		X							X					
Transportation Plan	X	X						X		X							X					
Land-use Plan	X	X				X		X		X	X						X					
Flood Mitigation Assistance (FMA) Plan																						
Watershed Plan	X	X						X		X							X					
Firewise or other fire mitigation plan			X							X							X					
Critical Facilities Plan (Mitigation/Response/Recovery)		X								X	X						X	X				
<b>Policies/Ordinance</b>																						
Zoning Ordinance	X	X				X		X		X	X	X	X	X	X		X	X	X	X	X	

	County	Asbury	Bankston	Balltown	Bernard	Cascade	Centralia	Dubuque	Durango	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle
Building Code						X		X						X	X		X	X	X	X	X	
Floodplain Ordinance	X	X				X		X		X	X		X	X	X	X	X	X	X	X	X	
Subdvision Ordinance	X	X				X		X		X	X	X	X	X	X	X	X	X	X		X	
Tree Trimming Ordinance		X				X		X		X	X			X			X					
Nuisance Ordinance	X	X				X		X		X	X	X	X	X	X	X	X	X	X	X	X	
Storm Water Ordinance	X	X				X		X			X	X		X	X		X					
Drainage Ordinance	X	X				X		X			X	X		X								
Site Plan Review Requirement	X	X				X		X		X	X	X		X	X		X					
Historic Preservation Ordinance	X							X														
Landscape Ordinance								X		X							X					
Iowa Wetlands and Riparian Areas Conservation Plan Program								X														
Zoning /Land Use Restriction	X	X						X		X	X	X	X	X	X	X	X	X	X	X	X	
Codes Building Site/Design		X						X						X	X	X	X	X	X	X	X	
National Flood Insurance Program (NFIP) Participant	X							X		X	X	X	X	X	X	X		X	X	X	X	
Hazard Awareness Program																						
National Weather Service (NWS) Storm Ready	X																					
Building Code Effectiveness (BCEGS)								X									X					
ISO Fire Rating		X				X		X		X	X	X		X	X	X	X					
Economic Development Program		X				X		X		X		X					X					
Land Use Program	X	X						X		X	X			X	X		X					
Public Education/Awareness	X	X				X		X		X	X						X					
Property Acquisition	X	X						X		X							X					

	County	Asbury	Bankston	Baltown	Bernard	Cascade	Centralia	Dubuque	Durango	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle
Planning/Zoning Boards	X	X				X		X		X	X	X		X	X		X					
Stream Maintenance Program	X	X						X		X												
Tree Trimming Program						X		X		X							X					
Engineering Studies for Streams (Local/County/Regional)	X	X						X		X							X					
Mutual Aid Agreements	X	X				X		X		X	X	X	X	X	X	X	X	X	X	X	X	
<b>Studies/Reports/Maps</b>																						
Hazard Analysis/Risk Assessment (Local)														X								
Hazard Analysis/Risk Assessment (County)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Flood Insurance Maps	X	X						X		X	X	X	X	X	X	X	X	X	X	X	X	
FEMA Flood Insurance Study (Detailed)	X							X		X					X							
Evacuation Route Map	X									X												
Critical Facilities Inventory	X	X						X		X	X						X	X			X	
Vulnerable Population Inventory								X														
Land Use Map	X	X						X		X	X						X					
<b>Staff/Department</b>																						
Bulding Code Official		X				X		X									X					
Building Inspector		X				X		X									X				X	
Mapping Specialist (GIS)	X	X				X		X						X	X							
Engineer	X	X				X		X		X												
Development Planner	X					X		X														
Public Works Official	X	X				X		X		X	X	X		X	X	X	X	X		X	X	
Emergency Management Coordinator	X							X		X	X				X							
Bomb and/or Arson Squad																						

	County	Asbury	Bankston	Balltown	Bernard	Cascade	Centralia	Dubuque	Durango	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle
Emergency Response Team	X	X				X		X		X	X						X					
Hazardous Materials Expert								X														
Fire Department						X		X		X	X	X		X	X	X	X			X	X	
Law Enforcement	X	X	X			X		X		X	X	X										
County Emergency Management Commission	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sanitation Department					X	X	X															
Transportation Department																						
Economic Development Department																						
Housing Department																						
Planning Consultant																						
Regional Planning Agencies	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Historic Preservation								X														
American Red Cross								X														
Salvation Army		X						X														
Veterans Groups	X	X						X														
Environmental Organization	X				X			X														
Homeowner Associations		X						X														
Neighborhood Associations		X						X														
Chamber of Commerce	X	X				X		X														
Community Organizations (Lions, Kiwanis, etc.	X	X	X	X		X		X														
<b>Financial Resources</b>																						
Apply for Community Development Block Grants	X		X		X		X	X	X													



	County	Asbury	Bankston	Balltown	Bernard	Cascade	Centralia	Dubuque	Durango	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle
Fund projects through Capital Improvements funding	X	X	X		X		X	X														
Authority to levy taxes for specific purposes	X	X	X	X	X		X	X														
Fees for water, sewer, gas, or electric services	X	X	X	X	X		X	X														
Impact fees for new development	X		X		X		X	X														
Incur debt through general obligation bonds	X	X	X		X		X	X														
Incur debt through special tax bonds	X	X	X		X		X	X														
Incur debt through private activities	X		X		X		X	X														
Withhold spending in hazard prone areas	X		X				X	X														

**Table 2.9. Additional Jurisdictional Capabilities**

Jurisdiction	Mitigation-related Public Education Programs	Mitigation Programs	Tornado Safe Rooms
Dyersville	Volunteer Flood Buy-out Program, Tree Maintenance Program	HMGP Buyout, Tree Maintenance	Yes – Western Dubuque at Dyersville Elementary School (located in Delaware County)
Farley			At city hall
Peosta	Tree Maintenance Program		

Source: Data Collection Guides completed by each jurisdiction – 2023

## 2.3 Public School District Profiles and Mitigation Capabilities

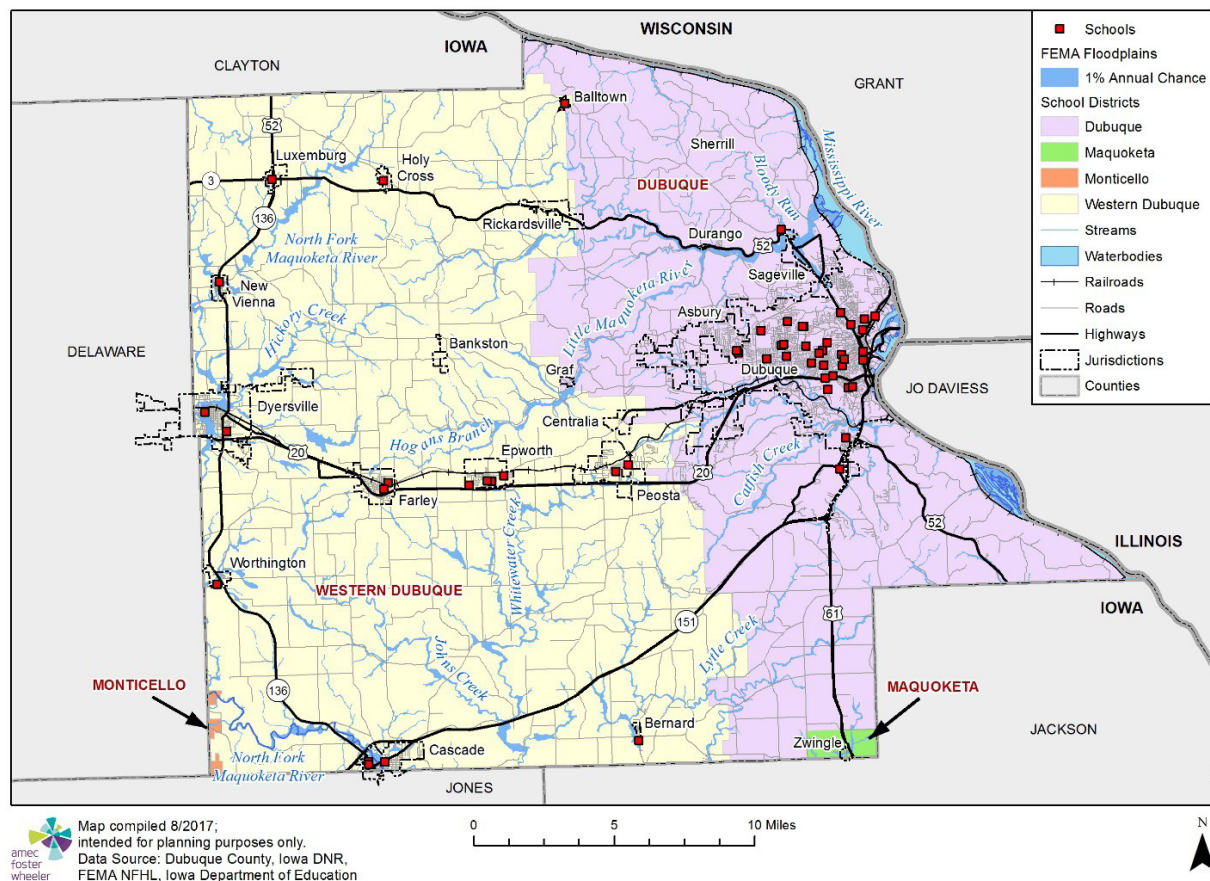
This section includes general profile information for two Dubuque County school districts. The school districts with buildings in the planning area are as follows.

- Dubuque Public School District
- Western Dubuque Public School District

Portions of other school district boundaries may extend into Dubuque County from adjacent counties. However, there are no buildings associated with these school districts in Dubuque County.

**Figure 2.5** provides the boundaries of the school districts in Dubuque County and **Table 2.10** provides location and enrollment information for each school district.

**Figure 2.5. Dubuque County, Iowa Public School Districts**



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**Table 2.10. Dubuque County School Buildings and Enrollment Data, 2015-2016**

<b>School</b>	<b>Total Enrollment</b>
<b>Dubuque</b>	<b>10512</b>
ABC Learning Preschool	22
Audubon Elementary School	281
Bryant Elementary School	314
Carver Elementary School	535
Dubuque Child Care Center	9
Dubuque Online School	208
Dubuque Senior High School	1435
Eisenhower Elementary School	566
Eleanor Roosevelt Middle School	1093
Frog Hollow Kid Campus Preschool	14
George Washington Middle School	624
Grand View Methodist Preschool	9
Hempstead High School	1584
Hills & Dales Preschool	9
Holy Ghost Preschool	38
Hoover Elementary School	303
Irving Elementary School	418
John Kennedy Elementary School	541
Key West ECC	26
Lincoln Elementary School	255
Little Leaps Learning Preschool	21
Marshall Elementary School	330
Mercy Child Development Center	35
Mini Masterpieces Preschool	13
Noah's Ark Preschool	19
Our Lady of Guadalupe Early Childhood Center	40
Our Redeemer Preschool	24
Prescott Elementary School	370
Resurrection Preschool	58
Sageville Elementary School	293
St Joseph The Worker Preschool	33
St. Columbkille Preschool	35
Table Mound Elementary School	415
Thomas Jefferson Middle School	459
University of Dubuque Child Care Center	16
Y Creative Learning Ctr	7
Young Uns Children Ctr	60

<b>Western Dubuque</b>	<b>3743</b>
Aquin Preschool	20
Cascade Elementary School	282
Cascade Junior-Senior High School	395
Drexler Middle School	655
Dyersville Elementary School	334
Epworth Elementary School	388
Farley Elementary School	266
LaSalle Catholic School Preschool	14
NICC Child Development Center	11
Peosta Elementary School	389
Seton Catholic Preschool	31
St. Xavier Preschool	38
Western Dubuque High School	920

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](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 2.11** provides a summary of the reported capabilities for each participating school district

**Table 2.11. Summary of Mitigation Capabilities, Dubuque County Public School Districts**

<b>Capability</b>	<b>Dubuque School District</b>	<b>Western Dubuque School District</b>
<b>Planning Elements</b>		
Master Plan	Yes	Yes
Capital Improvement Plan	Yes	Yes
School Emergency Plan	Yes	Yes
<b>Personnel Resources</b>		
Full-time building official (i.e., principal)	Yes	Yes
Emergency Manager	Yes	Yes
Grant Writer	Yes	Yes
Public Information Officer	Yes	Yes
<b>Financial Resources</b>		
Capital Improvements project funding	Yes	Yes
Local funds	Yes	Yes
General obligation bonds	Yes	Yes
Special Tax bonds	Yes	Yes

Capability	Dubuque School District	Western Dubuque School District
Planning Elements		
Private activities/donations	Yes	Yes
State and federal funds	Yes	Yes
NOAA Weather Radios	Yes	Yes
Tornado Shelter/Saferoom	Yes	Yes
Anticipated Enrollment Increase Next 5 Years	No	No

Source: Data Collection Guides completed by School Officials.



## 3 RISK ASSESSMENT

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**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 Dubuque 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 Dubuque County and participating jurisdictions followed the methodology described in the 2023 FEMA *Local Mitigation Planning Handbook*, which includes a five-step process:

- Step 1—Identify Hazards
- Step 2 — Describe Hazards
- Step 2—Identify Assets
- Step 3—Analyze Impacts
- Step 4—Summarize Vulnerability

This chapter is divided into six main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and the methodology utilized to score or rank the hazards;
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk;
- **Section 3.3 Development Since 2019 Plan Update** discusses what changes in development have occurred since the previous Hazard Mitigation Plan;
- **Section 3.4 Future Land Use and Development** discusses areas of planned future development;
- **Section 3.5 Hazard Profiles and Vulnerability** for each hazard, this section is divided into two parts: 1) Hazard Profile discusses the threat to the planning area, the geographic location/extent at risk, previous occurrences of hazard events and probability of future occurrence; and 2) Vulnerability Assessment further discusses specific assets at risk as well as loss estimates. Specifically, where data is available, this section defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards with estimates of potential losses to those assets, where possible;
- **Section 3.6 Hazard Analysis Summary** provides a tabular summary of the hazard ranking for each jurisdiction in the planning area.



## 3.1 Hazard Identification

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**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 hazards identified for this plan update are listed below in alphabetical order

- Animal/Plant/Crop Disease
- Dam/Levee Failure
- Drought
- Expansive Soils
- Extreme Heat
- Flash Flood
- Grass/Wildland Fire
- Hazardous Materials
- Human Disease
- Infrastructure Failure
- Landslide
- Radiological Incident
- River Flooding
- Severe Winter Storm
- Sinkholes
- Terrorism
- Thunderstorm/Lightning/Hail
- Tornado/Windstorm
- Transportation Incident

Sections 3.1.1 through 3.1.3 describe how these hazards were identified for this plan update.

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### 3.1.1 Review of Existing Mitigation Plans

Prior to 2012, Hazard Mitigation Planning in Dubuque County was implemented on a jurisdictional basis. In 2012 the unincorporated county and incorporated municipalities came together to coordinate Multi-Jurisdictional mitigation planning for the entire Dubuque County planning area. This coordinated effort resulted in the *Dubuque County, Iowa Multi-Jurisdictional Hazard Mitigation Plan*, approved by FEMA on February 28, 2014. To identify hazards to include in the Risk Assessment update, a comparison was performed between the hazard identification in the *2018 Iowa State Hazard Mitigation Plan* and the *2024 Dubuque County Multi-Jurisdictional Hazard Mitigation Plan*. **Table 3.1** provides the details of the comparison.

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**Table 3.1. Hazard Comparison Chart**

	2018 State Plan	2024 Dubuque County Plan
Natural Hazards	Animal/Crop/Plant Disease	Animal/Crop/Plant Disease
	Dam/Levee Failure	Dam/Levee Failure
	Drought	Drought
	Earthquake	Earthquake
	Expansive Soils	Expansive Soils
	Extreme Heat	Extreme Heat
	Flash Flooding	Flash Flooding
	River Flooding	River Flooding
	Grass or Wildland Fire	Grass or Wildland Fire
	Landslide	Landslide
	Severe Winter Storms	Severe Winter Storms
	Sinkholes	Sinkholes
	Thunderstorm/Lightning/Hail	Thunderstorm/Lightning/Hail
	Tornado/Windstorm	Tornado/Windstorm
Technological Hazards	Hazardous Materials	Hazardous Materials
	Human Disease	Human Disease
	Infrastructure Failure	Infrastructure Failure
	Radiological	Radiological
	Transportation Incident	Transportation Incident
Human Caused	Terrorism	Terrorism

### 3.1.2 Review Disaster Declaration History

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Information utilized to identify hazards relevant for Dubuque County was obtained by examining events that triggered federal disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. 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. If the disaster is 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 assistance.

FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damage and institutions or industrial sectors affected.

**Table 3.2** lists federal disaster declarations that included Dubuque County for the period from 1965 to 2023.

**Table 3.2. Disaster Declarations that included Dubuque County, Iowa, 1965-2023**

Disaster Number	Declaration Date	Incident Type	Title	Incident Begin Date	Incident End Date
DR-4732	8/25/2023	Flood	Flooding	4/24/23	5/13/23
DR-4642	2/23/22	Severe Storm	Severe Storms, Straight-line Winds, & Tornadoes	12/15/21	12/15/21
Dr-4557	8/17/20	Severe Storm	Severe Storms	8/10/20	8/10/20
DR-4483	3/23/20	Biological	Covid-19 Pandemic	3/17/20	5/11/23
DR-4334	8/27/2017	Severe Storm	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	7/19/2017	7/23/2017
DR-4018	8/30/2011	Severe Storm	Severe Storms & Flooding	7/27/2011	7/29/2011
DR-1930	7/29/2010	Severe Storm	Severe Storms, Flooding, & Tornadoes	6/1/2010	8/31/2010
DR-1763	5/27/2008	Severe Storm	Severe Storms, Tornadoes, & Flooding	5/25/2008	8/13/2008
DR-3239	9/10/2005	Hurricane	Hurricane Katrina Evacuation	8/29/2005	10/1/2005
DR-1518	5/25/2004	Severe Storm	Severe Storms, Tornadoes, & Flooding	5/19/2004	6/24/2004
DR-1420	6/19/2002	Flood	Severe Storms & Flooding	6/3/2002	6/25/2002
DR-1367	5/2/2001	Severe Storm	Severe Storms, Tornadoes & Flooding	4/8/2001	5/29/2001
DR-1277	5/21/1999	Severe Storm	Severe Storms, Flooding, & Tornadoes	5/16/1999	5/29/1999
DR-996	7/9/1993	Flood	Severe Storms & Flooding	4/13/1993	10/1/1993
DR-443	6/24/1974	Flood	Severe Storms & Flooding	6/24/1974	6/24/1974
DR-386	5/23/1973	Flood	Severe Storms & Flooding	5/23/1973	5/23/1973
DR-354	9/26/1972	Flood	Severe Storms & Flooding	9/26/1972	9/26/1972
DR-348	8/18/1972	Flood	Severe Storms & Flooding	8/18/1972	8/18/1972
DR-269	8/14/1969	Flood	Heavy Rains & Flooding	8/14/1969	8/14/1969
DR-259	4/25/1969	Flood	Flooding	4/25/1969	4/25/1969
DR-193	4/22/1965	Flood	Flooding	4/22/1965	4/22/1965

Source: Federal Emergency Management Agency, [www.fema.gov/](http://www.fema.gov/)

The U.S. Department of Agriculture's Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans (EM) to producers suffering losses in those counties, and in counties that are contiguous to a designated county. In addition to EM eligibility, other emergency assistance programs, such as Farm Service Agency (FSA) disaster assistance programs, have historically used disaster designations as an eligibility requirement trigger.

**Table 3.3** provides the USDA Secretarial disaster declarations that included Dubuque County from 2012 to August 2023. Details on USDA declarations prior to 2012 are not available. The only year during this time with declarations was 2012.

**Table 3.3. USDA Secretarial Disaster Declarations Including Dubuque Co. (2012-April 2023)**

County	Crop Disaster Year	Designation Number	Drought	Excessive rain, moisture, humidity	Flood, Flash flooding	wind, High Winds	Fire, Wildfire	Heat, Excessive Heat, High Temp. (incl. low humidity)	Frost, Freeze	Insects	Begin Date	Description of Disaster
Dubuque	2012	S3264	0	0	0	0	0	0	1	0	4/6/2012	Frosts, Freezes
Dubuque	2012	S3305	1	0	0	1	1	1	0	1	7/17/2012	Drought-FAST TRACK
Dubuque	2012	S3310	1	0	0	1	1	1	0	1	7/24/2012	Drought- FAST TRACK
Dubuque	2012	S3311	1	0	0	1	1	1	0	1	7/24/2012	Drought- FAST TRACK
Dubuque	2019	S4508	0	1	1	0	0	0	0	0	9/1/2018	Excessive moisture, flooding, and flash flooding
Dubuque	2020	S4786	0	0	0	1	0	0	0	0	8/10/2020	Derecho
Dubuque	2021	S5084	1	0	0	0	0	0	0	0	8/3/2021	Drought- FAST TRACK

Source: U.S. Department of Agriculture; <https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster->

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**Table 3.2. Disaster Declarations that included Dubuque County, Iowa, 1965-2023**  
[designation-information/index](#)

### 3.1.3 Research Additional Sources

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Additional data on locations and past impacts of hazards in the planning area was collected from the following sources:

- Dubuque County Flood Insurance Rate Map, FEMA
- Dubuque County Emergency Management
- Dubuque County Flood Insurance Study, FEMA
- *Dubuque County Multi-Jurisdictional Hazard Mitigation Plan*, 2019
- Data Collection Guides completed by each jurisdiction
- Environmental Protection Agency
- Federal Emergency Management Agency (FEMA)
- 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 Natural Resources
- Iowa Department of Public Safety
- Iowa Department of Transportation, Office of Traffic and Safety
- *Iowa State Hazard Mitigation Plan* (September 2018)
- Iowa Utilities Board
- National Drought Mitigation Center Drought Reporter
- National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center
- Pipeline and Hazardous Materials Safety Administration
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
- U.S. Department of Transportation
- United States Geological Survey
- Various articles and publications available on the internet (sources are indicated where data is cited)

### 3.1.4 Hazards Identified

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Through the hazard identification review process, it was determined that the following natural and human-caused/technological hazards have the potential to significantly affect the planning area and were chosen for further analysis in the risk assessment. The hazards identified for this plan update are listed below in alphabetical order.

- Animal/Plant/Crop Disease
- Dam/Levee Failure
- Drought
- Expansive Soils
- Extreme Heat
- Flash Flood
- Grass/Wildland Fire
- Hazardous Materials
- Human Disease
- Infrastructure Failure
- Landslide
- Radiological Incident
- River Flooding
- Severe Winter Storm
- Sinkholes
- Terrorism
- Thunderstorm/Lightning/Hail
- Tornado/Windstorm
- Transportation Incident

Of the 20 hazards identified in the 2018 State Hazard Mitigation Plan, the following was eliminated from further review:

- Earthquake—The planning area is in a low-risk zone for earthquakes (Source: USGS; DNR). According to the planning committee, no real impacts experienced or expected; this hazard was not included in the 2019 Dubuque County Hazard Mitigation Plan.

Additionally, to maintain consistency and to facilitate the roll-up or summarization of hazards in the next State Plan Update, it was agreed that the hazard grouping/hazard naming for this update will be consistent with the 2018 State Plan.

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### 3.1.5 Multi-Jurisdictional Risk Assessment

For this Multi-Jurisdictional plan, the risks are assessed for each jurisdiction where they deviate from the risks facing the entire planning area. The planning area is uniform in terms of climate and topography as well as building construction characteristics. Accordingly, the geographic areas of occurrence for weather-related hazards do not vary greatly across the planning area for most hazards. The more urbanized areas within the planning area have more assets that are vulnerable to weather-related hazards and varied development trends impact the future vulnerability. Similarly, more rural areas have more assets (crops/livestock) that are vulnerable to drought. These differences are discussed in greater detail in the vulnerability sections of each hazard.

Although 19 hazards with the potential to significantly affect the planning area were identified and selected for additional analysis, not all hazards impact every jurisdiction. **Table 3.4** provides a summary of the jurisdictions impacted by each hazard. An “x” indicates the jurisdiction is impacted by the hazard. A “N/A” indicates the hazard is not applicable to that jurisdiction.

**Table 3.4. Hazards Identified for Each Jurisdiction**

Jurisdiction	Animal/Plant/Crop Disease	Dam Failure	Drought	Expansive Soils	Extreme Heat	Flash Flood	Grass/Wildland Fire	Hazardous Materials Incident	Human Disease	Infrastructure Failure	Landslide	Radiological Incident	River Flood	Severe Winter Storm	Sinkholes	Terrorism	Thunderstorm/Lightning/Hail	Tornado/Windstorm	Transportation Incident
Unincorporated Dubuque County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Asbury	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Balltown	X	N/A	X	X	X	X	X	X	X	X	X	X	N/A	X	X	X	X	X	X
Bankston	X	N/A	X	X	X	X	X	X	X	X	X	X	N/A	X	X	X	X	X	X
Bernard	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cascade	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Centralia	X	N/A	X	X	X	X	X	X	X	X	X	X	N/A	X	X	X	X	X	X
Dubuque	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Durango	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dyersville	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Epworth	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Farley	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Graf	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Holy Cross	X	N/A	X	X	X	X	X	X	X	X	X	X	N/A	X	X	X	X	X	X
Luxemburg	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New Vienna	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Peosta	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rickardsville	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sageville	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sherrill	X	N/A	X	X	X	X	X	X	X	X	X	X	N/A	X	X	X	X	X	X
Worthington	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zwingle	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dubuque CSD	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Western Dubuque CSD	X	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

### 3.1.6 Hazard Scoring Methodology

To maintain reporting format consistent with the *2018 Iowa State Hazard Mitigation Plan*, the Dubuque County Hazard Mitigation Planning Committee (HMPC) used the same methodology to score and prioritize the hazards. This prioritization was based on a hazard scoring system that considers four elements of risk: probability, magnitude/severity, warning time, and duration. **Table 3.5** provides definitions for each of the four elements along with associated rating levels.

**Table 3.5. Hazard Score Element Definitions and Rating Scales**

Element/Score	Definitions
Probability: Reflects the likelihood of the hazard occurring again in the future, considering both the hazard's historical occurrence and the projected likelihood of the hazard occurring in any given year.	
1—Unlikely	Less than 10% probability in any given year (up to 1 in 10 chance of occurring), history of events is less than 10% likely or the event is unlikely but there is a possibility of its occurrence.
2—Occasional	Between 10% and 20% probability in any given year (up to 1 in 5 chance of occurring), history of events is greater than 10% but less than 20% or the event could possibly occur.
3—Likely	Between 20% and 33% probability in any given year (up to 1 in 3 chance of occurring), history of events is greater than 20% but less than 33% or the event is likely to occur.
4—Highly Likely	More than 33% probability in any given year (event has up to a 1 in 1 chance of occurring), history of events is greater than 33% likely or the event is highly likely to occur.
Magnitude / Severity: Assessment of severity in terms of injuries and fatalities, personal property, and infrastructure and the degree and extent with which the hazard affects the jurisdiction.	
1—Negligible	Less than 10% of property severely damaged, shutdown of facilities and services for less than 24 hours, and/or injuries /illnesses treatable with first aid.
2—Limited	10% to 25% of property severely damaged, shutdown of facilities and services for more than a week, and/or injuries/illnesses that do not result in permanent disability.
3—Critical	25% to 50% of property severely damaged, shutdown of facilities and services for at least 2 weeks, and/or injuries/illnesses that result in permanent disability.
4—Catastrophic	More than 50% of property severely damaged, shutdown of facilities and services for more than 30 days, and/or multiple deaths.
Warning Time: Rating of the potential amount of warning time that is available before the hazard occurs. This should be taken as an average warning time.	
1	More than 24 hours warning time
2	More than 12 to 24 hours warning time
3	6 to 12 hours warning time
4	Minimal or no warning time (up to 6 hours warning)
Duration: A measure of the duration of time that the hazard will affect the jurisdiction.	
1	Less than 6 hours
2	Less than 1 day
3	Less than 1 week
4	More than one week

Using the rating scales described in the table above, the formula used to determine each hazard's score, including weighting factors, is provided below:

$$(\text{Probability} \times .45) + (\text{Magnitude/Severity} \times .30) + (\text{Warning Time} \times .15) + (\text{Duration} \times .10) = \text{SCORE}$$

Based on the hazard's overall weighted score, the hazards are categorized as follows: High (3.0-4.0), Moderate (2.0-2.9), and Low (1.0-1.9).

These terms relate to the level of planning analysis to be given to the hazard in the risk assessment process and are not meant to suggest that a hazard would have only limited impact. To focus on the most critical hazards, those assigned a level of high or moderate were given more extensive attention in the remainder of the risk assessment (e.g., quantitative analysis or loss estimation), while those with a low planning significance were addressed in more general or qualitative ways.



The HMPC determined overview hazard ranking scores for the planning area. The results of this overview are provided below in **Table 3.6**. Additionally, the hazard ranking overview is provided at the beginning of each hazard profile and vulnerability section. Compared to rankings in the 2019 plan, seven fewer hazards were ranked with a Planning Significance of “High”; one fewer was ranked as “Moderate”, while six more than in 2019 were ranked as having a “Low” Planning Significance. A detailed hazard summary by jurisdiction is provided at the conclusion of each hazard profile and vulnerability section to provide a summary of how the hazard varies by jurisdiction.

**Table 3.6. Dubuque County Planning Area Hazard Ranking Results**

Hazard	Probability	Magnitude	Warning Time	Duration	CPRI	Planning Significance
Tornado/Windstorm	4	3	3	3	3.45	High
Thunderstorm/Lightning/Hail	4	2	3	2	3.05	High
Severe Winter Storm	4	2	1	3	2.85	Moderate
Flash Flood	3	2	4	2	2.75	Moderate
Drought	3	2	1	4	2.50	Moderate
Transportation Incident	3	1	4	2	2.45	Moderate
Extreme Heat	3	2	1	3	2.40	Moderate
Hazardous Materials	2	2	4	3	2.40	Moderate
Infrastructure Failure	2	2	4	3	2.40	Moderate
River Flooding	3	1	1	4	2.20	Moderate
Human Disease	2	2	1	4	2.05	Moderate
Grass/Wildland Fire	2	1	4	1	1.90	Low
Radiological Incident	1	1	4	4	1.75	Low
Terrorism	1	1	4	4	1.75	Low
Landslide	1	1	4	1	1.45	Low
Sinkholes	1	1	4	1	1.45	Low
Animal/Plant/Crop Disease	1	1	1	4	1.30	Low
Dam/Levee Failure	1	1	1	4	1.30	Low
Expansive Soils	1	1	1	4	1.30	Low

### 3.1.7 Climate Change

In accordance with FEMA Administrator Policy 2011-OPPA-01, where possible, this plan update has considered the potential impacts of climate change on the hazards profiled. In 2010, the Iowa Climate Change Advisory Council reported to the Governor and the Iowa General Assembly on Climate Change Impacts in Iowa. The Report summarized the following climate changes 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***

- 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.

### ***Agricultural Challenges***

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

### ***Habitat Changes***

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

### ***Public Health Effects***

- Increases in heart and lung programs from increasing air pollutants of ozone and fine particles enhanced by higher temperatures.
- Increases in infectious diseases transmitted by insects requiring a warmer, wetter climate.
- An increase prevalence of asthma and allergies.

## 3.2 Assets at Risk

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in the planning area that may be at risk to hazards.

### 3.2.1 Total Exposure of Population and Structures

#### Unincorporated County and Incorporated Cities

**Table 3.7** shows the total population and building / improvement counts and assessed values for the unincorporated county and each city in the planning area broken out by usage type.

The methodology employed to extract the summary of building/improvement counts and values from the parcel data is provided below:

- Parcel values that had an associated dwelling or improvement value were used as the structure file.
- Parcel polygons were converted to points.
- Parcel points were spatially joined to the political area (jurisdiction).

Population data is based on the 2020 U.S. Census Bureau data. Building counts and building exposure values are based on parcel data and assessed values provided by Dubuque County. The contents exposure values were calculated based on usage type. The contents multipliers were derived from the HAZUS and are defined below **Table 3.7**. Land values have been purposely excluded from the tables because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value (other than crop insurance).

**Table 3.7. Population and Building Exposure by Jurisdiction-Unincorporated County and Incorporated Cities**

Jurisdiction	Property Class	Parcel Counts	Improved Value	Content Value	Total Value
Asbury 5,943	Agriculture	3	\$536,700	\$536,700	\$1,073,400
	Commercial	25	\$9,115,400	\$9,115,400	\$18,230,800
	Commercial Exempt	22	\$13,671,300	\$13,671,300	\$27,342,600
	Multi-Residential	22	\$38,861,700	\$19,430,850	\$58,292,550
	Residential	2,047	\$597,112,300	\$298,556,150	\$895,668,450
	Residential Exempt	2	\$496,100	\$248,050	\$744,150
	<b>Total</b>	<b>2,121</b>	<b>\$659,793,500</b>	<b>\$341,558,450</b>	<b>\$1,001,351,950</b>
Balltown 79	Commercial	2	\$804,500	\$804,500	\$1,609,000
	Commercial Exempt	2	\$341,500	\$341,500	\$683,000
	Residential	32	\$5,593,200	\$2,796,600	\$8,389,800
	<b>Total</b>	<b>36</b>	<b>\$6,739,200</b>	<b>\$3,942,600</b>	<b>\$10,681,800</b>

Jurisdiction	Property Class	Parcel Counts	Improved Value	Content Value	Total Value
Bankston 23	Agriculture	3	\$568,300	\$568,300	\$1,136,600
	Commercial	1	\$145,100	\$145,100	\$290,200
	Commercial Exempt	1	\$751,200	\$751,200	\$1,502,400
	Residential	9	\$1,189,500	\$594,750	\$1,784,250
	<b>Total</b>	<b>14</b>	<b>\$2,654,100</b>	<b>\$2,059,350</b>	<b>\$4,713,450</b>
Bernard 114	Agriculture	4	\$284,500	\$284,500	\$569,000
	Commercial	14	\$548,100	\$548,100	\$1,096,200
	Commercial Exempt	2	\$219,000	\$219,000	\$438,000
	Residential	48	\$5,396,500	\$2,698,250	\$8,094,750
	<b>Total</b>	<b>68</b>	<b>\$6,448,100</b>	<b>\$3,749,850</b>	<b>\$10,197,950</b>
Cascade 2,386	Commercial	126	\$24,137,200	\$24,137,200	\$48,274,400
	Commercial Exempt	37	\$20,203,700	\$20,203,700	\$40,407,400
	Industrial	17	\$13,750,400	\$20,625,600	\$34,376,000
	Multi-Residential	18	\$13,772,200	\$6,886,100	\$20,658,300
	Residential	724	\$132,315,100	\$66,157,550	\$198,472,650
	Residential Exempt	1	\$193,100	\$96,550	\$289,650
	<b>Total</b>	<b>923</b>	<b>\$204,371,700</b>	<b>\$138,106,700</b>	<b>\$342,478,400</b>
Centralia 116	Agriculture	10	\$1,393,700	\$1,393,700	\$2,787,400
	Commercial	3	\$418,200	\$418,200	\$836,400
	Commercial Exempt	2	\$19,600	\$19,600	\$39,200
	Multi-Residential	4	\$303,700	\$151,850	\$455,550
	Residential	38	\$6,962,900	\$3,481,450	\$10,444,350
	<b>Total</b>	<b>57</b>	<b>\$9,098,100</b>	<b>\$5,464,800</b>	<b>\$14,562,900</b>
Dubuque 59,667	Agriculture	23	\$4,117,800	\$4,117,800	\$8,235,600
	Commercial	2,486	\$1,793,923,100	\$1,793,923,100	\$3,587,846,200
	Commercial Exempt	262	\$225,600	\$225,600	\$451,200
	Industrial	130	\$143,300,100	\$214,950,150	\$358,250,250
	Multi-Residential	648	\$335,634,700	\$167,817,350	\$503,452,050
	Residential	20,822	\$3,386,416,700	\$1,693,208,350	\$5,079,625,050
	<b>Total</b>	<b>24,371</b>	<b>\$5,663,618,000</b>	<b>\$3,874,242,350</b>	<b>\$9,537,860,350</b>
Durango 20	Commercial	5	\$207,900	\$207,900	\$415,800
	Residential	8	\$971,400	\$485,700	\$1,457,100
	<b>Total</b>	<b>13</b>	<b>\$1,179,300</b>	<b>\$693,600</b>	<b>\$1,872,900</b>
Dyersville 4,477	Agriculture	8	\$1,405,500	\$1,405,500	\$2,811,000
	Commercial	202	\$62,367,100	\$62,367,100	\$124,734,200
	Commercial Exempt	50	\$33,862,900	\$33,862,900	\$67,725,800
	Industrial	34	\$27,494,500	\$41,241,750	\$68,736,250
	Multi-Residential	21	\$23,945,200	\$11,972,600	\$35,917,800
	Residential	1,600	\$319,766,200	\$159,883,100	\$479,649,300
	Residential Exempt	1	\$321,500	\$160,750	\$482,250

Jurisdiction	Property Class	Parcel Counts	Improved Value	Content Value	Total Value
	<b>Total</b>	<b>1,916</b>	<b>\$469,162,900</b>	<b>\$310,893,700</b>	<b>\$780,056,600</b>
Epworth 2,023	Agriculture	13	\$1,753,800	\$1,753,800	\$3,507,600
	Commercial	47	\$7,812,400	\$7,812,400	\$15,624,800
	Commercial Exempt	16	\$24,430,600	\$24,430,600	\$48,861,200
	Industrial	1	\$171,500	\$257,250	\$428,750
	Multi-Residential	7	\$1,562,000	\$781,000	\$2,343,000
	Residential	652	\$143,125,900	\$71,562,950	\$214,688,850
	Residential Exempt	1	\$416,900	\$208,450	\$625,350
	<b>Total</b>	<b>737</b>	<b>\$179,273,100</b>	<b>\$106,806,450</b>	<b>\$286,079,550</b>
Farley 1,766	Agriculture	2	\$693,000	\$693,000	\$1,386,000
	Commercial	79	\$21,228,900	\$21,228,900	\$42,457,800
	Commercial Exempt	18	\$15,275,300	\$15,275,300	\$30,550,600
	Industrial	14	\$22,083,200	\$33,124,800	\$55,208,000
	Multi-Residential	8	\$6,408,500	\$3,204,250	\$9,612,750
	Residential	579	\$120,979,000	\$60,489,500	\$181,468,500
	<b>Total</b>	<b>700</b>	<b>\$186,667,900</b>	<b>\$134,015,750</b>	<b>\$320,683,650</b>
Graf 76	Agriculture	1	\$1,200	\$1,200	\$2,400
	Commercial Exempt	2	\$38,000	\$38,000	\$76,000
	Industrial	1	\$202,200	\$303,300	\$505,500
	Residential	29	\$4,565,800	\$2,282,900	\$6,848,700
	<b>Total</b>	<b>33</b>	<b>\$4,807,200</b>	<b>\$2,625,400</b>	<b>\$7,432,600</b>
Holy Cross 356	Agriculture	1	\$16,700	\$16,700	\$33,400
	Commercial	25	\$2,699,300	\$2,699,300	\$5,398,600
	Commercial Exempt	6	\$1,342,600	\$1,342,600	\$2,685,200
	Industrial	1	\$132,000	\$198,000	\$330,000
	Multi-Residential	2	\$551,700	\$275,850	\$827,550
	Residential	130	\$21,968,300	\$10,984,150	\$32,952,450
	<b>Total</b>	<b>165</b>	<b>\$26,710,600</b>	<b>\$15,516,600</b>	<b>\$42,227,200</b>
Luxemburg 245	Agriculture	1	\$4,700	\$4,700	\$9,400
	Commercial	15	\$5,885,600	\$5,885,600	\$11,771,200
	Commercial Exempt	5	\$1,237,800	\$1,237,800	\$2,475,600
	Residential	109	\$17,728,600	\$8,864,300	\$26,592,900
	<b>Total</b>	<b>130</b>	<b>\$24,856,700</b>	<b>\$15,992,400</b>	<b>\$40,849,100</b>
New Vienna 382	Agriculture	6	\$322,000	\$322,000	\$644,000
	Commercial	33	\$3,676,900	\$3,676,900	\$7,353,800
	Commercial Exempt	14	\$3,482,400	\$3,482,400	\$6,964,800
	Industrial	1	\$417,400	\$626,100	\$1,043,500
	Residential	185	\$29,593,300	\$14,796,650	\$44,389,950
	<b>Total</b>	<b>239</b>	<b>\$37,492,000</b>	<b>\$22,904,050</b>	<b>\$60,396,050</b>
	Agriculture	2	\$213,300	\$213,300	\$426,600

Jurisdiction	Property Class	Parcel Counts	Improved Value	Content Value	Total Value
Peosta 1,908	Commercial	45	\$61,386,800	\$61,386,800	\$122,773,600
	Commercial Exempt	18	\$39,757,600	\$39,757,600	\$79,515,200
	Industrial	18	\$65,824,800	\$98,737,200	\$164,562,000
	Multi-Residential	10	\$18,808,900	\$9,404,450	\$28,213,350
	Residential	681	\$190,832,400	\$95,416,200	\$286,248,600
	<b>Total</b>	<b>774</b>	<b>\$376,823,800</b>	<b>\$304,915,550</b>	<b>\$681,739,350</b>
Rickardsville 202	Agriculture	6	\$243,700	\$243,700	\$487,400
	Commercial	7	\$787,100	\$787,100	\$1,574,200
	Commercial Exempt	5	\$552,600	\$552,600	\$1,105,200
	Residential	78	\$15,646,300	\$7,823,150	\$23,469,450
	<b>Total</b>	<b>96</b>	<b>\$17,229,700</b>	<b>\$9,406,550</b>	<b>\$26,636,250</b>
Sageville 95	Agriculture	2	\$256,600	\$256,600	\$513,200
	Commercial	14	\$3,759,700	\$3,759,700	\$7,519,400
	Commercial Exempt	2	\$88,800	\$88,800	\$177,600
	Industrial	1	\$692,900	\$1,039,350	\$1,732,250
	Multi-Residential	1	\$102,900	\$51,450	\$154,350
	Residential	31	\$6,410,000	\$3,205,000	\$9,615,000
	<b>Total</b>	<b>51</b>	<b>\$11,310,900</b>	<b>\$8,400,900</b>	<b>\$19,711,800</b>
Sherrill 189	Commercial	8	\$1,863,100	\$1,863,100	\$3,726,200
	Commercial Exempt	6	\$337,500	\$337,500	\$675,000
	Multi-Residential	2	\$175,900	\$87,950	\$263,850
	Residential	68	\$10,736,800	\$5,368,400	\$16,105,200
	<b>Total</b>	<b>84</b>	<b>\$13,113,300</b>	<b>\$7,656,950</b>	<b>\$20,770,250</b>
Worthington 382	Agriculture	3	\$171,700	\$171,700	\$343,400
	Commercial	29	\$3,625,600	\$3,625,600	\$7,251,200
	Commercial Exempt	12	\$2,496,200	\$2,496,200	\$4,992,400
	Industrial	1	\$372,100	\$558,150	\$930,250
	Multi-Residential	1	\$102,200	\$51,100	\$153,300
	Residential	157	\$23,346,700	\$11,673,350	\$35,020,050
	<b>Total</b>	<b>203</b>	<b>\$30,114,500</b>	<b>\$18,576,100</b>	<b>\$48,690,600</b>
Zwingle 84	Agriculture	2	\$370,700	\$370,700	\$741,400
	Commercial	5	\$294,300	\$294,300	\$588,600
	Commercial Exempt	2	\$16,300	\$16,300	\$32,600
	Residential	35	\$2,888,000	\$1,444,000	\$4,332,000
	<b>Total</b>	<b>44</b>	<b>\$3,569,300</b>	<b>\$2,125,300</b>	<b>\$5,694,600</b>
Unincorporated 18,733	Agriculture	2,653	\$426,373,700	\$426,373,700	\$852,747,400
	Commercial	301	\$88,499,400	\$88,499,400	\$176,998,800
	Commercial Exempt	79	\$60,057,400	\$60,057,400	\$120,114,800
	Industrial	17	\$15,804,800	\$23,707,200	\$39,512,000
	Multi-Residential	20	\$6,385,700	\$3,192,850	\$9,578,550

Jurisdiction	Property Class	Parcel Counts	Improved Value	Content Value	Total Value
	Residential	5,452	\$1,532,832,600	\$766,416,300	\$2,299,248,900
	Residential Exempt	3	\$573,700	\$286,850	\$860,550
	<b>Total</b>	<b>8,525</b>	<b>\$2,130,527,300</b>	<b>\$1,368,533,700</b>	<b>\$3,499,061,000</b>
<b>99,266</b>	<b>Grand Total</b>	<b>41,300</b>	<b>\$10,065,561,200</b>	<b>\$6,698,187,100</b>	<b>\$16,763,748,300</b>

Sources: Population Estimate, U.S. Census Bureau, 2020 American Community Survey (ACS) 5-year estimates. Note: Unincorporated Dubuque County population was estimated by subtracting populations of incorporated cities from the total Dubuque County population. Building/Improvement Count and Values, Dubuque County Assessor's Office. Contents Exposure derived by applying multiplier to Building Exposure based on HAZUS MH 2.2 standard contents multipliers by usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultures (100%).

**Table 3.8** provides the number of structures built by period. Note: There are minor differences between the structure counts from the parcel data and the structure counts in the census data due to the types of structures included in the counts. For example, many parcels zoned as agricultural use also have a residential structure (housing unit).

**Table 3.8. Year Structure Built**

Jurisdiction	Total Housing Units	Built 2020 or later	Built 2010 to 2019	Built 2000 to 2009	Built 1990 to 1999	1980 to 1989	Built 1970 to 1979	Built 1960 to 1969	Built 1950 to 1959	Built 1940 to 1949	Built 1939 or earlier
Unincorporated County	7510	30	721	1678	1043	456	1079	764	452	244	1102
Asbury city, Iowa	2,056	6	416	872	272	75	309	86	20	0	0
Balltown city, Iowa	18	0	0	1	2	1	2	6	0	0	6
Bankston city, Iowa	1	0	0	0	0	0	0	0	1	0	0
Bernard city, Iowa	59	0	0	4	0	0	18	2	5	14	16
Cascade city, Iowa	849	0	60	136	86	51	144	86	44	51	191
Centralia city, Iowa	55	0	2	2	6	7	15	2	5	4	12
Dubuque city, Iowa	27,078	7	1,530	1,989	1,991	1,153	3,567	3,869	3,403	1,454	8,115
Durango city, Iowa	9	0	0	0	0	0	0	3	2	0	4
Dyersville city, Iowa	1,862	0	213	207	190	171	217	279	125	91	369
Epworth city, Iowa	744	0	68	145	80	50	162	51	60	20	108
Farley city, Iowa	674	0	59	89	144	16	107	39	53	16	151
Graf city, Iowa	20	0	0	5	0	0	9	0	2	3	1
Holy Cross, Iowa	142	0	0	15	8	16	21	22	22	2	36
Luxemburg city, Iowa	90	1	4	13	3	3	17	14	5	7	23
Peosta city, Iowa	830	0	223	260	257	29	28	10	0	11	12
Rickardsville city, Iowa	86	0	3	19	4	3	18	13	12	2	12
Sageville city, Iowa	39	0	2	0	6	8	7	5	4	0	7
Sherrill city, Iowa	78	0	2	0	5	10	5	9	7	0	40
Worthington city, Iowa	157	0	0	7	13	7	29	19	13	5	64
Zwingle city, Iowa	49	0	1	9	7	0	1	9	7	1	15
<b>Total</b>	<b>42,406</b>	<b>44</b>	<b>3,304</b>	<b>5,451</b>	<b>4,117</b>	<b>2,056</b>	<b>5,755</b>	<b>5,288</b>	<b>4,242</b>	<b>1,925</b>	<b>10,284</b>

Source: U.S. Census Bureau 2020 American Community Survey 5-Year Estimates; Unincorporated structure counts estimated by subtracting incorporated areas structure counts from the Total in the County.



### 3.2.1.1 Public School Districts

The 2023-2024 enrolled number of students at the participating public-school districts is provided in **Table 3.9**, as well as the number of buildings, building values (building exposure) and contents value (contents exposure).

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**Table 3.9. Enrollment and Building Exposure by Jurisdiction-Public School Districts**

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Dubuque Public School District	10,064	72	\$424,261,073	\$41,686,428	\$465,947,501
Western Dubuque Public School District	n/a	n/a	n/a	n/a	n/a

Source: DCSD, 2023

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### 3.2.2 Critical and Essential Facilities and Infrastructure

As part of the update to the *Dubuque County Multi-Jurisdictional Hazard Mitigation Plan*, participating jurisdictions assessed the vulnerability of the following types of facilities below:

- **Critical Facilities:** Those facilities that are essential in providing utility or direction either during the response to an emergency or during the recovery operation.
- **Essential Facilities:** Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.
- **High Potential Loss Facilities:** Those facilities that would have a high loss or impact on the community.
- **Transportation and Lifeline Facilities:** Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

**Table 3.10** is a summary of the inventory of critical and essential facilities and infrastructure in the planning area. This list was compiled from data layers provided by Dubuque County. The full list of critical facilities is included in Appendix E. This is a non-public appendix and is maintained by Dubuque County Emergency Management.

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**Table 3.10. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction**

Type of Facility	Asbury	Balltown	Bernard	Cascade	Centralia	Dubuque	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle	Unincorporated County	Total
Enter the Number Physically Located in Each Jurisdiction																					
Airport Runway / Airfield							1													2	3
Ambulance Service	1			1		2	1	1	1		1						1				9
American Red Cross HQ						1															1
Cell Towers						17	3	1				1	1	3		1	1			30	58
College / University						5		1						1							7
Community / Recreation Center				1		1	1				1		1	1				2		4	12
Convention Center						2								1						1	4
County Government Facility						2			1											4	7
Court House						1															1
Education Facility				3		27		3	3		1	1		3			1			1	42
Emergency Response Facility						1	1		1											1	4
Fire Station/EMS Station	1		1	2	1	6	1	1	1		1	1	1	1			1	1		2	21
Government or Military Facility				1		1	1							1						1	5
Health or Medical Facility				2		19	2							1							24
Hospital/Medical Center						2	1														3
Information or Communication Facility						1															1
Law Enforcement	1			1		2	1	1	1					1						1	9
Municipal Government Facility	1	1		1		10	1	2	14		1	1	1	1			1	1		2	37
Nursing Home / Long Term Care	2			2		20	1														25

Type of Facility	Asbury	Balltown	Bernard	Cascade	Centralia	Dubuque	Dyersville	Epworth	Farley	Graf	Holy Cross	Luxemburg	New Vienna	Peosta	Rickardsville	Sageville	Sherrill	Worthington	Zwingle	Unincorporated County	Total
Outdoor Theater / Amphitheater				1		2	1														4
Outpatient Clinic				2		20	2							1							25
School				3		21	3	2			1			5							35
School: Elementary				2		13	2	1	2		1			2							23
School: High School				1		4	1	1													7
School: Middle School				2		4	1							1							8
Storm shelters				2			1	1	1					1							6
Sirens	5	1		3	1	17	6	3	3		2	1	2	3		1	1	2		0	51
State Government Facility						5	1													1	7
Tier II Facility						48			1											12	61
Transportation Facility						2			1												3
Veterinary Hospital/Clinic	1			1		5	2		1					1							11
Wastewater Treatment Plant	1			1		1	1	1	1		1	1	1	1	1		1	1			13

Source: Dubuque County Hazard Mitigation Planning Committee

## Other Assets

Assessing the vulnerability of the planning area to disaster also involves inventorying the natural, historic, cultural, and economic assets of the area. This is important for the following reasons:

- The plan participants may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing about them ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.
- Losses to economic assets (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

In the planning area, specific assets include the following:

Threatened and Endangered Species: **Table 3.11** includes Federally Threatened, Endangered, Proposed and Candidate Species in Dubuque County, Iowa.

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**Table 3.11. Threatened and Endangered Species in Dubuque County**

Common Name	Scientific Name	Status
Northern long-eared bat	<i>Myotis septentrionalis</i>	Endangered
Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	Threatened
Northern wild monkshood	<i>Aconitum novaboracense</i>	Threatened
Sheepnose Mussel	<i>Plethobasus cyphus</i>	Endangered
Higgins eye (pearly mussel)	<i>Lampsilis higginsii</i>	Endangered
Iowa Pleistocene snail	<i>Discus macclintocki</i>	Endangered
Rusty patched bumble bee	<i>Bombus affinis</i>	Endangered

Source: U.S. Fish and Wildlife Service, [http://www.fws.gov/midwest/endangered/lists/iowa\\_cty.html](http://www.fws.gov/midwest/endangered/lists/iowa_cty.html)

Natural Resources: The Dubuque County Conservation Board manages parks and nature preserve areas in Dubuque County. There are seven county parks, six preserves and one state park in the County. The County also operates one golf course and maintains 26 miles of a hike and bike trail called Heritage Trail that was part of an old, abandoned railroad right of way.

Additional details about managed areas listed below can be found at:

<http://dubuquecounty.org/conservation/>

- Bankston Park
- Fillmore Recreation Area

- Finley's Landing Park
- Massey Marina Park
- Mud Lake Park
- New Wine Park
- Swiss Valley Park
- Swiss Valley Nature Preserve
- Interstate Power Forest Preserve
- Little Maquoketa River Mounds Preserve
- Pohlman Prairie Preserve
- Ringneck Ridge Wildlife Area
- Whitewater Canyon Wildlife Area

**Historic Resources:** The National Register of Historic Places is the official list of the Nation's cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. There are 49 buildings on the National Register of Historic Places, 28 districts, one object, four sites and six structures in Dubuque County that are listed on the National Register of Historic Places (see **Table 3.12**)

**Table 3.12. Properties/Landmarks on the National Register of Historic Places, Dubuque County**

City	Resource	Address	Type
Cascade	Sauser-Lane House	101 2nd Ave., SW	BUILDING
Dubuque	Andrew-Ryan House	1375 Locust	BUILDING
Dubuque	Bell, John, Block	1307-07 Central Ave.	BUILDING
Dubuque	Bishop's Block	90 W. Main St.	BUILDING
Dubuque	Carnegie-Stout Public Library	11th and Bluff Sts.	BUILDING
Dubuque	Diamond Jo Boat Store and Office	Jones and Water Sts.	BUILDING
Dubuque	Dubuque Casket Company	1798 Washington St.	BUILDING
Dubuque	Dubuque City Hall	50 W. 13th St.	BUILDING
Dubuque	Dubuque County Courthouse	720 Central Ave.	BUILDING
Dubuque	Dubuque County Jail	36 E. 8th St.	BUILDING
Dubuque	Dubuque Freight House	E. 3rd St. Extension	BUILDING
Dubuque	Dubuque Star Brewery	500 E. Fifth St.	BUILDING
Dubuque	Dubuque YMCA Building	125 W 9th St.	BUILDING
Dubuque	Garland House	1090 Langworthy Ave.	BUILDING
Dubuque	German Bank	342 Main St.	BUILDING

City	Resource	Address	Type
Dubuque	Grand Opera House	135 8th St.	BUILDING
Dubuque	Ham, Mathias, House	2241 Lincoln Ave.	BUILDING
Dubuque	Hancock, Charles T., House	1105 Grove Terr.	BUILDING
Dubuque	Holland, Ora, House	1296 Mt. Pleasant St.	BUILDING
Dubuque	Hollenfelz House	1651 White St.	BUILDING
Dubuque	Interstate Power Company Building	1000 Main; 131 W. 10th St.	BUILDING
Dubuque	Kelley House	274 Southern Ave.	BUILDING
Dubuque	Langworthy House	1095 W. 3rd St.	BUILDING
Dubuque	Loetscher, T. Ben, House	160 S. Grandview Ave.	BUILDING
Dubuque	McMahon House	800 English Lane	BUILDING
Dubuque	Metz Manufacturing Company	1690 Elm St.	BUILDING
Dubuque	Mount Saint Bernard Seminary and Barn	10336 Military Rd.	BUILDING
Dubuque	Old Chapel Hall	2050 University Ave.	BUILDING
Dubuque	Orpheum Theatre and Site	405 Main St.	BUILDING
Dubuque	Rath, Johann Christian Frederick, House	1204 Mt. Loretta Ave.	BUILDING
Dubuque	Redstone	504 Bluff St.	BUILDING
Dubuque	Roshek Brothers Department Store	250 W. 8th St.	BUILDING
Dubuque	Round Barn, Dubuque Township	2810 Cascade Rd.	BUILDING
Dubuque	Sacred Heart School	2238 Queen St	BUILDING
Dubuque	Schroeder-Klein Grocery Company Warehouse	40-48 Main St	BUILDING
Dubuque	Security Building	800 Main St.	BUILDING
Dubuque	St. Luke's Methodist Episcopal Church	1199 Main St.	BUILDING
Dubuque	Thedinga, J. H., House	340 W. 5th St.	BUILDING
Dubuque	Town Clock Building	823-25 Main St.	BUILDING
Dubuque	Ziepprecht Block	1347-53 Central Ave.	BUILDING
Dyersville	Allen House	515 1st Ave., W.	BUILDING
Dyersville	Basilica of St. Francis Xavier, Church and Rectory	114 2nd St. SW	BUILDING
Dyersville	Memorial Building	340 1st Ave., E.	BUILDING
Epworth	Epworth School	310 W. Main St.	BUILDING
Epworth	Kidder, Zephaniah, House	206 1st Ave NE	BUILDING
Farley	Lincoln School	About 4 mi. N of Farley	BUILDING
Holy Cross	Western Hotel	SE of Holy Cross on U.S. 52	BUILDING
Sherrill	Haberkorn House and Farmstead	W of Sherrill	BUILDING
Sherrill	Sherrill Mount House	5259 S. Mound Rd.	BUILDING
Dubuque	Cathedral Historic District	Roughly bounded by a bluff line running W. of Bluff St., W. 7th, Locust and Jones Sts.	DISTRICT
Dubuque	Cathedral Historic District (Boundary Increase)	Roughly bounded by 7th, Locust, 4th, Bissel, Jones, Bluff, Emmett & St. Mary's Sts.	DISTRICT

City	Resource	Address	Type
Dubuque	Dubuque Millwork Historic District	White, Jackson, Elm between E. 6th and E. 11th Sts.	DISTRICT
Dubuque	Dubuque Trading Post-Village of Kettle Chief Archeological District	Address Restricted	DISTRICT
Dubuque	Eagle Point Park Historic District	2601 Shiras Ave.	DISTRICT
Dubuque	Fenelon Place Residential Historic District	Hill St., 3 & 5th Sts., W., Fenelon Pl., Fenelon Place Elevator	DISTRICT
Dubuque	Four Mounds Estate Historic District	4900 Peru Rd.	DISTRICT
Dubuque	Holy Ghost Catholic Historic District	2887-2921 Central Ave.	DISTRICT
Dubuque	Jackson Park Historic District	Roughly bounded by Seventeenth, Iowa, Tenth and Ninth, and Bluff and Montrose Sts.	DISTRICT
Dubuque	Langworthy Historic District	Langworthy, West Third, Melrose Terrace, vet. Hill and W. 5th, Alpine and Walnut bet. Solon and W. Fifth	DISTRICT
Dubuque	Lock and Dam No. 11 Historic District	11 Lime St.	DISTRICT
Dubuque	Loras College Historic District	Roughly bounded by Alta Vista St., Loras Blvd., Kirkwood St., Cox St., West 17th St., and Henion St.	DISTRICT
Dubuque	Mines of Spain Area Rural Community Archeological District	Address Restricted	DISTRICT
Dubuque	Mines of Spain Lead Mining Community Archeological District	Address Restricted	DISTRICT
Dubuque	Mines of Spain Prehistoric District	Address Restricted	DISTRICT
Dubuque	Old Main Historic District	Main St. between 1st and 4th Sts.	DISTRICT
Dubuque	Old Main Street Historic District (Boundary Increase and Additional Documentation)	Main St. between W. 1st & 4th Sts.	DISTRICT
Dubuque	Schrup, John and Marie (Palen) Farmstead Historic District	10086 Lake Eleanor Rd.	DISTRICT
Dubuque	Seminary Hill Residential Historic District	Clarke Dr., N. Main & Madison Sts., Madison Park	DISTRICT
Dubuque	St. Mary's Catholic Church Historic District	105 E. 15th, 1584 White, 1501 & 1561 Jackson Sts.	DISTRICT
Dubuque	Upper Central Avenue Commercial Historic District	1460-1965 Central Ave.	DISTRICT
Dubuque	Upper Iowa Street Historic District	Iowa St. between W. 11th & 12th Sts.	DISTRICT
Dubuque	Upper Main Street Historic District	1000's-1100's Main St.	DISTRICT
Dubuque	Upper Main Street Historic District (Boundary Increase)	909, 951, 955, 965 Main St.	DISTRICT
Dubuque	Washington Residential Historic District	1100 - 1900 blks. White, Jackson & Washington Sts.	DISTRICT
Dubuque	Washington Street and East 22nd Street Historic District	2162-2255 Washington St and E 22nd St	DISTRICT
Dubuque	West Eleventh Street Historic District	Bounded by Grove Terrace, Loras Blvd., Wilbur and Walnut Sts.	DISTRICT
New Vienna	St. Boniface of New Vienna Historic District	7401 Columbus St.	DISTRICT
Dubuque	Dubuque, Julien, Monument	Confluence of Mississippi River and Catfish Creek in Mines of Spain State Recreation Area	OBJECT
Dubuque	Four Mounds Site	Address Restricted	SITE
Dubuque	Washington Park	Bounded by 6th, 7th, Bluff, and Locust Sts.	SITE

City	Resource	Address	Type
Durango	Concord Congregational Cemetery	21755 US 52 N.	SITE
Durango	Cottage Hill Methodist-Episcopal Cemetery	22001 US 52 N.	SITE
Bernard	Washington Mill Bridge	Creek Branch Ln. over Lytle Cr.	STRUCTURE
Dubuque	Dunleith and Dubuque Bridge	7600 Chavenelle Dr.	STRUCTURE
Dubuque	Fenelon Place Elevator	512 Fenelon Pl.	STRUCTURE
Dubuque	Julien Dubuque Bridge	US 20 over Mississippi R.	STRUCTURE
Dubuque	Rogers, George W. Company Shot Tower	Commercial St. and River Front	STRUCTURE
Dubuque	WILLIAM M. BLACK (dredge)	E. 2nd St.	STRUCTURE

Source: <https://www.nps.gov/subjects/nationalregister/data-downloads.htm>

**Agriculture and the Economy:** Agriculture plays an important role in the Dubuque County economy (see **Table 3.13**).

**Table 3.13. Agricultural Statistics for Dubuque County**

2022 Census of Agriculture	
Total Land in Farms (acres)	313,476
Number of Farms	1,402
Average Farm Size (acres)	224
Average Age of Farmers (years)	53.9
Market Value of All Farm Products (\$)	440,085,000
Market Value of All Crops (\$)	128,304,000
Market Value of All Livestock (\$)	311,781,000
Production Expenses (\$)	350,245,000
Hogs & Pigs Inventory (head)	140,922,000
<b>Cattle as of January 1, 2022</b>	
All Cattle and Calves (State Rank 3)	130,000
<b>Crops-2021 Acreage, Yield, and Production Rank</b>	
Corn for Grain (State Rank 35)	146, 500 acres
Soybeans (State Rank 68)	42,400 acres
Oats (State Rank 3)	6,200 acres

Source: Iowa Agricultural Statistics Bulletin, USDA, National Agricultural Statistics Service, [http://www.nass.usda.gov/Statistics\\_by\\_State/Iowa/Publications/Annual\\_Statistical\\_Bulletin/2015/115\\_15.pdf](http://www.nass.usda.gov/Statistics_by_State/Iowa/Publications/Annual_Statistical_Bulletin/2015/115_15.pdf)

### 3.3 Development Since 2019 Plan Update

This section provides information on development that has occurred since the 2019 Dubuque County Multi-Jurisdictional Hazard Mitigation Plan Update.



According to the U.S. Census Bureau, the Dubuque County population increased 11.36% percent from 2010 to 2020 overall. During this time-period, some jurisdictions within the county saw a decrease in population including Bankston, Durango, Luxemburg, New Vienna, Sageville, and Zwingle. **Table 3.14** provides the population change statistics for all cities in Dubuque County as well as the county. The unincorporated areas population was determined by subtracting the populations of the incorporated areas from the overall county population.

**Table 3.14. Dubuque County Population Change, 2000 - 2020**

Jurisdiction	2000 Population	2010 Population	2020 Population	# Change 2000-2020	% Change 2000-2020
Asbury	2,450	4,170	5,943	3,493	142.57%
Balltown	73	68	79	6	8.22%
Bankston	27	25	23	-4	-14.81%
Bernard	97	112	114	17	17.53%
Cascade	1,958	2,159	2,386	428	21.86%
Centralia	101	134	116	15	14.85%
Dubuque	57,686	57,637	59,667	1,981	3.43%
Durango	24	22	10	-14	-58.33%
Dyersville	4,035	4,058	4,477	442	10.95%
Epworth	1,428	1,860	2,023	595	41.67%
Farley	1,334	1,537	1,766	432	32.38%
Graf	73	79	76	3	4.11%
Holy Cross	339	374	356	17	5.01%
Luxemburg	246	240	245	-1	-0.41%
New Vienna	400	407	382	-18	-4.50%
Peosta	651	1,377	1,908	1,257	193.09%
Rickardsville	191	182	202	11	5.76%
Sageville	203	122	95	-108	-53.20%
Sherrill	186	177	189	3	1.61%
Worthington	381	401	382	1	0.26%
Zwingle	100	91	84	-16	-16.00%
Dubuque County	89,143	93,653	99,266	10,123	11.36%
Iowa	2,926,324	3,046,355	3,190,369	264,045	9.02%

Source: U.S. Census Bureau 2020

**Table 3.15** provides the change in numbers of housing units in the planning area from 2010 to 2020.

**Table 3.15. Change in Housing Units, 2010-2020**

<b>Jurisdiction</b>	<b>2010 Housing Units</b>	<b>2020 Housing Units</b>	<b># Change 2010-2020</b>	<b>% Change 2010-2020</b>
Unincorporated County	6935	7233	298	4.3%
Asbury	1463	2128	665	45.5%
Balltown	33	33	0	0.0%
Bankston	9	10	1	11.1%
Bernard	56	56	0	0.0%
Cascade	974	1050	76	7.8%
Centralia	54	50	-4	-7.4%
Dubuque	25029	27174	2145	8.6%
Durango	10	11	1	10.0%
Dyersville	1808	1956	148	8.2%
Epworth	651	717	66	10.1%
Farley	586	678	92	15.7%
Graf	30	28	-2	-6.7%
Holy Cross	158	159	1	0.6%
Luxemburg	103	104	1	1.0%
New Vienna	180	178	-2	-1.1%
Peosta	456	656	200	43.9%
Rickardsville	74	80	6	8.1%
Sageville	57	44	-13	-22.8%
Sherrill	74	78	4	5.4%
Worthington	162	165	3	1.9%
Zwingle	49	42	-7	-14.3%
<b>Total</b>	<b>38951</b>	<b>42630</b>	<b>3679</b>	<b>9.4%</b>

Source: U.S. Census Bureau 2020.

## 3.4 Future Land Use and Development

The following sections provide details regarding future growth, land use and development. The information in this section comes from the *Dubuque County 2019 Multi-Jurisdictional Hazard Mitigation Plan*, information provided by each of the participating jurisdictions as well as other sources, cited throughout. Where available, maps are provided to facilitate consideration of hazard areas in future development plans as well as potential growth areas.

### ***Dubuque County***

The unincorporated areas of Dubuque County are primarily agriculturally based. The

topography varies through the County and associated land capabilities drive the type of farm-based enterprises that operate in each location. Numerous major U.S. and state highways run through Dubuque County. Dubuque County has 17 townships and 21 incorporated cities, the most cities of any other county in Iowa and is ranked the 7<sup>th</sup> most populated county in Iowa.

There are 3 four-lane highways that provide access into the county: US Highway 20, US Highway 151, and US Highway 61 South. Additionally, there are two main two-lane highways that provide access into and around the county: US Highway 52 and Iowa Highway 136 which is on the west end of the county. These five highways provide access to three-quarters of the cities in the County.

The County's primary land use is agricultural and is found throughout the unincorporated areas of the county. Residential development in the county's unincorporated areas generally continues to occur according to previously established development patterns and is following the Future Land Use Development Map. Residential uses are primarily located near incorporated cities, along major highways and roadway corridors and are found in clusters up and down the Mississippi River. Most of the new residential growth continues to occur within 2-4 miles of the City of Dubuque and near the larger cities in the county such as Cascade, Dyersville, Epworth, Farley, and Peosta.

Commercial development is located mostly along the highway corridors with most of the commercial uses found along US Highways 151 and 61 south from the City of Dubuque to the Airport, along US Highway 20 from the Dubuque City limits to Peosta and along US Highway 52 from the City of Dubuque to Mud Lake Road. Some new commercial development is occurring in the flood plain along the Couler Valley and Little Maquoketa River north of the City of Dubuque. Property owners are filling in the old barrow pits along Highway 52 North that are in the flood plain and then marketing the property for new commercial and industrial uses. The County is looking into amending the Flood Plain Management Ordinance to restrict the filling in of flood plain and to reduce the occurrence of flooding in that area and in the County, as a whole.

Industrial uses in Dubuque County are primarily located in three areas around the City of Dubuque. The first area is to the south along Highways 52, 151 and 61. New development is occurring in Tamarack Park and near the airport. Another industrial area is located west of the City of Dubuque along Highway 20. This area is mostly developed from the Dubuque city limits to Peosta. The third area is along Highway 52 North in the Couler Valley and Little Maquoketa River outlet to the Mississippi River. John Deere Dubuque is located just outside the flood plain of the Little Maquoketa River. Over the last few years, Flood Plain Permits have been issued for filling in the flood plain along Highway 52 North. Some older more established businesses are seeing flooding in the Couler Valley watershed that have not flooded before. New development will occur along this corridor until the Flood Plain Management Ordinance is amended to restrict filling in and development of the flood plain in this area. Both the South and West commercial and industrial corridors will be affected by the proposed four-lane highway, the Southwest Arterial that will be built in the next 5-10 years between US Highways 151/61 and US Highway 20. Residential, commercial, and industrial development is expected to occur from the city limits on the southwest side of the City of Dubuque to beyond the Southwest Arterial after the new highway is built. This change in land use will be put into the Future Land Use Development Map

at some future date as construction of the highway is nearing completion.

Dubuque County's Comprehensive Land Use Development Plan and Map is the community's guide to future development of the unincorporated areas of Dubuque County. The development plan and map guide development decisions made by the Board of Supervisors. The Comprehensive Land Use Development Plan is not an ordinance. It contains the long-range goals and objectives for the County that were compiled after several public meetings and hearings to determine a community vision for the future of Dubuque County.

The first Comprehensive Plan for the County was adopted on January 21, 1969, and was recently updated in 2011-2012 to incorporate the 10 Smart Planning Principles and 13 Comprehensive Planning Elements adopted by the State of Iowa. Population projects can be found in Table 3.16 and future land use development can be found in Table 3.17.

**Table 3.16 Dubuque County 2010, 2020 Population, Population Projections 2025-2040**

2010 Population	2020 Population	2025 Population Projection	2030 Population Projection	2035 Population Projection	2040 Population Projection
93,653	99,266	98,407	100,248	102,107	103,994

Source: 2010 and 2020 Population from the U.S. Census Bureau 2010 Decennial Census; Population Projections from the "2010 State Profile: Iowa", Woods & Poole Economics, Inc., Inc., [www.woodsandpoole.com](http://www.woodsandpoole.com) Prepared by: <http://www.iowadatatcenter.org>  
State Library of Iowa, State Data Center Program

<b>Table 3.17. Future Land Use &amp; Development</b>		
<b>Jurisdiction</b>	<b>2019 Plan</b>	<b>2024 Plan</b>
<b>Asbury</b>	There are no expected or planned growth areas in the city. However, the city is planning for the construction of the Clair Creek well and a new water tower at Asbury Park. No development is expected to occur in a 100-year floodplain or other known hazard areas.	There is no expected growth to occur in known hazard areas. The city will continue with various capital improvement projects including a roundabout at the intersection of Asbury Road and Hales Mill Road; various street improvement projects; expansion and improvement of city trails.
<b>Balltown</b>	None	None reported.
<b>Bankston</b>	None	None
<b>Bernard</b>	None	None
<b>Cascade</b>	None reported.	New Parkridge Phase 3 subdivision, approximately 25-30 new single fam lots. Four new homes in Parkview subdivision. New park on the SE Corner of the Oak Hill subdivision. New library at 110 S 2nd Ave SW. New dog park at the base of the water tower. Additional single family lots being platted in Oak Hill, not sure number but likely 40.
<b>Centralia</b>	None	None
<b>Dubuque</b>	None reported.	With the opening of the Southwest Arterial, the city expects future growth along the corridor. The city is encouraging development of housing and has over 2000 units in the process of being

Table 3.17. Future Land Use & Development		
Jurisdiction	2019 Plan	2024 Plan
		reviewed/approved and/or constructed throughout the community. These housing units include both affordable and market rate and are composed of residential subdivisions, multi-family apartments and mixed-use development. Additional industrial park development is anticipated with the continued infilling of the Dubuque Industrial Center West, Dubuque Industrial Center South, Kerper Industrial Center and Dubuque Industrial Center Crossroads. Additional development/redevelopment of the Port of Dubuque and Chaplain Schmitt Island is planned. Development continues in the Historic Millwork District with ongoing adaptive reuse of warehouse buildings. The Upper Central Avenue Corridor from 22nd Street to 10th Street is part of a masterplan and buildings will be rehabilitated for mixed-use and streetscape improvements will be made. The city received a RAISE Grant and will involve reconstruction of 16th Street, installation of roundabouts and construction of a 14th Street overpass over Elm Street. As part of an East-West Corridor Study, the city is in the process of designing the reconstruction of University Avenue from Pennsylvania Avenue to Delhi Street. This reconstruction will include the installation of roundabouts at key intersections.
<b>Durango</b>	None reported.	None reported.
<b>Dyersville</b>	There are no expected growth areas in the city, and development is not expected to occur in any known hazard areas. The city expects construction on the following projects: Expand Trail System and playground equipment at Westside Park; install sewer pump station at southeast section of the city; install roundabout at 1st avenue west and X49; rehab various street projects citywide.	The city plans to proceed with the development of Field of Dreams and the expansion of the Industrial Park. However, the city officials are ensuring no development will occur in any known hazardous areas. The city is conducting a study on its watershed and will apply for federal grants to fund capital investment. The city is also looking to obtain federal and state grants to build three bridges and enhance its transportation network.
<b>Epworth</b>	New development of 115 acres of land is expected to occur south of Highway 20. Additionally, the city expects to begin construction on water and sewer main extensions within the next five years.	Residential and commercial growth is occurring south of Hwy 20. The development is not in any known hazard areas.
<b>Farley</b>	Growth in Farley is expected to occur in the areas highlighted in green in the map shown below. These are not known hazard areas. Additionally, the city is expected to begin construction on two radium removal facilities and a lift station. Street construction on 9th Ave NW and 11 Ave NW may also occur. (MAP indicates all 3 east of highway 20.	None reported.

<b>Table 3.17. Future Land Use &amp; Development</b>		
<b>Jurisdiction</b>	<b>2019 Plan</b>	<b>2024 Plan</b>
<b>Graf</b>	None reported.	None
<b>Holy Cross</b>	None	None
<b>Luxemburg</b>	None	The city plans to develop the rest of the residential lots in the city subdivision.
<b>New Vienna</b>	The city is planning for the development of a new industrial park within the next five years. This project will not occur within the 100-year floodplain or any other known hazard area. Additionally, the city expects construction to begin on a new fire station on North Columbus Street.	None
<b>Peosta</b>	There are expected growth areas in the city, and development is not expected to occur in any known hazard areas. The city expects construction on the following projects: Remodel of PCC and City Hall; Kelly Oaks Park/Trail System and playground equipment Trail extension from Kelly Oaks Park to Ulyana; New Water tower South of Highway 20; Peosta St and Burds Rd turn lane project; various street projects citywide.	None reported.
<b>Rickardsville</b>	None	None
<b>Sageville</b>	None	None
<b>Sherrill</b>	None	None
<b>Worthington</b>	None reported.	The city is working on development of 8.65 acres at the end of 4th Ave NW for residential housing subdivision. This development is not located in the any known hazard area.
<b>Zwingle</b>	None	
<b>DCSD</b>	The local option tax has been renewed; therefore, the school district expects that Senior High School will likely see another \$30 million renovation project starting 2020.	The Dubuque Senior High School project is taking place and will be completed at the end of 2024. We have put a bond out for vote in November 2023. The primary focus is to build a new middle school on the Washington Middle School site, to air condition the remaining elementaries that are not currently air conditioned, add a gym addition to Eisenhower Elementary School, construction of a baseball and softball facility, and purchase property for a future elementary school.
<b>WDCSD</b>	None reported.	None reported.
<b>NICC</b>	None reported.	None
<b>Unincorporated County</b>	None reported.	Residential property. New interchanges on Highway 20.



## 3.5 Hazard Profiles and Vulnerability

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### **Hazard Profiles**

**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.**

Each hazard identified in Section **3.1.4** is profiled individually in this section in alphabetical order.

The level of information presented in the profiles varies by hazard based on the information available. With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards that affect the planning area. Detailed profiles for each of the identified hazards include information categorized as follows:

#### **Hazard Description**

This section consists of a general description of the hazard and the types of impacts it may have on a community. It also includes the ratings assigned to the hazard relative to typical warning times and duration of hazard events as described in **Table 3.5.1**.

#### **Geographic Location/Extent**

This section describes the geographic location of the hazard in the planning area. Where available, maps are utilized to indicate the specific locations of the planning area that are vulnerable to the subject hazard. This section also provides information as to the extent of the hazard (i.e., the size or degree of impact).

#### **Previous Occurrences**

This section includes information on historic incidents and their impacts.

#### **Probability of Future Occurrence**

The frequency of past events is used to gauge the likelihood of future occurrences. Where possible, the probability or chance of occurrence was calculated based on historical data. Probability was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percentage chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests a 10 percent chance of a drought occurring in any given year. For each hazard, the probability is assigned a rating as defined in **Table 3.5.1**.



## **Vulnerability Assessments**

**Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.**

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

**Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

**Requirement §201.6(c)(2)(ii): (As of October 1, 2008) [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged in floods.**

Following the hazard profile for each hazard is the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards. The vulnerability assessments were conducted based on the best available data and the significance of the hazard. Data to support the vulnerability assessments was collected from the following sources:

- Available GIS data sets such as DFIRM, parcel data, critical facilities, etc. (all sourced when used).
- Homeland Security Infrastructure Program Freedom, 2015.
- Written descriptions of assets and risks provided by participating jurisdictions.
- Existing plans and reports.
- Personal interviews with planning committee members and other stakeholders; and
- Other sources as cited.

Detailed profiles for each of the identified hazards include information categorized as follows:

### **Vulnerability Overview**

This section consists of a general overview narrative of the planning area's vulnerability to the hazard. Within this section, the magnitude/severity of the hazard is discussed. The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the

location affected, the resilience of the community and the effectiveness of the emergency response and disaster recovery efforts.

For each hazard, the magnitude/severity is assigned a rating as defined in **Table 3.5.1**.

### **Potential Losses to Existing Development**

This section provides the potential losses to existing development. Where data is available, this section provides estimated financial losses as well as the methodology used. For hazards with an overall “Low” rating, potential losses may not be discussed.

### **Future Development**

This section provides information on how vulnerability to this hazard will be impacted by planned future development, as well as information for jurisdictions to consider in planning future development.

### **Climate Change Impacts**

This section will discuss any potential impacts to this hazard because of climate change.

### **Hazard Summary by Jurisdiction**

For hazards that vary by jurisdiction, this section will provide an overview of how the hazard varies, followed by a table indicating the probability, magnitude, warning time and duration rankings for each jurisdiction with the resulting hazard score and level.

## **3.5.1 Animal/Plant/Crop Disease**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	1	4	1.30	Low

### **Profile**

#### ***Hazard Description***

Agricultural infestation is the naturally occurring infection of vegetation, crops or livestock with insects, vermin, or diseases that render the crops or livestock unfit for consumption or use. Because of Iowa’s overall substantial agricultural industry and related facilities and locations, the potential for infestation of crops or livestock poses a significant risk to the economy of the State. Iowa cropland is vulnerable to disease and other agricultural pests.

Some levels of agricultural infestation is normal in Iowa. The concern is when the level of an infestation escalates suddenly, or a new infestation appears, overwhelming normal control efforts. The levels and types of agricultural infestation appear to vary by many factors, including cycles of heavy rains and drought.

## 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 nearly 4 million cattle and calves, while Dubuque County had nearly 132,000 head of cattle and calves and nearly 141,000 head of hogs and pigs. With this substantial agricultural industry and related facilities throughout the State, the potential for infestation of livestock poses some risk to the economy.

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

- Avian Influenza
- Bovine Spongiform Encephalopathy (BSE) Disease
- Chronic Wasting Disease
- Exotic Newcastle Disease
- Foot and Mouth Disease
- Johne's Disease
- Pseudo rabies
- Scrapie, 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.

Avian influenza continues to be of concern in Iowa as the State is number one in poultry egg layers (approximately 40 million). ( Source: Iowa Poultry Association, 2014.) As of this writing (10/25/23) new bird flu cases have been reported in Iowa, joining three other states as the disease resurfaces. Two commercial turkey farms in Iowa have been hit by the reemerging highly pathogenic bird flu, causing about 100,000 birds to be killed to prevent the disease from spreading.

Bird flu last year (2022) caused U.S. poultry producers nearly 59 million birds across 47 states, including egg-laying chickens, and turkeys and chicken raised for meat. 2022 was the country's deadliest outbreak ever, according to USDA figures. The outbreak caused spikes in egg and turkey prices for consumers and cost the government over \$660 million.

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.

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.

Exotic Newcastle disease (END) is a contagious and fatal viral disease affecting all species of birds. There was an epidemic of END in California in 2003 that is resulting in the death of millions of chickens and other birds, and costing millions of dollars. END is probably one of the most infectious diseases of poultry in the world. END is so virulent that many birds die without showing any clinical signs.

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 Paratuberculosis, 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 with 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.

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/Diseases

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 across the U.S. The cascading net negative economic effects could result in widespread 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 <http://www.ipm.iastate.edu/ipm/info/insects> 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 Dubuque County, see the website above.

### Emerald Ash Borer

The Hazard Mitigation Planning Team is also aware of the emerald ash borer pest that threatens Iowa's forests and urban landscape. This pest is a slender, emerald, green beetle that is ½ inch long, and responsible for the destruction of approximately 20 million ash trees in Ohio, Michigan, Indiana, Illinois, and Ontario, Canada. Emerald Ash Borer has made its way into Iowa and has become an increasing threat.

### Wildlife

Iowa farmers lose a significant amount of crops each year because of wildlife foraging. This can be particularly problematic in areas where natural habitat has been diminished or in years where weather patterns such as early/late frost deep snow, or drought has caused the wild food sources to be limited.

**Table 3.18** 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.

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**Table 3.18. Market Value of Agricultural Products Sold, 2012 - Dubuque County, IA**

Market Value of Products Sold	\$440,085,000
Market Value of Crops	\$128,304,000 (29.15%)
Market Value of Livestock	\$311,781,000 (70.85%)
Average Per Farm	\$313,898

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

### Animal Location/Extent

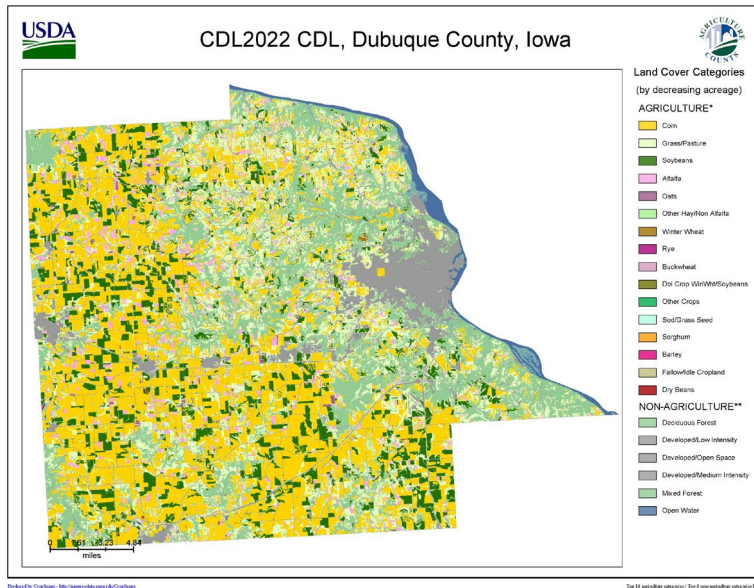
In addition to the animal farm operations, there are also confined and open feeding operations in Dubuque County. According to data from the Iowa NRGIS Repository, there are 56 Animal Feeding Operations listed in the Iowa Department of Natural Resources Animal Feeding Operations Database. This includes 29 Confined Animal Feeding Operations and 24 Open Feedlots, and three combination Confined/Open feedlots. There are also ten registered Captive Cervid Herd in Dubuque County (8 Deer and 2 Elk).

## Crop Location/Extent

According to the National Agricultural Statistics Service, in 2017 Dubuque County's top crop items included the following:

- Corn for Grain (State Rank 65)-152,316 acres harvested
- Soybeans (State Rank 94)-36,196 acres harvested
- Oats (State Rank 2)-1,432 acres harvested

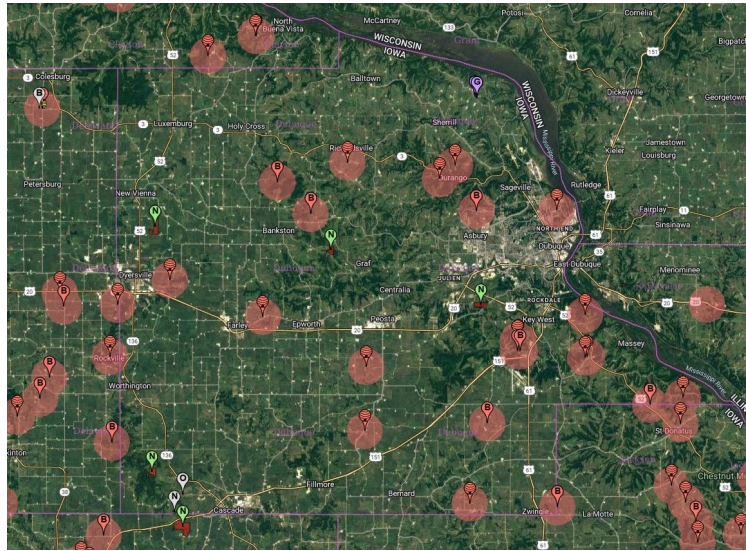
**Figure 3.1. Dubuque County Cropland Data Layer**



Source: USDA, produced by CropScape, <http://nasgeodata.gmu.edu/CropScape/>

According to the Iowa Department of Agriculture and Land Stewardship, Pesticide Bureau. The red icons indicate beehives and the purple icons indicate grapes.

**Figure 3.2. Sensitive Crops Registered Sites, Dubuque County, IA**



Source: Iowa Specialty Crop Site Registry, <https://ia.driftwatch.org/map>

### ***Previous Occurrences***

In the beginning of April 2015, there were a significant number of confirmed diagnoses of avian influenza in the State of Iowa. As a result, on Friday May 1, 2015, Governor Branstad declared a state of emergency. The last positive flock was detected on June 16, 2015. Confirmed cases occurred in the following counties: Buena Vista, Calhoun, Cherokee, Clay, Hamilton, Kossuth, Lyon, Madison, O'Brien, Osceola, Palo Alto, Plymouth, Pocahontas, Sac, Sioux, Webster, and Wright. Infected flocks were depopulated and composted and clean up and disinfection occurred. There were 77 total premises and 34 million birds affected. This included 35 commercial turkey flocks, 22 commercial egg production flocks, 13 pullet flocks, 1 breeding flock for a mail order hatchery, and 6 backyard flocks. More than 2,300 USDA staff and contractors were dispatched to Iowa to assist with the response to the avian influenza situation, including a USDA Incident Management Team (IMT). More than 300 state employees also participated in the disaster response (<http://www.iowaagriculture.gov/AvianInfluenza.asp>). There were no reported infected flocks in Dubuque County.

### **Bovine Spongiform Encephalopathy (BSE) (A.K.A. Mad Cow Disease)**

To date, BSE has been confirmed in Great Britain, Belgium, France, Germany, Spain, Switzerland, Japan, Canada, and the United States. In the United States, the first positive BSE cow was discovered in Washington. As a result of a surveillance program from June 2004 to March 2006, two additional positive domestic cows were found; one each in Texas and Alabama. Since 1997 FDA implemented a feed ban prohibiting the feeding of feedstuff derived from ruminants to other ruminants. The results of this ban and enhanced surveillance indicate that while BSE is present, it is at an extremely low level in U.S. cattle.

### **Chronic Wasting Disease**

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. Subsequent testing found CWD at the deer farm. The farm was placed under quarantine, but the owners sued for

compensation. The litigation prevented the farm from being depopulated of deer until August 2014. The Iowa Department of Agriculture and Land Stewardship conducted testing. Results were released in early October 2014, stating that 284 of 356 deer (80 percent) from a captive herd in north-central Iowa tested positive for chronic wasting disease. This finding represents the highest number of CWD-positive animals detected at a facility, according to wildlife health officials (Milwaukee-Wisconsin Journal Sentinel, October 4, 2014). In 2014, the first case of CWD was found in a wild deer in Allamakee County. Then in 2015, two wild deer tested positive for CWD in Allamakee County.

### Scrapie

There has been a total of 37 sheep flocks in Iowa that have been found to be infected with Scrapie since the accelerated national Scrapie Eradication Program started in November 2001. Of those, 10 have been depopulated and 27 have completed, or are currently completing a genetic flock plan. Iowa's last infected flock was found in June 2010.

### Rabies

According to the Iowa Department of Public Health, Center for Acute Disease Epidemiology, there were 12 confirmed animal rabies cases in Iowa in 2015. Reported numbers indicate rabies is not a major threat in Dubuque County.

**Table 3.19** summarizes the occurrence of rabies in Dubuque County from 2011-2018.

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**Table 3.19. Rabies Cases in Dubuque County, 2011-2018**

Year	Confirmed Rabies Cases Animal/#
2018	Bat/1
2017	Bat/1
2016	0
2015	0
2014	0
2013	0
2012	1/Feline
2011	0

Source: Iowa Department of Public Health, Center for Acute Disease Epidemiology, <https://idph.iowa.gov/rabies/resources>

According to the U.S. Department of Agriculture's Risk Management Agency, during the six-year period from 2017, combined crop insurance payments for damages resulting from insects, plant disease and wildlife totaled \$198,474 in Dubuque County. The Iowa Statewide average for insurable crop acres with insurance is 89 percent (USDA Risk Management Agency, 2015 Iowa Crop Insurance Profile. **Table 3.20** provides a summary of insured crop losses because of crop infestations.

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**Table 3.20. Crop Insurance Payments for Crop Pests/Diseases 2017-2022**



Damage Cause	Sum of Indemnity Amount	Sum of Determined Acres
<b>Insects</b>	<b>\$7,797.50</b>	<b>38</b>
2017	\$7,797.50	38
<b>Plant Diseases</b>	<b>\$125,577.00</b>	<b>\$1,013.00</b>
2015	\$89,485.00	771
2016	\$36,092.00	242
<b>Wildlife</b>	<b>\$65,099.05</b>	<b>334</b>
2014	\$1,924.65	4
2015	\$5,886.00	13
2016	\$4,137.00	39
2017	\$33,505.70	216
2019	\$199.00	7
2020	\$2,808.60	33
2021	\$5,098.50	9
2022	\$11,539.60	13
<b>Grand Total</b>	<b>\$198,473.55</b>	<b>\$1,385.00</b>

Source: USDA Risk Management Agency

### ***Probability of Future Occurrence***

The planning area experiences some level of agricultural loss every year because of naturally-occurring diseases that impact animals/livestock. The concern is when the level of an infestation escalates suddenly, or a new infestation appears, overwhelming normal control efforts. Normal control efforts include crop insurance and employment of various other agricultural practices that limit impact. For purposes of determining probability of future occurrence, the HMPC defined “occurrence” as an infestation occurring suddenly, a new infestation, or infestation that overwhelmed normal control efforts. Research did not reveal any infestations in Dubuque County that have reached this level of defined “occurrence”. Therefore, it was determined that the probability of this defined “occurrence” of agricultural infestation is “Unlikely”.

## **Vulnerability**

### ***Overview***

A widespread infestation of animals/livestock and crops could impact the economic base of the County. According to the USDA 2017 Census of Agriculture, Dubuque County agriculture provides 7,023 jobs. (Source: Coalition to Support Iowa's Farmers, <http://www.supportfarmers.com/Assets/2014/cntydata/Dubuque.pdf>).

In 2017 the total market value of Dubuque County's agricultural products sold was more than \$440 million. With this contribution of agriculture to the economy, a wide-scale agricultural infestation could severely impact the economic stability of the County.

### ***Potential Losses to Existing Development***

Buildings, infrastructure, and critical facilities are not vulnerable to this hazard. Its impacts are primarily economic and environmental, rather than structural effects.

Rough estimates of potential direct losses from a maximum threat event fall in a range of 1-75 percent of livestock receipts. The market value of all livestock in Dubuque County in 2012 was \$267,757,000. Based on a worst-case scenario where 75 percent of livestock is lost each year due to agricultural infestations, the total direct costs could exceed \$200 million.

**Table 3.21** provides the annual crop losses for insurable crops. The insurable loss is adjusted to estimate losses to all insurable crops by considering that 89 percent of insurable crops in the State were insured (2015 Iowa Crop Insurance Profile from USDA's Risk Management Agency).

**Table 3.21. Estimated Insurable Crop Losses Resulting from Disease, Infestation, and Wildlife**

Crop Insurance Paid-10 yrs.	Adjusted 10-year Losses	Annual Estimated Losses
\$214,307	\$240,794	\$24,079

Source: USDA Risk Management Agency; adjust loss calculation by ECIA

Rough estimates of potential direct losses from a maximum threat event fall in a range of 1-50 percent of annual crop receipts. The market value of all crops sold in Dubuque County in 2017 was \$128.3 million. Based on a worst-case scenario where 50 percent of crop production is lost each year due to agricultural infestations, the total direct costs could exceed \$64 million.

The U.S. Forest Service estimates that Dubuque County has up to 500,000 ash trees in the County. Removal of debris if an infestation occurs would be challenging and costly. If only 10 percent of the Ash trees were impacted in Dubuque County that could translate to 50,000. It is estimated that it costs \$682 to replace each Ash tree, which translates to over \$34 million.

### ***Future Development***

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 increases, 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.

### ***Climate Change Impacts***

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 (CO<sub>2</sub>) 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 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

Even though 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.

## **3.5.2 Dam/Levee Failure & High Hazard Potential Dams**

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<b>Hazard Score Calculation</b>
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Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	1	4	1.30	Low

## **Profile**

### ***Hazard 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 or levee for flood control or a reservoir for a constant water source. This section discusses both dam and levee failure.

### **Dam Failure**

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.

### **Levee Failure**

Levee Failure is the uncontrolled release of water resulting from a structural failure. Possible causes of the failure could include flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, terrorism, erosion, piping, saturation, or under seepage.

### ***Geographic Location/Extent***

#### **Dams in Planning Area**

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:

- a. *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.*
- b. *Any dam designed to provide permanent storage in excess of 18 acre-feet and which has a height of 5 feet or more.*
- c. *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 3.22**). 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.

**Table 3.22. 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

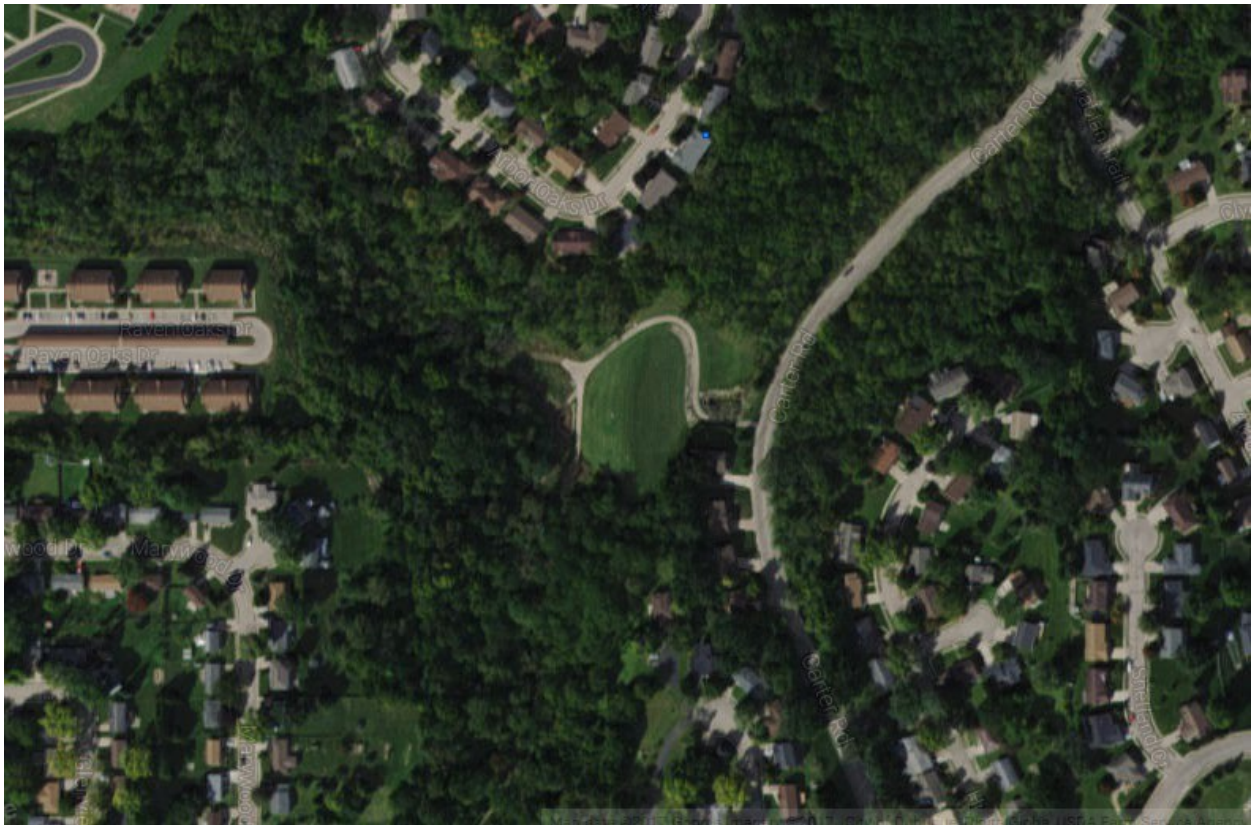
For this plan update, both the National Inventory of Dams as well as the State-regulated dam inventory were consulted. There are 13 regulated dams within the county boundaries of Dubuque County. Of the 13 dams, two are High Hazard dams, four are Significant Hazard dams, and seven are Low Hazard dams. One of the high hazard dams is a federal dam; the Mississippi River Lock & Dam No. 11, which is owned and operated by the U.S. Army Corps of Engineers. The high and significant hazard dams in the county are listed below with the nearest jurisdiction and distance:

- Carter Road Stormwater Detention Dam, High Hazard—City of Dubuque (0 miles)
- Mississippi River Lock & Dam No. 11, High Hazard—City of Dubuque (1 mile)
- Seippel Road Dam, Significant Hazard—City of Dubuque (0 miles)
- Southeast Dam (Dubuque), Significant Hazard—City of Dubuque (0 miles)
- West 32nd St Stormwater - Lower Dam, Significant Hazard—City of Dubuque (0 miles)
- West 32nd St Stormwater - Upper Dam, Significant Hazard—City of Dubuque (0 miles)

Aerial images of these dams are provided below in **Figure 3.3** through **3.7**.

**FIGURE 3.3 Carter Road Stormwater Detention Dam**

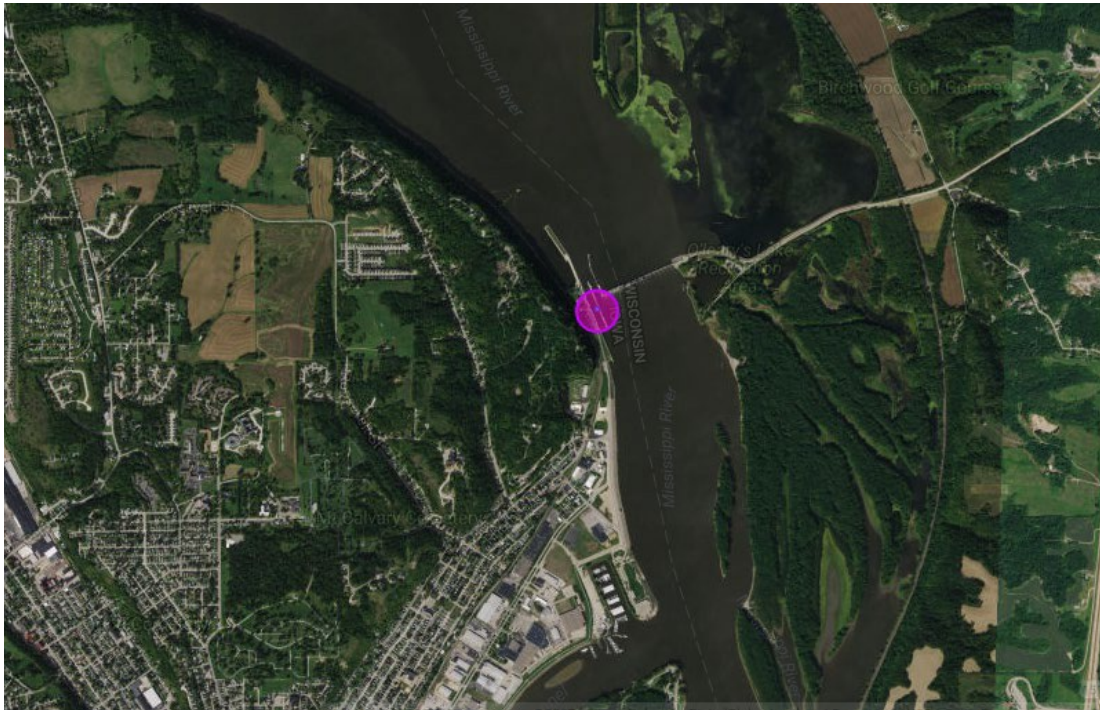
Source: National Inventory of Dams





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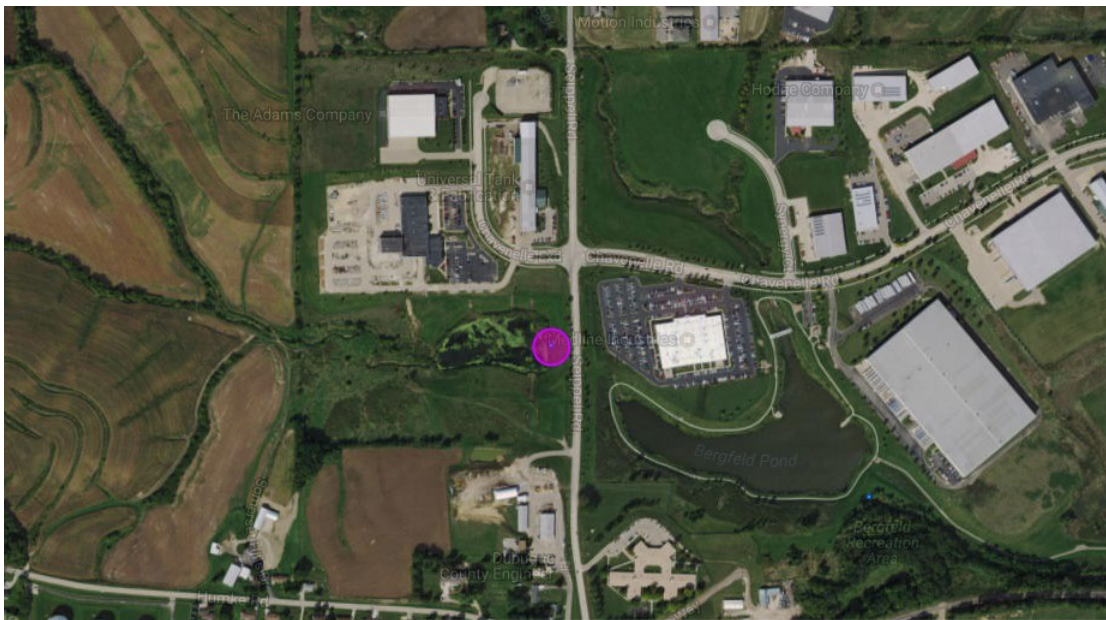
**Figure 3.4 Mississippi River Lock and Dam No. 11**



Source: National Inventory of Dams

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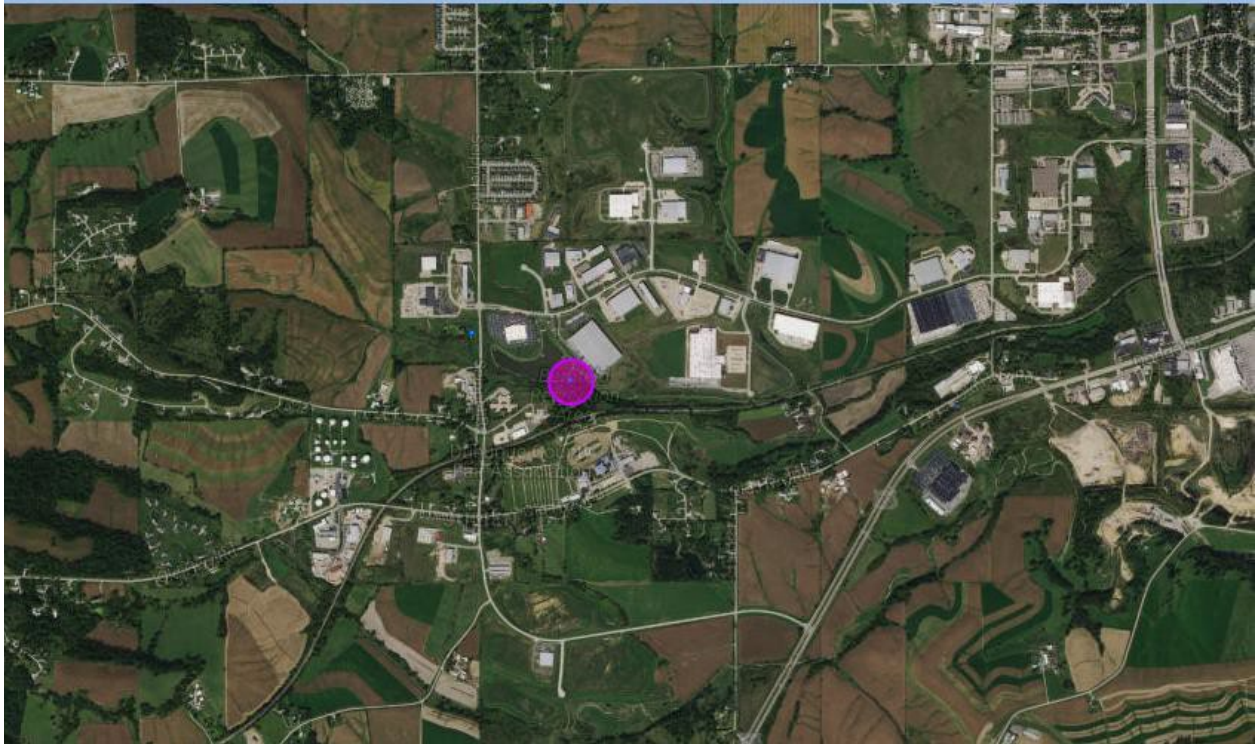
**Figure 3.5 Seippel Road Dam**



Source: National Inventory of Dams

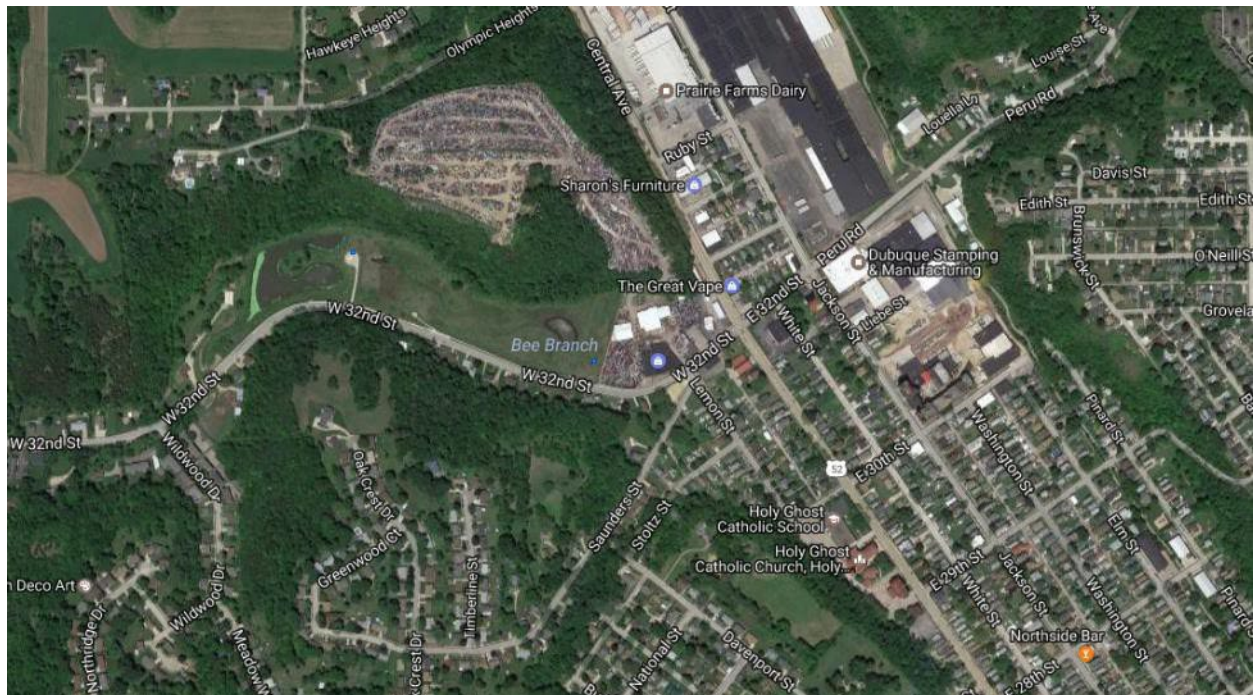


**FIGURE 3.6**      **Southeast Dam**



Source: National Inventory of Dams

**Figure 3.7 West 32<sup>nd</sup> Street Stormwater – Lower Dam & Upper Dam**





### Dams Upstream of Planning Area

The planning committee expressed concern regarding Lake Delhi dam. This upstream dam in Delaware County on the Maquoketa failed during flooding in 2010 and was rebuilt in 2016.

### Levees in Planning Area

The National Levee Database and the FEMA Flood Insurance Rate Map were consulted to identify levees in the planning area. There are two levee segments in Dubuque County as follows:

- Dubuque Levee—5.5 miles long. This Corps Program levee was constructed in 1973 by the USACE and then turned over to the sponsors for operations and maintenance. The sponsors are the City of Dubuque and the Royal Oaks Development Corporation. It received an “Acceptable” Inspection rating by USACE in November 2014.

The levee protects almost all the City of Dubuque from Mississippi River flooding to an elevation of 615.47 msl (river state 30.0”). Only Dubuque’s Chaplain Schmitt Island and Catfish Creek valley lie outside the protection of Dubuque’s floodwall levee. The levee withstood river crests as high as 611.93 msl (river state 26.46’). FEMA certified Dubuque’s floodwall and levee system in 2011.

- Cascade Levee—0.96 miles long. This Corps Program levee was locally constructed and is locally operated and maintained by the City of Cascade. It received an “Acceptable” Inspection rating by USACE in May 2015.

The North Fork of the Maquoketa River flows through the City of Cascade between Fillmore and Pierce Streets. Several small ephemeral streams flow through the community into the North Fork of the Maquoketa River. In 1925, the City of Cascade experienced a catastrophic and unprecedented flood following cloudbursts. Property damage was estimated at \$500,000. The area that received the most damage is located southward along Johnson Street. As a result, Upstream of the US Highway 151 Bridge, levees were constructed on both banks; downstream of the bridge, a levee was built only on the west bank since the east bank was sufficiently high. Portions of the levee have been sandbagged during high-flow conditions. The levee on the west bank of the river, upstream of the bridge, is responsible for protecting the highly developed daddle-like area that was damaged in the 1925 flood.

In April 1990, the Rock Island District COE inspected and evaluated the existing condition of the city’s flood-control project under Public Law 84-99. Based upon the results of the field inspection and the evaluation, the overall condition of the levee in the City of Cascade was rated unacceptable. The levee crown was rated at approximately a 10-year frequency.

Based on the 1990 COE inspection and evaluation, the City of Cascade completed two installments of levees. In 1999-2000, the city constructed a levee on the south portion of the west bank of the river and the second portion was installed in fall 2011. The Corps of

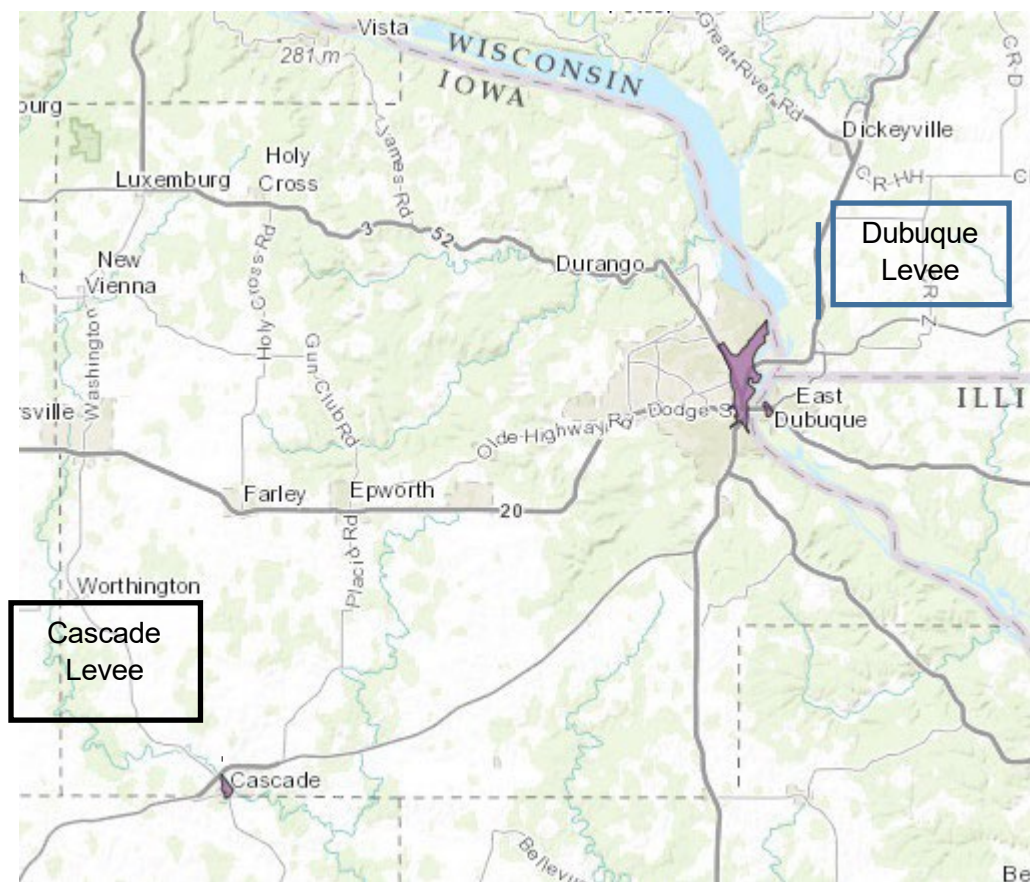
Engineers inspect annually and make recommendations; however, the second extension has not yet been tested as there has been no heavy rain since it was constructed. This portion of the levee was locally funded.

In 2009, rip rap and rock were put in to stabilize the north side of the western back bank as well. The bank on the north end is not completely rip-rapped and is only an earthen levee due to funding. Downstream from the bend in the North Fork of the Maquoketa River is rip-rapped, which is where the force of the water is greatest.

**Figure 3.8** shows the locations of both levees in Dubuque County. **Figure 3.8** and **Figure 3.10** provide close-up images of Dubuque and Cascade Levees. The purple shaded areas represent the levees areas.

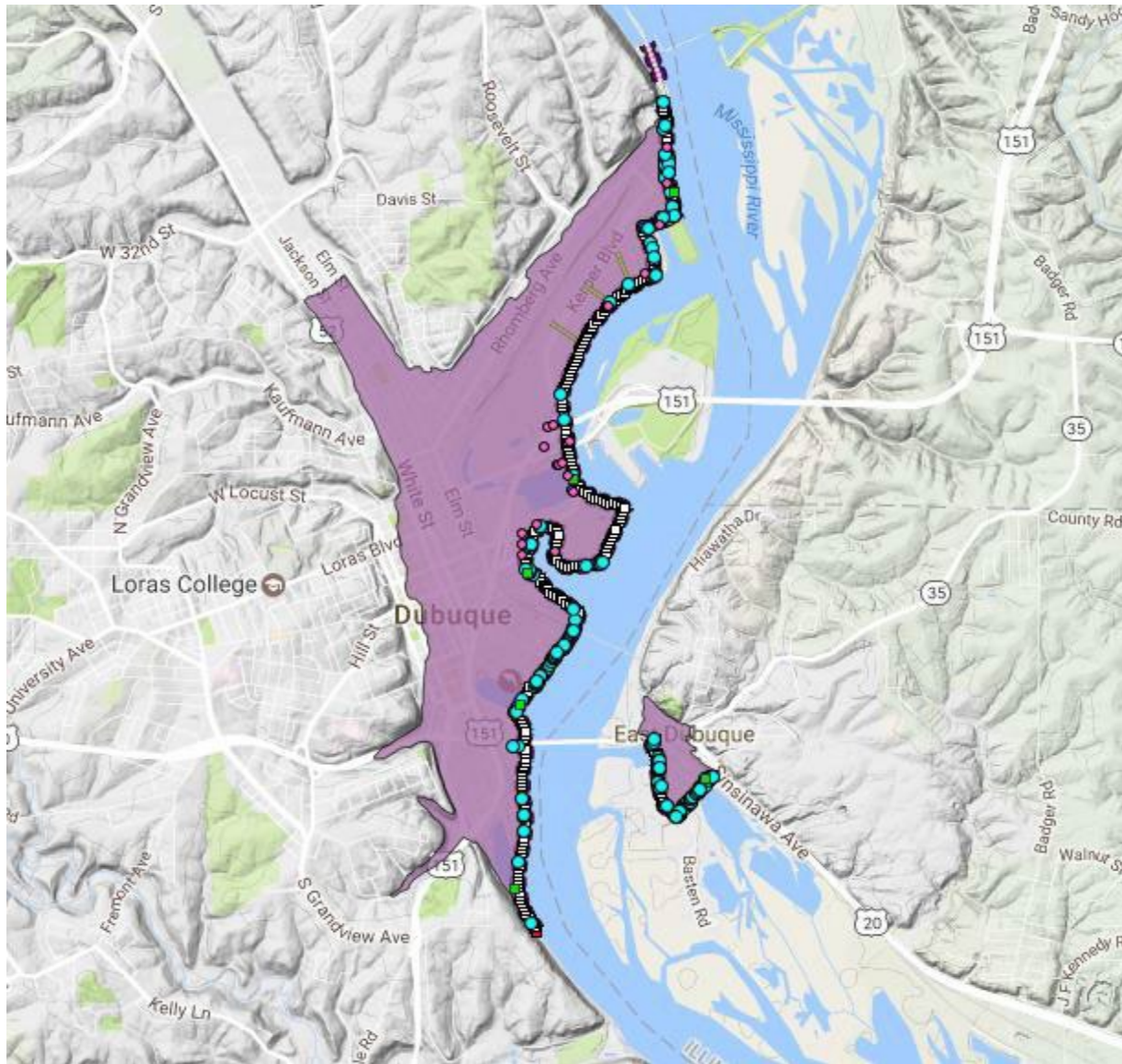
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**Figure 3.8 Dubuque County, Iowa Levees**



Source: National Levee Database

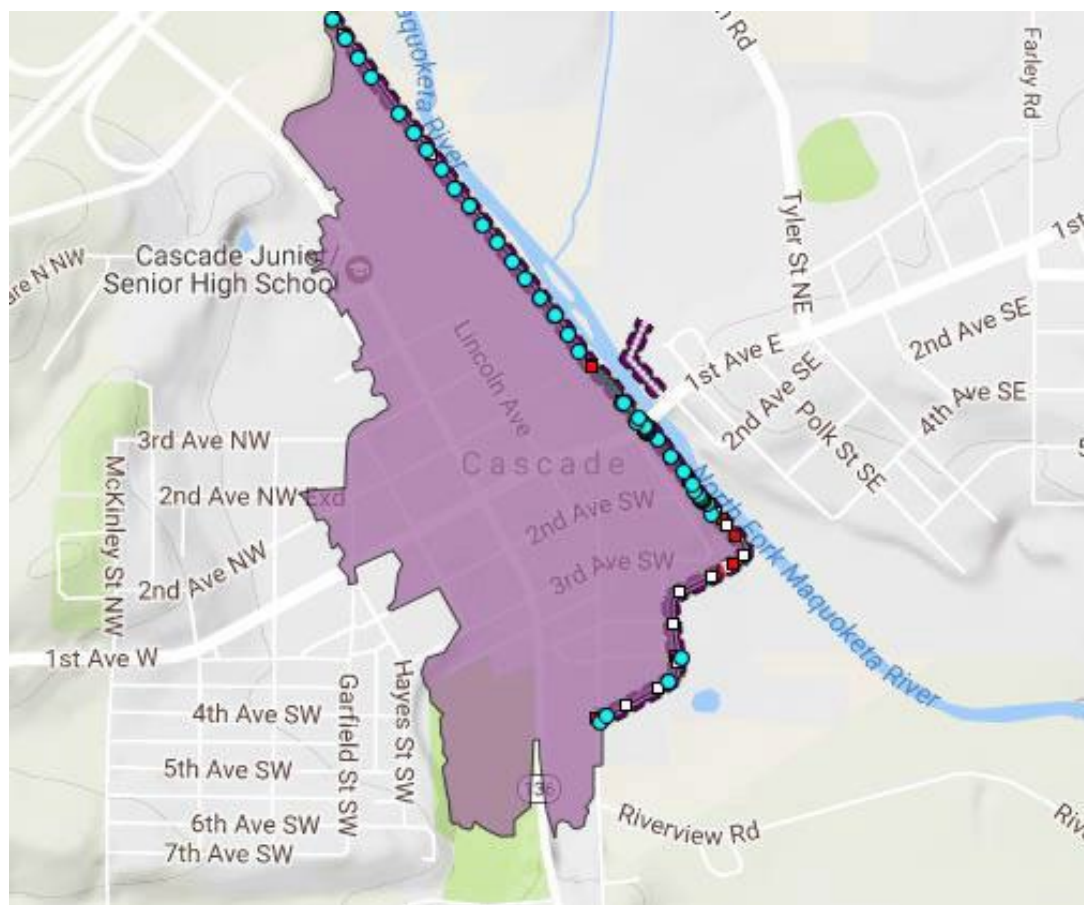
**Figure 3.9 Dubuque Levee**



Source: USACE National Levee Database



**Figure 3.10 Cascade Levee**



Source: USACE National Levee Database

### ***Previous Occurrences***

#### **Dam Failure**

To determine previous occurrences of dam failure within Dubuque County, the *2019 Dubuque County Multi-Jurisdictional Hazard Mitigation Plan*, the *Iowa State Hazard Mitigation Plan*, and the Stanford University's National Performance of Dams Program (<https://npdp.stanford.edu/>) were reviewed for historical dam failures. No record of dam failure within Dubuque County boundaries was found.

#### **Levee Failure**

No events of levee failure in Dubuque have occurred since completion of its 64-mile-long earthen and concrete levee in 1973.

### ***Probability of Future Occurrence***

The flooding of 1993 and again in 2008 was so great that the limits of many levees were tested and sometimes exceeded. Of the 275 Corps of Engineers levees affected by the 1993 flood, 85% held, of the 15% that failed, 31 overtopped (11%), eight (8) eroded and ruptured (3%), and three (3) breached (1%). The performance of non-federal levees was much worse: only 43% withstood the trauma, and 800 of 1,400 failed. The rate of failure of a levee or floodwall is difficult to predict with sudden failure a possibility.

Both the Corps of Engineers and City of Dubuque Engineers agree that “overtopping” of the Dubuque levee is a more likely scenario than levee failure.

## **Vulnerability**

### ***Overview***

#### **Dam Failure**

Dam or levee failure is typically an additional or secondary impact of another disaster such as flooding or earthquake. Additional details on the high and significant hazard dams are provided below:

**Table 3.23. High and Significant Hazard Dams in Dubuque County**

<b>Dam Name</b>	<b>Hazard Class</b>	<b>NID ID</b>	<b>Owner Name</b>	<b>NID Height (Ft.)</b>	<b>NID Storage</b>	<b>Primary Purpose</b>	<b>River</b>
Carter Road Stormwater Detention Dam	High	IA03512	City of Dubuque	41	170	Recreation	Bee Branch
Mississippi River Dam 11	High	IA00003	USACE	43	170000	Navigation	Mississippi River
Seippel Road Dam	Significant	IA03303	City of Dubuque	34	211	Flood Control	Tr- Middle Fork Catfish
Southeast Dam (Dubuque)	Significant	IA03304	City of Dubuque	24	223	Flood Control	Tr- Middle Fork Catfish Creek
West 32nd St Stormwater - Lower Dam	Significant	IA03907	City of Dubuque	8	111	Flood Control	Bee Branch
West 32nd St Stormwater - Upper Dam	Significant	IA03906	City of Dubuque	23	63	Flood Control	Bee Branch

Source: National Inventory of Dams, Iowa Department of Natural Resources

The High Hazard state-regulated dam is routinely inspected by the Iowa Department of Natural Resources. The Carter Road facility was inspected in 2023 and found to be in fair condition. The dam received the rating due to debris and eroded soil in and around the outlet trash rack, the condition of the trash rack, and the overgrowth around the principal spillway inlet and outlet areas. These issues were addressed following the inspection. In late 2022, an Emergency Action Plan was established for the Carter Road Stormwater Detention Dam for the purpose of eliminating injury, loss of life, and minimizing

property damage during an unusual or emergency event at the dam. It defines responsibilities and procedures to identify conditions that might endanger the dam, contact information to notify appropriate emergency personnel, and steps to take for possible mitigating actions.

### Levee Failure

The Corps of Engineers conducts two types of levee inspections as part of the Levee Safety Program:

- Routine Inspections, also called annual inspections or continuing eligibility inspections, are visual inspections that verify proper levee system operation and maintenance. Routine Inspections are conducted on an annual basis.
- Periodic Inspections provide a more rigorous assessment than the Routine Inspection and include a more detailed and consistent evaluation of the condition of the levee system. Periodic Inspections verify proper operation and maintenance; evaluate operational adequacy, structural stability, and safety of the system; and compare current design and construction criteria with those in place when the levee was built. Periodic Inspections are conducted every five years.

Inspection results of acceptable, minimally acceptable, or unacceptable are provided to project sponsors to address deficiencies. Additionally, the District will work with sponsors to identify performance concerns, areas for further analysis, changes in design criteria and potential consequences of levee failures that need to be addressed to provide the continued safety of the levee.

Both the Dubuque (2014) and Cascade (2015) Levees received “Acceptable” ratings from their most recent inspections.

### ***Potential Losses to Existing Development***

The jurisdictions that would be impacted in the event of failure of the high or significant hazard dams or levees are discussed below relative to the applicable flood protection structure:

- Carter Road Stormwater Detention Dam, High Hazard—City of Dubuque (0 miles)
- Mississippi River Lock & Dam No. 11, High Hazard—City of Dubuque (1 mile)
- Seippel Road Dam, Significant Hazard—City of Dubuque (0 miles)
- Southeast Dam (Dubuque), Significant Hazard—City of Dubuque (0 miles)
- West 32nd St Stormwater - Lower Dam, Significant Hazard—City of Dubuque (0 miles)
- West 32nd St Stormwater - Upper Dam, Significant Hazard—City of Dubuque (0 miles)
- Dubuque Levee—City of Dubuque
- Cascade Levee—City of Cascade

### Dam Failure

Based on the definition of high hazard dams, failure of these dams could 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. For the significant

hazard dams, failure could result in damage to isolated homes or cabins, industrial or commercial buildings, moderately traveled roads or railroads, or interrupt major utility services, but without substantial risk of loss of human life.

Inundation maps were provided by the Iowa DNR for Carter Road Stormwater Detention Dam. Inundation maps were not available for other dams in the planning area.

Combined with the parcel data in a GIS format with assessed values, the inundation map allowed comparative analysis of this layer to determine parcels and improvement values by type that fall within the boundaries of the dam inundation area.

GIS was used to create a centroid or point representing the center of the parcel polygon. The dam inundation area was then overlaid on the parcel centroids. For the purposes of this analysis, if the dam inundation area intersected a parcel centroid, inundation was assigned for the entire parcel. The model assumes that every parcel with a building or dwelling value greater than zero is improved in some way. Specifically, an improved parcel assumes there is a building on it. It is important to note that there could be more than one structure or building on an improved parcel (i.e., condo complex occupies one parcel but might have several structures). In these cases, the analysis counts this as one structure. Only improved parcels and the value of their improvements were analyzed. The result is an inventory of the number and types of parcels and buildings subject to dam failure.

**Table 3.24** provides the numbers of improved parcels (structures), and values by type of parcel that are in the dam inundation area according to the analysis methodology described above.

**Table 3.24. Assets at Risk to Failure of the Carter Road Stormwater Detention Dam**

Jurisdiction	Property Type	Improved Parcel Counts	Improved Value	Content Value	Total Exposed Value
Dubuque	Commercial	76	\$11,770,659	\$11,770,659	\$23,541,318
	Exempt	18	\$5,172,292	\$5,172,292	\$10,344,584
	Industrial	11	\$1,938,160	\$1,938,160	\$3,876,320
	Multi-Residential	19	\$2,376,160	\$2,376,160	\$4,752,320
	Residential	634	\$36,693,960	\$36,693,960	\$73,387,920
	<b>Total</b>	<b>758</b>	<b>\$57,951,231</b>	<b>\$57,951,231</b>	<b>\$115,902,462</b>

Source: Parcel layer and improved values from Dubuque County, Inundation layers from Iowa Department of Natural Resources, analysis by ECIA.

To determine the potential number of people that might be impacted by failure of the Carter Road Stormwater Detention Dam, the average household size from the 2020 U.S. Census (2.40) was multiplied by the number of dwellings (residential structures) in the dam inundation areas (653). This revealed approximately 1,567 people at risk to failure of this dam. This analysis is limited due to the uncertainty of how many separate households are in the multi-residential structures.

### Levee Failure

GIS data was available from the National Levee Inventory to identify the levee protected areas for both the Cascade Levee and the Dubuque FCW Levee. Combined with the parcel data in a GIS format with assessed values, this allowed comparative analysis of these two layers to determine parcels and improvement values by type that fall within the boundaries of the levee protected areas.

GIS was used to create a centroid or point representing the center of the parcel polygon. The levee protected areas were then overlaid on the parcel centroids. For the purposes of this analysis, if the levee protected area intersected a parcel centroid, the levee protection area (and thus the area prone to failure) was assigned for the entire parcel. The model assumes that every parcel with a building or dwelling value greater than zero is improved in some way. Specifically, an improved parcel assumes there is a building on it. It is important to note that there could be more than one structure or building on an improved parcel (i.e., condo complex occupies one parcel but might have several structures). In these cases, the analysis counts this as one structure. Only improved parcels and the value of their improvements were analyzed. The result is an inventory of the number and types of parcels and buildings subject to levee failure.

**Table 3.25** provides the numbers of parcels, improved parcels (structures), and values by type of parcel that are in the levee protected areas of the Cascade Levee and Dubuque Levee according to the analysis methodology described above.

**Table 3.25. Assets at Risk to Levee Failure – Cascade Levee & Dubuque Levee**

<b>Cascade IA Levee Analysis</b>					
<b>Jurisdiction</b>	<b>Property Type</b>	<b>Improved Parcel Counts</b>	<b>Improved Value</b>	<b>Content Value</b>	<b>Total Exposed Value</b>
Cascade	Commercial	26	\$873,888	\$873,888	\$1,747,776
	Exempt	7	\$320,640	\$320,640	\$641,280
	Multi-Residential	2	\$440,400	\$220,200	\$660,600
	Residential	43	\$3,155,810	\$1,577,905	\$4,733,715
	<b>Total</b>	<b>78</b>	<b>\$4,790,738</b>	<b>\$2,992,633</b>	<b>\$7,783,371</b>

<b>Dubuque FCW Levee Analysis</b>					
<b>Jurisdiction</b>	<b>Property Type</b>	<b>Improved Parcel Counts</b>	<b>Improved Value</b>	<b>Content Value</b>	<b>Total Exposed Value</b>
Dubuque	Commercial	563	\$225,878,984	\$225,878,984	\$451,757,968
	Exempt	99	\$113,798,192	\$113,798,192	\$227,596,384
	Industrial	51	\$37,394,340	\$56,091,510	\$93,485,850
	Multi-Residential	102	\$15,379,320	\$7,689,660	\$23,068,980
	Residential	1,790	\$110,709,820	\$55,354,910	\$166,064,730
	<b>Total</b>	<b>2,605</b>	<b>\$503,160,656</b>	<b>\$458,813,256</b>	<b>\$961,973,912</b>

Source: Parcel layer and improved values from Dubuque County, Levee Protected areas from the National Levee Inventory, analysis by ECIA.

According to this analysis, there is nearly \$8 million in improvements / contents value in the area



protected by the Cascade Levee and nearly \$1 billion in improvements / contents value in the area protected by the Dubuque Levee.

To determine the potential number of people that might be impacted by levee failure, the average household size from the 2010 U.S. Census was multiplied by the number of dwellings (residential structures) in the levee protected areas. This analysis is limited due to the uncertainty of how many separate households are in the multi-residential structures.

**Table 3.26. Population at Risk to Levee Failure – Cascade Levee & Dubuque Levee**

Levee	# Residential structures	Average Household Size	Est. People at Risk
Cascade	45	2.40	108
Dubuque	1,892	2.40	4,541

Source: # Residential Structures – ECIA Analysis Results; Average Household Size – U.S. Census 2010 Decennial Census;

### ***Critical Facilities and Infrastructure at Risk to Dam or Levee Failure***

To analyze critical facilities at risk in the planning area, the inventory of critical and essential facilities and infrastructure in the planning area was compiled from data layers provided by Dubuque County. A comparison was made of the critical facilities with the dam inundation area for the Carter Road Dam and the levee protected areas from the National Levee Database for the Cascade and Dubuque Levees to determine those facilities that could be impacted in the event of levee failure. This analysis revealed 55 critical facilities at risk of Dam or Levee Failure. The summary results of this analysis are provided in **Table 3.27**.

**Table 3.27. Critical Facilities and Infrastructure at Risk to Dam or Levee Failure**

Jurisdiction / Dam - Levee Name	Ambulance Service	Cell Towers	College / University	Convention Center	County Government Facility	Fire Station / EMS Station	Government or Military Facility	Health or Medical Facility	Municipal Government Facility	Nursing Home / Long Term Care	Outdoor Theater / Amphitheater	School	School: Elementary	Shelters	Sirens	State Government Facility	Tier II Facility	Transportation Facility	Veterinary Hospital / Clinic	Grand Total
<b>Cascade</b>																				
Cascade Levee															1					1
<b>Dubuque</b>																				
Carter Road Dam		1				1		1				1			1	1	1	1		8
Dubuque Levee	1	3	1	1	1	3	1	1	2	1	1		4	9	4	1	10	1	1	46
<b>Grand Total</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>9</b>	<b>6</b>	<b>2</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>55</b>

Appendix E provides the list of critical facilities that were inventoried and analyzed as well as the

specific names of facilities at risk to dam or levee failure. This Appendix is redacted from the public version of this plan. To obtain access for official use, contact the Dubuque County Emergency Management Agency.

Future development located downstream from dams in floodplains or inundation zones and/or in levee protected areas would increase vulnerability to dam or levee failure.

### ***Climate Change Impacts***

Increased frequency of precipitation and precipitation extremes leading to flooding could cause additional stress on dam and levee structures.

## **3.5.3 Drought**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
3	2	1	4	2.50	Moderate

### **Profile**

#### ***Hazard Description***

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period 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 based on 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 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 focuses 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 droughts 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 viability 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. NDMC's website is found at <http://www.drought.unl.edu/>. Specific drought impacts by county are recorded at <http://droughtreporter.unl.edu/>.

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.

### ***Geographic Location/Extent***

According to the 2017 Census of Agriculture, of the 608 square miles (389,120 acres) of land area in Dubuque County, 82 percent (313,476 acres) is utilized for agricultural purposes. There were 1,402 farms with an average size of 224 acres per farm. Although the entire planning area in Dubuque County is at risk of drought, the agricultural areas are more vulnerable to the immediate effects of drought. The map in **Figure 3.1** in the Animal/Plant/Crop Disease hazard section displays the locations of various cropland uses in Dubuque County.

### ***Previous Occurrences***

According to the Iowa Environmental Mesonet, the average annual precipitation for Dubuque County is 32 inches. In average years, this represents enough rainfall to prevent drought; however, successive years of below-average rainfall are the cause drought impacts in the planning area.

**Table 3.28** provides the rainfall history at the Dubuque weather station from 1955 to February 2017. Complete years with less than 30 inches of rain include 1955, 1956, 1958, 1976, 1988,

1989, 1995, 1997, 2005, 2012, and 2021. The lowest annual precipitation on record occurred in 1988 with 22.7 inches.

**Table 3.28. Monthly and Annual Precipitation Totals, 1951 to February 2017, Dubuque Lock-and-Dam, Iowa Weather Station**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1955	0.28	0.98	1.21	3.29	2.72	4.06	1.38	2.47	2.73	2.7	0.27	0.69	22.78
1956	0.5	0.83	0.65	4.5	4.04	1.48	3.56	3.94	1.44	0.69	2.02	1.14	24.79
1957	0.47	0.69	0.96	2.78	5.71	3.34	5.56	5.44	1.13	1.69	2.17	1.71	31.65
1958	0.66	0.07	0.29	2.54	0.65	6.08	2.08	4.18	1.25	3.46	1.61	0.55	23.42
1959	1.36	1.61	3.66	4.43	4.26	3.09	4.98	5.45	2.46	5.93	1.99	1.56	40.78
1960	4	0.7	1.78	3.93	5.52	2.74	1.33	3.59	3.71	2.94	1.26	0.7	32.2
1961	0.27	1.13	4.32	1.64	1.13	2.45	5.64	2.22	7.95	4.33	6.2	1.01	38.23
1962	0.76	1.95	1.64	2.77	6.99	2.17	6.26	3.09	1.67	2.92	0.31	0.59	31.12
1963	0.46	0.32	1.89	2.9	1.65	1.67	4.1	2.09	2.17	0.09	2.49	0.54	20.37
1964	0.22	0.22	1.41	5.18	5.52	2.53	1.68	3.21	1.43	0.01	1.39	0.43	23.23
1965	1.56	0.75	2.8	4.98	3.36	0.79	1.16	9.32	8.73	1.58	1.7	1.94	38.67
1966	1.72	1.06	2.3	1.43	2.55	5.84	2.06	1.71	1.86	0.78	0.53	3.46	25.3
1967	0.65	0.92	1.88	3.28	2.11	5.81	0.34	1.92	7.41	5.14	1.98	1.11	32.55
1968	0.5	0.31	0.74	4.09	2.06	5.43	1.2	4.1	6.98	1.06	0.8	2.09	29.36
1969	2.48	0.24	0.47	3.43	2.87	14.28	5.11	0.02	1.21	3.96	0.59	1.28	35.94
1970	0.3	0.29	2.36	1.79	4.77	5.4	2.08	4.53	8.74	1.6	1	1.75	34.61
1971	1.46	2.87	1.6	1.36	2.55	2.11	3.21	2.94	3.93	2.61	3.54	3.72	31.9
1972	0.66	0.43	1.84	3.89	3.21	2.03	8.92	9.37	9.83	3.24	1.23	1.75	46.4
1973	1.44	0.7	4	6.78	6.09	3.43	3	1.9	8.1	0.82	2.11	1.75	40.12
1974	2.39	0.85	3.08	3.85	5.74	6.63	2.18	4.39	0.62	2.56	2.01	1.54	35.84
1975	0.84	1.73	2.6	3.4	2.28	3.83	2.14	4.63	1.26	0.48	3.81	0.21	27.21
1976	0.2	2.39	3.84	4.07	0.98	1.75	2.05	1.99	0.65	2.24	0.02	0.29	20.47
1977	0.49	0.29	4.14	2.79	2.23	3.3	5.84	5.96	3.84	2.12	2.5	0.95	34.45
1978	1.25	0.38	0.58	2.99	6.45	3.37	4.29	1.69	4.55	1.79	2.65	1.4	31.39
1979	1.73	0.59	1.93	2.17	2.2	4.23	5.62	4.49	0.77	2.03	2.02	1.13	28.91
1980	1.54	0.81	0.85	1.38	5.06	3.47	5.43	6.7	5.82	2.5	0.72	0.84	35.12

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1981	0.09	2.13	0.27	7.06	1.01	7.09	2.11	8.66	4.55	2.59	1.73	1.28	38.57
1982	1.69	0.18	2.74	1.61	4.86	2.86	6.48	3.14	1.41	3.82	3.86	2.93	35.58
1983	0.84	1.46	1.5	2.89	7.23	1.06	3.38	2.56	3.72	1.4	3.14	1.77	30.95
1984	0.74	0.81	1.19	3.68	3.38	5.98	3.8	1.87	2.4	6.34	1.95	2.22	34.36
1985	0.95	1.92	3.65	1.44	4.41	1.34	1.78	3.44	5.55	4.15	4.27	1.75	34.65
1986	0.64	1.64	2.04	2.35	6.7	6.3	3.5	4.68	10.7	3.79	1.39	0.53	44.26
1987	0.54	0	1.25	1.5	4	1.82	5.59	7.33	2.64	1.02	4.06	2.84	32.59
1988	1.14	0.48	1.74	2.02	1.15	0.67	2.17	2.7	3.05	1.54	2.46	1.2	20.32
1989	1.09	0.6	1.09	1.66	1.43	2.15	4.09	3.16	4.72	2.35	0.53	0.43	23.3
1990	1.36	0.83	3.81	2.5	3.76	4.75	4.3	7.96	0.51	1.61	2.19	2.7	36.28
1991	0.9	0.31	5.57	5.45	3.25	4.4	1.84	3.66	4.29	4.21	4.49	1.38	39.75
1992	1.45	1.2	1.33	3.31	0.74	0.96	6.7	2.32	4.01	0.58	6.2	2.11	30.91
1993	1.45	1.02	2.82	4.35	4.74	8.69	9.57	7.27	3.41	1.05	1.02	0.6	45.99
1994	1.41	1.84	0.85	1.63	2.44	7.24	7.93	5.87	2.94	0.35	2.87	1.28	36.65
1995	0.77	0.15	2.68	5.37	4.49	2.02	5.79	1.55	1.07	4.33	2.96	0.23	31.41
1996	2.7	0.22	0.9	2.15	6.37	7.26	2.23	1.69	1.97	3.49	1.87	1.33	32.18
1997	0.94	2.53	1.24	1.47	5.22	6.62	4.15	3.28	3.5	1.87	1.16	1.11	33.09
1998	0.87	2.35	3.43	5.35	5.02	7.94	2.31	3.48	3.94	4.82	1.14	0.37	41.02
1999	2.15	0.87	0.71	6.94	5.11	6.14	5.52	3.56	1.55	1.37	0.73	0.89	35.54
2000	1.21	1.06	0.69	1.55	4.11	8.59	3.12	3.37	2.99	0.66	1.28	2.26	30.89
2001	1.36	3.26	0.92	4.35	4.97	4.65	1.05	3.25	6.74	3.17	1.55	1.37	36.64
2002	0.23	1.41	1.27	3.45	4.72	7.73	6.53	5.14	3.41	4.66	0.3	0.73	39.58
2003	0.58	0.34	1.01	1.83	6.38	3.21	4.4	0.42	4.66	1.53	7.93	1.82	34.11
2004	0.35	1.61	4.35	1.14	8.65	5.52	2.73	2.56	0.7	3.36	2.35	1.49	34.81
2005	2.3	1.17	0.88	2.46	2.99	3.79	3.61	3.32	4.77	0.8	2.3	1.03	29.42
2006	1.31	0.55	3.77	4.98	3.98	4.68	7.85	2.15	5.38	2.34	2.63	1.54	41.16
2007	0.81	1.58	2.12	4.91	1.49	3.93	7.48	8.65	2.86	4.59	0.41	3.96	42.79
2008	1.36	2.97	2.15	7.3	8.58	7.83	3.67	1.58	3.61	1.91	1.6	2.6	45.16
2009	1.01	1.12	4.4	3.23	3.42	3.71	5.82	7.73	1.53	6.87	1.72	3.72	44.28
2010	1.74	0.59	0.9	4.74	6.57	7.63	13.09	3.89	2.63	1.82	1.29	2.8	47.69
2011	1.34	3.39	2.32	4.85	2.72	3.52	14.71	2.51	3.27	1.54	3.71	2.78	46.66
2012	1.26	1.26	2.31	2.58	2.6	1.75	0.85	2.47	1.39	3.48	1.29	2.2	23.44
2013	1.5	2.18	2.45	7.14	5.39	5.2	3.36	3.93	2.44	1.69	2.57	1.02	38.87
2014	1.39	1.33	1.68	6.1	1.36	10.93	3.11	3.2	2	2.76	1.36	1.2	36.42
2015	0.77	1.05	0.68	2.9	4.08	6.43	1.47	2.88	4.85	2.67	5.19	4.76	37.73
2016	0.59	0.81	3.66	2.03	4.95	7.55	7.36	4.94	5.53	2.17	2.75	1.82	44.16
2017	2.13	0.77	2.3	3.83	3.55	3.58	9.21	3.39	0.23	6.25	0.95	0.63	36.82
2018	1.14	2.72	1.13	1.78	4.21	3.44	4.45	6.88	10.03	7.82	1.71	2.02	47.33
2019	2.57	3.7	1.55	4.3	5.56	3.31	5.67	4.24	12.57	8.57	1.16	1.25	54.45
2020	1.95	3.3	3.62	1.66	5.14	7.6	3.93	1.68	6.72	3.34	2.28	3.66	44.88

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
2021	1.34	0.92	1.96	1.58	2.39	1.68	3.43	3.89	2.17	4.38	0.65	1.96	26.35

According to NOAA, there have been 12 drought events in Dubuque County between July 1, 1950 and July 31, 2023, with a total of \$21.3 million in crop damages reported. While the NOAA database covers severe weather events as far back as 1950, the first recorded drought event in Dubuque County was in August 2003 and recorded \$14.9 million in crop damages, or 70% of all damages recorded in the County.

According to the USDA's Risk Management Agency, payments for insured crop losses in Dubuque County because of drought conditions occurred in all ten years from 2013-2022 and totaled \$8.3 million, more than 66% less than the previous ten years (see **Table 3.30**).

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**Table 3.30. Crop Insurance Claims Paid from Drought, 2013-2022**

Year	Insurance Paid
2013	\$1,983,319.00
2014	\$2,897,403.55
2015	\$311,560.81
2016	\$5,476.00
2017	\$147,175.70
2018	\$4,944.00
2019	\$1,011.00
2020	\$1,757,861.85
2021	\$1,044,144.50
2022	\$202,910.90
<b>Insurance Paid</b>	<b>\$8,355,807.31</b>

Source: USDA Risk Management Agency

### ***Probability of Future Occurrence***

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 for farmers to estimate soil moisture.

In the past ten years, there have been ten years with crop insurance claims because of drought in Dubuque County. If this trend continues, this results in a probability of 90% agricultural impacts because of drought in any given year. However, the trend from the previous ten years has been down significantly. Expectations are that Dubuque County will have more precipitation.

## **Vulnerability**

### ***Overview***

Dubuque County jurisdictions are impacted by drought because it is an expensive weather disaster; it reduces agricultural productivity and causes a strain on urban water supplies. In Dubuque County, farmers bear the most direct stress from drought as wells may run dry; crops wilt and die, and forage for livestock becomes scarce and costly.

Dubuque County has 1,402 farms in the County that cover 313,476 acres of land. This translates to 82 percent of the surface land in the County being used for agriculture. Therefore, the planning area has a high exposure to this hazard. Aside from agricultural impacts, other losses related to drought include increased costs of fire suppression and damage to roads and structural foundations due to the shrink dynamic of expansive soils during excessively dry conditions. Drought also presents hazards to public health in extreme cases, where drinking water production cannot keep up with demand. Water wells become less productive during drought and a failure of remaining productive wells (due to power outage, etc.) can cause public drinking water supplies to become compromised.

### ***Potential Losses to Existing Development***

Areas associated with agricultural use are vulnerable to drought conditions which could result in a decrease in crop production or a decrease in available grazing area for livestock. Drought has no real effect on houses and buildings. The impacts would be minimal in terms of landscaping. Rationing water supplies would most likely be the worst-case scenario impact.

### ***Future Development***

Increases in acreage planted with crops would increase the exposure to drought-related agricultural losses. In addition, increases in population add additional strain on water supply systems to meet the growing demand for treated water.

### ***Climate Change Impacts***

For the most part, climate change studies have shown increases in precipitation, rather than decreases. However, drought cycles continue. Climate change studies have also shown some increases in average temperatures. If this occurs during a drought cycle, the drought impacts will be exacerbated and increased agricultural losses will be sustained.

## **3.5.4 Expansive Soils**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	1	4	1.30	Low

## **Profile**

### ***Hazard Description***

A relatively widespread geologic hazard for Iowa is the presence of soils that expand and shrink in relation to their water content. Expansive soils can cause physical damage to building foundations, roadways, and other components of the infrastructure when clay soils swell and shrink due to changes in moisture content. The effects of expansive soils are most prevalent in regions of moderate to high precipitation where prolonged periods of drought are followed by long periods of rainfall. These conditions exist in Dubuque County from time to time.

The warning time for expansive soils is consistent with other geologic hazards that occur slowly over time. The duration of response to this hazard is limited in the State of Iowa. Although prolonged periods of drought are a primary indicator of risk followed by forecasted periods of precipitation, the response to expansive soils in Iowa is limited and is in large part coupled with response to flash flooding and river flooding.

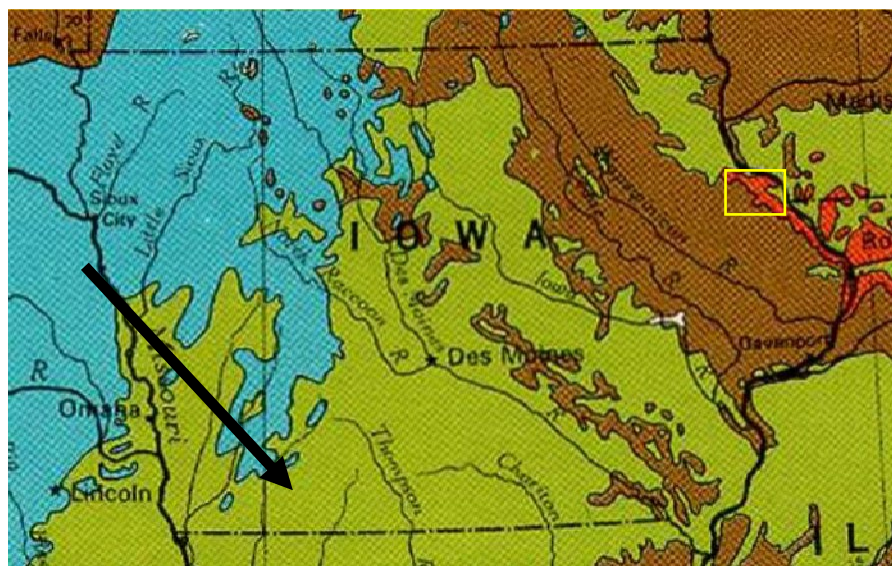
### ***Geographic Location/Extent***

**Figure 3.11** shows a map of the swelling potential of soils in Iowa. Dubuque County has units near the Mississippi River that contain abundant clay, having high swelling potential. The soil in the remainder of the county contains little or no swelling clay. This hazard primarily impacts the following jurisdictions: Unincorporated Dubuque County, Balltown, Rickardsville, Sherrill, Durango, Sageville, Asbury, Graf, Centralia, Peosta, Dubuque, and Zwingle.

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### **Figure 3.11 U.S. Geological Survey Swelling Clays Map of Iowa**

Source: U.S. Geological Survey publication "Swelling Clays Map of the Conterminous United States" by W.W. Olive, A.F.





Chleborad, C.W. Frahme, Julius Schlocker, R.R. Schneider, and R.L. Shuster, 1989: Purple square indicates approximate location of Dubuque County.

### ***Previous Occurrences***

Streets and parking lots throughout the county are damaged every year by the effects of expansive soils as well as underground water lines that are damaged as the soil expands and contracts at varying levels along a water line. The frequency of damage from expansive soils can be associated with the cycles of drought and heavy rainfall, which reflect changes in moisture content. Damages occur with isolated incidents and affect property owners, local governments, and businesses generally make any necessary repairs.

### ***Probability of Future Occurrence***

There will continue to be some damage to paved areas and foundations in Dubuque County due to swelling soils every year. It is unlikely that these damages will become greater in the future unless new development occurs in areas where the hazard is more severe. Certain buildings and construction practices could be put in place to lessen these impacts.

## **Vulnerability**

### ***Overview***

While the entire planning area is vulnerable to some structural damage because of shrinking, and expanding soils, there is no data available to determine damage estimates for this hazard. In most cases, individual property owners, local governments, and businesses pay for repairs to damages caused by this hazard. Underground utility lines such as water and sewer pipes are also at risk of damages associated with expansive soils. However, there is no data to support damages and costs associated with this hazard at this time. This hazard does not impact human safety.

### ***Potential Losses to Existing Development***

Existing development will continue to be vulnerable to expansive soils.

### ***Future Development***

Additional future development in the planning area will also be vulnerable to this hazard.

## **3.5.5 Extreme Heat**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
3	2	1	3	2.40	Moderate

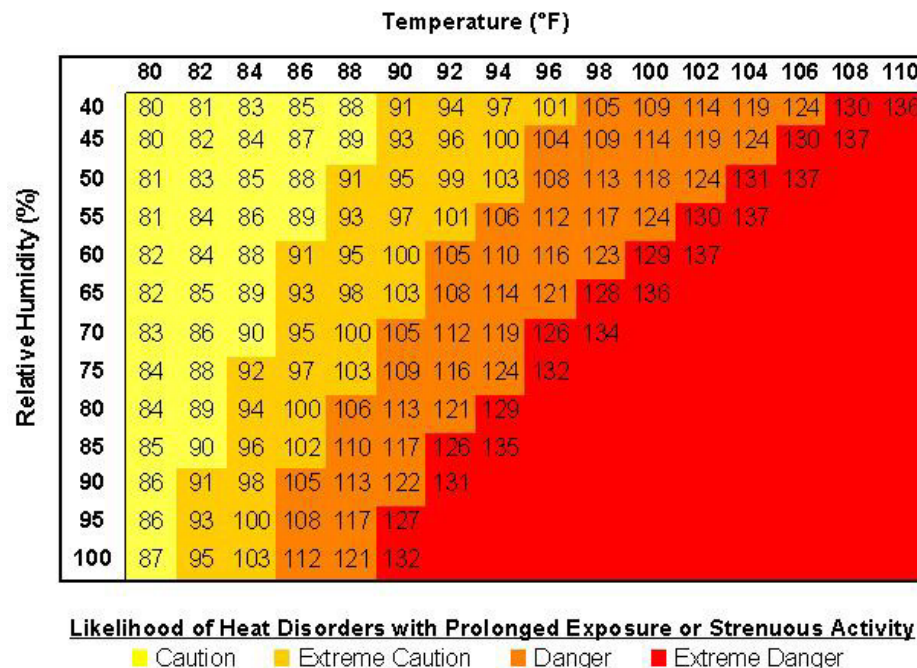
## **Profile**

### ***Hazard Description***

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. 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 3.12** uses both factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

**Figure 3.12 Heat Index (HI) Chart**



Source: National Weather Service (NWS) [http://www.nws.noaa.gov/os/heat/heat\\_index.shtml](http://www.nws.noaa.gov/os/heat/heat_index.shtml)

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.

The most dangerous place to be is in a permanent 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.

**Table 3.31** lists typical symptoms and health impacts of exposure to extreme heat.

**Table 3.31 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: National Weather Service Heat Index Program, [www.weather.gov/os/heat/index.shtml](http://www.weather.gov/os/heat/index.shtml)

The National Weather Service 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.

### ***Geographic Location/Extent***

The entire planning area is subject to extreme heat and all participating jurisdictions are affected.

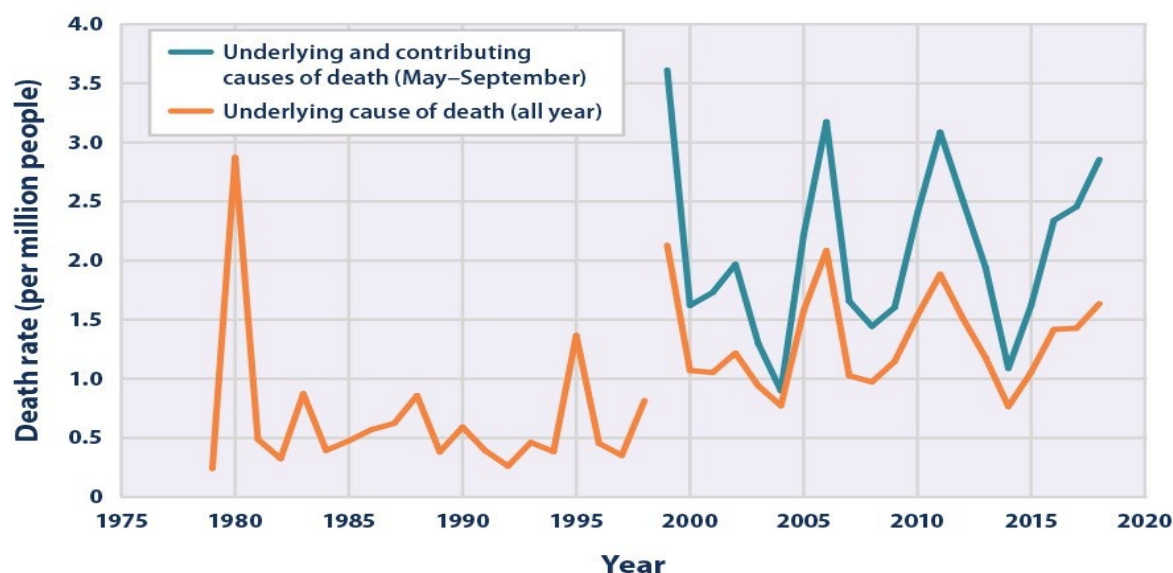
### ***Previous Occurrences***

**Figure 3.13 illustrates** heat-related deaths in the United States using two methodologies. One method shows deaths for which excessive natural heat was stated as the underlying cause of death from 1975 to 2020. The other data series shows deaths for which heat was listed as either the underlying cause or a contributing cause, based on a broader set of data that at present can only be evaluated back to 1999. For example, in a case where cardiovascular disease was determined to be the underlying cause of death, heat could be listed as a contributing factor because it can make the individual more susceptible to the effects of this disease. Because excessive heat events are associated with summer months, the 1999–2013 analysis was limited to May through September.

According to the National Weather Service, in 2015, 45 people died nationally because of extreme heat. In 2014, there were 20 heat-related deaths. In 2013 there were 92 and in 2012, there were 155 deaths. The 10-year average for heat related fatalities is 124. Only one heat-related death has been reported for Iowa within the last 10 years, occurring in 2006. (Source: <http://www.nws.noaa.gov/om/hazstats.shtml>).

On average, the hottest months of the year are July and August. According to the High Plains Regional Climate Center, the average temperature in Dubuque County for the month of July is 72.61 degrees Fahrenheit (°F) with an average maximum temperature of 83.28 °F; and the average temperature for the month of August is 70.63 °F with an average maximum temperature of 81.35 °F. (Source: <http://www.hprcc.unl.edu/datasets.php?set=CountyData#>)

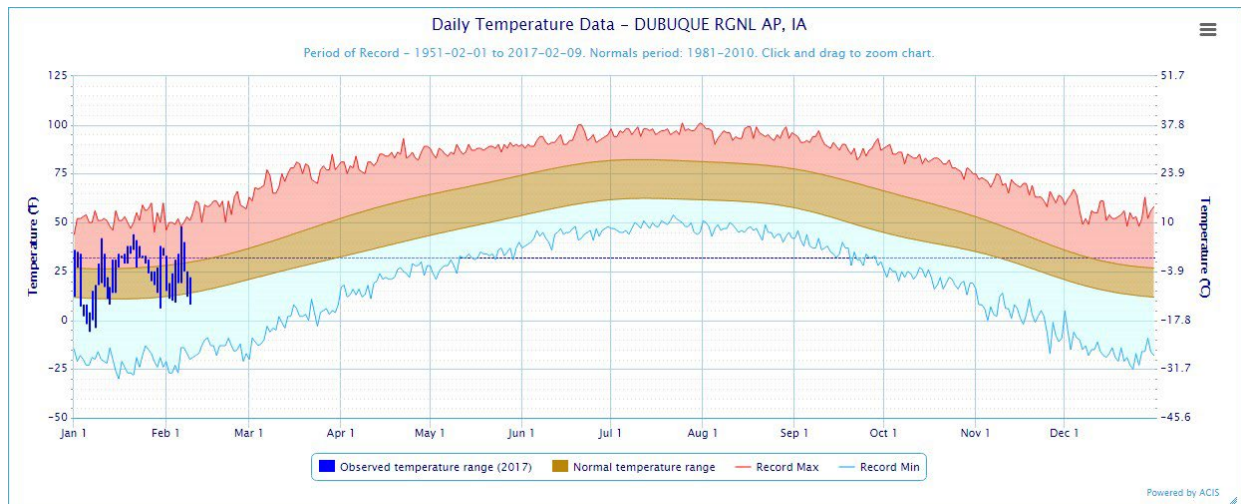
**Figure 3.13 Deaths Classified as “Heat Related” in the United States, 1975-2020**



Source: Environmental Protection Agency, [https://www3.epa.gov/climatechange/pdfs/print\\_heat-deaths-2015.pdf](https://www3.epa.gov/climatechange/pdfs/print_heat-deaths-2015.pdf)

**Figure 3.14** provides the daily temperature averages and extremes for the Dubuque Regional Airport weather station for the period from 1981 to 2010 from the High Plains Regional Climate Center. This graph also shows the observed temperature range for 2017 to-date as of February 13, 2017.

**Figure 3.14 Daily Temperature Averages and Extremes, Dubuque Regional Airport, Iowa (1981 – 2010)**



Source: High Plains Regional Climate Center, <http://climod.unl.edu/>

At the Dubuque Regional Airport weather station from 1993 to 2016, there were 13 days with temperatures 95 degrees Fahrenheit or above (at least 10 degrees above normal). When looking at only those events with a high temperature of 95 degrees Fahrenheit and higher that lasted for 3 consecutive days or more, there were two occurrences during the 24-year period from 1993 to 2016.

The following summarizes the National Weather Service Advisories, Watches, and Warnings for Heat or Excessive Heat in Dubuque County from 1986 to 2023 (38 years of data). No excessive heat events have been documented since 2013.

- 19 Advisories
- 3 Watches
- 2 Warnings

The National Climatic Data Center reported three regional heat events and one regional excessive heat event in and around the Dubuque County planning area:

- **July 25, 1997 – Regional Heat Event** - Heat and high humidity teamed together produced excessive heat index values reaching 105 °F to 110 °F during the day. This came in the middle of an otherwise much cooler than normal summer and many claimed that their bodies were not properly acclimated and therefore unprepared for the sudden spike in temperatures and humidity.
- **July 19, 1999 - Regional Heat Event** - A strong ridge of high pressure over the central U.S. produced very hot and humid conditions over the Midwest from mid to late July. Heat advisories and warnings were issued for portions of eastern Iowa during the period. Temperatures around the 100 °F mark combined with dew points in the 70s produced heat indices of 105 °F to as high as 125 °F. Newspaper accounts indicate at least 19 people in Illinois, and 27 in Missouri, died from heat-related factors since July 19th.
- **July 4, 2012 – Regional Excessive Heat Event** - A very hot and humid air mass surged into the Midwest during the long 4th of July holiday. The dangerous heat began about

noon on July 4 with relief from the heat and humidity finally arriving during the evening of July 7. During this period, afternoon and early evening temperatures soared into the upper 90s to lower 100s with nighttime temperatures remaining well into the 70s. Combining the heat and humidity created heat index values of 105 °F to 115 °F during the afternoon and evening. The hottest day was Saturday July 7 when many locations reported afternoon maximum temperatures of 100 °F to 105 °F.

- **August 26, 2013 - Regional Heat Event** - A large, nearly stationary upper level high centered over eastern Kansas and Missouri and a dome of unseasonably warm air aloft dominated the weather picture from August 26 through August 30, 2013. This was the hottest weather of the entire summer. Maximum temperatures soared into the 90s during much of this period with several locations reporting lower 100's on August 30. In fact, record high temperatures were either broken or tied at Cedar Rapids, Iowa and Moline, Illinois during this heat wave. In addition to the heat, dew points were well into the 60s to lower 70s which pushed heat index values to 100 to 105, with a few locations reporting 110 °F. Schools without air-conditioning either canceled classes or dismissed students early. In many cities and towns, cooling centers were opened.

According to the USDA's Risk Management Agency, insured payments in Dubuque County for damages to crops because of heat from 2013-2021 totaled \$79,616.50 – more than 50% less than the previous five years. There was no damage to crops because of hot wind.

**Table 3.32** shows the insurable crop insurance claims paid in Dubuque County because of heat.

**Table 3.32** Claims Paid in Dubuque County for Crop Loss as a Result of Heat (2007-2016)

Year	Insurance Paid
2013	\$46,131.00
2017	\$12,693.00
2018	\$2,415.00
2020	\$5,228.00
2021	\$515.00
<b>Insurance Paid</b>	<b>\$79,636.50</b>

Source: Crop Insurance Paid is from the USDA's Risk Management Agency for 2013-2021.

Note: There were no claims paid in 2014, 2015, 2016, or 2019.

## **Vulnerability**

### ***Overview***

Those at greatest risk for heat-related illness and deaths include people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations that may be more vulnerable to extreme heat, demographic data was obtained from the U.S. Census Bureau on numbers of people in each jurisdiction that are over the age of 65 are seen in **Table 3.33**. Data was not available for overweight individuals and those on certain medications.

Overall, Iowans are older than the country. About 18 percent of its population is over 65 years,

compared with 13 percent nationally. Dubuque County's population over 65 years is higher than the national and state averages at 19.5 percent (up nearly 4 percent from 2019). The participating jurisdictions with 20 percent or more of the adults 65 and over in descending order are the cities of Rickardsville, Sherrill, Luxemburg, New Vienna, and Sageville.

**Table 3.33 Dubuque County Population 65 years and Over,**

Jurisdiction	Total Population	Population 65 yrs. and over	Percent 65 yrs. and over
Dubuque County	99266	17256	17.38%
Asbury	5943	913	15.36%
Balltown	79	15	18.99%
Bankston	23	1	4.35%
Bernard	114	15	13.16%
Cascade	2386	426	17.85%
Centralia	116	23	19.83%
Dubuque	59667	11013	18.46%
Durango	20	2	10.00%
Dyersville	4477	738	16.48%
Epworth	2023	324	16.02%
Farley	1766	251	14.21%
Graf	76	12	15.79%
Holy Cross	356	59	16.57%
Luxemburg	245	54	22.04%
New Vienna	382	84	21.99%
Peosta	1908	137	7.18%
Rickardsville	202	54	26.73%
Sageville	95	19	20.00%
Sherrill	189	43	22.75%
Worthington	382	72	18.85%
Zwingle	84	9	10.71%

Source: [www.census.gov/quickfacts/fact/table/dubuquecountyiowa/PST045222](https://www.census.gov/quickfacts/fact/table/dubuquecountyiowa/PST045222)

### ***Estimated Losses to Existing Development***

According to the 2022 Iowa Crop Insurance Profile Report issued by the USDA's Risk Management Agency, there were more than 22 million acres insured and gross premiums were at \$1.36 million. Losses for 2022 were \$265,874,131, a ratio of 20 percent.

Extreme heat can also cause a strain on electricity delivery infrastructure which can be overloaded during peak use of electricity to power air conditioning during extreme heat events. Another type of infrastructure damage that can occur because of extreme heat is road damage.



When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt- paved roads, driveways, and parking lots.

### ***Future Development***

Dubuque County is experienced a small population decline of -0.6 percent between the U.S. Census 2020 and July 1, 2022, estimates. Therefore, estimated losses should remain similar based on development alone.

### ***Climate Change Impacts***

The following climate change impacts relative to Extreme Heat were included in the *2010 Climate Change Impacts on Iowa* report developed by the Iowa Climate Change Impacts Committee.

- 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.

Both impacts could increase the number of extreme heat events in the planning area as well as the potential for negative impacts on people and agriculture.

## **3.5.6 Flash Flooding**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
3	2	4	2	2.75	Moderate

### **Profile**

#### ***Hazard Description***

A flash flood is an event that occurs when water levels rise at an extremely fast rate because of intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil or impermeable surfaces.

Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation.

Riverine Flooding is discussed separately in **Section 3.5.13** and flooding caused by dam failure is discussed in **Section 3.5.2** respectively.

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 river



and stream 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 disburse 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.

***Geographic Location/Extent***

The topography of Dubuque County is gently sloping (5 to 9 percent) to strongly sloping (9 to 30 percent) farmland with some steep bluffs near streams. Vegetal cover is typically pastureland grass, with some timber, especially near streams.

The Mississippi River flows adjacent to the east limit of the county, flowing generally in a southeasterly direction. The Mississippi River is joined by the Little Maquoketa River system flowing east some five miles north of the City of Dubuque and the Catfish Creek system also flowing east. The western and southern portions of the county are drained by the North Fork Maquoketa River and by streams draining into that river which all tend to flow in a southern direction before joining the Maquoketa River some 30 miles south of the City of Dubuque. Land use in and around the floodplain is primarily agricultural.

Flash flooding occurs in those locations of the planning area that are low-lying and/or do not have adequate drainage to carry away the amount of water that falls during intense rainfall events. According to NCDC and reports from the HMPC, the following locations have a history of flash flooding events:

- **City of Dubuque**
  - Bee Branch Drainage Basin - St. Mary's Catholic Church, Elm Street, and the Historic Millwork District
  - Downtown Dubuque, Between 20th and 28th Streets and between Washington and Jackson Streets; 17th St and Locust St
  - Herber and Rupp Hollow Roads
  - Spring Valley Mobile Home Park
  - Kennedy Mall and JF Kennedy Road
  - Rockdale Road and Cedar Cross Road
  - English Mill Rd and N Cascade Rd,
- **City of Dyersville**
  - North Fork of the Maquoketa River
  - Floyd Road and 180th Street
- **City of Durango**
  - Paradise Valley Road
- **City of Cascade**
  - Highway 151 between Cascade and Monticello.
- **City of New Vienna**
  - New Wine Park
- **City of Sageville**
  - Herber Road near John Deere Road closed due to mudslide.
  - Highway 52 at Rickardsville and Sageville

The National Weather Service has various flash flooding products that are issued to the public to provide information regarding upcoming and current flash flood threats (see **Table 3.34**).

**Table 3.34 National Weather Service Flash Flooding Products**

Product	What It Means	You Should...
Hazardous Weather Outlook	Will there be any threat of flash flooding in the next several days?	If there is a threat of flash flooding, check back later for updated forecasts and possible watches and warnings. <a href="#">Latest Hazardous Weather Outlook</a>
Flash Flood Watch	There is a threat of flash flooding within the next 48 hours, either as a result of heavy rain, ice jams, or the threat of a dam break.	Monitor weather conditions closely, especially if you live in an area prone to flash flooding.
Flash Flood Warning	There is an immediate threat for flash flooding in the warned area, especially in low-lying and poor drainage areas. These warnings are updated frequently with Flash Flood Statements.	If you live in an area susceptible to flash flooding, be prepared to evacuate and head to higher ground. Be very cautious when driving in the warned area, especially at night or while it is still raining. You may not be able to see a flooded road until it is too late!
A <b>Flash Flood Emergency</b> may be declared when a severe threat to human life and catastrophic damage from a flash flood is imminent or ongoing. The declaration of a <b>Flash Flood Emergency</b> would typically be found in either a Flash Flood Warning or Flash Flood Statement. People are strongly encouraged to avoid the geographic area of concern in a <b>Flash Flood Emergency</b> . The <b>Flash Flood Emergency</b> wording is used very rarely and is reserved for exceptionally rare and hazardous events.		
Areal Flood Warning	The threat of flash flooding is over, but there is still significant standing water in the affected area.	Areal flood warnings will typically list locations and roads impacted by the flooding. Try to avoid these locations until the water has receded.

Source: National Weather Service, website accessed 8/26/2013 <http://www.crh.noaa.gov/dmx/?n=preparefloodproducts>

## Previous Occurrences

**Table 3.35** provides details regarding the flashflood and areal flood watches and warnings issued for Dubuque County and the Dubuque County forecast zone by National Weather Service. Areal flooding is a type of flash flooding that is generally over a large area usually due to the amount and duration of rainfall.

**Table 3.35 Flash Flood-Related National Weather Service Watches and, Warnings Issued for Dubuque County and, Dubuque County, Iowa Forecast Zone (2000 to 2022)**

Type of Flood / Product Issued	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
<b>Aerial Flood</b>																					
Warning						3	2	2	1		1	2									11
Watch				1	2	4	1					2			2	4	4	3		1	24
<b>Flash Flood</b>																					
Warning	2	4	5		4	7	3	6	1		2	5	1								40
Watch				1	6	12	4	17	3	1	5	4	4	5	3	9	10	5	1		90
<b>Total</b>	2	4	5	2	12	26	10	25	5	1	8	13	5	5	5	13	14	8	1	1	165

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

As discussed in the Description Section, flash flooding can be caused by intense rainfall over a brief period. **Table 3.36** provides the top 30 rainfall events at the Dubuque Lock and Dam Climate Station from 1893 to 2016.

**Table 3.36 Top 30 Rainfall Events, Dubuque Lock and Dam Climate Station, 1893 to 2023**

Date	Amount (inches)	Date	Amount (inches)
2011-07-28	8.8	1947-06-13	3.88
2010-07-23	7.18	1919-07-09	3.87
1972-08-02	5.27	1987-07-30	3.86
1875-09-09	4.95	2007-07-18	3.75
2002-06-04	4.86	1927-09-09	3.72
1876-07-05	4.55	1927-05-08	3.67
1978-05-13	4.5	1938-06-14	3.66
1972-09-13	4.48	1962-05-29	3.64
1918-08-16	4.26	2022-07-16	3.6
2017-07-22	4.23	1915-09-26	3.57
1967-09-14	4.04	2003-11-04	3.57
1881-09-26	4.01	1912-08-18	3.55
2002-08-22	3.98	1892-06-23	3.48
1873-08-07	3.92	1925-07-03	3.46
2016-06-15	3.92	2014-06-19	3.4

Source: Iowa State University Department of Agronomy

<http://mesonet.agron.iastate.edu/climodat/index.phtml?network=IACLIMATE&station=IA2364&report=02>

Information from the NCDC was obtained from 1993 to 2016 to determine previous occurrences for flash flood in the planning area. This search did not reveal any flash flood incidents recorded from 1993 to 1996. Between 1997 and 2016, there were 42 flash flood events and 30 heavy

rain events. When counting only events that occurred on separate days, there were 34 events. During this timeframe, there were no injuries or deaths reported. Total property damages for these events were estimated to be \$30,606,000. **Table 3.37 provides** a summary of the NCDC data

**Table 3.37 NCDC Dubuque County, Iowa Flash Flood Events Summary, 1993-2016**

Date	Property Loss	# Events
<b>Flash Flood</b>		
2/20/1997	\$0	1
5/16/1999	\$5,000,000	2
5/17/1999	\$16,000,000	4
6/8/1999	\$0	2
5/8/2000	\$0	1
6/4/2002	\$0	5
8/22/2002	\$0	4
5/22/2004	\$10,000	1
6/16/2004	\$40,000	1
7/18/2007	\$500,000	1
4/25/2008	\$0	2
5/25/2008	\$0	1
5/30/2008	\$0	1
6/8/2008	\$50,000	2
6/12/2008	\$0	1
7/22/2010	\$500,000	1
7/27/2011	\$8,000,000	2
6/22/2013	\$0	1
6/19/2014	\$0	3
6/29/2014	\$0	1
6/30/2014	\$0	1
6/14/2016	\$0	1
7/23/2016	\$500,000	1
9/22/2016	\$4,000	2
<b>Total</b>	<b>\$30,604,000</b>	<b>42</b>
<b>Heavy Rain</b>		
7/5/2003	\$2,000	1
6/16/2004	\$0	1
6/25/2005	\$0	1
8/18/2005	\$0	1
4/13/2006	\$0	1
6/24/2006	\$0	2
4/25/2008	\$0	2
7/27/2011	\$0	8
7/28/2011	\$0	12
8/23/2011	\$0	1
<b>Total</b>	<b>\$2,000</b>	<b>30</b>
<b>Grand Total</b>	<b>\$30,606,000</b>	<b>72</b>

Source: NCDC

Flash flood events with significant property loss include the following:

- **May 16-17, 1999, Flooding:** Flash flooding along the North Fork of the Maquoketa River caused extensive damage in Dyersville. Numerous businesses across town sustained major damage. The costliest damage occurred at Scale Models, which sustained an estimated \$150,000 in damage. Other businesses reported flooding to depths of 7 feet in their basements. About 100 people were evacuated from 60 homes. State officials set the preliminary damage estimates from Dyersville at \$3 to \$5 million.

Five to six feet of water flooded city streets downtown. Major road damage resulted, including buckled roads and pavement washed away. Approximately 25 residential blocks were affected. Basements in over 60 houses were flooded with water from 2 feet deep up to the rafters. Flooding was reported between 20th and 28th Streets and between Washington and Jackson streets. State damage estimates were set at \$17 million in Dubuque.

- **May 2004 Flooding:** A low level jet developed the first of two squall lines in western Iowa that raced east across Iowa and Illinois. The first squall line travelled north of the stationary front across Iowa and Northern Illinois. The storms brought renewed heavy rain to areas that had been saturated by storms just hours earlier. New Wine County Park evacuated.
- **June 2004 Flooding:** Scattered thunderstorms developed ahead of a cold front moving east through Iowa. By the evening, a surface low had developed along the cold front as it moved into Eastern Iowa. This enhanced the overall lift in a near tropical atmosphere and produced copious amounts of rain in a very short period. This resulted in flash flooding across parts of Northeast Iowa and Northwest Illinois due to the hilly terrain. Water over numerous roads in the north part of county; Highway 52 closed at Rickardsville and Sageville.
- **July 2007 Flooding:** Rainfall totals of 2 to 6 inches over a 7-hour period resulted in numerous flooded roads, creeks, streams, and rivers throughout Dubuque County. The following locations reported flooding during this event: Rupp Hollow Rd, W Locust St and 22nd St, 17th St and Locust St, all along Locust St, Downtown Dubuque, Highway 52 on the north side of town, Highway 52 and Clayhill Rd, 22nd St and White St, many roads north of Highway 20, English Mill Rd and N Cascade Rd, Paradise Valley Rd and Highway 52, and several areas along Highway 52 from Sageville, IA to Holy Cross, IA. It was also reported that portions of the Maquoketa River were well out of its banks and the river level was rising rapidly.
- **June 2008 Flooding:** Heavy rain-producing showers and thunderstorms moved across eastern Iowa during the morning and early afternoon hours of June 8 producing damaging winds and flash flooding. Heavy rains caused the Little Maquoketa River to rise rapidly resulting in some flash flooding of Highway 52 near Durango, IA around 2:00 pm June 8. The highway was closed until the flood waters receded. Some Durango residences along the river were evacuated.

- **July 2010 Flooding:** Heavy rains of 4 to 8 inches which fell in about 12 hours resulted in flash flooding of much of Dubuque County during the morning of July 23. At 1245 am CDT, about 15 inches of water was flowing in some streets in Dubuque as torrential rains continued. At 122 am CDT, the baseball field near the junction of Coffee Creek and the North Fork Maquoketa River in New Vienna was flooded with 4 feet of water. In addition, the North Fork of the Maquoketa River flooded, and flood waters started to reach the edges of some residences in town. By 539 am CDT, Highway 52 north of Dubuque was closed due to flooding.

In Dyersville, both Bear Creek and the North Fork Maquoketa River overtopped, flooding various streets around town including a 3-block section of downtown near the historic basilica. One neighborhood was surrounded by water, forcing emergency crews to stage personnel in the isolated area. About 50 homes in Dyersville were affected either by flooded basements or by loss of access.

- **July 2011 Flooding:** Torrential downpours of rain fell across much of Dubuque County during the evening of July 27 and early morning hours of July 28 resulting in flash flooding of much of the county, especially in Dubuque, IA. Rainfall totals of 7 to 15 inches were common across the area, with most of the rain falling in under 12 hours. Numerous roads and bridges were washed out and many others closed, causing Dubuque County to run out of barricades. Several neighborhoods were evacuated, including the Valley Hill trailer park where the water was 6 feet deep. Many creeks in the area raged out of their banks, including Catfish Creek. Very early estimates of damage to infrastructure alone exceeded \$3 Million. Numerous roads and streets were flooded, with some eroded or washed away completely. Among the hardest hit areas was the vicinities of St. Mary's Catholic Church, Elm Street and the Millwork District. The Dubuque water treatment plant was heavily damaged, with estimates between \$1.5 Million and \$2 Million. A basement wall caved in at 1790 Chaney Road on Dubuque's West End.
- **July 2016 Flooding:** A disturbance interacting with a frontal system produced an area of severe thunderstorms with numerous damaging winds, some flash flooding and a few isolated, brief tornadoes. Amateur radio report received water over several roads in downtown Dubuque including Central Avenue and Jackson Streets which were closed.

The US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CRREL) maintains a database of historic ice jams. According to a query of that database from 1950 to the present, eight recorded ice jams have occurred in Dubuque County: six within the City of Dubuque; one in the City of Durango; and one in the City of New Vienna. (Source: <http://rsgisias.crrel.usace.army.mil/apex/f?p=524:1>).

### ***Probability of Future Occurrence***

The frequency of past events is used to gauge the likelihood of future occurrences. The events from NCDC that occurred on the same day were combined to determine the total number of 34 flash flooding events in the planning area over the 24-year period from 1993 to 2016. However, with past mitigation efforts, the planning committee believes that this reduces the

score to a 3 for probability.



## **Vulnerability**

### ***Vulnerability Overview***

Water over low-lying roads and bridges is the most frequent impacts associated with flash flooding that has occurred in the planning area. This can cause wash out of bridge abutments and erosion/scour damage on roads. 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. Building damage is generally limited to water in basements where rain is too intense for drainage systems and natural drainage to carry water away from the structure. In addition, when combined storm/sanitary sewer systems are overloaded, this can result in sewer back-up. In general, flash-flooding is short in duration and government services and business operations are not impacted. However, flash flooding within Dubuque County has caused over \$30 million dollars in property damages.

### ***Potential Losses to Existing Development***

When roads and bridges are inundated by water, damage often occurs as the water scours materials around bridge abutments and gravel roads.

The water can also cause erosion undermining roadbeds. In some instances, steep slopes that are saturated with water may cause mud or rockslides onto roadways. This damage can cause costly repairs for state, county, and city road/bridge maintenance departments. When sewer back-up occurs, this can result in costly clean-up for home and business owners as well as present a health hazard.

Based on loss estimates reported by NCDIC, property losses averaged \$1,275,250 per year over the 24-year period from 1993 to 2016.

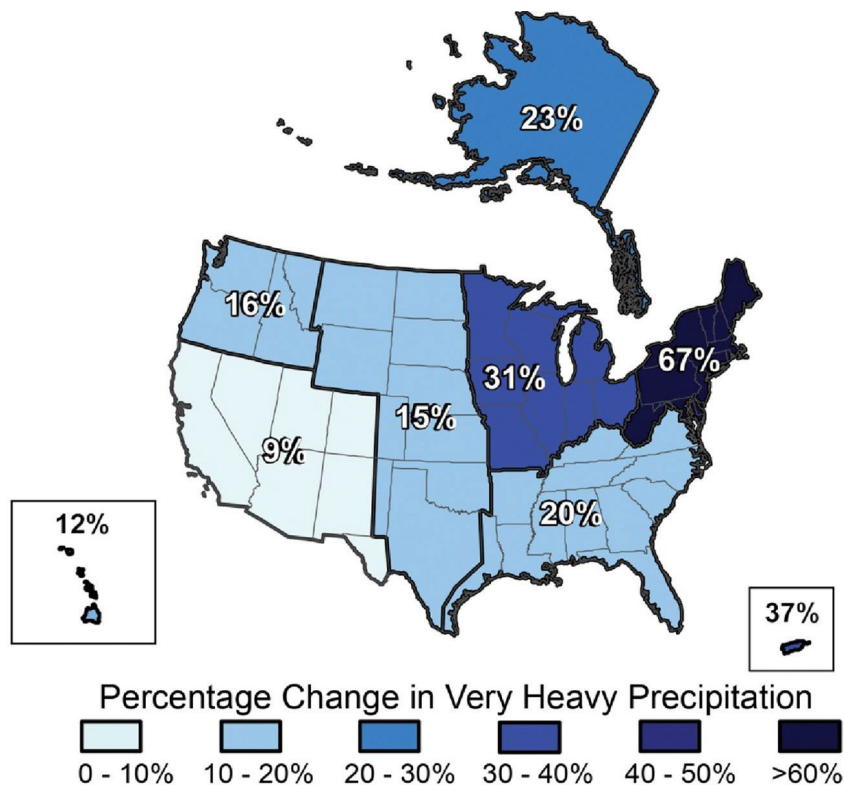
### ***Future Development***

In planning future development, jurisdictions in the planning area should avoid development in low-lying areas near rivers and streams or where interior drainage systems are not adequate to provide drainage during heavy rainfall events. Future development should also take into consideration the impact of additional impervious surfaces on water run-off and drainage capabilities during heavy rainfall events.

### ***Climate Change Impacts***

One of the climate change impacts noted in the *2010 Climate Change Impacts on Iowa* report by the Iowa Climate Change Impacts Committee is the increase in frequency of severe precipitation events. **Figure 3.15** shows that all of Iowa is in the region with a 31% increase in very heavy precipitation from 1958 to 2007. For this study, very heavy precipitation was defined as the heaviest 1% of all events.

**Figure 3.15 Increase in Very Heavy Precipitation in the U.S., 1958-2007**



Source: Karl, T.R., J.M. Melillo, and T.C. Peterson (eds). 2009. *Global Climate Change Impacts in the United States*. U.S. Global Climate Change Research Program. Cambridge University Press and <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts> as cited in the 2010 *Climate Change Impacts on Iowa* report by the Iowa Climate Change Impacts Committee

If this trend increases, flash flooding events and their associated impacts will likely occur more often in the planning area.

### 3.5.7 Grass or Wildland Fire

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
2	1	4	1	1.90	Low

#### Profile

##### **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 National Weather Service monitors the conditions supportive of wildfires in the State daily so that wildfires can be predicted, if not prevented.

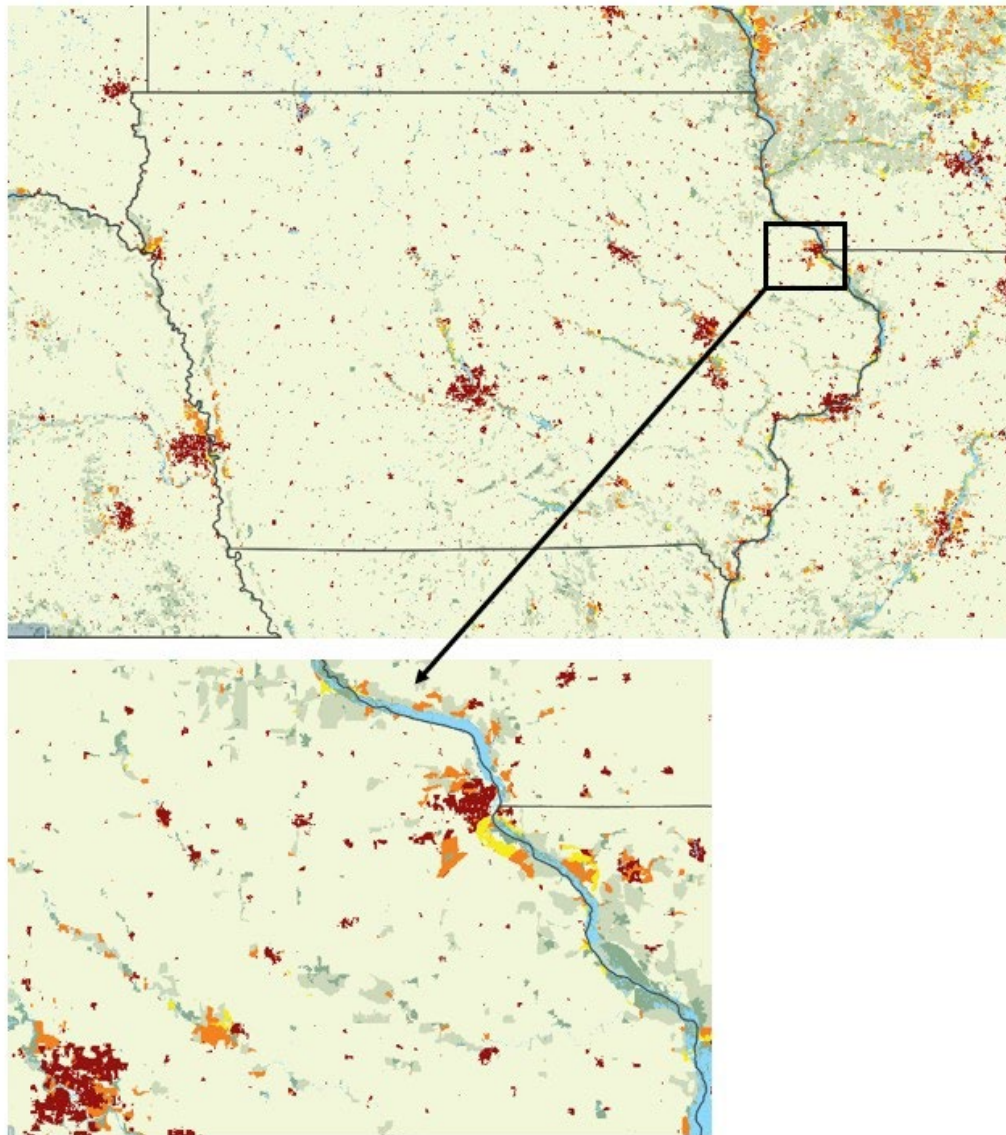
The risk factors considered are:

- High temperature
- High wind speed
- Fuel moisture (greenness of vegetation)
- Low humidity
- Little or no cloud cover

### ***Geographic Location/Extent***

Wildland/Grass fires are most likely to occur in the Wildland Urban Interface (WUI). This is the area where houses meet or intermingle with undeveloped wildland vegetation. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas. As can be seen in **Figure 3.16** Dubuque County has a moderate amount of intermix areas (red) and no interface areas (yellow).

**Figure 3.16 Dubuque County Wildland Urban Interface, 2023**



Source: SILVIS Lab, Department of Forest Ecology and management, University of Wisconsin-Madison; WUI 2023, <http://silvis.forest.wisc.edu/maps/wui/state10>

### ***Previous Occurrences***

Data was requested from the Iowa Department of Public Safety, State Fire Marshal Division to provide information on previous occurrences of grass/wildland fires in the planning area. Through the National Fire Incident Reporting System (NFIRS), the Iowa State Fire Marshal's Office collects and reports fire incidents throughout the State. NFIRS is a repository of

statistical data reported by participating fire departments. The State Fire Marshal's Division was unable to provide the historical grass/wildland fire data at this time.

### ***Probability of Future Occurrence***

Historical data was not available to document the average number of wildland/grass fires per year. The HMPC stated that field fires do occur, but the jurisdictions in the county have not experienced large scale wildfires. Since statistical data was unavailable to determine a quantitative probability, a qualitative probability is based on the anecdotal descriptions from the HMPC.

## **Vulnerability**

### ***Overview***

Areas that are most vulnerable to wildfire are agricultural areas where land is burned, rural areas where trash and debris are burned, and the wildland-urban interface/intermix areas.

To demonstrate how vulnerability to this hazard varies by jurisdiction, the 2023 spatial data indicating acreage of Wildland Urban Interface/Intermix areas from the SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison was compared against the corporate boundary layer for the planning area. **Table 3.38** and **Table 3.39** provide additional details.

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**Table 3.38 Dubuque County Wildland/Urban Interface and Intermix Acres**

<b>Jurisdiction</b>	<b>Intermix (acres)</b>	<b>Interface (acres)</b>
Asbury	7	0
Balltown	19	0
Cascade	2	0
Dubuque	1,153	0
Epworth	9	0
Sageville	167	0
Worthington	2	0
Unincorporated	19,999	0
<b>Total</b>	<b>21,358</b>	<b>0</b>

Source: SILVIS Lab, Department of Forest Ecology and management, University of Wisconsin-Madison; WUI 2010, <http://silvis.forest.wisc.edu/maps/wui/2020/download>

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**Table 3.39 Wildland Urban Intermix / Interface Acreage by WUI Class**

WUI Class	Acres
High Density Intermix	2
Medium Density Intermix	1,898
Low Density Intermix	19,459
Total	21,358

Source: SILVIS Lab, Department of Forest Ecology and management, University of Wisconsin-Madison; WUI 2020  
<http://silvis.forest.wisc.edu/maps/wui/2020/download>

### ***Potential Losses to Existing Development***

Wildfires can be responsible for extensive damage to crops, the environment and occasionally residential or business facilities. Homes built in rural areas are more vulnerable since they are in closer proximity to land that is burned and homeowners are more likely to burn trash and debris in rural locations. The vulnerability of structures in rural areas is exacerbated due to the lack of hydrants in these areas for firefighting and the distance required for firefighting vehicles and personnel to travel to respond. Potential losses to crops and rangeland are additional concerns.

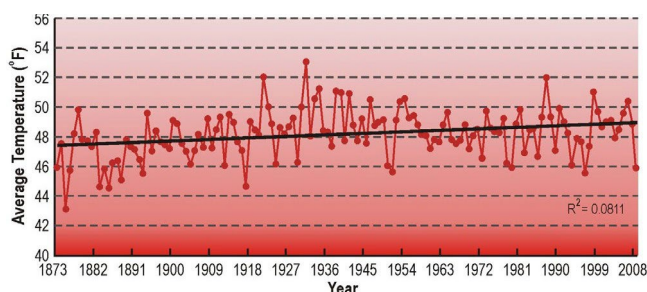
### ***Future Development***

Future development in the wildland-urban interface/intermix areas would increase vulnerability to this hazard.

### ***Climate Change Impact***

According to the *2010 Climate Change Impacts on Iowa* report, by the Iowa Climate Change Impacts Committee, the annual average temperature has been increasing over the last 136 years. **Figure 3.17** shows this data graphically.

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**Figure 3.17 Annual Average of Statewide Daily Average Temperatures (° F)**

Source: *2010 Climate Change Impacts on Iowa* report, by the Iowa Climate Change Impacts Committee, Data from the Iowa Climatology Bureau, 2010

If Iowa were to experience a severe drought, as has occurred in the past, the slow and steady rise in statewide annual mean temperature, masked in summer by moist surface conditions during non-drought years, could lead to an abrupt switch to extreme summer heat comparable to the summers of 1983 or 1988. If these conditions occur, the occurrence of wildfire would be expected to increase as was seen in 2012.

### 3.5.8 Hazardous Materials Incident

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Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
2	2	4	3	2.40	Moderate

#### **Profile**

##### ***Hazard Description***

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 increasing types and quantities. Each year over 1,000 new synthetic chemicals are introduced and as many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals”. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous material incidents generally affect a localized area.

##### ***Fixed Hazardous Materials Incident***

A fixed hazardous materials incident is the accidental release of chemical substances or mixtures during production or handling at a fixed facility.

##### ***Transportation Hazardous Materials Incident***

A transportation hazardous materials incident is the accidental release of chemical substances or mixtures during transport. Transportation Hazardous Materials Incidents in Dubuque County can occur during highway or air transport. Highway and rail accidents involving hazardous materials pose a great potential for public exposures. Both nearby populations and motorists can be impacted and become exposed by accidents and releases. Barge accidents involving hazardous material pose potential for exposure through contamination of the water as well as populations near the point of release. If airplanes carrying hazardous cargo crash, or otherwise leak contaminated cargo, populations and the environment in the impacted area can become exposed.

##### ***Pipeline Incident***

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak to a large rupture where an explosion is possible. 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 near the pipelines.

##### ***Geographic Location/Extent***

This section provides geographic locations within Dubuque County impacted by each type of potential hazardous materials incident.

##### ***Fixed Hazardous Materials Incident***

According to the Iowa Department of Natural Resources, there are 58 sites in Dubuque 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.

**Table 3.40** provides the number of Tier II Facilities for each jurisdiction in the planning area as well. **Figure 3.18** that follows is a map showing the locations of Tier II Facilities.

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**Table 3.40 Tier II Facilities in Dubuque County per jurisdiction**

Jurisdiction	# of Tier II Facilities
Unincorporated	12
Asbury	1
Cascade	2
Dubuque	25
Dyersville	9
Epworth	2
Farley	1
Peosta	3
Sherrill	2
Worthington	1
Total	58

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**Figure 3.18 Map of Tier II Facilities in Dubuque County per jurisdiction**





### ***Transportation Hazardous Materials Incident***

The transport of hazardous materials in Dubuque County occurs via trucks on the highways/roads and railways as well as via barge traffic on the Mississippi River and airplanes carrying hazardous cargo.

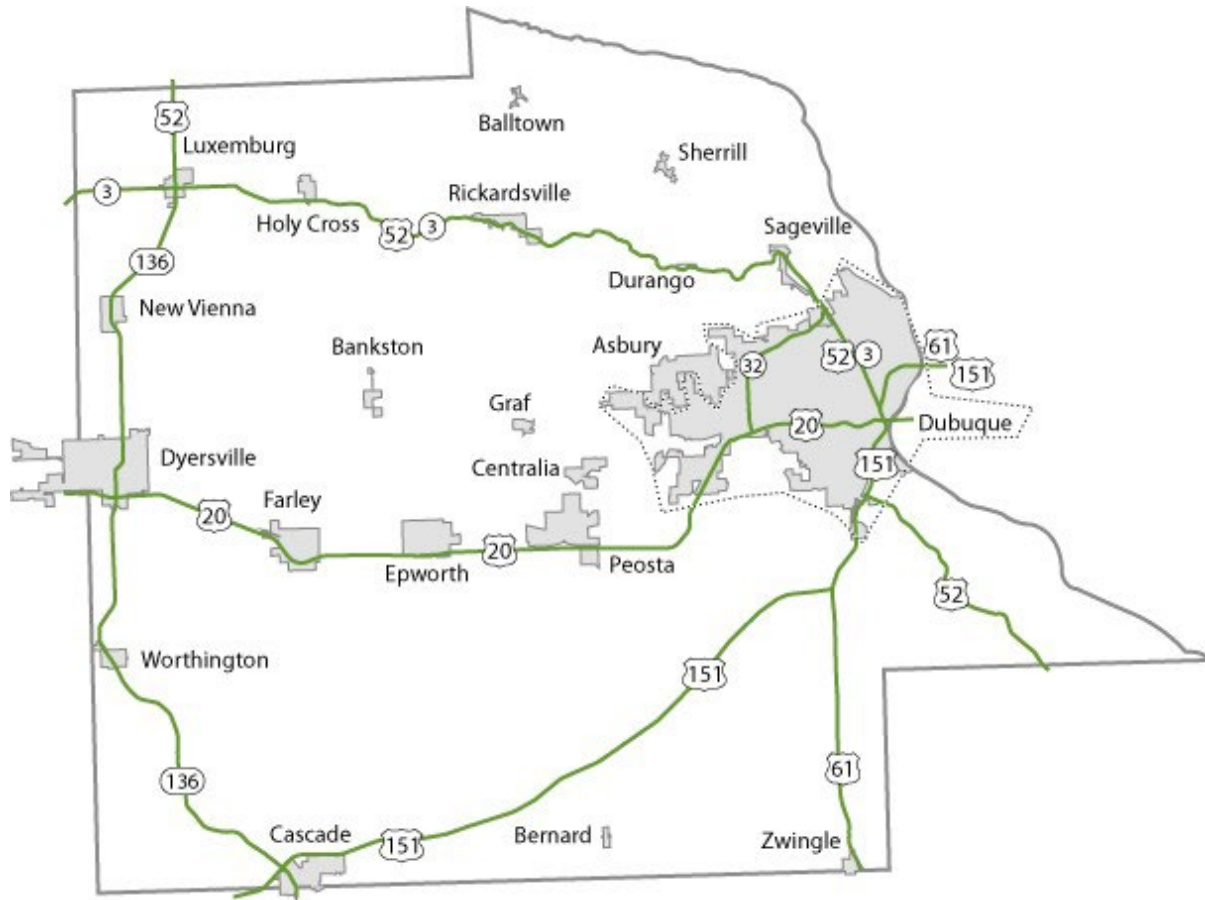
#### **Truck Transport**

Hazardous materials can be transported on any of the roads in Dubuque County. Numerous major US and state highways run through Dubuque County. The City of Dubuque is the major hub for the four-lane US Highway 20 that runs east west through Dubuque County extending into Iowa and Illinois. Four-lane US Highway 61 extends north south from the City of Dubuque and extends into Wisconsin on the north and to the Quad Cities and beyond to the south. Four-lane US Highway 151 extends from the City of Dubuque and into Wisconsin on the north and to Cedar Rapids and beyond to the southwest. US Highway 52 runs north-south generally following the Mississippi River and extending north from Dubuque County through Iowa into Minnesota and to the south through Bellevue and Sabula before entering Illinois. The major highways are listed below:

- US Highway 20
- US Highway 52
- US Highway 61
- US Highway 151
- Iowa Highway 3
- Iowa Highway 32
- Iowa Highway 136

Numerous paved county roads connect all the incorporated cities and unincorporated towns throughout the county. Agriculture is important to the economy of Dubuque County. As a result, along with other chemicals, chemicals utilized in agriculture are frequently transported along county and local roadways. Industrial areas in Dubuque County are primarily located in three areas around the City of Dubuque. The first area is to the south along Highways 52, 151 and 61. The second is located west of the City of Dubuque along Highway 20 and extends to Peosta. The third area is along Highway 52 North in the Couler Valley and Little Maquoketa River outlet to the Mississippi River. These industrial areas have the potential for the use of hazardous chemicals. As a result, incidents may occur more frequently in these areas. **Figure 3.19** illustrates the highways in Dubuque County.

**Figure 3.19 Dubuque County Highways**



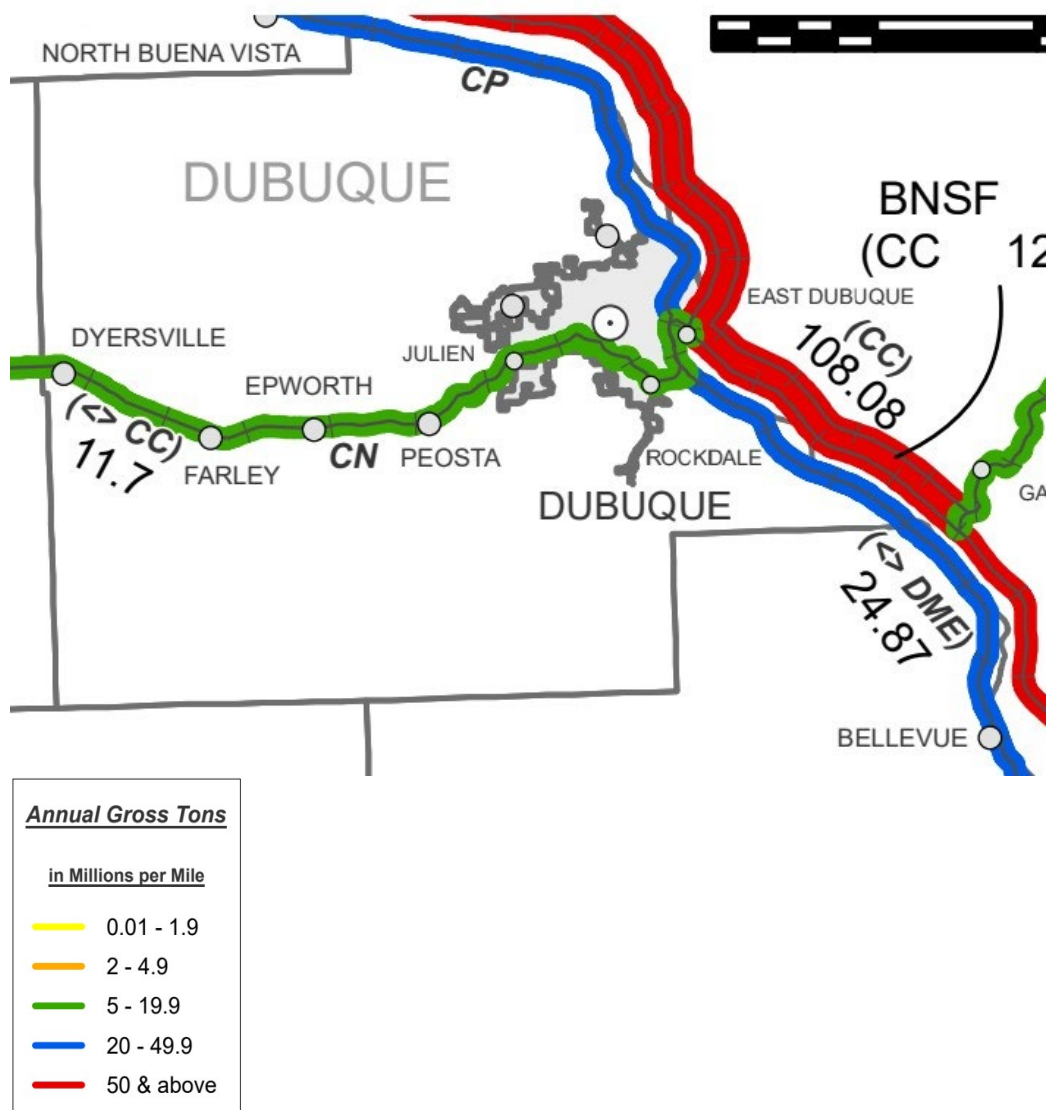
Source: Iowa Department of Transportation, <http://www.iowadot.gov/maps/msp/pdfview/counties.html>

## Rail Transport

The following railroads operate in Dubuque County: Canadian Pacific Railroad (CP), Dakota, Minnesota and Eastern (DME) R.R. Company, Canadian National Railway Company. Burlington Northern Sante Fe Railroad has a line (in red) that runs down the Illinois side of the Mississippi River adjacent to Dubuque County.

**Figure 3.20** shows the railroads that operate in Dubuque County with the annual gross tons per mile. This demonstrates that the main CP/DME line that runs along the Dubuque County side of the Mississippi carries 20 to 24.87million tons per mile annually.

**Figure 3.20 Railroad Lines in Dubuque County**



Source: Iowa Department of Transportation, <http://www.iowadot.gov/iowarail/railroads/maps/maphome.htm>

### Air Freight

The Dubuque Regional Airport is located south of the Dubuque County (see **Figure 3.21**). There are also three private airports: Dyersville Area Airport, Kleis Airport (Zwingle) and Anderson Airport (near Graf).

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**Figure 3.21 Dubuque Regional Airport**



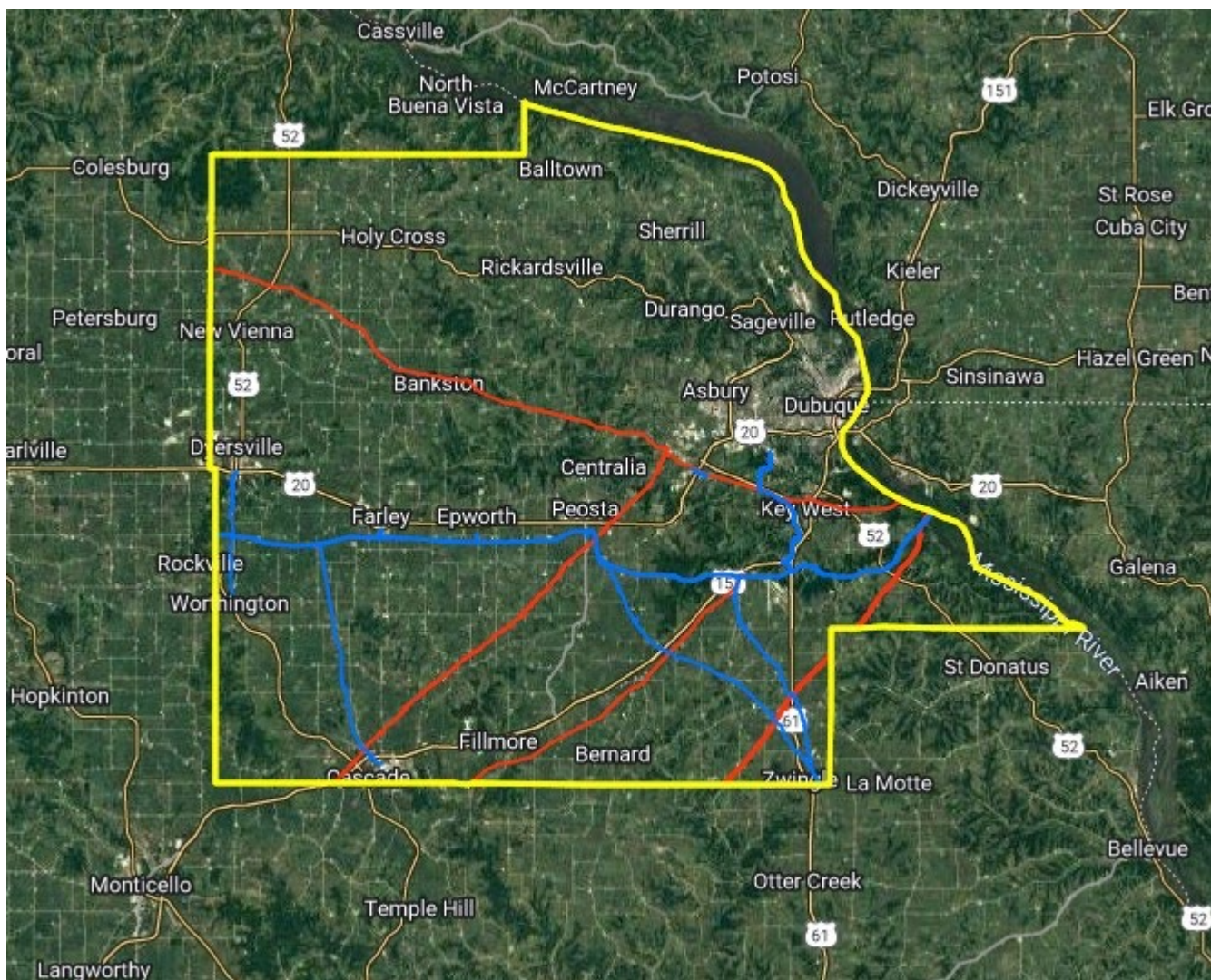
Source: Iowa Department of Transportation, <http://www.iowadot.gov/aviation/airports/municipal.aspx>

### Pipeline Incident

**Figure 3.22** provides the locations of pipelines in Dubuque County. The data for this map consists of gas transmission pipelines (blue) and hazardous liquid trunklines (red). It does not contain gathering or distribution pipelines, such as lines which deliver gas to a customer's home. Therefore, not all pipelines in the County will be visible.



**Figure 3.22 Pipelines in Dubuque County, Gas Transmission Pipelines (Blue) And Hazardous Liquid Trunklines (Red).**



Source: Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, <https://pvnpm.phmsa.dot.gov/PublicViewer/>

Any type of hazardous materials incident within a city that includes a large release of hazardous materials could affect large areas of the city in the right conditions, possibly even the entire city. This could necessitate evacuation of large areas. In the rural unincorporated areas where population densities are low, even in the event of a large release the number of homes that may need to be evacuated would be significantly lower than in an urban environment.

Immediate dangers from hazardous materials include fires and explosions. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. Some chemicals cause painful and damaging burns if they come in direct contact with skin. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into

the environment may cause debilitation, disease, or birth defects over a long period of time. Loss of livestock and crops may lead to economic hardships within the community. The occurrence of a hazmat incident many times shuts down transportation corridors for hours at a time while the scene is stabilized, the product is off-loaded and reloaded on a replacement container.

### **Previous Occurrences**

In Iowa, hazardous materials spills are reported to the Department of Natural Resources. According to Iowa Administrative Code Chapter 131, *Notification of Hazardous Conditions*, any person manufacturing, storing, handling, transporting, or disposing of a hazardous substance must notify the Department of Natural Resources and the local police department or the office of the sheriff of the affected county of the occurrence of a hazardous condition as soon as possible but not later than six hours after the onset of the hazardous condition or the discovery of the hazardous condition. The Department of Natural Resources maintains a database of reported spills.

According to the DNR database, from 2000 to 2016 (17 years), there have been 261 hazardous materials spills reported in Dubuque County. **Table 3.41** provides a summary of the reported spills during this period for each jurisdiction indicated in the database as well as the mode of the spill. According to this data, the most spills occurred in the City of Dubuque (150) and most spills occurred during handling and storage (97) followed by transportation (92) **Table 3.44** that follows summarizes the spills by material type. Petroleum is the most common material type spilled.

**Table 3.43. Dubuque County Hazardous Materials Spills Reported to Iowa DNR, 2000-2023 by Jurisdiction and Mode**

<b>Mode</b>  <b>Jurisdiction</b>	<b>Dumping</b>	<b>Fire</b>	<b>Handling And Storage</b>	<b>Manure</b>	<b>Other</b>	<b>Pipeline</b>	<b>Railroad</b>	<b>RR Incident</b>	<b>Transformer</b>	<b>Transportation</b>	<b>Unknown</b>	<b>Grand Total</b>
Asbury			1						2	3		6
Bankston				1								1
Bernard		1	3	1						3		8
Cascade		1	3						2	5		11
Dubuque	4	1	107	1	9	5	3	2	36	68	4	240
Durango			1	1						7		9
Dyersville	1		5	2	1				2	13		24
Epworth			2	1						12		15
Farley			6	1					2	3	1	13

Guttenberg										1		1
Holy Cross									2	2		4
Luxemburg			1	2								3
New Vienna			1	1	1							3
Peosta			9	1		2		1	4	8		25
Rickardsville										5		5
Sageville										1		1
Sherrill							1	2	1	1		5
Toddville										2		2
Worthington			3	1		2			1	3		10
Zwingle			2	1		2				2		7
Not Reported		1	7	2	1	4	2			4		21
<b>Grand Total</b>	<b>5</b>	<b>4</b>	<b>151</b>	<b>16</b>	<b>12</b>	<b>15</b>	<b>6</b>	<b>5</b>	<b>52</b>	<b>143</b>	<b>5</b>	<b>414</b>

Source: Iowa Department of Natural Resources,  
<http://www.iowadnr.gov/InsideDNR/RegulatoryLand/EmergencyPlanningEPCRA/SpillReporting.aspx>



**Table 3.44. Dubuque County Hazardous Materials Spills Reported to Iowa DNR, 2000-2023 by Material Type**

Type Jurisdiction	Acids/Bases	Ammonia (anhydrous)	Animal/Vegetable Product	Chlorine	Fertilizer Pesticide	Fertilizer/Pesticide	Inorganic Chemical	Manure	Organic Chemical	Other Chemical	Paints/Dyes/Organic Solv	Petroleum	Propane/LPG/Natural Gas	Transformer oil/PCB	Unknown	Not Reported	Grand Total
Asbury												3	1	2			6
Bankston								1									1
Bernard	1	1			2	1		1				2					8
Cascade	1		1			3			2			3				1	11
Dubuque	16	2	8	4	5	12	11	1	13	3	7	125	1	28	2	2	240
Durango			2		1	2		1				3					9
Dyersville			1		3	7		2				9		2			24
Epworth					1	6	1	1				5				1	15
Farley		2				3	1	1	1		1	3		1			13
Guttenberg			1														1
Holy Cross						1						2		1			4
Luxemburg						1		1								1	3
New Vienna								1				2					3
Peosta	2		1			3	1	1				15		1		1	25
Rickardsville			1		1				1			2					5
Sageville												1					1
Sherrill	1				1				1			1		1			5
Toddville												2					2
Worthington						3		1				5		1			10
Zwingle					1			1	1			1	3				7
Not Reported			1	2		3		2	1			12					21
<b>Grand Total</b>	<b>21</b>	<b>5</b>	<b>16</b>	<b>6</b>	<b>15</b>	<b>45</b>	<b>14</b>	<b>15</b>	<b>20</b>	<b>3</b>	<b>8</b>	<b>196</b>	<b>5</b>	<b>37</b>	<b>2</b>	<b>6</b>	<b>414</b>

<http://www.iowadnr.gov/InsideDNR/RegulatoryLand/EmergencyPlanningEPCRA/SpillReporting.aspx>

### ***Pipelines***

The U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration maintains a database of pipeline incidents and mileage reports. From 1996 to 2015, there were no reported pipeline incidents in Dubuque County.

### ***Probability of Future Occurrence***

From 2000 to 2023 (18 years), there have been 414 spills reported to Iowa DNR. This computes to an annual average of more than 23 hazardous materials spills per year. However,

the number has decreased in the latter ten years, and therefore the committee lowered the Probability rating from the previous plan.

## **Vulnerability**

### ***Vulnerability Overview***

A hazardous materials incident can occur almost anywhere. So, all jurisdictions are considered to have at least some vulnerability to this hazard. People, pets, livestock, and vegetation in proximity to facilities producing, storing or transporting hazardous substances are at higher risk. Populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, more people, in a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation.

Most of the hazardous materials incidents that have occurred in Dubuque County are localized and are quickly contained or stabilized. Depending on the characteristic of the hazardous material 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. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as river, lake, or aquifer. Spills can be costly to clean up due to the specialized equipment and training, and disposal sites that are necessary. Although most spills are small and within local capabilities to respond quickly, the potential exists for large spills due to the industries in the planning area.

### ***Potential Losses to Existing Development***

The impact of this type of disaster will likely be localized to the immediate area surrounding the incident. The initial concern will be for people, then the environment. If contamination occurs, the spiller is responsible for the cleanup actions and will work closely with responders in the local jurisdiction, the Iowa Department of Natural Resources, and the Environmental Protection Agency to ensure that cleanup is done safely and in accordance with federal and state laws.

As mentioned, it is difficult to determine the potential losses to existing development because of the variable nature of a hazardous materials spill. For example, a spill of a toxic airborne chemical in a populated area could have greater potential for loss of life. By contrast a spill of a very small amount of a chemical in a remote rural area would be much less costly and possibly limited to remediation of soil.

Data provided by the Iowa Department of Natural Resources did not provide information relative to costs associated with cleaning up any of the spills or of any property damage that occurred. Without data on costs of previous events, it is not possible to determine potential costs associated with future spills.

To analyze critical facilities at risk in the planning area, the inventory of critical and essential facilities and infrastructure in the planning area was compiled from data layers provided by Dubuque County. The compiled inventory consisted of critical facilities was compared with the locations of Tier II Facilities to determine those critical/essential facilities/functions (other than Tier II facilities themselves) that are within ½ mile of Tier II fixed chemical facilities. This

analysis revealed 156 critical or essential facilities within ½ mile of fixed chemical facilities with the Tier II reporting requirement. The results are summarized in **Table 3.45**

**Table 3.45. Critical Facilities within ½ Mile of Tier II Facilities**

Facility Type	Cascade	Centralia	Dubuque	Dyersville	Epworth	Farley	Peosta	Sherrill	Unincorporated	Worthington	Grand Total
Airport Runway / Airfield									1		1
Ambulance Service			1								1
Cell Towers			14	2							16
College / University			2		1		1				4
Community / Recreation Center			1	3	1					1	6
Convention Center			1								1
County Government Facility				1					1	1	3
County Government			1								1
Emergency Response Facility									1		1
Fire Station / EMS Station	1	1	5	1	1			1	1	1	12
Government or Military Facility			2								2
Health or Medical Facility	1										1
Hospital / Medical Center			1								1
Information or Communication Facility			1	1							2
Law Enforcement				1	1						2
Municipal Government Facility	1		2	1	1		1	1		1	8
National Guard Armory / Base			1								1
Nursing Home / Long Term Care			7								7
Outdoor Theater / Amphitheater			1								1
School			4	1	1		1			1	8
School: Elementary	2		5		1		1				9
School: High School	1			1							2
School: Middle School			1								1
Shelters	5		17	4	4		2	1	3	1	37
Sirens	3	1	4	4	2	1	2	1	2	2	22
State Government Facility			1								1
Transportation Facility			1								1
Wastewater Treatment Plant				1							1
Water Supply or Treatment Facility	1		1								2
Water Tower						1					1
<b>Total</b>	<b>15</b>	<b>2</b>	<b>74</b>	<b>21</b>	<b>13</b>	<b>2</b>	<b>8</b>	<b>4</b>	<b>9</b>	<b>8</b>	<b>156</b>

Appendix E contains the detailed results of analysis with the names of specific facilities

within the buffer areas. This Appendix is redacted from the public version of this plan.

To  
obtain access for official use, contact the Dubuque County Emergency Manager.

### ***Future Development***

The number and types of hazardous chemicals stored and transported through Dubuque County will likely continue to increase. Business growth along major transportation corridors could also increase the vulnerability to transportation hazardous materials spills.

## **3.5.9 Human Disease**

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Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
2	2	1	4	2.05	Moderate

### **Profile**

#### ***Hazard Description***

This hazard covers human disease incident and pandemic human disease. This includes a medical, health, or sanitation threat to the public (such as contamination, epidemics, plaques, insect infestations, and pandemics). In addition to the traditional vectors of disease, mental health related issues have become classified under the category of human disease.

An incident related to human disease is defined as a medical, health or sanitation threat to the public (such as contamination, epidemics, plagues and insect infestation). There are over 60 infectious diseases that are designated notifiable at the national level. A notifiable disease is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of the disease (Center for Disease Control and Prevention, 2011).

The highest rates of infectious disease in the State of Iowa come from: Chlamydia, Gonorrhea, Salmonellosis, Cryptosporidiosis, Giardiasis, Pertussis, E-Coli, HIV and Lyme Disease. Also, on the "watch list" for health officials due to the severity of the illnesses are Ebola and Zika viruses. Recently the Covid-19 pandemic has become the most serious human disease that has faced the nation and by extension Dubuque County since the HIV/AIDS epidemic began in the 1980's.

A pandemic human disease is defined as a disease that has spread around the world to many people, causing illness in a person on every continent. Examples include HIV/AIDS/Influenza/Covid 19.

#### **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.

### Coronavirus disease (COVID-19)

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus.

Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age.

The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing, or breathe. These particles range from larger respiratory droplets to smaller aerosols.

### Influenza

Influenza (flu) is a viral infection of the nose, throat, bronchial tubes, and lungs. There are two main types of viruses: 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 Influenza

A pandemic is a global disease outbreak. 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. Foodborne Disease

There are several agents that can cause illness when consumers eat contaminated food, beverages, or water. Foodborne illness (food poisoning) can also be spread person-to-person as well as from contact with animals. **Table 3.46** is a list of common foodborne diseases

**Table 3.46. Common Foodborne Diseases**

Organism	Onset of Symptoms	Associated Food(s)
Botulism	12 - 36 hours	Canned fruits and vegetables
Campylobacter	2 - 5 days, range 1 - 10 days	Undercooked chicken or pork, unpasteurized milk
Cholera	12 - 72 hours	Undercooked or raw seafood, especially oysters
Cryptosporidium	7 days, range 1 - 12 days	Unpasteurized beverages, contaminated food or water, person-to-person
E. coli (shiga-toxin)	3 - 4 days, range 2 - 10 days	Undercooked ground meats, unpasteurized milk, contaminated fruits or vegetables, person-to-person
Giardia	7 - 10 days, range 3 - 25 days	Contaminated water, person-to-person
Hepatitis A	28 - 30 days, range 15 - 50 days	Raw produce, undercooked foods, person-to-person
Listeria	3 weeks, range 3 - 70 days	Soft cheeses, unpasteurized milk, ready-to-eat deli meats, hot dogs, undercooked poultry, unwashed raw vegetables

Norovirus	24 - 48 hours, range 10 - 50 hours	Contaminated ready-to-eat food, undercooked shellfish, person-to-person
Salmonella	12 - 36 hours, range 6 - 72 hours	Contaminated eggs, poultry, beef, raw fruits and vegetables, unpasteurized milk or juice, cheese
Shigella	1 - 3 days, range 12 - 96 hours	Contaminated food or water, person-to-person
Trichinosis	8 - 15 days, range 5 - 45 days	Raw or undercooked pork or wild game meat

Source: Iowa Department of Public Health, Center for Acute Disease Epidemiology  
<http://www.idph.state.ia.us/Cade/Foodborne.aspx>.

### ***Geographic Location/Extent***

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.

### ***Previous Occurrences***

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/](http://www.who.int/en/)).

There have been four acknowledged pandemics in the past century:

- **COVID 19** – According to USA FACTS, there have been 30,647 reported cases of Covid 19 in Dubuque County for all time, and 325 deaths, equaling 1% of reported cases. According to the New York Times (lates update March 23, 2023), there have been 10,770 deaths from the coronavirus in Iowa, or 1 in 293 residents. Dubuque County falls far below the State average.
- **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 were highest among adults 20-50 years old; the reasons for this are uncertain.

#### Other Reportable Diseases

**Table 3.47** shows the 10-year historical reported deaths in Dubuque County from Influenza and Pneumonia as well as Infective and Parasitic Disease.

**Table 3.47. Deaths by Year 2010 - 2021, Influenza and Pneumonia and Infective and Parasitic Disease, Dubuque County and State of Iowa**

Year	Influenza/Pneumonia Deaths, Dubuque County	Influenza/Pneumonia Deaths, Iowa	Infective/Parasitic Disease Deaths, Dubuque County	Infective/Parasitic Disease Deaths, Iowa
2021	8	361	12	148
2020	Data Not Available	536	17	158
2019	12	583	19	186
2018	12	688	20	186
2017	8	567	22	554
2016	17	483	7	429
2015	12	592	13	488
2014	10	549	8	448
2013	24	755	11	511
2012	23	656	11	511

Source: Iowa Department of Public Health, Bureau of Health Statistics-Vital Statistics of Iowa in Brief, <http://idph.iowa.gov/health-statistics/data>; \* = fewer than three deaths, number suppressed to protect confidentiality

**Table 3.48** provides the number of common reportable diseases in Dubuque County from 2013 to 2017 from the Iowa Department of Public Health, Center for Acute Epidemiology Annual Reports.

**Table 3.48. Iowa Common Reportable Diseases by Year in Dubuque County**

2013	2014	2015	2016	2017
610	647	245	548	192

Source: Iowa Department of Public Health, Center for Acute Disease Epidemiology Annual Reports. 2010-2015, <http://idph.iowa.gov/CADE>

#### ***Probability of Future Occurrence***

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 public (such as contamination, epidemic, or plague).

# Vulnerability

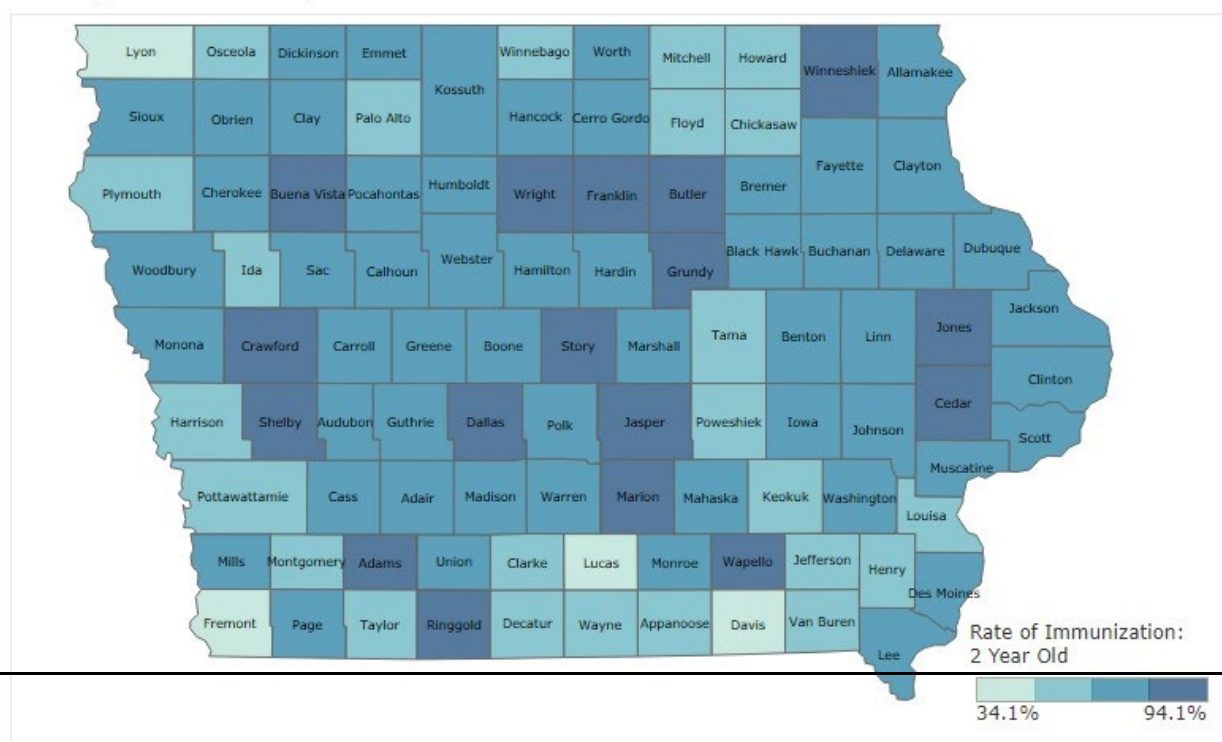
## Overview

Although infectious diseases do not respect geographic boundaries, several populations in Dubuque County are at specific risk for 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 7 facilities that are classified as nursing homes or long-term care.

T here are also over 40 school facilities in the county.

**Figure 3.25 County Immunization Assessment Maps (2-year-Old Coverage-top, 13-15-year Old Coverage-bottom), Selected Vaccination Series**

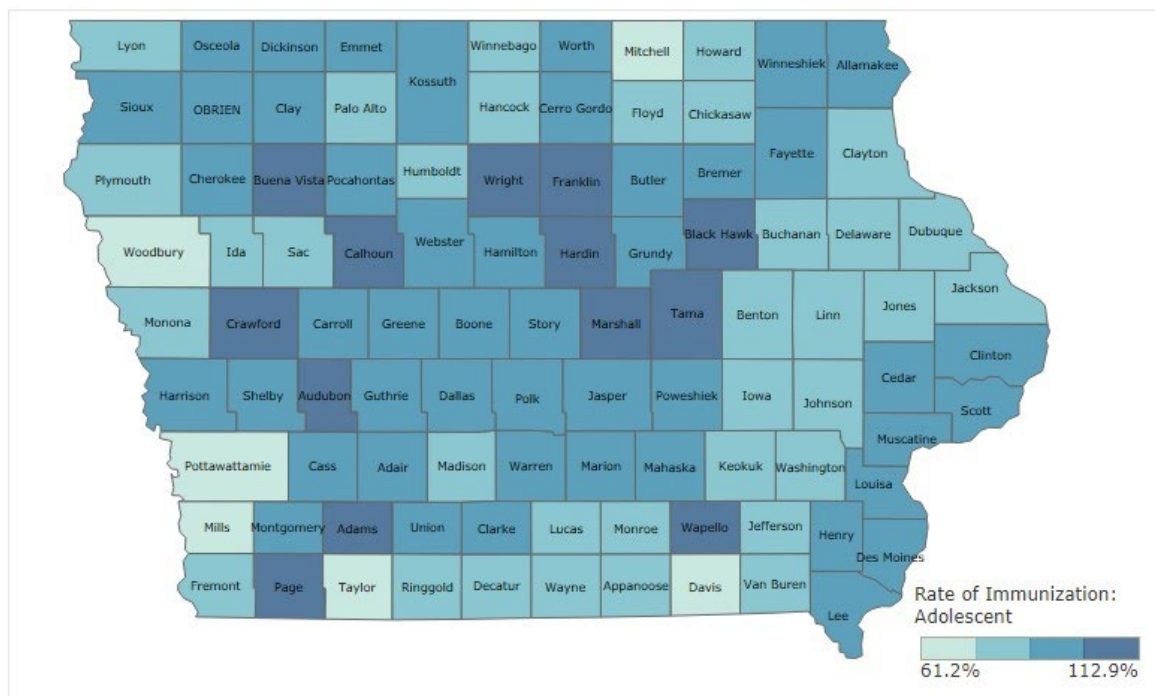
**Figure 3.25.**



## 2 Year Old State Summary

Number of Immunized Patients	27,167
Census Population	38,742
Immunization Rate - Census Population	70.1%

Records in IRIS	38,298
Census Population with IRIS Record	98.85%
Immunization Rate - IRIS Population	70.9%



### Adolescent State Summary

Number of Immunized Patients	112,273	Records in IRIS	157,568
Census Population	125,917	Census Population with IRIS Record	125.14%
Immunization Rate - Census Population	89.2%	Immunization Rate - IRIS Population	71.3%

Source: Iowa Department of Public Health, Iowa Immunization Program Annual Report 2015 County Immunization Assessment,

The magnitude of human disease outbreak was determined to be critical based on a widespread scenario. The magnitude of an infectious disease outbreak is related to the ability of the public health and medical communities to stop the spread of the disease. Most disease outbreaks that cause critical numbers of deaths are communicable in nature, meaning that they are spread from person to person. The key to reducing the critical nature of the event is to stop the spread of disease. This is generally done in three ways: (1) identification and isolation of the ill, (2) quarantine of those exposed to the illness to prevent further spread, and (3) education of the public about methods to prevent transmission. The public health and health care providers in Dubuque County routinely utilize all three methods to reduce morbidity and mortality from infectious disease.

### **Potential Losses to Existing Development**

According to *The Annual Impact of Seasonal Influenza in the US: Measuring Disease Burden and Costs* by Molinari et al., nationally the economic burden of influenza medical costs, medical costs plus lost earnings, and the total economic burden was \$10.4 billion, \$26.8 billion and \$87.1 billion respectively. The financial burden of healthcare-associated infections nationally has been estimated at \$33 billion annually. Specific amounts for Dubuque County are not available.

The pandemic predictions for Iowa from the *Iowa Pandemic Influenza Annex*, 2006 are that 15-35 percent of the population may be affected with a “medium level” case scenario with no vaccine and no antiviral drugs could cause 900-2,000 deaths and 3,000-7,000 hospitalizations statewide. Also, the predictions state that if a pandemic were to occur, it is likely that it would not be a worst-case scenario. Most agricultural-related jobs could continue, and school and other congregating activities could be cancelled, resulting in less spreading of a disease outbreak.

The U.S. Centers for Disease Control and Prevention (CDC) estimates 76 million people suffer foodborne illnesses each year in the United States, accounting for 325,000 hospitalizations and more than 5,000 deaths. Foodborne disease is extremely costly. Health experts estimate that the yearly cost of all foodborne diseases in this country is \$5 to \$6 billion in direct medical expenses and lost productivity. Infections with the bacteria *Salmonella* alone account for \$1 billion yearly in direct and indirect medical costs.

Buildings, infrastructure, and critical facilities are not vulnerable to this hazard. It affects only persons susceptible to the illness. The impacts and potential losses are largely economic and are dependent on the type, extent, and duration of the illness.

#### ***Future Development***

As of the US Census 2023, 19.5 percent of the population is over 65 years old in Dubuque County. Those over 65 are more susceptible to health complications because of disease.

#### ***Climate Change Impacts***

The following is an excerpt from the 2010 *Climate Change Impacts on Iowa* Report.

*Investigations of the past two decades indicate that the health effects of climate change can be serious. The World Health Organization estimated that in 2002, 2.4% of worldwide diarrhea cases, 6% of malaria cases, 7% of dengue fever cases, and 170,000 deaths (0.3% of worldwide deaths) were attributed to climate change (Beggs and Bambrick 2005, WHO 2002). A major 2010 study included a range of diseases in its listing of potential effects of climate change, ranging from obvious illnesses such as asthma and vector-borne disease to less obvious cancer and neurological disease (Portier 2010).*

The report details the following as climate change contributors to negative consequences for public health in Iowa:

- Extreme Precipitation Events, Rising Humidity, and Associated Disease
- Illness and Death Associated with Extreme Heat and Heat Waves
- Warming, Air Quality and Respiratory Problems
- Pollen Production and Allergies
- Diseases Transferred by Food, Water, and Insects

### **3.5-10 Infrastructure Failure**

<b>Hazard Score Calculation</b>
---------------------------------

Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
2	2	4	3	2.4	Moderate

## **Profile**

### ***Hazard 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 most 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 because of faulty equipment, lack of maintenance, degradation over time, or accidental damage such as damage to buried lines or pipes during excavation.

To maintain consistency with the state plan, this hazard encompasses a variety of different types of infrastructure failure, including communications failure, energy failure, structural failure, and structural fire.

### **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 like flood in that infrastructure can be damaged or made inaccessible by water. Lightning strikes can damage substations and transformers but are 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 have 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.

#### Structural Failure / Structure Fire

The collapse (partial or total) of any structure including roads, bridges, towers, and buildings is considered a structural failure. A road, bridge, or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may also cause the roof of a building to collapse (under the weight of snow). In 1983 a KWWL television tower collapsed due to ice buildup. Heavy rains and flooding can undercut and washout a road or bridge. This occurred twice in 2008 when railway bridges failed in Waterloo and Cedar Rapids due to flooding. The age of the structure is sometimes independent of the cause of the failure. Enforcement of building codes can better guarantee that structures are designed to hold-up under normal conditions. Routine inspection of older structures may alert inspectors to weak points. The level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge, and the type, and amount of products stored in the structure. There have been structural failures across the state in the past as mentioned above. They have included homes, commercial structures, and communications towers. There is no central collection point for this information, but news articles document infrastructure failure.

A structural fire is an uncontrolled fire in a populated area that threatens life and property and is beyond normal day-to-day response capability. Structural fires present a far greater threat to life and property and the potential for much larger economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved fire-fighting equipment, training, and techniques lessen the chance and impact of a major urban fire. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near

the fire or fighting the fire because of the volume or type of the material involved. Less severe structural fires are almost a common occurrence in some communities.

### ***Geographic Location/Extent***

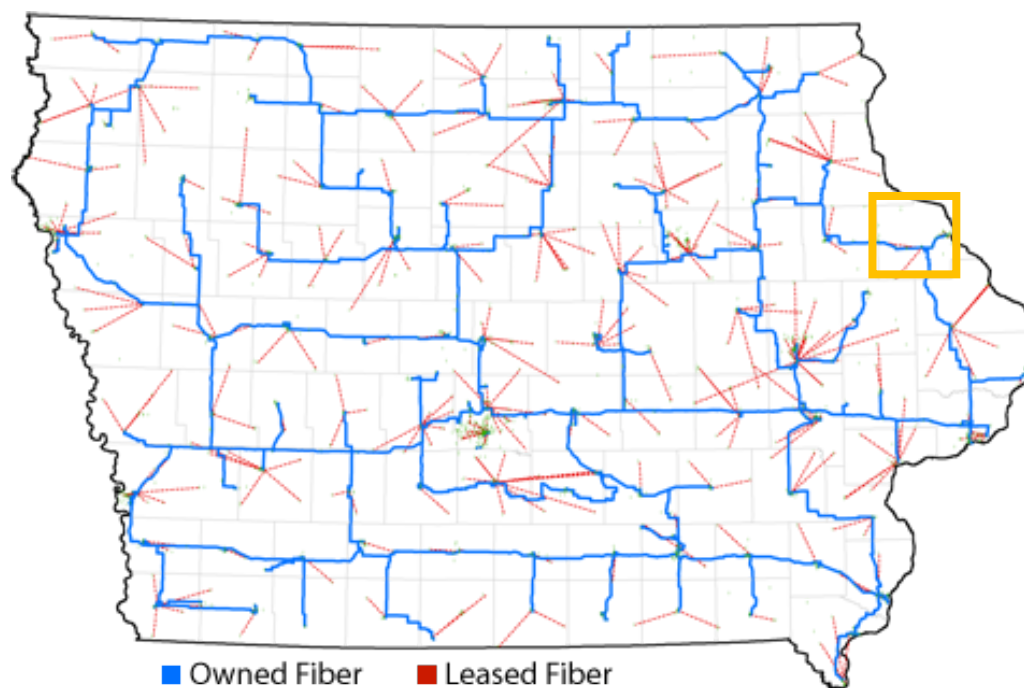
The entire planning area is at risk to all types of infrastructure failure included in the hazard description section, either from primary failure due to malfunction, degradation, or accidental or intentional damage or because of a secondary impact related to another hazard event.

### **Communications**

**Figure 3.26** shows the Iowa Communications Network (ICN) that administers Iowa's statewide fiber optic telecommunications network.

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**Figure 3.26. Map of Iowa Communication Network**



Source: <http://icn.iowa.gov/about-icn/agency-information-icn-story>

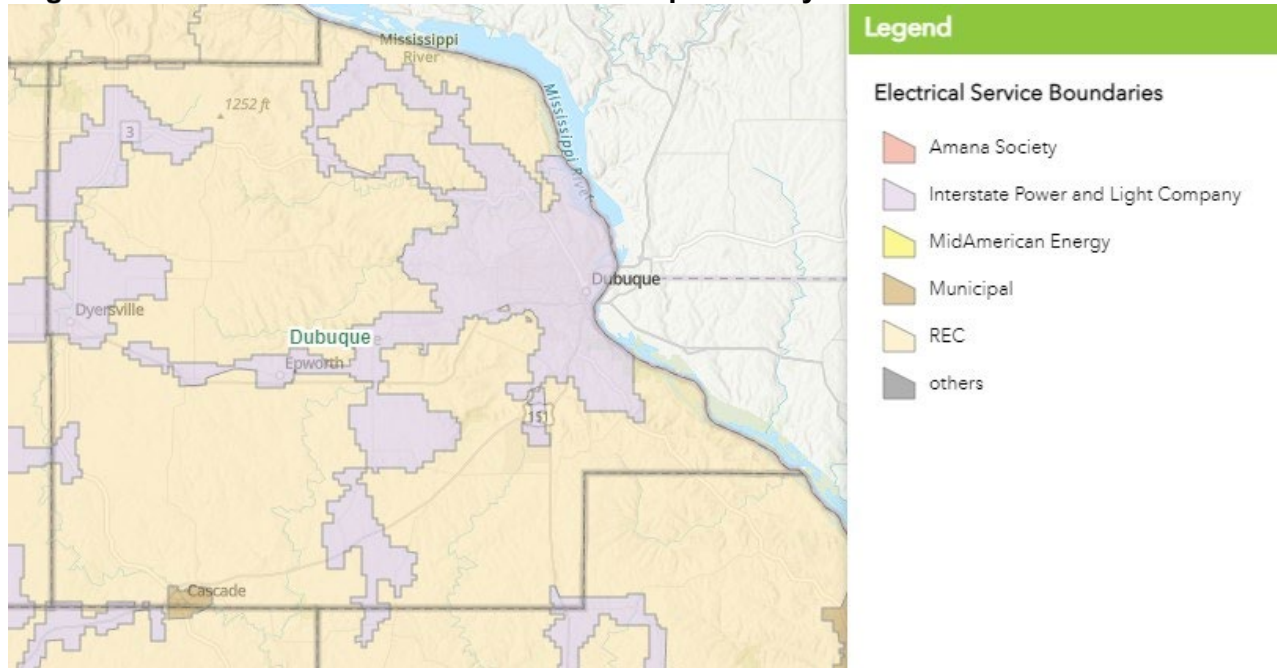
Note: Orange box outlines Dubuque County.

Power outages can occur in outlying areas with more frequency than in more developed areas. A loss of electric power can also interrupt the supply of water from a well. Food in freezers or refrigerators may also be lost. Power outages can cause problems with computers and other devices as well.

**Figure 3.27** is the electrical service area map for Dubuque County.



**Figure 3.27. Electrical Service Areas in Dubuque County**



Source: <http://www.iowadot.gov/maps/msp/electrical/electrical.html>

## Other Utilities

### Water

There are 42 Water Supply Systems in Dubuque County, Iowa (see **Table 3.49**).

**Table 3.49. Water Supply Systems in Dubuque County, Iowa**

Dubuque Water Works Dubuque (Serves 57,686 people)
Dyersville Municipal Water Co Dyersville (Serves 4,035 people)
Asbury Municipal Water System Asbury (Serves 2,550 people)
Cascade Municipal Water Supply Cascade (Serves 1,958 people)
Epworth Water Supply Epworth (Serves 1,602 people)
Farley Water Supply Farley (Serves 1,334 people)
Peosta Water Supply Peosta (Serves 1,052 people)
Table Mound Park Dubuque (Serves 600 people)
New Vienna Water Supply New Vienna (Serves 400 people)
Burds Green Acres Subdivision Peosta (Serves 385 people)
Worthington Water Supply Worthington (Serves 381 people)
Holy Cross Water Supply Holy Cross (Serves 339 people)



Barrington Lakes Water Commission Dubuque (Serves 333 people)
Super 20 Mobile Home Park Dubuque (Serves 312 people)
Thunder Hills Home & Utility Assoc. Peosta (Serves 300 people)
Luxemburg Water Supply Luxemburg (Serves 246 people)
Twin Ridge Corp Dubuque (Serves 174 people)
Hickory Acres Dubuque (Serves 139 people)
Verde Investments - Spring Valley Park Bellevue (Serves 135 people)
Vernon Water Co(Serves 125 people)
Corporation Of New Melleray Dubuque (Serves 108 people)
Bernard Water System Bernard (Serves 97 people)
Lost Canyon Mhp (Peosta)Peosta (Serves 97 people)
Knapp Mobile Home Court No 4 Dubuque (Serves 87 people)
Broadview Trailer Court Dubuque (Serves 82 people)
North End Mobile Home Park Dubuque (Serves 78 people)
Granada Mobile Home Park Dubuque (Serves 75 people)
Valley Hill Court, Inc. Dubuque (Serves 72 people)
Quality Water, Inc. #2 (k-l) Dubuque (Serves 70 people)
Lore Mobile Home Park Dubuque (Serves 68 people)
Twin T Mobile Home Park, Inc. Dubuque (Serves 67 people)
Lore Oaks Homeowners Assn. Dubuque (Serves 61 people)
Briarwood Estates Peosta (Serves 60 people)
Ace Mobile Home Park Dubuque (Serves 60 people)
Cedar Hills Apartments Dubuque (Serves 52 people)
Wild Flower Ridge Subdivision (Serves 50 people)
Green Brier Subdivision Dubuque (Serves 47 people)
Regency West Subdivision Dubuque (Serves 46 people)
Star Water (Serves 42 people)
Country Hills Water Corp Centralia (Serves 38 people)
Shagbark Estates Dubuque (Serves 38 people)
Thunder Ridge Estates Peosta (Serves 36 people)

Source: <https://www.nytimes.com/interactive/projects/toxic-waters/contaminants/ia/Dubuque/index.html> )

## Sewer

There are 59 permitted wastewater treatment discharge sites in Dubuque County, Iowa according to the Department of Natural Resources (see **Table 3.50**).

**Table 3.50. Permitted Wastewater Sites in Dubuque County**

Facility Name	Facility City	Permit Type	Class	Treatment Type
1840, LLC	Dubuque	Industrial	Minor	No Treatment
A.Y. McDonald Mfg. Co.	Dubuque	Industrial	Minor	No Treatment
Albrecht Acres Campground-STP	Sherrill	Semi-Public	Minor	Septic Tank Sand Filter
Alliant Energy Data Center	Dubuque	Industrial	Minor	No Treatment
Arctic Glacier Premium Ice	Dubuque	Industrial	Minor	Other
Asbury City of STP	Asbury	Municipal	Minor	Oxidation Ditch
Asbury, City of Ms4	Asbury	Stormwater	Minor	No Treatment
Audubon Elementary School	Dubuque	Industrial	Minor	No Treatment
Balltown, City of-North WWTF	Sherrill	Municipal	Minor	Septic Tank Sand Filter
Balltown, City of-South WWTF	Sherrill	Municipal	Minor	Septic Tank Sand Filter
Bankston City of STP	Bankston	Municipal	Minor	Septic Tank Sand Filter
Bernard, City of-STP	Bernard	Municipal	Minor	Waste Stabilization Lagoon
Bp Products Dubuque Terminal	Peosta	Industrial	Minor	Other
Crescent Community Health Center	Dubuque	Industrial	Minor	No Treatment
Dubuque City of STP	Dubuque	Municipal	Major	Activated Sludge
Dubuque County Courthouse	Dubuque	Industrial	Minor	No Treatment
Dubuque County Sheriff office	Dubuque	Industrial	Minor	No Treatment
Dubuque Regional Airport	Dubuque	Semi-Public	Minor	Aerated Lagoon
Dubuque Residential Facility	Dubuque	Industrial	Minor	No Treatment
Dubuque, City of Ms4	Dubuque	Stormwater	Minor	No Treatment
Dyersville City of STP	Dyersville	Municipal	Minor	Activated Sludge
Edwards Cast Stone Company	Dubuque	Industrial	Minor	Other
Epworth City of STP	Epworth	Municipal	Minor	Activated Sludge
Farley City of STP	Farley	Municipal	Minor	Activated Sludge
Granada Gardens Mobile Home Park	Dubuque	Semi-Public	Minor	Aerated Lagoon
Grand River Center	Dubuque	Industrial	Minor	No Treatment
Hickory Acres Subdivision	Dubuque	Semi-Public	Minor	Activated Sludge
Holy Cross City of STP	Holy Cross	Municipal	Minor	Waste Stabilization Lagoon
Ice Harbor Center	Dubuque	Industrial	Minor	No Treatment
Interstate Building Llp	Dubuque	Industrial	Minor	No Treatment
Ipl - Dubuque Generating Station	Dubuque	Industrial	Minor	No Treatment
John Deere Dubuque Works	Dubuque	Industrial	Major	Activated Sludge
Key City Plating	Dubuque	Industrial	Minor	No Treatment
Knapp Mobile Home Park-STP	Dubuque	Semi-Public	Minor	Trickling Filter
Loras College	Dubuque	Industrial	Minor	No Treatment
Lore Mobile Home Park STP	Dubuque	Semi-Public	Minor	Waste Stabilization Lagoon
Lost Canyon Mobile Home Park	Peosta	Semi-Public	Minor	Trickling Filter
Luxemburg, City of-STP	Luxemburg	Municipal	Minor	Waste Stabilization Lagoon
Magellan Pipeline Company, LLC	Dubuque	Industrial	Minor	Other
Miracle Car Wash	Dubuque	Industrial	Minor	No Treatment

Mystique Casino	Dubuque	Industrial	Minor	No Treatment
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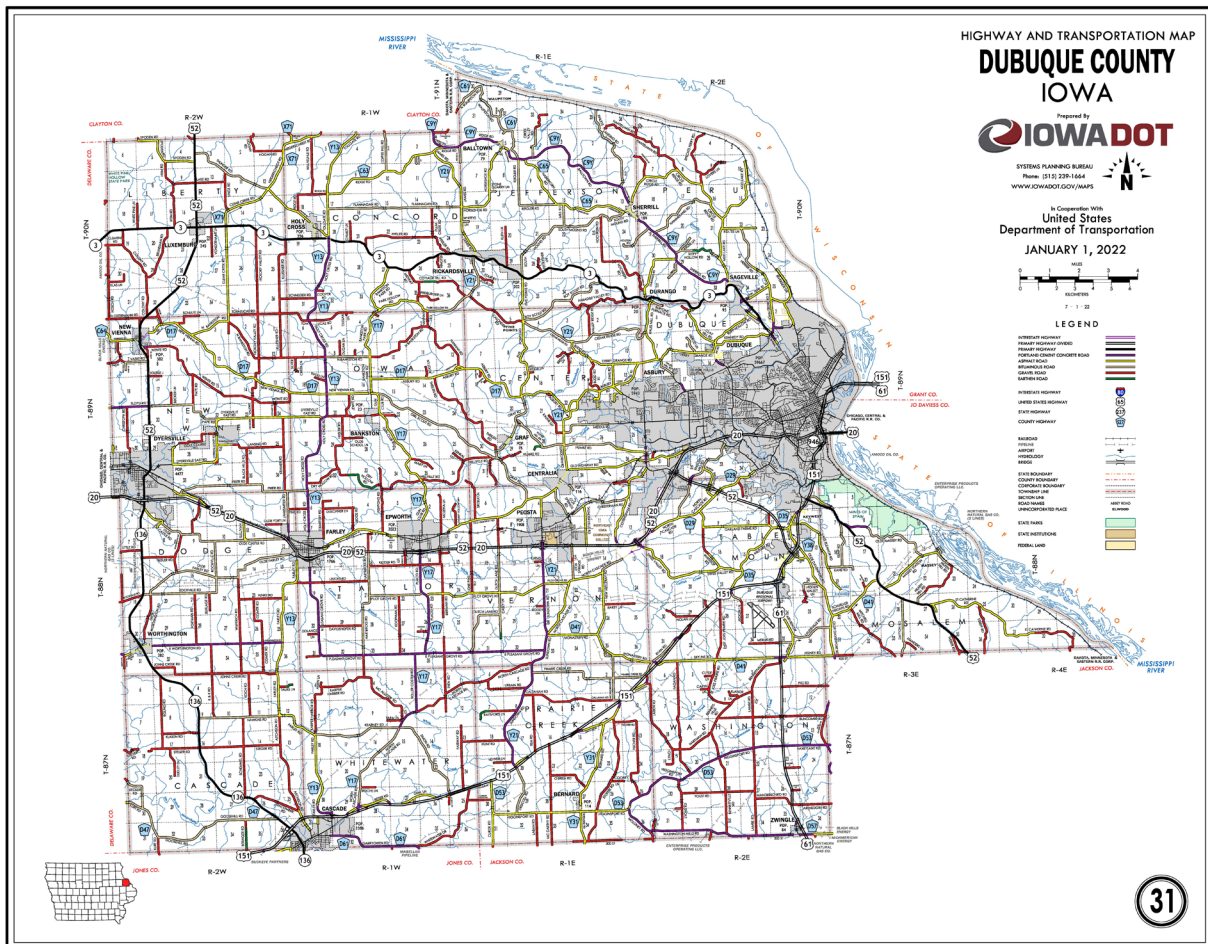
Facility Name	Facility City	Permit Type	Class	Treatment Type
National Mississippi River Museum and Aquarium	Dubuque	Industrial	Minor	No Treatment
New Vienna City of STP	New Vienna	Municipal	Minor	Aerated Lagoon
Northend Mobile Home Park	Dubuque	Semi-Public	Minor	Trickling Filter
Peosta, City of STP	Peosta	Municipal	Minor	Waste Stabilization Lagoon
Prescott Elementary School	Dubuque	Industrial	Minor	No Treatment
Rickardsville City of STP	Rickardsville	Municipal	Minor	Waste Stabilization Lagoon
Rousselot, Inc.	Dubuque	Industrial	Minor	No Treatment
Sageville School STP	Dubuque	Semi-Public	Minor	Waste Stabilization Lagoon
Sherrill City of STP (East)	Sherrill	Municipal	Minor	Waste Stabilization Lagoon
Spring Valley Mobile Park	Bellevue	Semi-Public	Minor	Trickling Filter
Sundown Ski Area	Dubuque	Semi-Public	Minor	Waste Stabilization Lagoon
Super 20 Mobile Home Park	Dubuque	Semi-Public	Minor	Activated Sludge
Table Mound #1 Mobile Home Park	Dubuque	Semi-Public	Minor	Activated Sludge
The Grand Opera House	Dubuque	Industrial	Minor	Other
Twin Ridge Subdivision	Dubuque	Semi-Public	Minor	Waste Stabilization Lagoon
U.S. Army Reserve Center STP	Dubuque	Semi-Public	Minor	Waste Stabilization Lagoon
Western Dubuque Biodiesel, LLC	Farley	Industrial	Minor	No Treatment
Worthington City of STP	Worthington	Municipal	Minor	Activated Sludge

Source: Iowa Department of Natural Resources, <http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Wastewater-Permitting/Current-NPDES-Permits>

### Infrastructure/Structures

The Highway map for Dubuque County is provided in **Figure 3.21** in the Hazardous Materials Incident Section. The detailed Highway and Transportation Map that includes other transportation infrastructure in the county is provided in **Figure 3.28**.

**Figure 3.28. Dubuque County Transportation Map**



Source: Iowa Department of Transportation, <http://www.iowadot.gov/maps>

There are a total of 333 bridge structures in the County as follows:

- 84 State-owned Bridges.
- 217 county-owned bridges
- 32 city-owned bridges

### ***Previous Occurrences***

As indicated in the Hazard Description Section, Infrastructure Failure often occurs as a secondary impact to other hazard events. For specific descriptions, please see the Previous Occurrences section of the other hazards included in this plan. In addition to failure/impacts because of other hazard events, Infrastructure Failure can also occur because of lack of maintenance, human error, and age deterioration.

The structural fires that have occurred in Dubuque County have been within the normal day-to-day response capability, including use of pre-arranged mutual aid and do not fall into the category of uncontrolled fires in a populated area that threatens life and property.

### ***Probability of Future Occurrences***

As discussed in other hazard sections in this plan, infrastructure failure occurs as a secondary or cascading impact from several primary hazards such as winter storm, wind storm, and tornado as well as lack of maintenance and age deterioration and other human-caused incidents such as human error, and various forms of terrorism. Structure fire events also occur annually.

## **Vulnerability**

### ***Vulnerability Overview***

Iowa is almost entirely dependent on out-of-state resources for energy. Iowans purchase oil, coal, and natural gas from outside sources. As a result, world and regional fuel disruptions are felt in Iowa.

Every community in the planning area is at risk of some type of utility/infrastructure failure. Business and industry in the urban areas are reliant on electricity to power servers, computers, automated systems, etc. Rural areas of the County are vulnerable as well, as modern agricultural practices are reliant on energy, such as electric milking machines and irrigation pivots.

Generally, smaller utility suppliers such as small electrical suppliers have limited resources for mitigation. This could mean greater vulnerability in the event of a major, widespread disaster, such as a major flood, severe winter storm or ice storm. The municipal utilities that exist in the County purchase power on the wholesale market for resale to their customers. This may make them more vulnerable to regional shortages of power as well.

In the event of a large-scale event impacting water supply or wastewater treatment homes and businesses with well-supplied water and septic systems for waste treatment would be largely unaffected. However, these systems may be prone to individual failure and do not have back-up systems in place in the event of failure as larger systems might.

The Iowa Department of Transportation has conducted inspections of bridges in the state.

**Table 3.51** provides a summary of the condition of the 333 bridges in Dubuque County.

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**Table 3.5.1 Dubuque County Bridge Condition, SDFO Ratings, Weight Restrictions**

<b>Condition Index Rating - State Owned Bridges</b>		
Good	Fair	Poor
58	31	0
<b>Condition Index Rating - County Owned Bridges</b>		
Good	Fair	Poor

103	87	27
<b>Condition Index Rating - City Owned Bridges</b>		
Good	Fair	Poor
19	19	1
<b>Condition Index Rating - All Bridges in Dubuque County</b>		
Good	Fair	Poor
180	137	28
<b>Structurally Deficient/ Functionally Obsolete (SDFO) Rating - All Bridges in Dubuque County</b>		
Not Deficient	Structurally Deficient	Functionally Obsolete
317	28	0
<b>Weight Restrictions - All Bridges in Dubuque County</b>		
Unrestricted	Restricted	Closed
309	32	4

Source: Iowa Department of Transportation,  
<http://iowadot.maps.arcgis.com/apps/MapSeries/index.html?appid=db6cb43313354a4f85505089ab317e7a>

### ***Potential Losses to Existing Development***

Since utility/infrastructure failure is generally a secondary or cascading impact of other hazards, it is not possible to quantify estimated potential losses specific to this hazard due to the variables associated with affected population, duration of outages, etc.

Although the variables make it difficult to estimate specific future losses, FEMA has developed standard loss of use estimates in conjunction with their Benefit-Cost Analysis methodologies to estimate the cost of lost utilities on a per-person, per-use basis (See **Table 3.52**).

**Table 3.52. FEMA Standard Values for Loss of Service for Utilities and Roads/Bridges**

Loss of Electric Power	Cost of Complete Loss of Service
Total Economic Impact	\$126 per person per day
Loss of Potable Water Service	Cost of Complete Loss of Service
Total Economic Impact	\$93 per person per day
Loss of Wastewater Service	Cost of Complete Loss of Service
Total Economic Impact	\$41 per person per day
Loss of Road/Bridge Service	Cost of Complete Loss of Service
Vehicle Delay Detour Time	\$38.15 per vehicle per hour
Vehicle Delay Mileage	\$0.55 per mile (or current federal mileage rate)

Source: FEMA BCA Reference Guide, June 2009, Appendix C

### ***Future Development***

Increases in development and population growth would increase the demand for utilities and use of infrastructure as well as the level of impacts when the utilities or infrastructure fail. Dubuque County has seen an overall population decrease of about 2.4 percent in the last five years. As technological advances are made and systems become more and more automated and dependent on power and communications infrastructure, the impacts of infrastructure failure could increase even though population is decreasing slightly.

### ***Climate Change Impacts***

Please refer to the Climate Change Impacts sections of the following primary hazards that can cause a cascading or secondary impact of infrastructure failure: River Flood, Severe Winter Storm, Tornado/Windstorm, Thunderstorm/Lightning Hail, Extreme Heat, Flash Flood and Terrorism.

### **3.5.11 Landslide**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	4	1	1.45	Low

### **Profile**

#### ***Hazard Description***

A landslide is the downhill movement of masses of soil and rock by gravity. The basic ingredients for landslides are gravity, susceptible soil or rock, sloping ground, and water. Landslides occur when susceptible rock, earth, or debris moves down a slope under the force of gravity and water. Landslides may be very small or very large and can move at slow to very high speeds. A natural phenomenon, small scale landslides have been occurring in slide-prone areas of Iowa long before human occupation. New landslides can occur because of rainstorms, fires, earthquakes, and various human activities that modify slope and drainage.

#### ***Geographic Location/Extent***

Dubuque County, including the City of Dubuque, is located on the bluff lands of the Mississippi River Valley, which falls into the area for potential landslides. The planning committee noted landslides in the County in the areas of: Park Hollow, Heritage Trail and Highway 52. The events are infrequent and are not considered to be of significant concern. However, as development continues to occur on the high bluffs surrounding the banks of the Mississippi River and other areas where high embankments exist within the city limits, the city continues to witness occasional landslide events at various locations around the city. The City has an active inspection program which monitors construction activities and associated erosion control measures on a quarterly basis and after heavy rainfall events. A part of these activities includes the inspector being cognizant of possible landslides due to construction or other activities in the area.

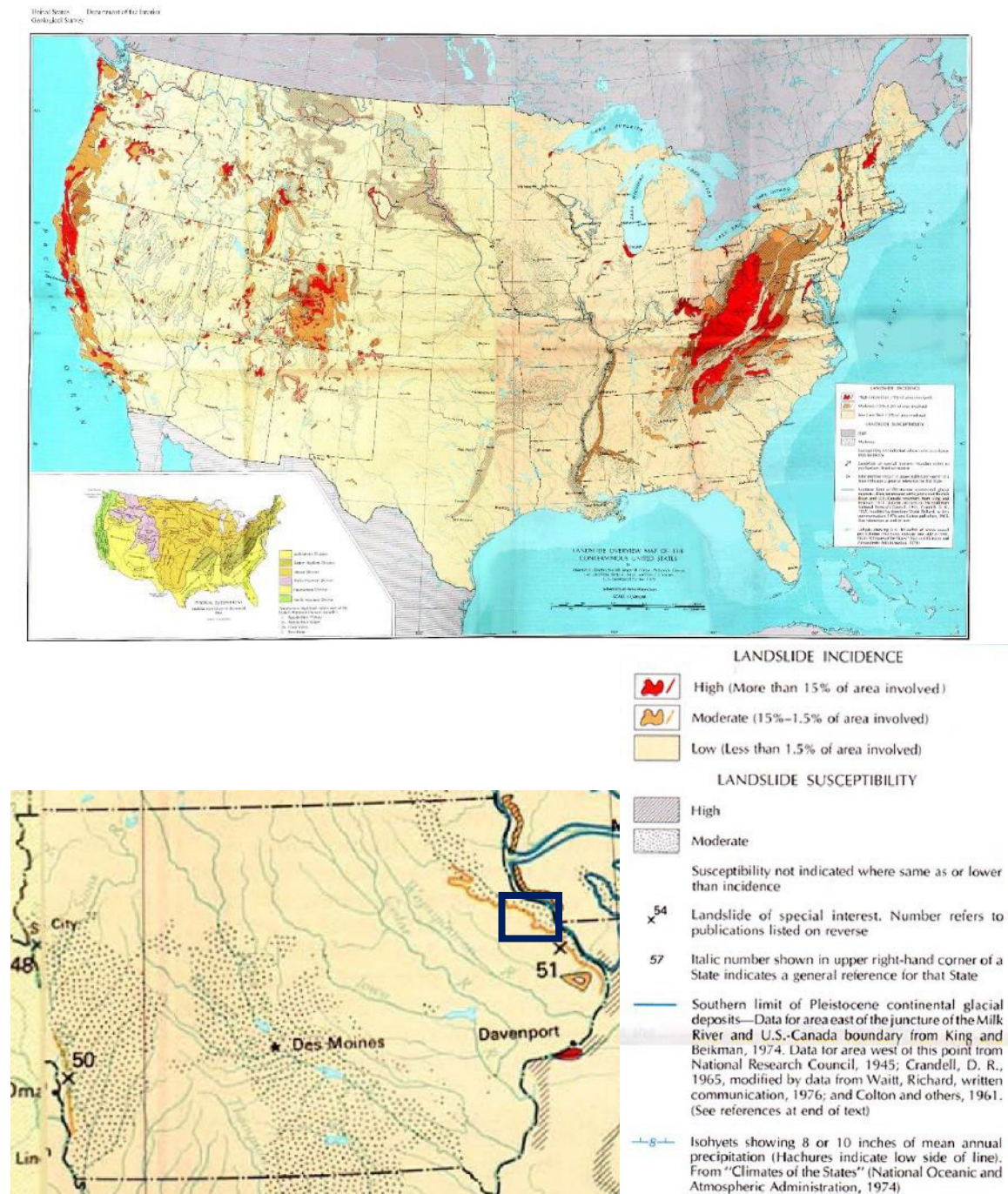
Another area of concern for the City of Dubuque is retaining walls. Development of the City of Dubuque has included many retaining walls over the years. Many of the walls are on private property either along the street right-of-way line or between lots. Some retaining walls have been constructed along the right-of-way to allow for the construction of the street. Surface runoff and subsurface water occasionally cause movement in the wall or stones to be displaced. The City relies on maintenance workers and the public to keep abreast of any changes in the structural stability of the walls. When notification of minor movement in the wall is received, after examination, City Engineering may set up control points to monitor the movement. If the wall is an immediate hazard, the area of influence will be barricaded off to protect the public. The wall will then be examined for corrective action or reconstruction. Since



there are several retaining walls that are considered public, the City has an annual Capital Improvement Project budget for such repairs or reconstruction.

The map in **Figure 3.29** depicts landslide susceptibility and incidents rates in Iowa according to the Iowa Department of Natural Resources. This shows that Dubuque County has low moderate susceptibility and incident rates.

**Figure 3.29. Landslide Susceptibility and Incident Rates**



Source: U.S. Geological Survey, <http://pubs.usgs.gov/pp/p1183/figures/map.jpg>; Approximate location of Dubuque County is the

purple rectangle.

Both the Unincorporated County and the City of Dubuque noted that landslides have occurred. There is no specific record of landslide incidents and these jurisdictions reported that they occur infrequently.

#### ***Probability of Future Occurrence***

The HMPC determined the probability of future occurrence of landslide in the planning area to be low.

### **Vulnerability**

#### ***Vulnerability Overview***

There will continue to be intense rainfall events that may cause landslides in the planning area. But the damages are relatively minimal and not widespread.

#### ***Potential Losses to Existing Development***

Due to the lack of information regarding previous occurrences of this hazard, it is not possible to estimate potential losses.

#### ***Future Development***

Future development down slope from areas prone to landslide will increase vulnerability to this hazard.

#### ***Climate Change Impacts***

One of the climate change impacts noted in the *2010 Climate Change Impacts on Iowa* report by the Iowa Climate Change Impacts Committee is the increase in frequency of severe precipitation events. See the “Climate Change Impacts” discussion in the Flash Flood Hazard Section (3.5.6)

## **3.5.12 Radiological Incident**

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Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	4	4	1.75	Low

### **Profile**

#### ***Hazard Description***

A radiological incident is an occurrence resulting in the release of radiological material at a fixed facility (such as power plants, hospitals, laboratories, etc.) or in transit.

Radiological incidents related to transportation are described as an incident resulting in a release of radioactive material during transportation. Transportation of radioactive materials through Iowa over the interstate highway system is considered a radiological hazard. The transportation of radioactive material by any means of transport is licensed and regulated by the federal government. As a rule, there are two categories of radioactive materials that are shipped over the interstate highways:

1. Low level waste consists of primarily of materials that have been contaminated by low level radioactive substances but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than a wide array of other hazardous materials.
2. High level waste, usually in the form of spent fuel from nuclear power plants, is transported in specially constructed casks that are built to withstand a direct hit from a locomotive.

### ***Geographic Location/Extent***

#### ***Fixed Facilities***

An incident resulting in a release of radiological material at a fixed facility is a fixed radiological incident. There is one nuclear power plant located within Iowa: the Duane Arnold Energy Center near Palo in Linn County. There are three additional nuclear facilities in adjacent states with planning buffer zones that cross into Iowa: Ft. Calhoun Nuclear Power Plant north of Omaha, Nebraska, Cooper Nuclear Power Plant south of Nebraska City, Nebraska, and Quad Cities Nuclear Power Plant in Cordova, Illinois. The southeast corner of Dubuque County is in the 50-mile planning buffer of the Quad Cities Nuclear Power Plant and the western side of Dubuque County is in the 50- mile planning buffer of the Duane Arnold Energy Center (see **Figure 3.30**)

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**Figure 3.30. Map of Nuclear Power Plants Impacting Iowa**

Source: Iowa Homeland Security and Emergency Management; red rectangle is approximate boundary of Dubuque County.

***Transportation Radiological Incidents***

There is also potential for the transport of radioactive waste within Dubuque County.

***Previous Occurrences***

The U.S. Nuclear Regulatory Commission has emergency classifications divided into four categories. Each level has a certain response requirement from the plant and government. The following are the emergency classifications from least to most severe:

- Unusual Event
- Alert
- Site Area Emergency
- General Emergency

According to the Iowa State Hazard Mitigation Plan, 2013, there have been no occurrences of a radiological transportation incident in Iowa since 1990.

### ***Probability of Future Occurrence***

The Nuclear Regulatory Commission (NRC) regulates commercial nuclear power plants and other uses of nuclear materials through licensing, inspection, and enforcement of requirements. Within the NRC, several Offices and Divisions have various responsibilities to ensure nuclear power plant safety. The Office of Nuclear Reactor Regulation is responsible for accomplishing key components of the NRC's nuclear reactor safety mission. As such, NRR conducts a broad range of regulatory activities in the four primary program areas of rulemaking, licensing, oversight and incident response for commercial nuclear power reactors, and test and research reactors to protect the public health, safety and the environment. NRR works with the regions and other offices to accomplish its mission and contribute to the agency mission.

Additionally, the Radiological Emergency Preparedness (REP) Program within FEMA coordinates the national effort to provide state, local and tribal governments with relevant and executable planning, training, and exercise guidance and policies necessary to ensure that adequate capabilities exist to prevent, protect against, mitigate the effects of, respond to, and recover from incidents involving commercial nuclear power plants. Dubuque County Emergency Management works closely with the REP program to ensure preparedness for any incidents involving the nuclear power plants.

Considering the regulatory and preparedness programs in place and based on the lack of any Site Area or General Emergency previous occurrences for this hazard, the probability of future occurrences of radiological incidents is "Unlikely".

## **Vulnerability**

### ***Vulnerability Overview***

In general, danger to the public in the planning area is less than a wide array of other hazardous materials. Those working with or near sources of radiation are at a greater risk than the general citizens in the planning area. Those responding to a radiological incident should be trained in recognizing a radiological incident and minimize exposure to radioactive materials. Although the probability of occurrence is low, if a release of radiation from the nuclear power plants did occur, this could have serious consequences in Dubuque County. Even if health impacts were not evident, the number of worried well could flood available healthcare facilities.

### ***Potential Losses to Existing Development***

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.

### ***Future Development***

Increased development in the planning buffer zones and along transportation corridors would increase the number of people vulnerable to this hazard in the planning area.

### ***Climate Change Impacts***

Drought can impact water levels for intake pipes that carry water from the Mississippi River to cool the reactor. See **Section 3.5.3** for discussion of Climate Change Impacts for Drought.

### 3.5.13 River Flooding

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
3	1	1	4	2.20	Moderate

#### **Profile**

##### ***Hazard Description***

Many of the communities were settled and developed largely because of their proximity to water resources. A flood is partial or complete inundation of normally dry land areas. Heavy precipitation can cause flooding either in the region of precipitation or in areas downstream. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the day and freezing at night. There are two main types of flooding in the planning area: riverine flooding and flash flooding which includes ice jam flooding. Flash flooding is discussed separately in **Section 3.5.6**. A specific type of flash flooding can occur because of dam failure or levee failure. Flooding caused by dam or levee failure is discussed in **Section 3.5.2**

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” and “100-year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Gauges along streams and rain gauges 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 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 Radio. People in the paths of river floods may have time to take appropriate actions to limit harm to themselves and their property.

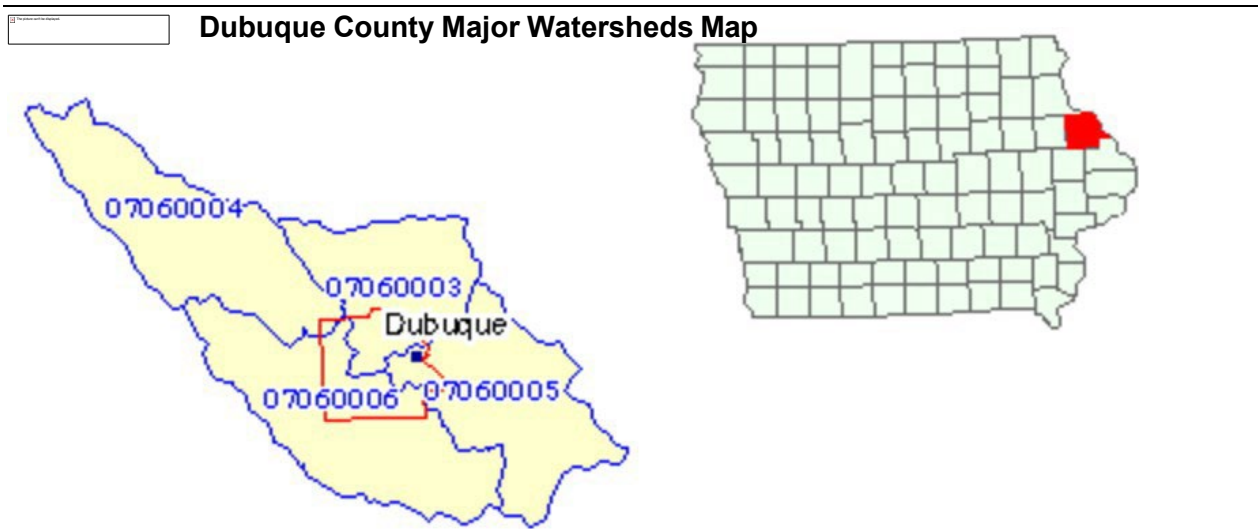
##### ***Geographic Location/Extent***

The Mississippi River provides the eastern boundary for Dubuque County. Other major rivers in the county include Catfish Creek, South Fork, Middle Fork, North Fork Catfish Creeks, and the Little Maquoketa river. Numerous small creeks, branches of rivers, and streams also flow through the County. Flooding from these rivers and their tributaries has been a significant problem for several of the communities in Dubuque County.

There are four HUC-8 watersheds in Dubuque County (see **Figure 3.31**):



- Grant-Little Maquoketa, 0706003
- Turkey, 0706004
- Apple-Plum, 07060005
- Maquoketa, 07060006



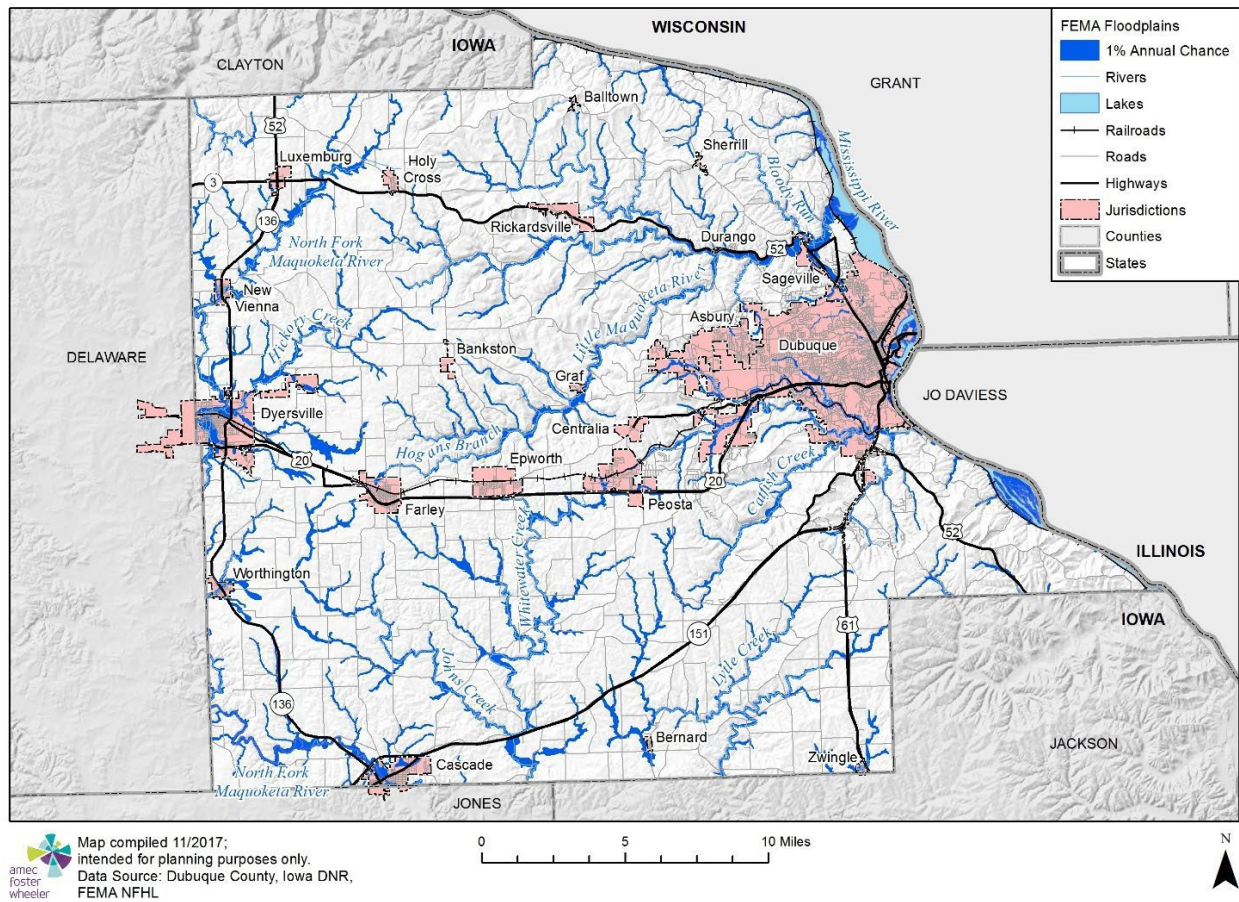
Source: EPA Surf Your Watershed Website, <https://cfpub.epa.gov/surf/locate/index.cfm>

For purposes of this hazard profile and vulnerability analysis, the geographic location/extent for river flooding will be considered as those areas at risk to the 100-year flood (also known as the 1-percent annual chance flood). The 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes.

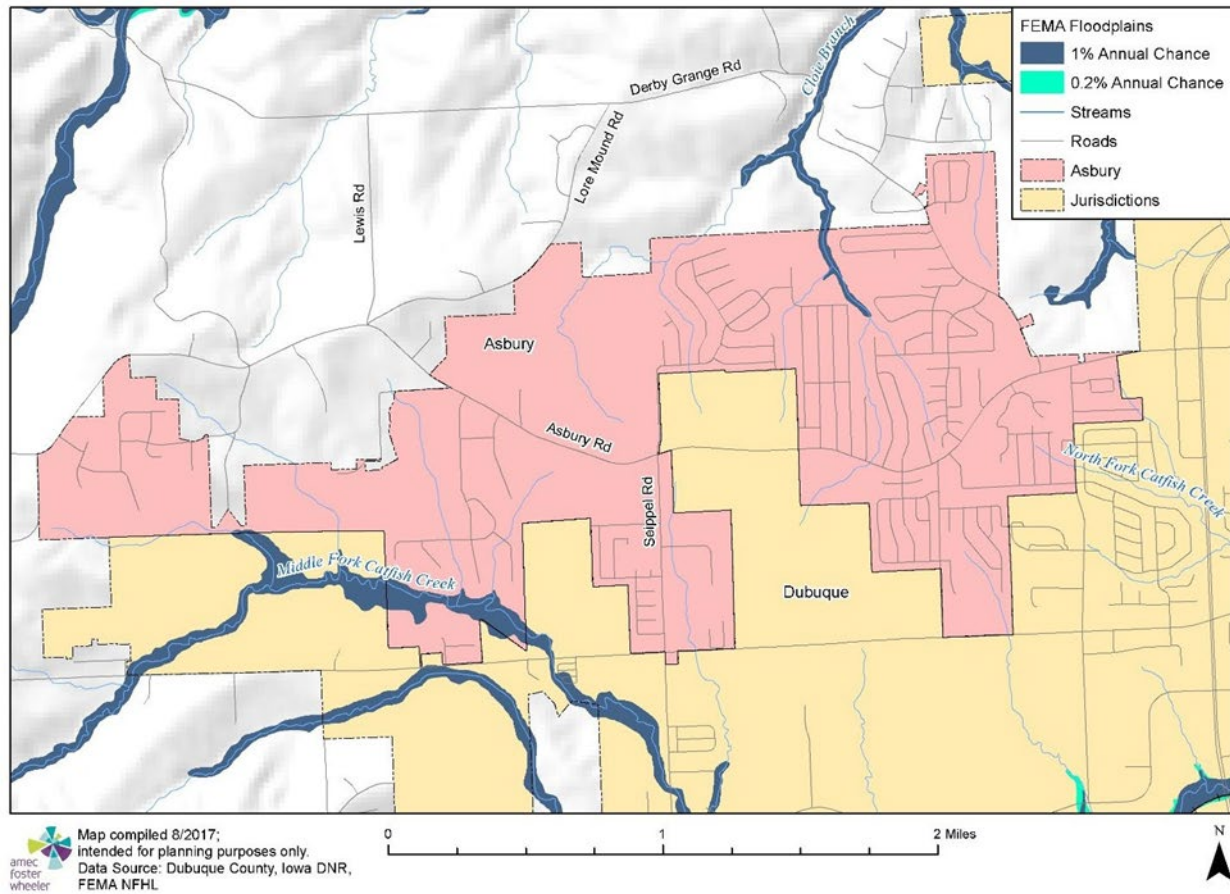
#### Jurisdictional Flood Hazard Maps

FEMA has identified Special Flood Hazard Areas in the unincorporated county and all incorporated jurisdictions except for: Balltown, Bankston, Centralia, Holy Cross, and Sherrill. **Figure 3.32** provides the 1-percent annual chance floodplain for all jurisdictions in the planning area according to the effective FEMA Flood Insurance Rate Map. The county-level map is provided first, and the remaining maps are provided in alphabetical order by the city. The School District maps are provided after the city maps. Appendix E provides locations of available critical facilities in relation to the 1-percent annual chance floodplain. This will be discussed in greater detail in the vulnerability section.

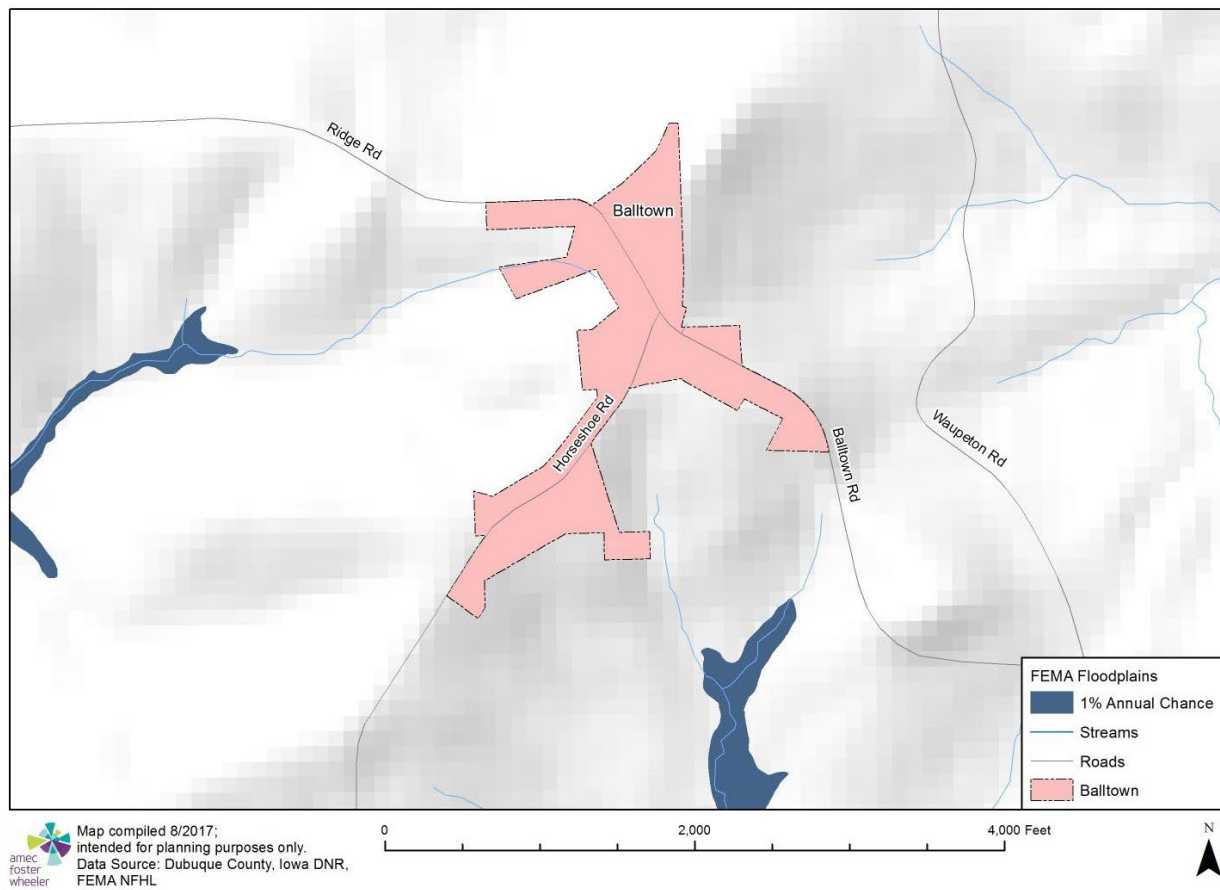
**Figure 3.32. Dubuque County 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.3. City of Asbury 1% Chance of Floodplain (100 Year Floodplain)**

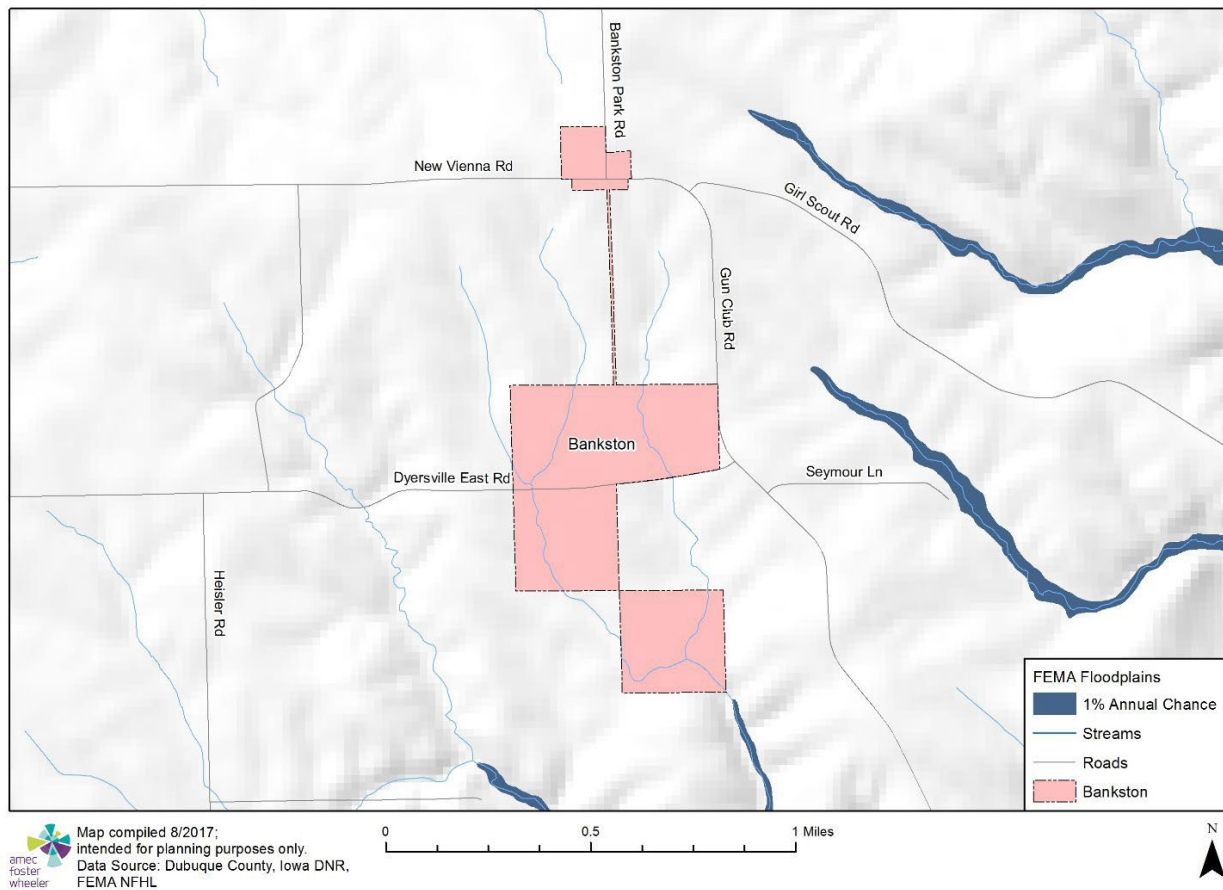


**Figure 3.34. City of Balltown 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

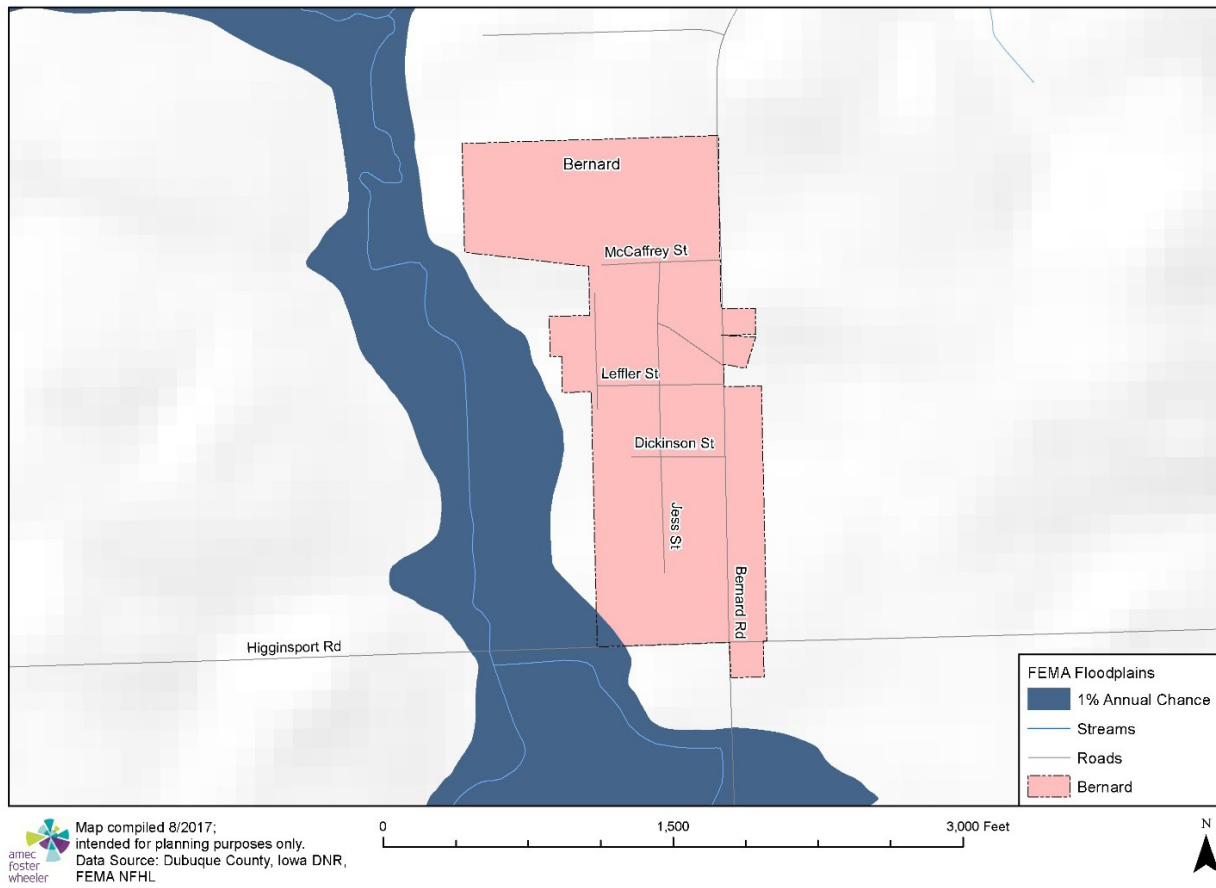




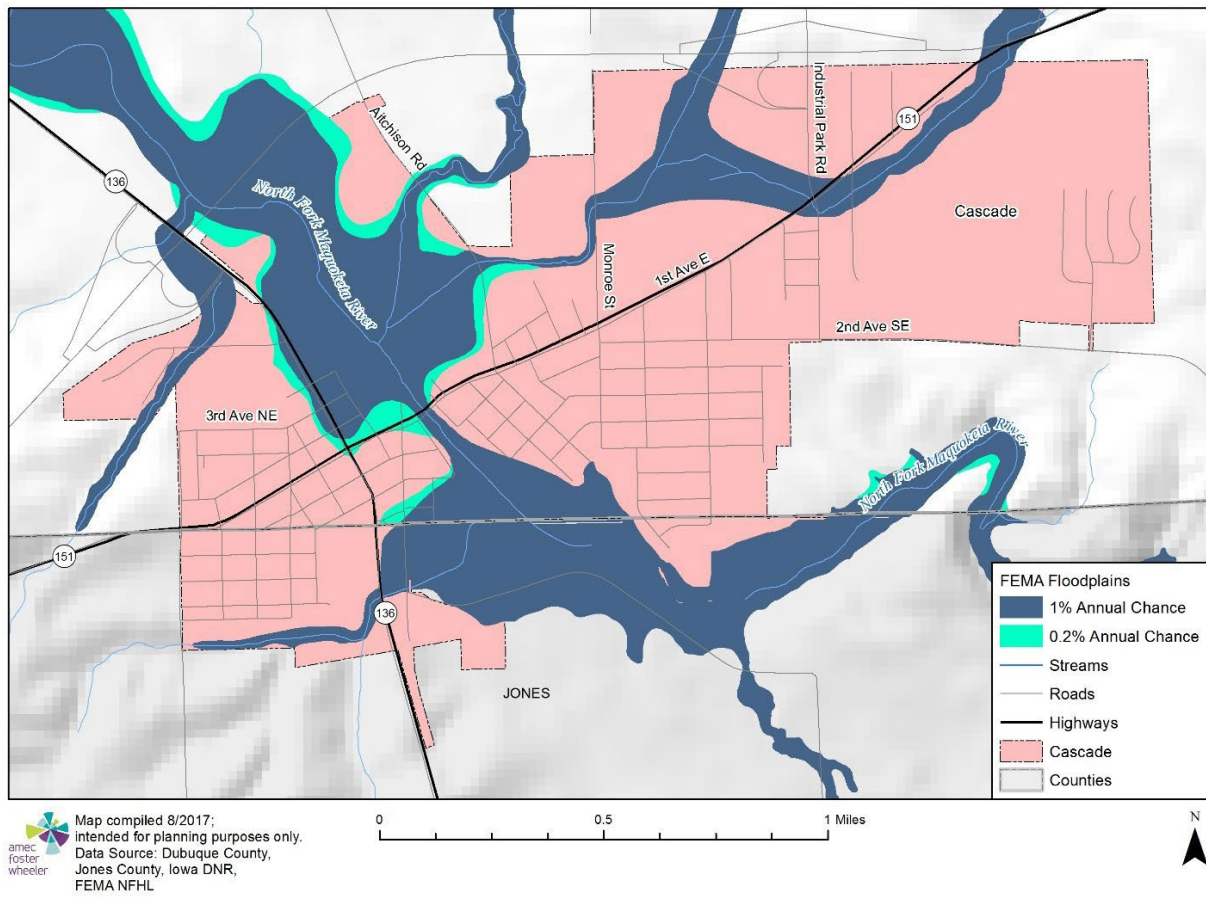
**Figure 3.35. City of Bankston 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.36. City of Bernard 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

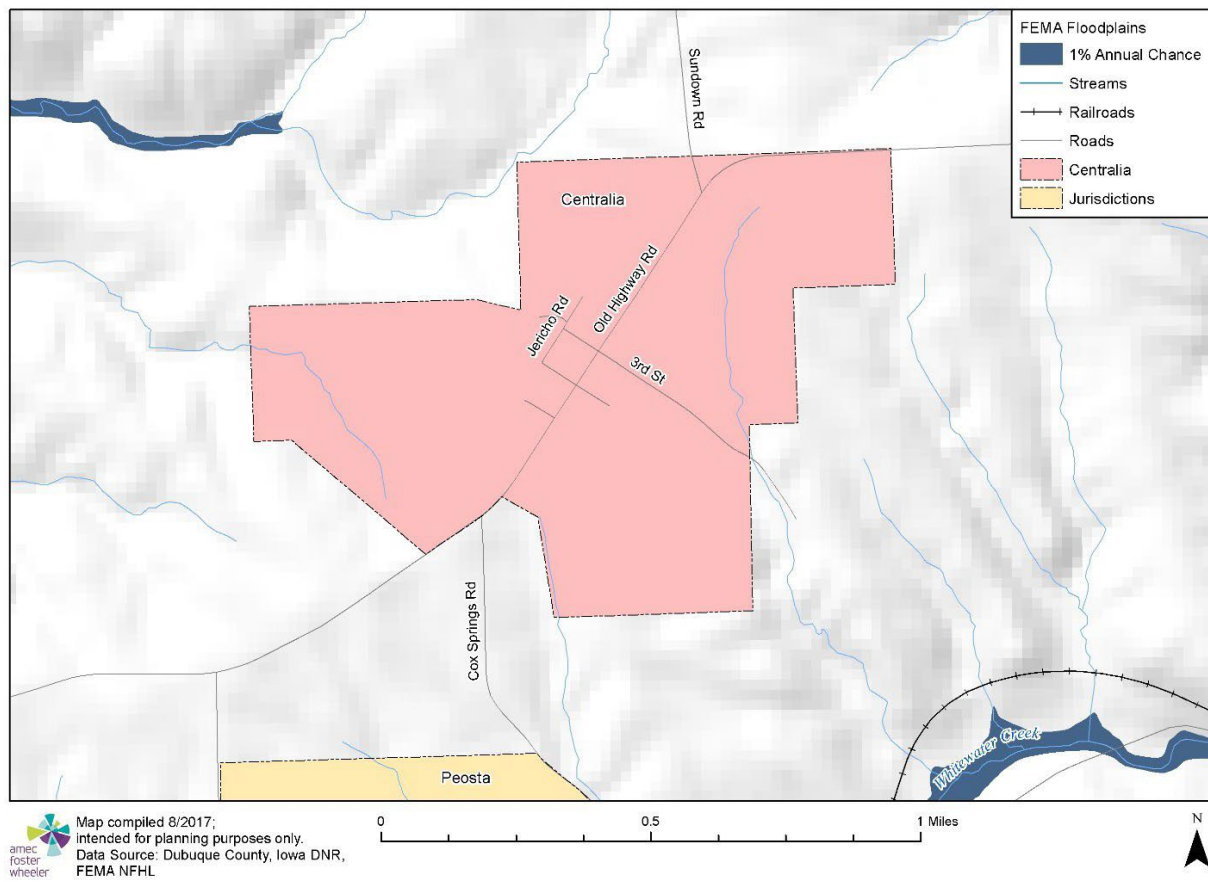


**Figure 3.37. City of Cascade 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

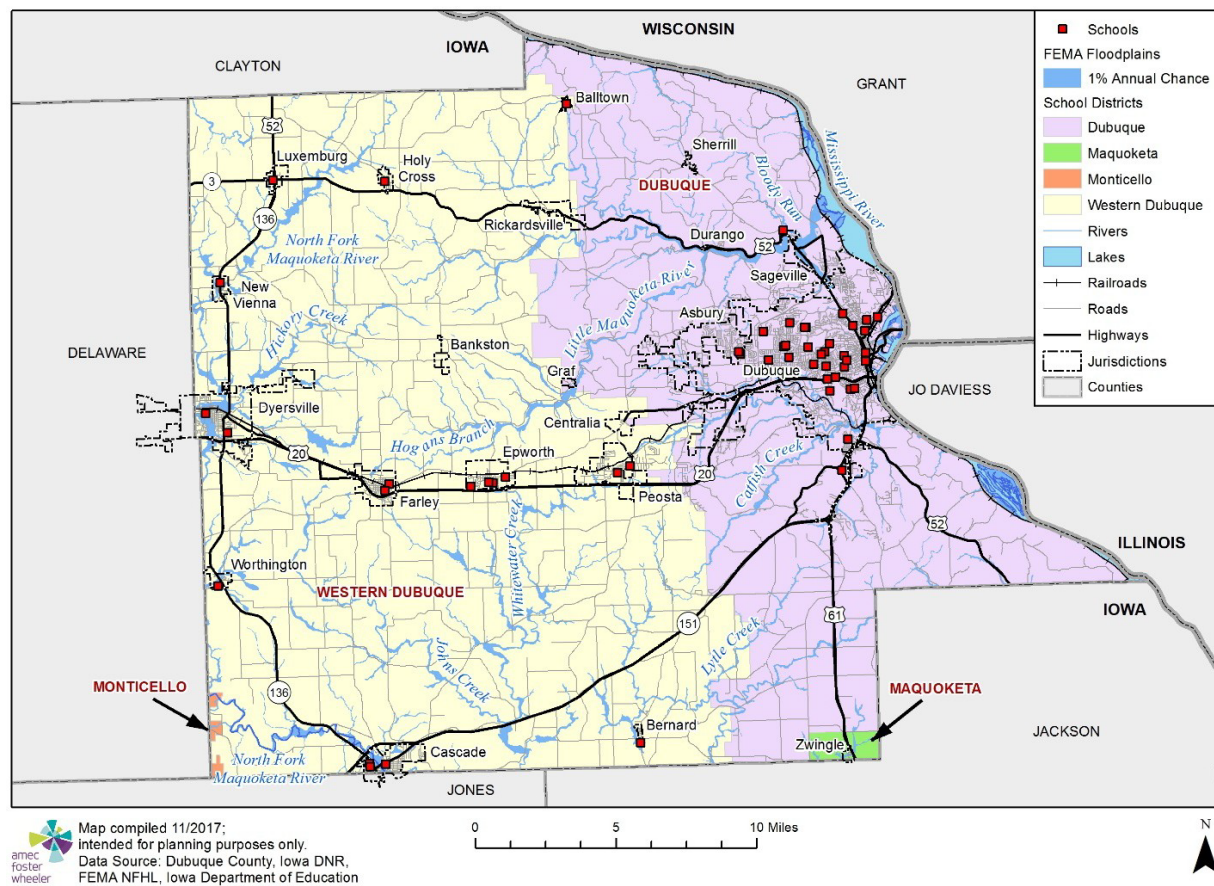




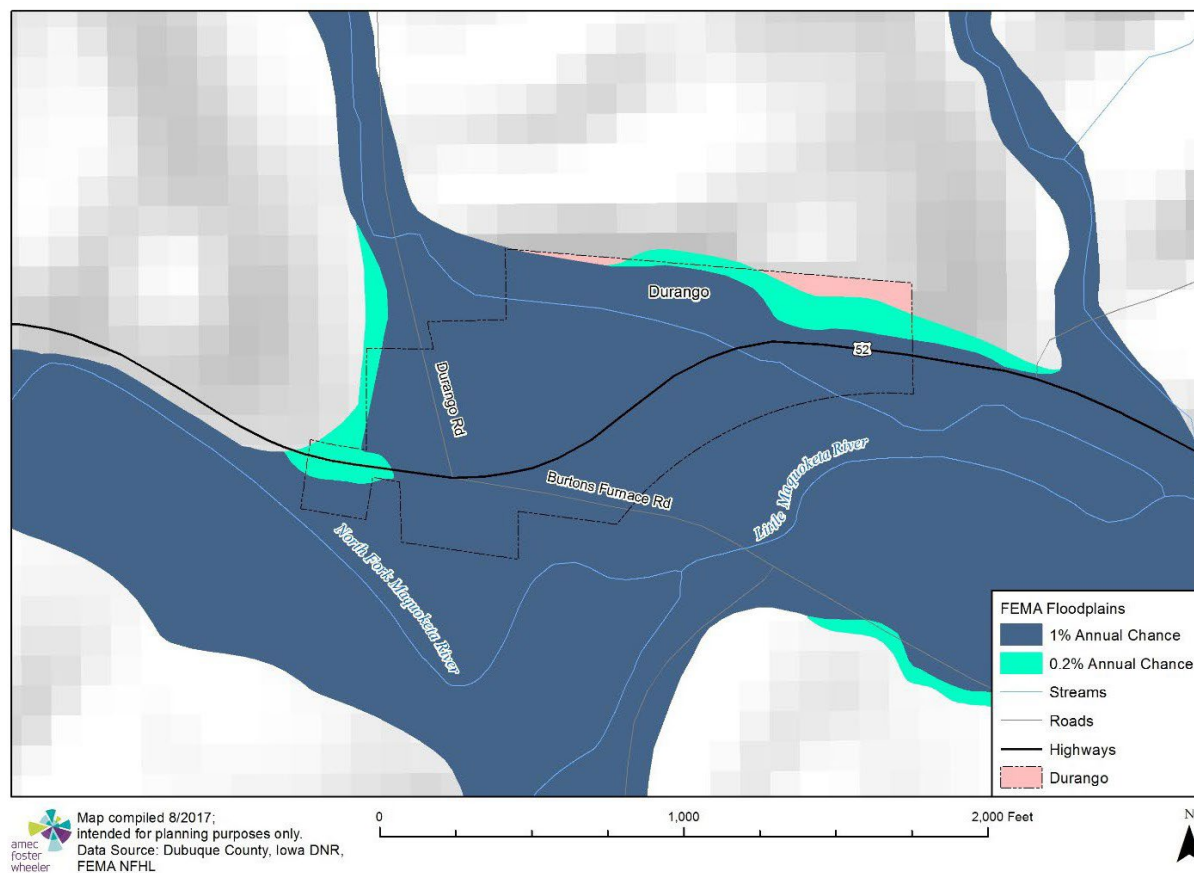
**Figure 3.38. City of Centralia 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



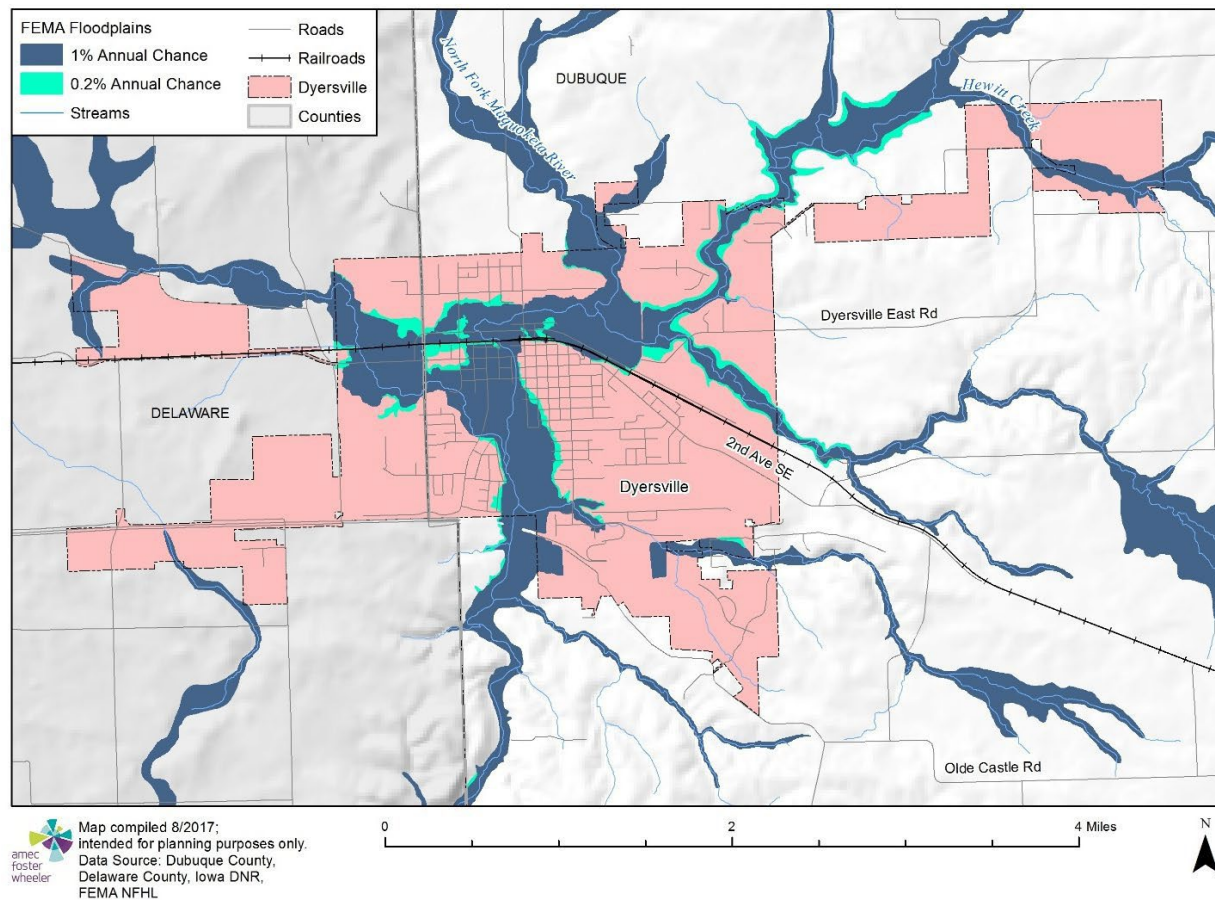
**Figure 3.39. City of Dubuque 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



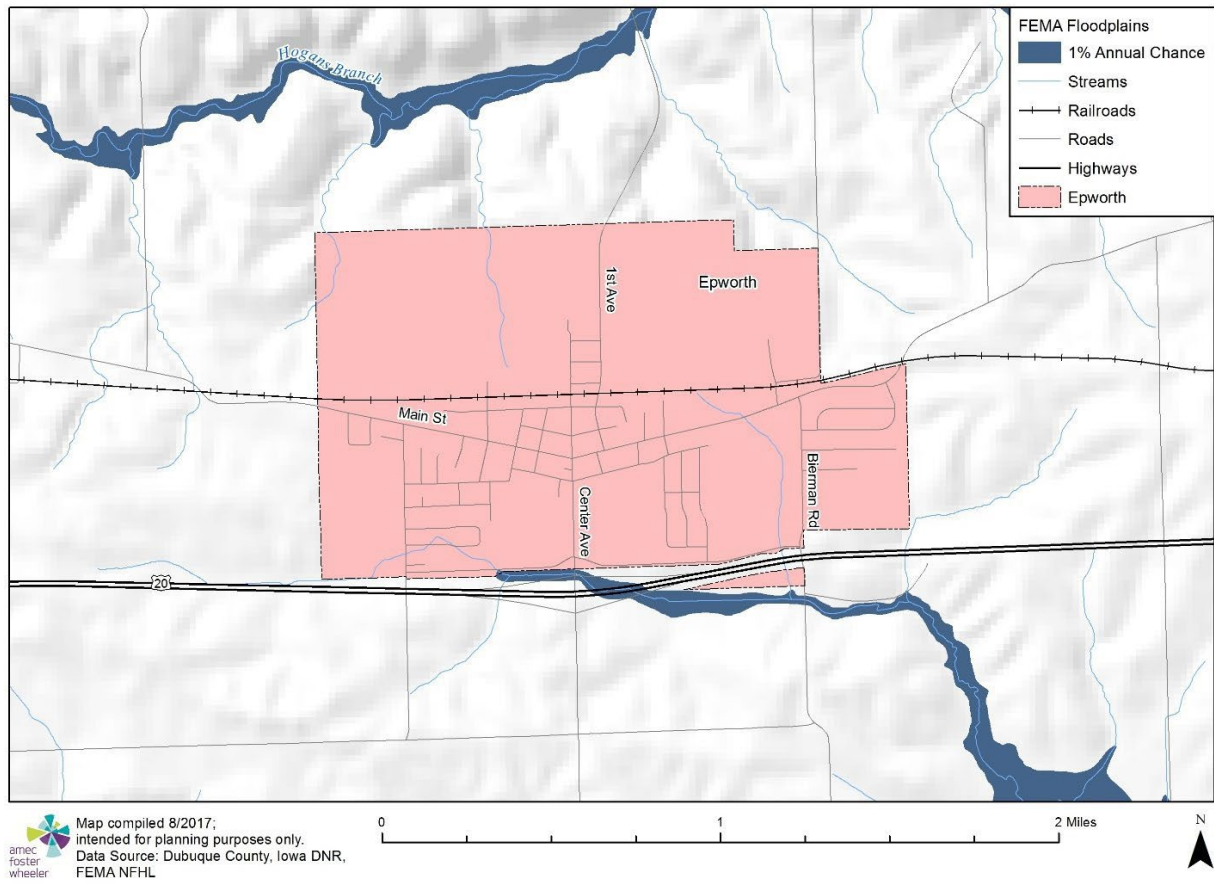
**Figure 3.40. City of Durango 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.41. City of Dyersville 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

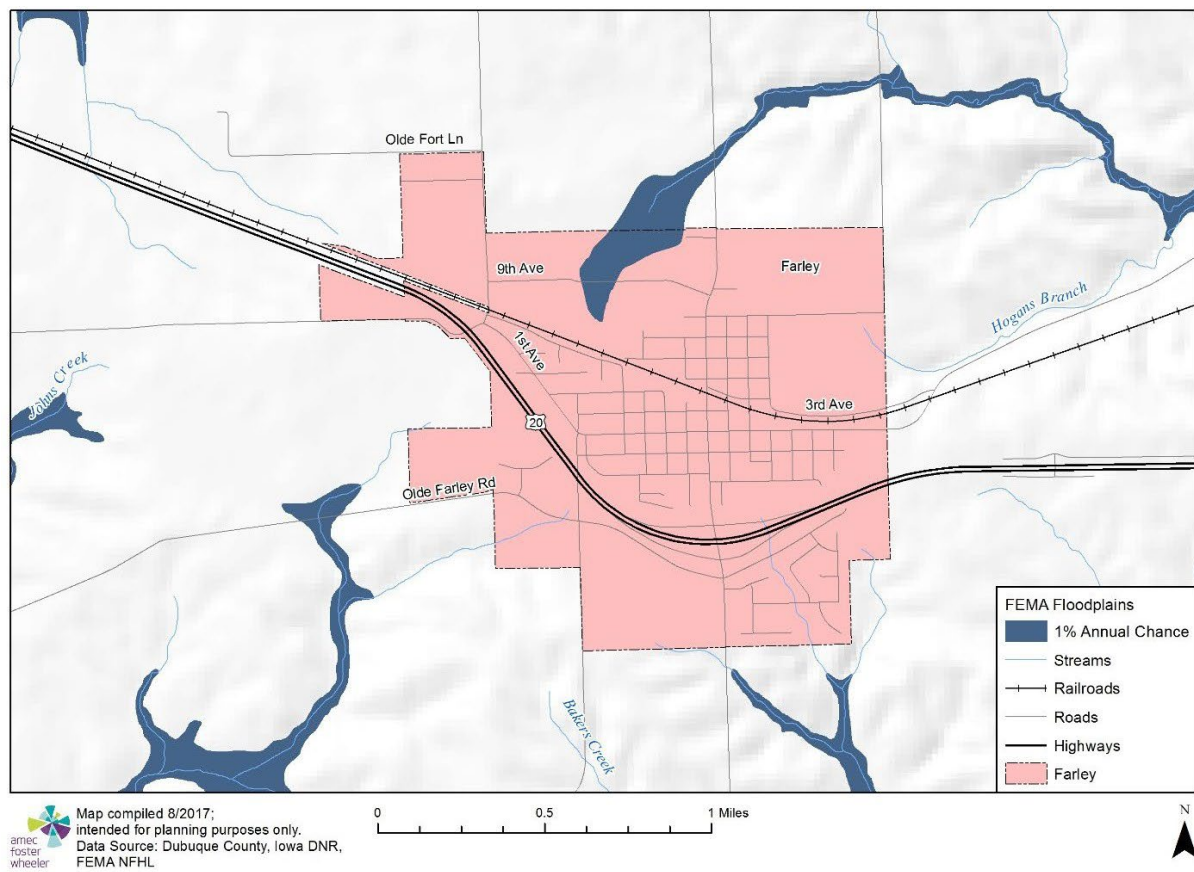


**Figure 3.42. City of Epworth 1% Floodplain (100 Year Floodplain)**

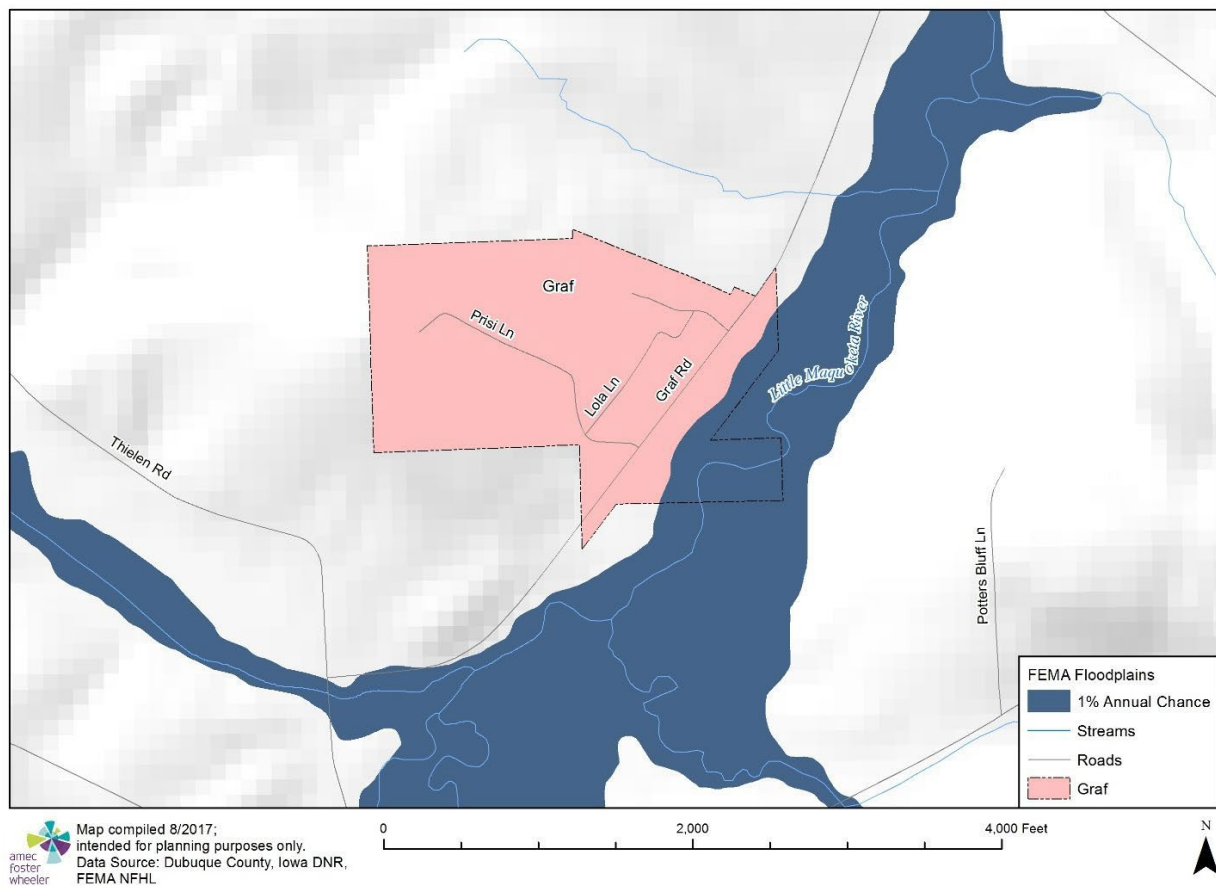




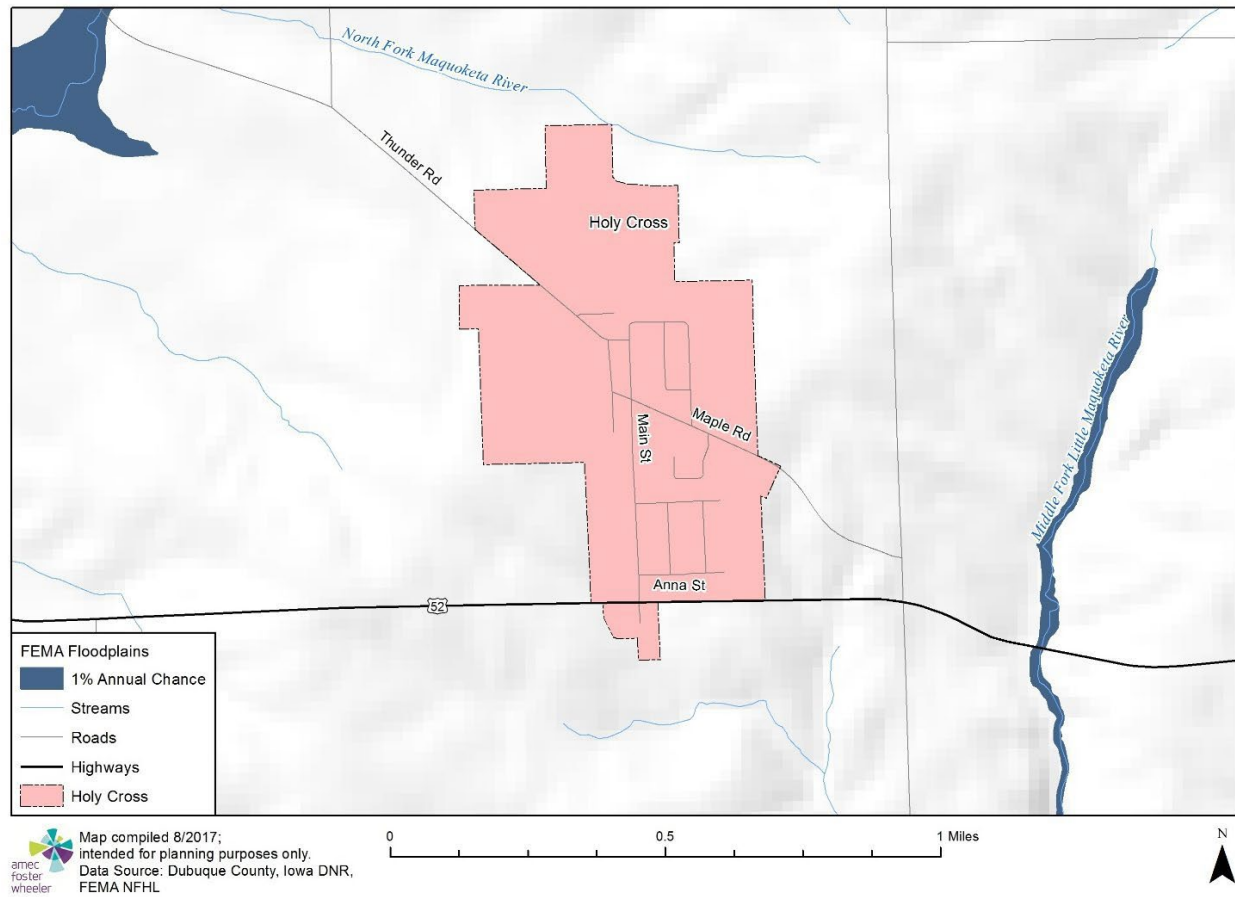
**Figure 3.43. City of Farley 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.44. City of Graf 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

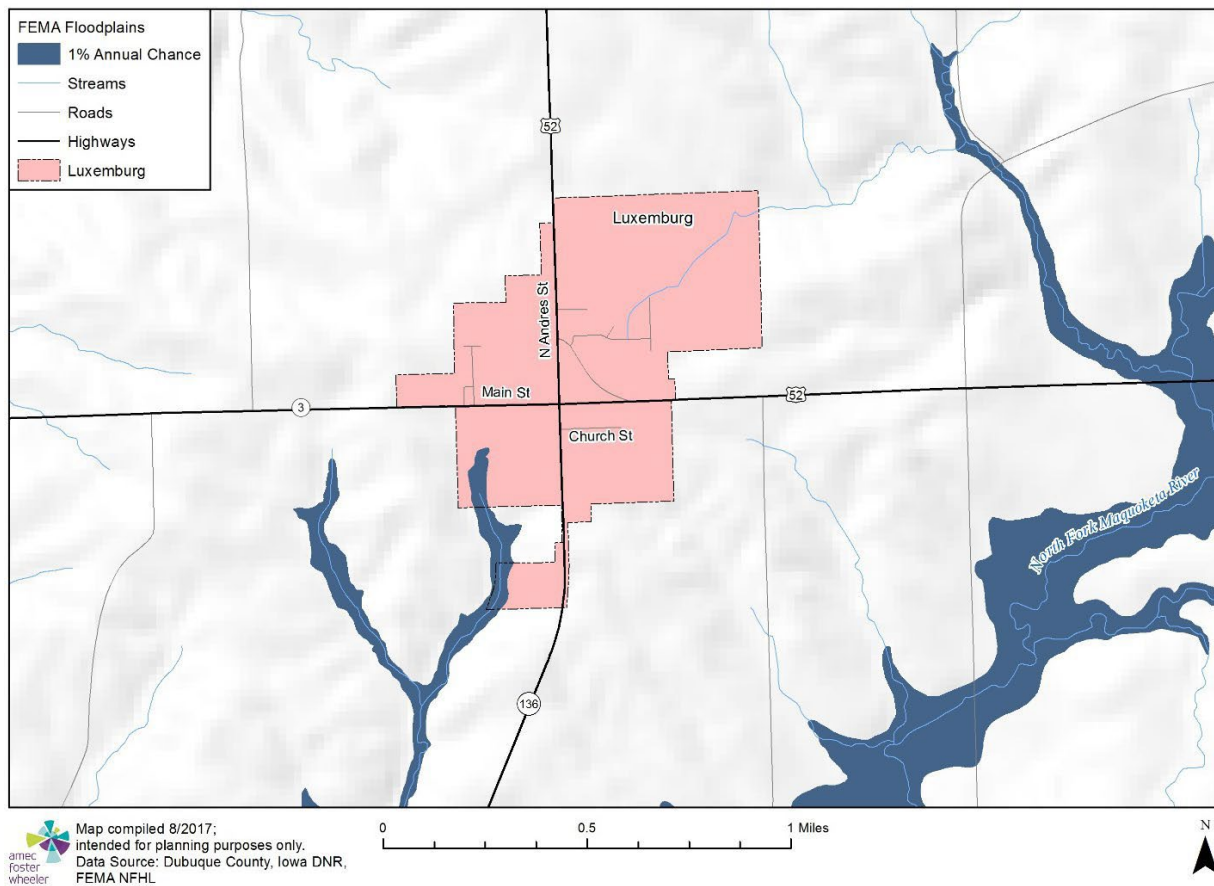


**Figure 3.45. City of Holy Cross 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

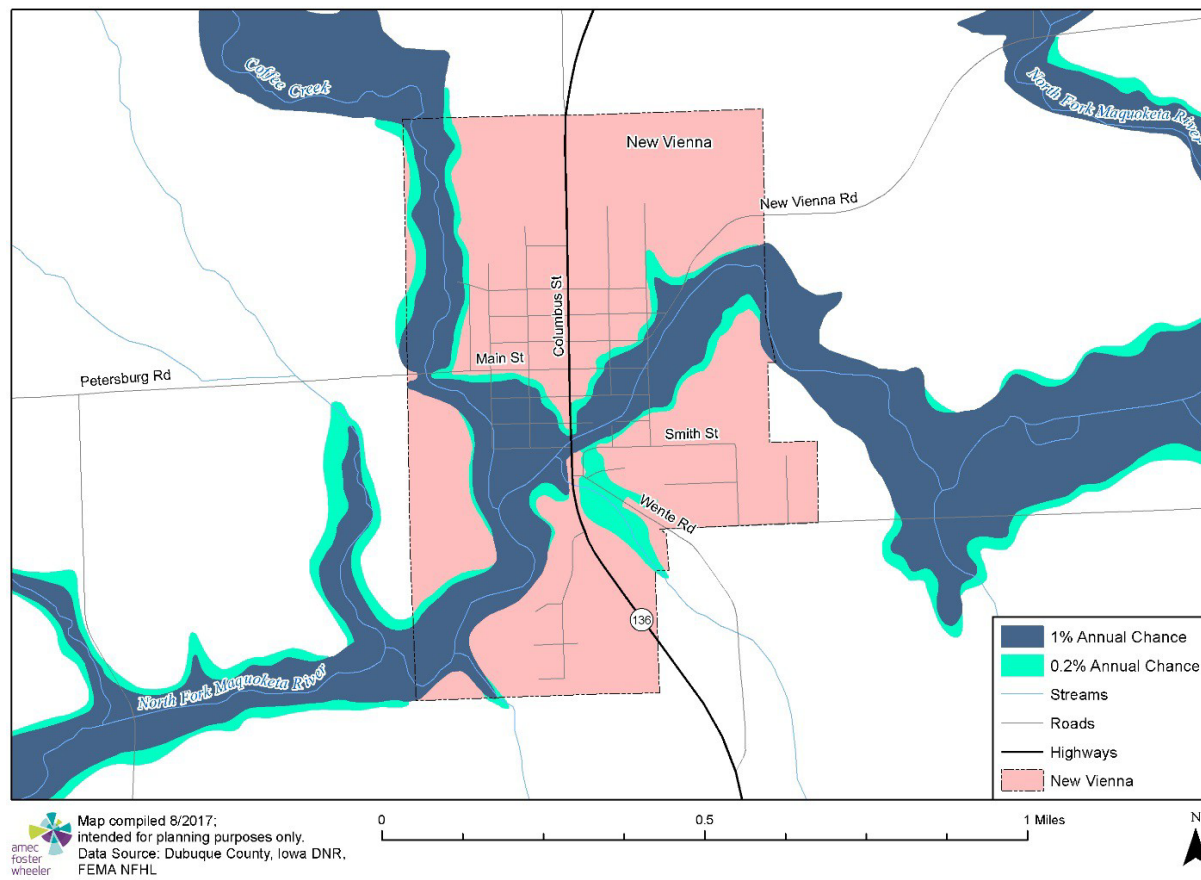




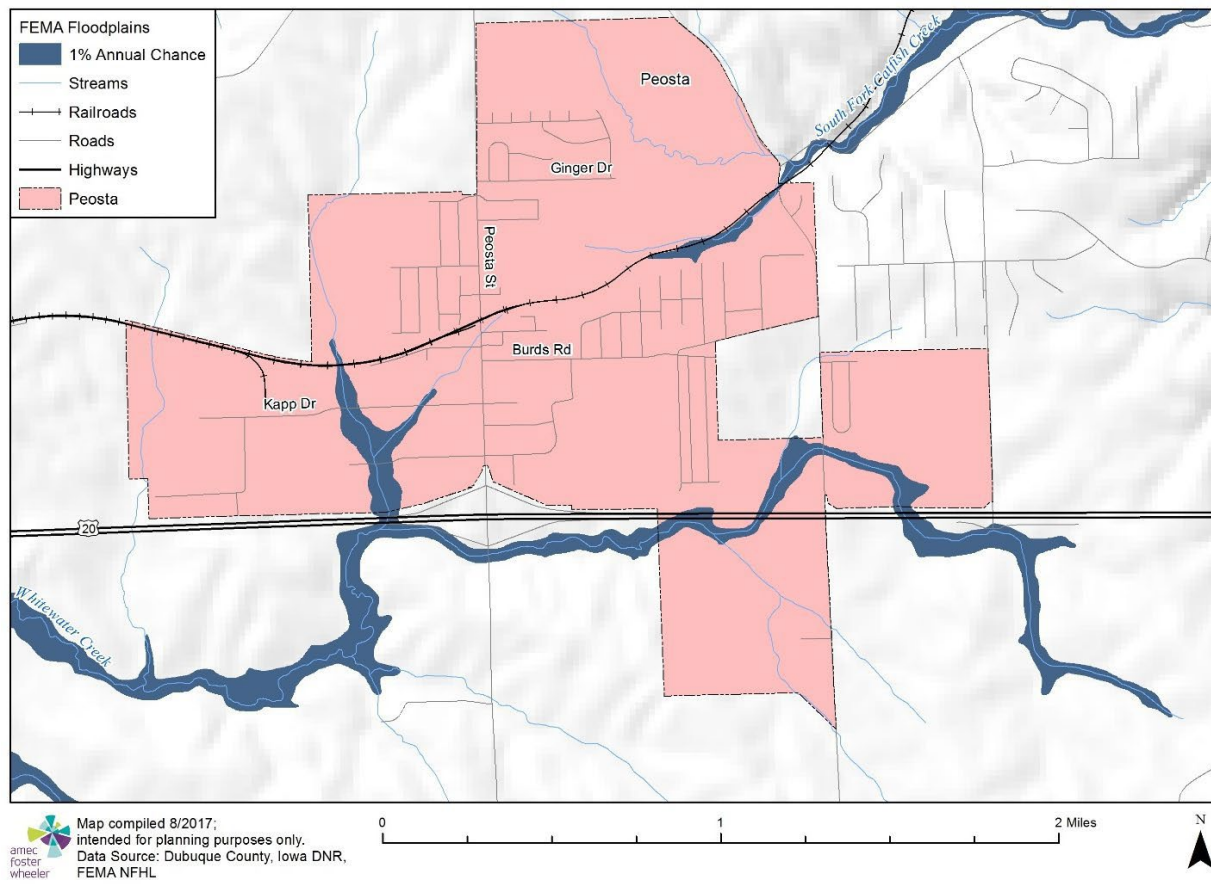
**Figure 3.46. City of Luxemburg 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



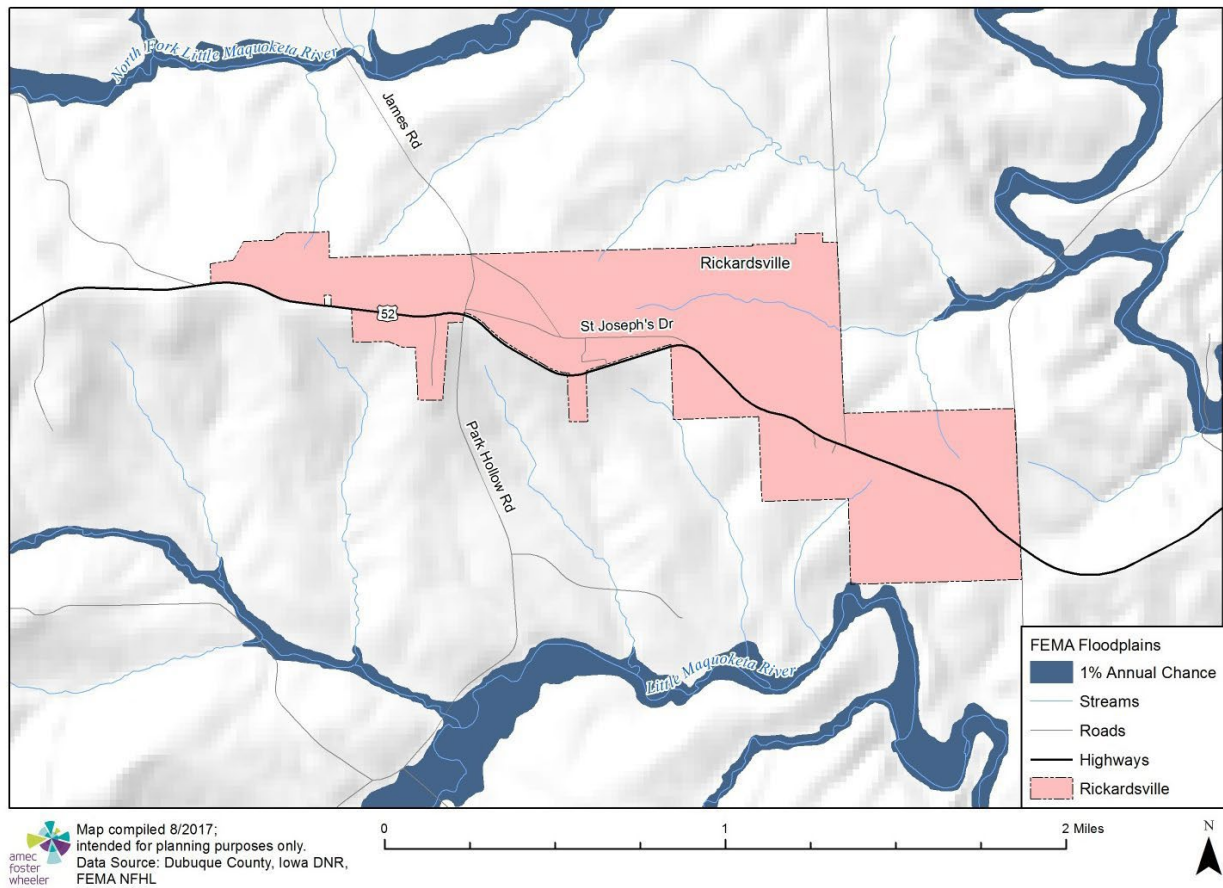
**Figure 3.47. City of New Vienna 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



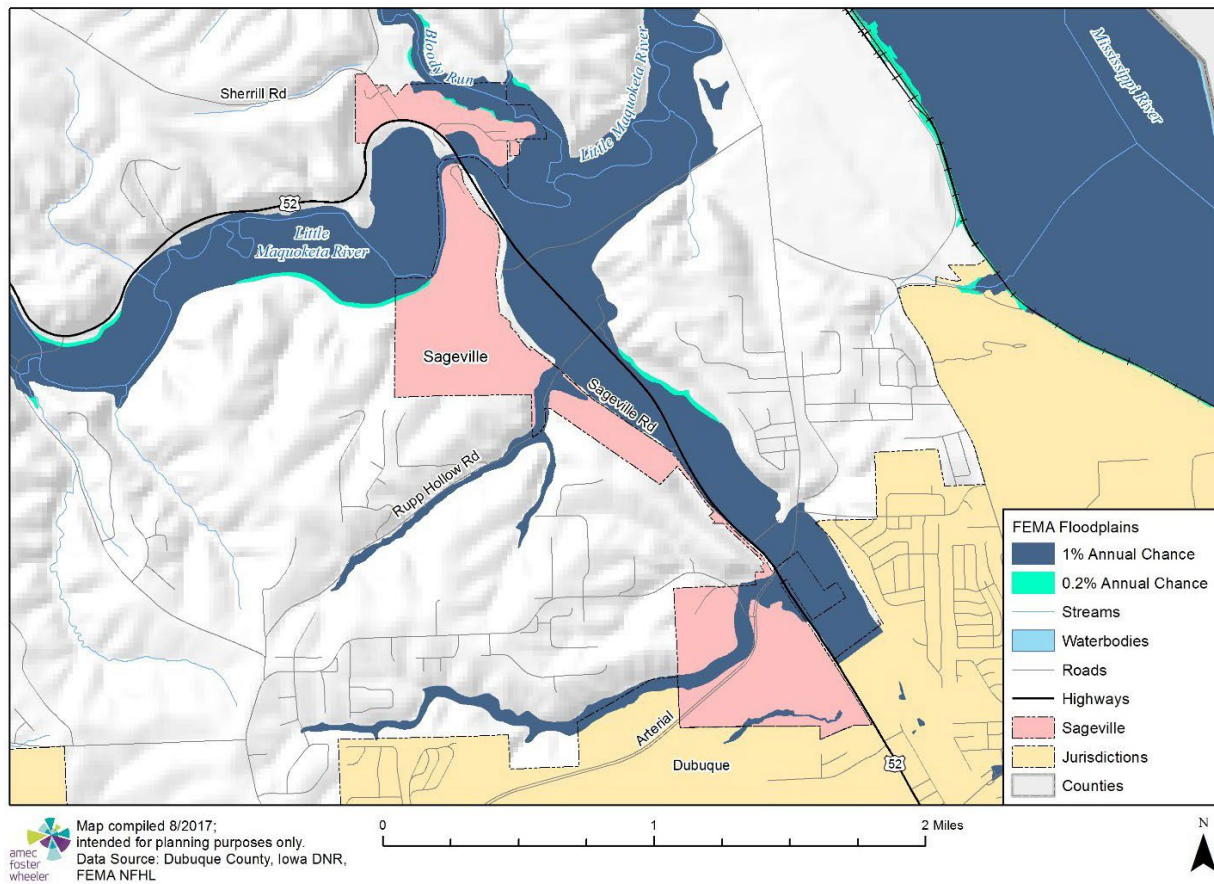
**Figure 3.48. City of Peosta 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.49. City of Rickardsville 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

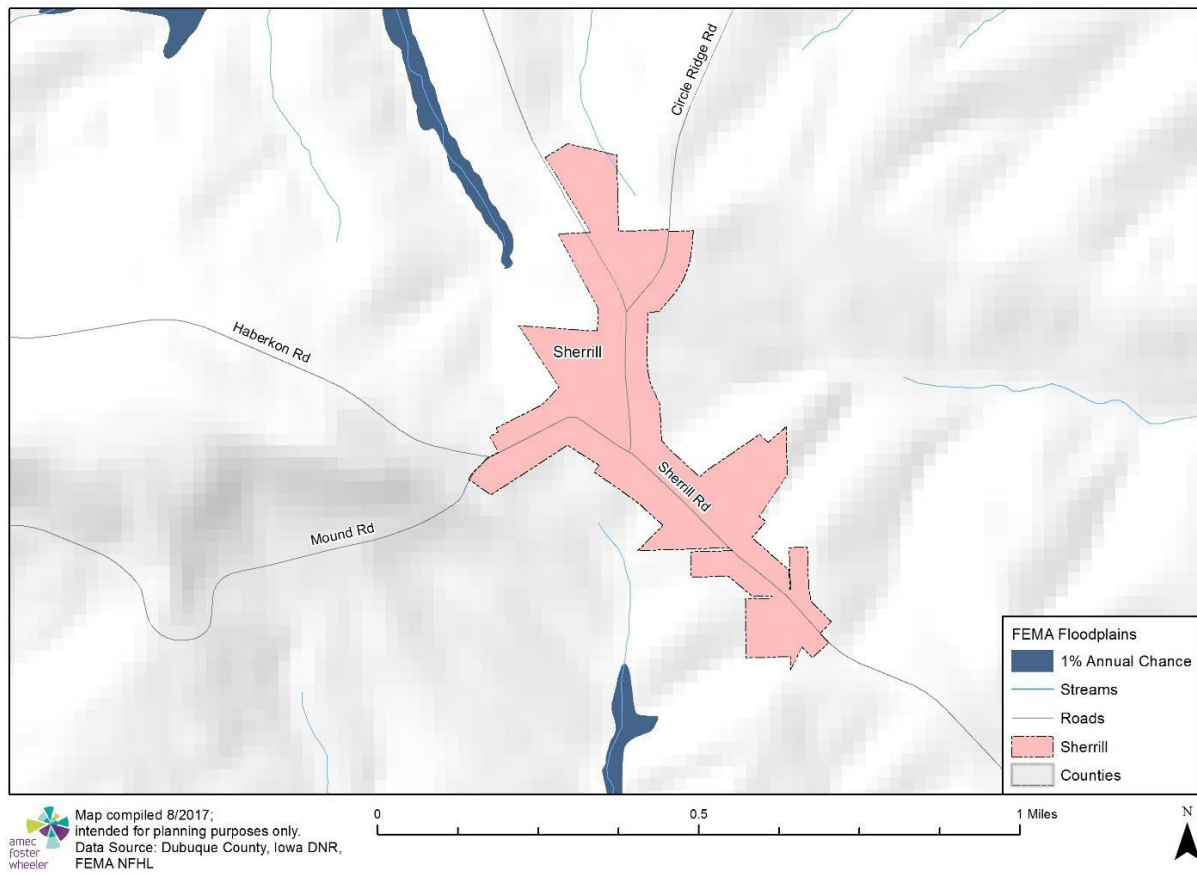


**Figure 3.50. City of Sageville 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

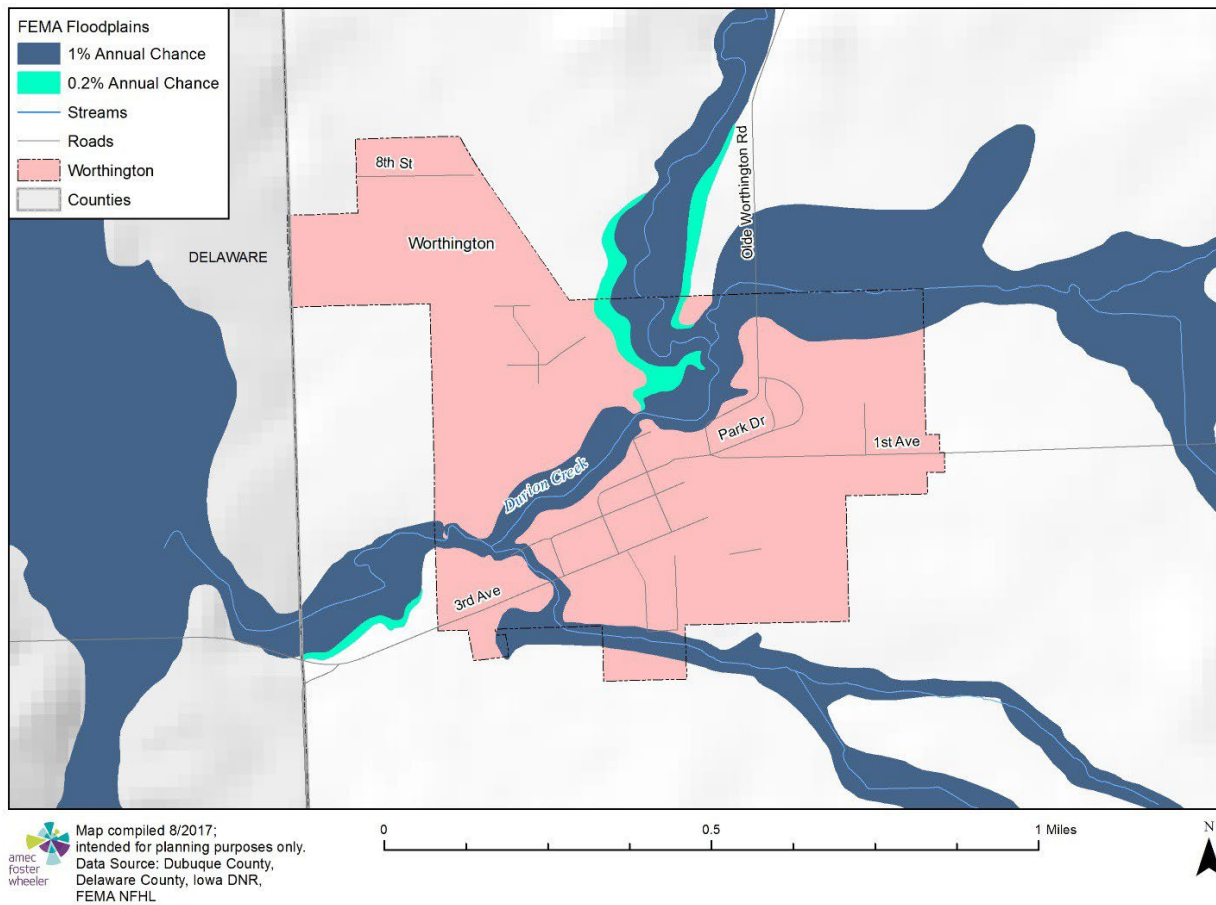




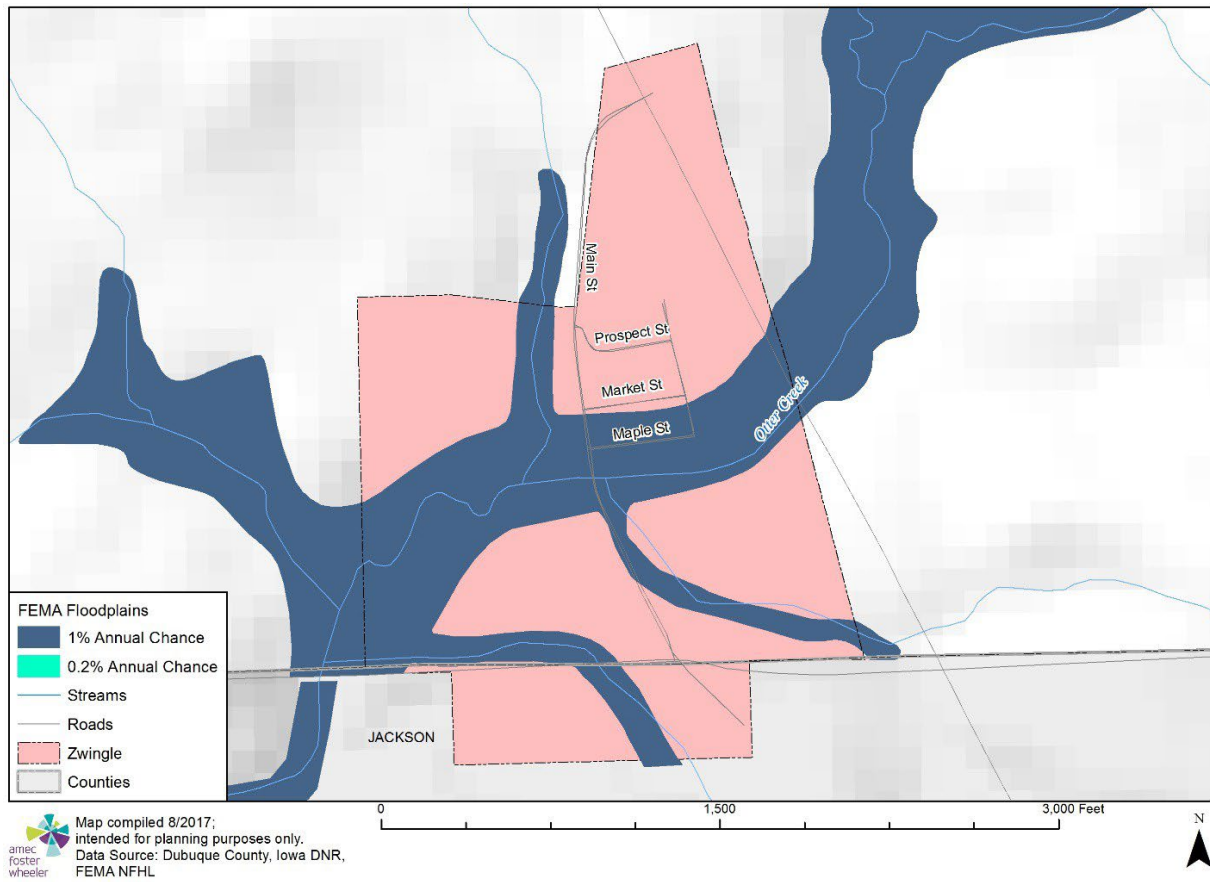
**Figure 3.51. City of Sherrill 1-Percent Annual Chance Floodplain (100-Year Floodplain)**



**Figure 3.52. City of Worthington 1-Percent Annual Chance Floodplain (100-Year Floodplain)**

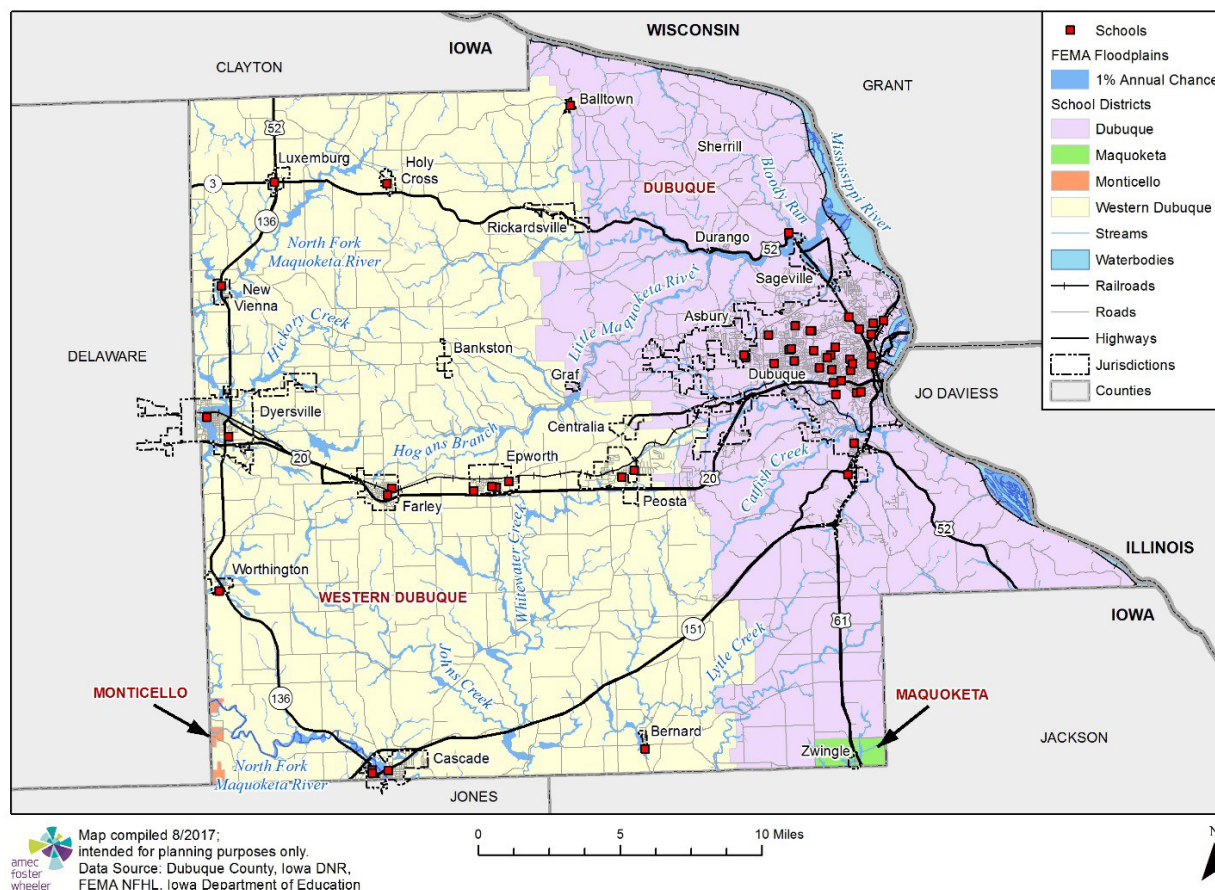


**Figure 3.53. City of Zwingle 1-Percent Annual Chance Floodplain (100-Year Floodplain)**





## Floodplain (100-Year Floodplain)



### Previous Occurrences

This section provides information on previous occurrences of riverine flooding in the planning area.

#### Presidential Declarations for Flooding in Planning Area

Since 1965 there have been 15 Major Presidential Disaster Declarations that included flooding in the planning area. The only disaster declaration during this time period did not include flooding was the 2005 Emergency Declaration for evacuees entering the state due to Hurricane Katrina. Additional details of the flood-related disaster declarations are provided in **Table 3.2** in the Hazard Identification Section.

According to the National Climatic Data Center, there were 14 reported flood events from 1993-2016. Please note events reported less than 10 days apart were combined and counted as one event. Details are provided below in **Table 3.53**.

**Table 3.53. NCDC Flood Events in Dubuque County, 1997 - 2019**

Location	Date	Deaths	Injuries	Property Damage
Dubuque County	4/8/1997	0	0	\$0
Dubuque County	5/17/1999	0	0	\$0
Epworth	6/8/1999	0	0	\$0
Worthington	6/8/1999	0	0	\$0
Dubuque County	6/1/2000	0	0	\$0
Dubuque County	4/14/2001	0	0	\$0
Dubuque County	5/1/2001	0	0	\$0
Dubuque	6/1/2001	0	0	\$0
Dubuque County	4/21/2002	0	0	\$0
Dubuque County	5/20/2003	0	0	\$1,000,000
Dubuque County	6/16/2004	0	0	\$0
Dubuque	4/1/2008	0	0	\$0
Balltown	6/1/2008	0	0	\$6,400,000
Dubuque	10/1/2010	0	0	\$0
Dubuque	10/1/2010	0	0	\$0
White Pine Hollow	4/13/2011	0	0	\$250,000
Sageville	4/3/2019	0	0	\$0
Dubuque	4/25/2019	0	0	0
Massey	5/1 /2019	0	0	0
Total				\$7,650,000

Source: NCDC

Additional details are provided below to describe previous events for specific jurisdictions:

- Durango:** In July 2010, Dubuque County experienced severe flooding. The City of Durango reported heavy downpours, thunder, and lightning. According to the planning committee, water entered the City of Durango from several sources. Water came over Highway 52 and the worst came from the north, from the area around the City of Sherrill and “raged” down highway 52. As water came over the highway, it poured into doors and into homes.

Three of the creeks that run through Durango have reportedly filled with sediment and floods have deposited soil. This has resulted in the waterways not being as deep or wide as they once were; consequently, flooding occurs more often and to a greater extent.

- Dubuque:** Historically, the Mississippi River has flooded the City of Dubuque’s low-lying

riverfront properties many times over the last 150 years. As the result of a concerted effort by local, state, and federal officials to construct a protective levee system was initiated. The 6.4-mile-long earthen and concrete floodwall system was completed in 1973. This system has protected Dubuque from numerous Mississippi River flood events since its completion including four of the ten highest flood crests ever measured, one of these was Dubuque's second highest ever crest of 25.40 feet in 2001. Although most of the city of Dubuque is protected by the levee system, Chaplain Schmitt Island and Catfish Creek valley lie outside the protected area.

- **Dyersville:** The city of Dyersville has a long history of dealing with flood events. The area experienced major flooding in 1999 and 2002 that prompted the first of several grant applications to acquire flood prone properties. To date, all the properties targeted for acquisition have either been acquired or withdrawn.

### Previous Agricultural Impacts

Flooding and excess moisture take a toll on crop production in the planning area. According to the USDA's Risk Management Agency, payments for insured crop losses in the planning area because of excess moisture and flood conditions from 20013-2020 totaled more than \$10 million. According to the USDA, 90% of Iowa's corn and soybean acres are generally insured using Revenue Protection (RP) multiple peril crop insurance. **3.54** summarizes claims paid by year.

**Table 3.54. Crop Insurance Claims Paid in Dubuque County for Crop Loss because of Excess Moisture/Precipitation/Rain and Flood (2013 - 2020)**

Damage Cause	Sum of Indemnity Amount	Sum of Determined Acres
Excess Moisture/Precipitation/Rain	<b>\$9,414,913.66</b>	<b>67599</b>
2013	\$998,815.00	7339
2014	\$4,249,447.36	24638
2015	\$572,365.20	5345
2016	\$176,459.05	2848
2017	\$513,894.13	3884
2018	\$750,546.79	6640
2019	\$1,463,549.73	11576
2020	\$509,557.40	4462
2021	\$162,822.00	608
2022	\$17,457.00	259
Flood	<b>\$672,906.15</b>	<b>3076</b>
2014	\$19,390.00	102
2017	\$123,283.65	461
2018	\$342,415.00	1672
2019	\$181,278.50	809
2020	\$6,539.00	32

<b>Grand Total</b>	<b>\$10,087,819.81</b>	<b>70675</b>
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Source: USDA Risk Management Agency

### National Flood Insurance Program (NFIP) Participation

**Table 3.55** provides details on NFIP participation for the communities in the planning area as well as the number of policies in force, amount of insurance in force, number of closed losses, and total payments for each jurisdiction, where applicable. The claims information is for the period from January 1, 1978, to February 28, 2015. This data was collected using HAZUS flood modeling, which is no longer utilized by the planners at ECIA, therefore the data is not updated past 2017.

**Table 3.55. NFIP Participation, Policy, and Claim Statistics**

Community Name	NFIP Participant (Yes/No)	Participant in CRS (Yes/No)	Current Effective Map Date	Regular-Emergency Program Entry Date	Policies in Force	Insurance in Force	Closed Losses	Total Payments
Dubuque County	Yes	No	8/19/2013	9/1/1983	27	\$4,549,100	33	\$707,345
Asbury	Yes	No	10/18/2011	1/28/2014	0	0	0	0
Balltown	Yes	No	N/A	N/A	N/A	N/A	N/A	N/a
Bankston	No NSFHA	No	N/A	N/A	N/A	N/A	N/A	N/A
Bernard	Yes	No	10/18/2011	11/8/2011	0	0	0	0
Cascade	Yes	No	10/18/2011	4/2/1979	10	\$1,388,500	1	\$6,509
Centralia	No NSFHA	No	N/A	N/A	N/A	N/A	N/A	N/A
Dubuque	Yes	No		4/2/1971	58	\$13,265,300	19	\$155,970
Durango	Yes	No	10/18/2011	7/16/1981	2	\$190,200	17	\$339,044
Dyersville	Yes	No	10/18/2011	12/1/1977	0	0	0	0
Epworth	Yes	No	10/18/2011	7/12/1977	3	\$770,000	0	0
Farley	Yes	No	10/18/2011	10/6/2011	1	\$8,700	0	0
Graf	Yes	No		4/10/2012	0	0	0	0
Holy Cross	Yes NSFHA	No	NSFHA	11/9/2011	1	\$210,000	0	0
Luxemburg	Yes	No	10/18/2011	3/23/2015	0	0	0	0
New Vienna	Yes	No	10/18/2011	10/18/1983	2	\$193,700	2	\$18,888
Peosta	Yes	No	8/1/2012	8/1/2012	0	0	0	0
Rickardsville	No Sanctioned 10/18/2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sageville	Yes	No	10/18/2011	6/15/1984	0	0	3	\$14,171
Sherrill	No NSFHA	No	N/A	N/A	N/A	N/A	N/A	N/A
Worthington	Yes	No	10/18/2011	10/18/1983	1	\$280,000	0	0
Zwingle	Yes	No	10/18/2011	9/12/2011	2	\$213,000	0	0

Source: Participation details from NFIP Community Status Book, 4/12/2017; <https://www.fema.gov/national-flood-insurance-program-community-status-book>; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program: Policy and Loss Statistics from BureauNet, <http://bsa.nfipstat.fema.gov/reports/reports.html>;

\*Closed Losses are those flood insurance claims that resulted in payment. Loss statistics are for the period from January 1, 1978 to February 28, 2017 .

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## Repetitive Loss/Severe Repetitive Loss Properties

**Repetitive Loss:** Repetitive Loss Properties are those properties with at least two flood insurance payments of \$5,000 or more in a 10-year period.

**Severe Repetitive Loss (SRL):** SRL properties are defined it as “a single family property” (consisting of one-to-four residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four 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 amounts of such claims payments exceeding \$20,000; or for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

**Table 3.56** provides additional details about the Repetitive and Severe Repetitive Loss Properties in Dubuque County. There are 11 Repetitive Loss Properties and no Severe Repetitive Loss properties.

**Table 3.56. Repetitive Loss / Severe Repetitive Loss Properties**

Community Name	Mitigated?	Insured	Occupancy	Zone	Losses
Dubuque County	No	No	Single Family	A08	2
Dubuque County	No	Yes	Single Family	A	2
Dubuque County	No	No	Single Family	AE	3
Dubuque County	No	No	Single Family	C	2
Dubuque County	No	No	Other-Nonres	C	3
Dubuque, City of	Yes	No	Single Family	AE	3
Dubuque, City of	Yes	Yes	Single Family	C	3
Durango, City of	No	No	Single Family	C	3
Durango, City of	No	No	2-4 Family	A08	4
Durango, City of	No	No	Single Family	AE	3
Durango, City of	No	No	Single Family	AE	2

Source: Iowa Department of Natural Resources

### ***Probability of Future Occurrence***

With the history of flooding in the planning area, it is likely that flooding of various levels will continue to occur. According to NCDRC, in the 25-year timeframe from 2018-2023, there were only four flood events, down 10 events (multiple events less than 10 days apart counted as one event) from the previous 2019 Dubuque County Hazard Mitigation plan. Further, no crop or property damage were recorded with any of the four events.

### **Vulnerability**

To determine vulnerability of people and property to riverine flood, an enhanced flood risk analysis was performed utilizing FEMA's Hazus software. This analysis included Level 2 enhancements to both the hazard and inventory inputs to the Hazus model to enhance the accuracy of flood risk modeling as follows:

- Depth Grids provided by the University of Iowa's Iowa Flood Center (IFC)
- Parcel layer provided by Dubuque County
- Assessor's data, including assessed valuations and other building attributes provided by Dubuque County

The Depth Grids provided by the IFC were used as the best available data to import into Hazus since older FEMA depth grids are difficult to obtain, if they exist, and using the IFC data complements the efforts that the Iowa Homeland Security and Emergency Management Department is undertaking for the State Plan. It should be noted that the Iowa Flood Center depth grids are very similar to the effective FEMA products; however, there are some differences in the detailed areas for the 1-percent annual chance floodplain.

Default Hazus inventories for structures were replaced with data supplied by Dubuque County utilizing the parcel layer and additional structure attributes in the Assessor's data. GIS was used to create a centroid, or point, representing the center of the parcel polygon in the parcel layer to represent the location of the primary structure on each parcel. The structure inventory data set was formatted for use in Hazus using the Hazus Comprehensive Data Management System (CDMS) tool. This tool syncs data and attributes fields necessary for Hazus analysis and imports the enhanced data set into the Hazus study region.

After the hazard and inventory data was imported into Hazus, analysis was completed to determine the potential losses because of a 1-percent annual chance flood. The portions of Cascade, Dyersville, and Zwingle that extend into adjacent counties were included in this analysis. Both Cascade and Dyersville did have parcels in adjacent counties that intersect the depth grid floodplain. However, Zwingle did not.

The flowing jurisdictions would have losses because of a 1-percent annual chance flood: Cascade, Dubuque, Durango, Dyersville, Graf, New Vienna, Peosta, Sageville, Worthington, Zwingle, and the Unincorporated County. There are other jurisdictions in the planning area that have Special Flood Hazard Areas, but no parcels with improvements intersected with the depth grid floodplain. These include Asbury, Bernard, Epworth, Farley, Luxemburg, and Rickardsville. Finally, the following jurisdictions do not have any Special Flood Hazard areas: Balltown, Bankston, Centralia, Holy Cross, and Sherrill.

The most losses would occur in Dyersville, followed by the unincorporated county, Sageville and Dubuque,



For the planning area ranking, the HMPT determined the magnitude of river flooding to be “Critical”. Individual jurisdictional ratings are provided at the end of this hazard section.

### ***Potential Losses to Existing Development***

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

- Building/Property Losses
- Estimated Population Displaced
- Agricultural Impacts; and
- Critical Facilities and Infrastructure at Risk.

### ***Building/Contents Losses***

**Table 3.57** provides the summary of potential flood loss estimates for the 1-percent annual chance flood by jurisdiction based on the Hazus Level 2 Analysis described in the Overview section above. It should be noted that there was a total of 383 out of a total 497 parcels that intersect the depth grid floodplain that did not result in calculated losses. The Hazus Helpdesk was contacted about this anomaly. However, no resolution has been achieved.

**Table 3.57. Potential Flood Loss Estimates, 1-Percent Annual Chance Flood**

Jurisdiction	Property Type	Improved Parcel Counts	Improved Value	Content Value	Total Exposed Value	Structures w/Losses	Improved Losses	Content Losses	Inventory Losses	Total Losses
Cascade	Commercial	7	\$1,285,418	\$1,285,418	\$2,570,836	0	\$0	\$0	\$0	\$0
	Exempt	7	\$165,410	\$165,410	\$330,820	0	\$0	\$0	\$0	\$0
	Industrial	1	\$3,320,300	\$4,980,450	\$8,300,750	0	\$0	\$0	\$0	\$0
	Multi-Residential	1	\$107,260	\$53,630	\$160,890	0	\$0	\$0	\$0	\$0
	Residential	46	\$3,250,450	\$1,625,225	\$4,875,675	6	\$1,312	\$875	\$0	\$2,187
	<b>Total</b>	<b>62</b>	<b>\$8,128,838</b>	<b>\$8,110,133</b>	<b>\$16,238,971</b>	<b>6</b>	<b>\$1,312</b>	<b>\$875</b>	<b>\$0</b>	<b>\$2,187</b>
Dubuque	Agriculture	3	\$8,870	\$8,870	\$17,740	2	\$19	\$251	\$78	\$348
	Commercial	5	\$1,552,140	\$1,552,140	\$3,104,280	0	\$0	\$0	\$0	\$0
	Exempt	1	\$38,000	\$38,000	\$76,000	0	\$0	\$0	\$0	\$0
	Multi-Residential	2	\$449,420	\$224,710	\$674,130	1	\$5,695	\$6,507	\$0	\$12,202
	Residential	10	\$1,248,070	\$624,035	\$1,872,105	3	\$23,328	\$9,442	\$0	\$32,770
	<b>Total</b>	<b>21</b>	<b>\$3,296,500</b>	<b>\$2,447,755</b>	<b>\$5,744,255</b>	<b>6</b>	<b>\$29,042</b>	<b>\$16,201</b>	<b>\$78</b>	<b>\$45,320</b>
Durango	Residential	7	\$588,310	\$294,155	\$882,465	3	\$1,918	\$1,279	\$0	\$3,197
	<b>Total</b>	<b>7</b>	<b>\$588,310</b>	<b>\$294,155</b>	<b>\$882,465</b>	<b>3</b>	<b>\$1,918</b>	<b>\$1,279</b>	<b>\$0</b>	<b>\$3,197</b>
Dyersville	Agriculture	3	\$31,850	\$31,850	\$63,700	2	\$0	\$118	\$0	\$118
	Commercial	43	\$6,005,075	\$6,005,075	\$12,010,150	2	\$1,979	\$5,485	\$7,097	\$14,561
	Exempt	10	\$3,762,230	\$3,762,230	\$7,524,460	0	\$0	\$0	\$0	\$0
	Industrial	8	\$5,296,060	\$7,944,090	\$13,240,150	1	\$4,074	\$0	\$4,074	\$8,148
	Multi-Residential	2	\$109,150	\$54,575	\$163,725	0	\$0	\$0	\$0	\$0
	Residential	161	\$16,139,830	\$8,069,915	\$24,209,745	45	\$239,472	\$146,696	\$0	\$386,168
	<b>Total</b>	<b>227</b>	<b>\$31,344,195</b>	<b>\$25,867,735</b>	<b>\$57,211,930</b>	<b>50</b>	<b>\$245,525</b>	<b>\$152,299</b>	<b>\$11,171</b>	<b>\$408,996</b>
Graf	Exempt	1	\$3,240	\$3,240	\$6,480	0	\$0	\$0	\$0	\$0
	<b>Total</b>	<b>1</b>	<b>\$3,240</b>	<b>\$3,240</b>	<b>\$6,480</b>	<b>0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
New Vienna	Agriculture	2	\$3,680	\$3,680	\$7,360	0	\$0	\$0	\$0	\$0
	Commercial	1	\$21,820	\$21,820	\$43,640	0	\$0	\$0	\$0	\$0

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Jurisdiction	Property Type	Improved Parcel Counts	Improved Value	Content Value	Total Exposed Value	Structures w/Losses	Improved Losses	Content Losses	Inventory Losses	Total Losses
	Exempt	2	\$5,640	\$5,640	\$11,280	0	\$0	\$0	\$0	\$0
	Residential	4	\$242,700	\$121,350	\$364,050	1	\$18	\$12	\$0	\$29
	<b>Total</b>	<b>9</b>	<b>\$273,840</b>	<b>\$152,490</b>	<b>\$426,330</b>	<b>1</b>	<b>\$18</b>	<b>\$12</b>	<b>\$0</b>	<b>\$29</b>
Peosta	Exempt	1	\$14,220	\$14,220	\$28,440	0	\$0	\$0	\$0	\$0
	Industrial	1	\$1,080	\$1,620	\$2,700	0	\$0	\$0	\$0	\$0
	<b>Total</b>	<b>2</b>	<b>\$15,300</b>	<b>\$15,840</b>	<b>\$31,140</b>	<b>0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
Sageville	Commercial	2	\$109,250	\$109,250	\$218,500	0	\$0	\$0	\$0	\$0
	Residential	3	\$559,030	\$279,515	\$838,545	2	\$34,668	\$21,053	\$0	\$55,721
	<b>Total</b>	<b>5</b>	<b>\$668,280</b>	<b>\$388,765</b>	<b>\$1,057,045</b>	<b>2</b>	<b>\$34,668</b>	<b>\$21,053</b>	<b>\$0</b>	<b>\$55,721</b>
Worthington	Commercial	2	\$214,130	\$214,130	\$428,260	0	\$0	\$0	\$0	\$0
	Residential	12	\$950,730	\$475,365	\$1,426,095	5	\$7,251	\$4,764	\$0	\$12,015
	<b>Total</b>	<b>14</b>	<b>\$1,164,860</b>	<b>\$689,495</b>	<b>\$1,854,355</b>	<b>5</b>	<b>\$7,251</b>	<b>\$4,764</b>	<b>\$0</b>	<b>\$12,015</b>
Zwingle	Residential	1	\$22,720	\$11,360	\$34,080	0	\$0	\$0	\$0	\$0
	<b>Total</b>	<b>1</b>	<b>\$22,720</b>	<b>\$11,360</b>	<b>\$34,080</b>	<b>0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
Unincorporated	Agriculture	82	\$777,950	\$777,950	\$1,555,900	14	\$1,286	\$5,638	\$5,976	\$12,900
	Commercial	18	\$2,085,806	\$2,085,806	\$4,171,612	8	\$611	\$1,230	\$2,441	\$4,283
	Exempt	4	\$213,450	\$213,450	\$426,900	1	\$72	\$504	\$0	\$576
	Residential	44	\$5,417,140	\$2,708,570	\$8,125,710	18	\$148,455	\$89,531	\$0	\$237,985
	<b>Total</b>	<b>148</b>	<b>\$8,494,346</b>	<b>\$5,785,776</b>	<b>\$14,280,122</b>	<b>41</b>	<b>\$150,424</b>	<b>\$96,903</b>	<b>\$8,417</b>	<b>\$255,745</b>
	<b>Grand Total</b>	<b>497</b>	<b>\$54,000,429</b>	<b>\$43,766,744</b>	<b>\$97,767,173</b>	<b>114</b>	<b>\$470,159</b>	<b>\$293,385</b>	<b>\$19,666</b>	<b>\$783,210</b>

### **Estimated Population Displaced**

To estimate population displaced by a 1-percent annual chance flood, the number of residential structures at risk was multiplied by the average household size for each jurisdiction. This analysis included all residential structures in the risk area, not just those that indicated losses. According to the analysis, there would be a total of 293 residential structures at risk. **Table 3.58** provides the estimated population impacted for each jurisdiction with parcels that intersected the depth grid floodplain. According to this analysis, nearly 700 people could be displaced.

**Table 3.58. Estimated Displaced Population**

Jurisdiction	Residential Structures at Risk	Average Household Size	Estimated Displaced Population
Cascade	47	2.39	112
Dubuque	12	2.28	27
Durango	7	2.2	15
Dyersville	163	2.36	385
New Vienna	4	2.35	9
Sageville	3	2.22	7
Worthington	12	2.51	30
Zwingle	1	2.02	2
Unincorporated	44	2.43	107
<b>Total</b>	<b>293</b>		<b>695</b>

### **Agricultural Impacts**

Additionally, USDA crop insurance claims for excess moisture/precipitation/rain and flood conditions for the ten-year period from 2007-2016 totaled \$13,985,489. Considering that 90 percent of insurable crops are insured in Iowa (2023 Iowa Crop Insurance Profile, USDA, RMA), the adjusted losses calculate to \$15,714,033 for all insurable crops for the period. This results in an average annual loss estimate of \$1,571,403 to insurable crops because of excess moisture/precipitation/rain and flood conditions affecting agriculture.

### **Critical Facilities and Infrastructure at Risk**

To analyze critical facilities at risk in the planning area, the inventory of critical and essential facilities and infrastructure in the planning area was compiled from data layers provided by Dubuque County. A comparison was made of the 429 total critical facilities with the effective flood insurance rate map to determine those facilities that would be damaged in the 1-percent and 0.2-percent annual chance flood events. This analysis determined that there are 17 critical facilities in the 1-percent annual chance floodplain and 4 critical facilities in the 0.2-percent annual chance floodplain. **Table 3.59** provides a summary of the critical facilities in the 1-percent annual chance floodplain. Additional details, including specific structure names and addresses as well as details on the 4 facilities in the 0.2-percent annual chance floodplain are provided in Appendix E.

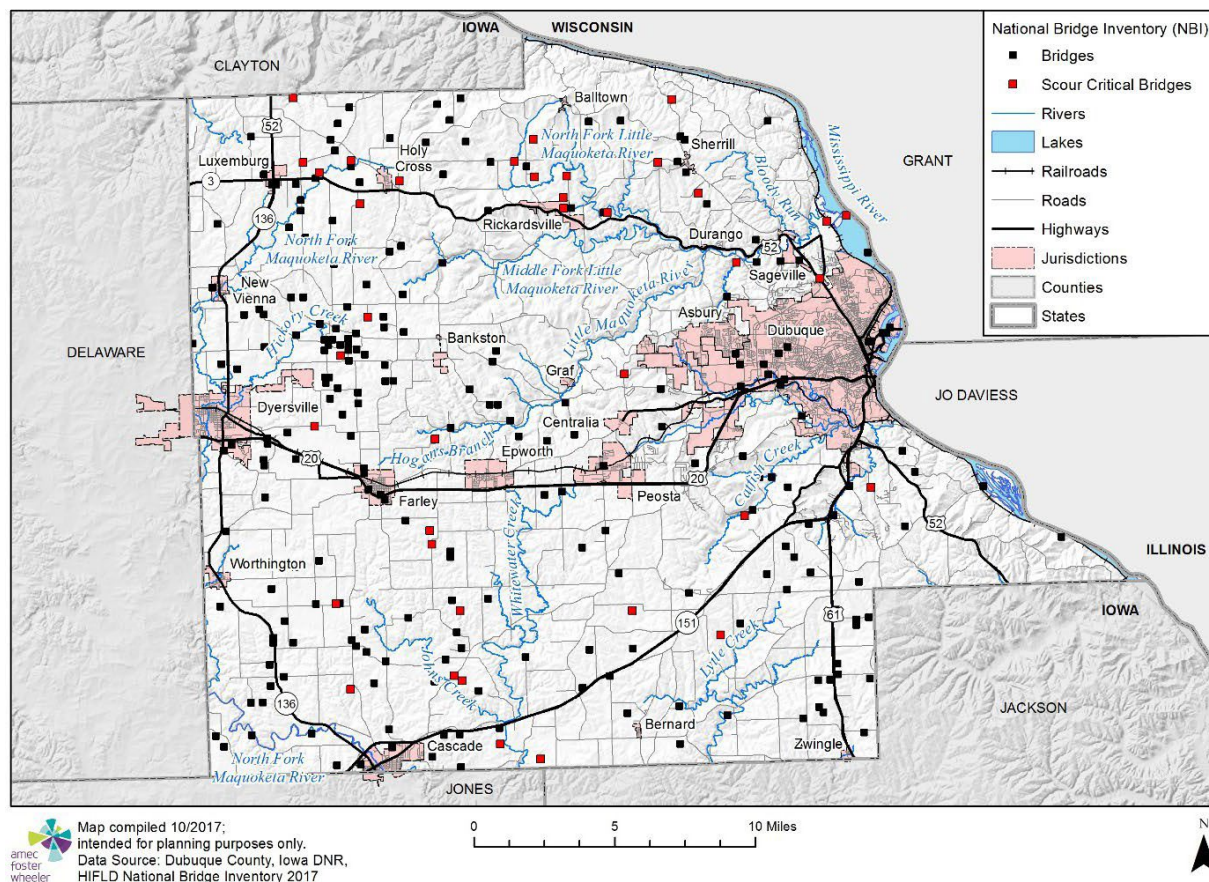
**Table 3.59. Critical Facilities in the 1-percent Annual Chance Floodplain**

Facility Type	Cascade	Dubuque	Dyersville	New Vienna	Unincorporated	Worthington	Zwingle	Grand Total
Community / Recreation Center			1		1			2
County Government Facility				1				1
Fire Station / EMS Station			1					1
Municipal Government Facility							1	1
School			1					1
School: Elementary					1			1
Shelters			1		1			2
Sirens	1		1					2
Tier II Facility			1			1		2
Transportation Facility		1						1
Wastewater Treatment Plant			1		1			2
Water Supply or Treatment Facility	1							1
<b>Grand Total</b>	<b>2</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>17</b>

Appendix E provides the list of critical facilities that were inventoried and analyzed. This Appendix is redacted from the public version of this plan. To obtain access for official use, contact the Dubuque County Emergency Management Agency.

According to the National Bridge Inventory, there are several scour critical bridges in Dubuque County. These bridges are depicted in **Figure 3.55**.

**Figure 3.55. Dubuque County Bridges Identified as Scour Critical**



### **Future Development**

Any future development in floodplains would increase risk in those areas. For those communities that participate in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas. With new regulatory flood maps in process of becoming effective, additional communities with designated Special Flood Hazard Areas are intending to join the National Flood Insurance Program, including regulation of development in their floodplains.

### **Climate Change Impacts**

One of the climate change impacts noted in the *2010 Climate Change Impacts on Iowa* report by the Iowa Climate Change Impacts Committee is the increase in frequency of severe precipitation events. This climate change impact was also noted in the Flash Flood hazard analysis. Although very heavy precipitation does not always result in riverine flooding, it can if/when the very heavy precipitation occurs frequently without enough time for the watershed to drain away as much water is coming in due to precipitation in the watershed or upstream watersheds.

**Figure 3.17** in the Flash Flood section shows that all of Iowa is in the region with a 31% increase in very heavy precipitation from 1958 to 2007. For this study, very heavy precipitation

was defined as the heaviest 1% of all events. If this trend increases, riverine flooding events and their associated impacts will likely occur more often in the planning area.

### 3.5.14 Severe Winter Storm

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
4	2	3	4	3.25	High

#### Profile

##### ***Hazard 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 National Weather Service 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



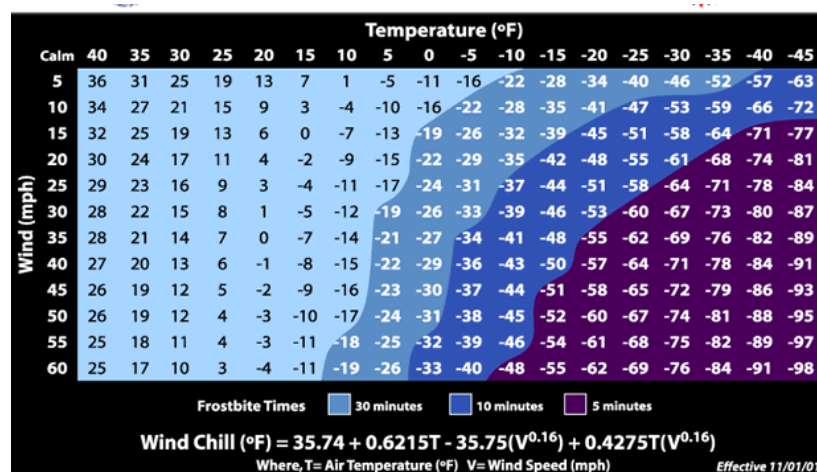
frostbite in people who are exposed to the weather without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipe to freeze and rupture. 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 National Weather Service, **Figure 3.56** below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

**Figure 3.56. Wind Chill Chart**



Source: National Weather Service

### Geographic Location/Extent

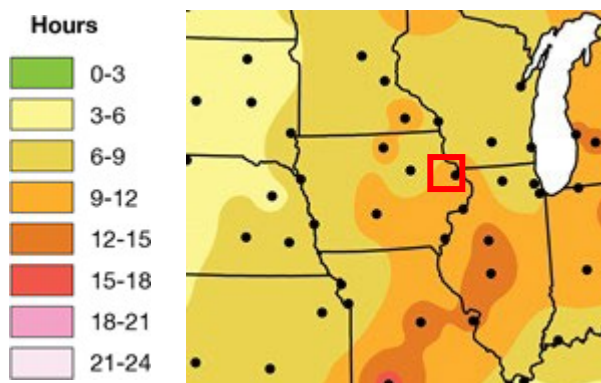
According to the High Plains Regional Climate Center and based on the Dubuque Weather Station, the planning area has an average maximum temperature of 30.82 °F in December, 26.88 °F in January, and 31.98 °F in February. Average minimum temperatures for those same three months are 14.47 °F, 9.36 °F and 13.81 °F. Average snowfall is highest in December, January, and February with an annual average of 33.7 inches. (Source: <http://www.hprcc.unl.edu/datasets.php?set=CountyData#>)

The entire state of Iowa is vulnerable to heavy snow, extremely 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 3.57** shows that the planning area (approximated within the red square) is in the orange-shaded area that receives 9-12 hours of freezing rain per year.

**Figure 3.57. Average Number of Hours per Year with Freezing Rain**



Source: Midwestern Regional Climate Center; [http://mcc.sws.uiuc.edu/living\\_wx/icestorms/index.html](http://mcc.sws.uiuc.edu/living_wx/icestorms/index.html)  
 Note: Red square provides approximate location of planning area.

### **Previous Occurrences**

From 2018 - 2023, the National Climatic Data Center reports the following 12 severe winter storm events one blizzard, one extreme cold/wind chill event, one heavy snow, two ice storms, and four winter weather events.

NOAA's National Weather Service has issued 398 Advisory, Watch and/or Warnings concerning winter weather phenomena **between 1986 and 2016** (see **Table 3.60**). The data is kept with Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, (<http://mesonet.agron.iastate.edu/vtec/search.php>).

**Table 3.60. National Weather Service Issuances for Winter Weather in Dubuque County, IA**

Phenomenon/Significance	Advisory	Warning	Watch	Total
Blizzard		5	1	6
Blowing Snow				0
Freeze		33	9	42
Freezing Fog				0
Freezing Rain	9			9
Frost	39			39
Ice Storm		1		1
Snow				0
Snow and Blowing Snow				0
Wind Chill	76	14	3	93

Winter Storm		38	39	77
Winter Weather	131			131
<b>Grand Total</b>	<b>255</b>	<b>91</b>	<b>52</b>	<b>398</b>

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

### ***Agricultural Impacts***

Winter storms, cold, frost and freeze take a toll on crop production in the planning area. According to the USDA's Risk Management Agency, payments for insured crop losses in the planning area because of cold conditions and snow from 2013-2022 totaled \$749,327. (see **Table 3.61**).

**Table 3.61. Crop Insurance Claims Paid in Dubuque County as a Result of Cold Conditions and Snow (2013-2022)**

Year	Cold Wet Weather	Cold Winter	Freeze	Frost	Total Insurance Paid
2013	\$5,704.00				\$5,704.00
2014	\$254,298.23	\$18,777.00	\$1,493.20		\$274,568.43
2015	\$61,576.50				\$61,576.50
2016	\$8,842.11		\$19,885.00	\$584.00	\$29,311.11
2017	66413.5	\$1,303.00			\$67,716.50
2018	\$2,786.75				\$2,786.75
2019	\$259,950.00	\$19,557.00			\$279,507.00
2021	\$507.00			\$1,777.00	\$2,284.00
2022	\$25,872.50				\$25,872.50
<b>Total</b>	<b>\$685,950.59</b>	<b>\$39,637.00</b>	<b>\$21,378.20</b>	<b>\$2,361.00</b>	<b>\$749,326.79</b>

Source: USDA Risk Management Agency

### ***Probability of Future Occurrence***

According to NCDC, during the 25-year period from 2016 - 2023, the planning area experienced 12 total blizzards, winter storms, ice storms frost/freeze, and extreme cold events, and annual insurance claims due to cold weather.

## **Vulnerability**

### ***Vulnerability Overview***

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.

### ***Potential Losses to Existing Development***

#### **Vulnerable Buildings, Infrastructure, and Critical Facilities**

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms. Businesses experience loss of income because 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. Businesses can experience loss of income because of closure during winter storms.

#### ***Loss of Use***

Overhead power lines and infrastructure are also vulnerable to damages from winter storms, in particular ice accumulation during winter storm events can cause damages to power lines due to the ice weight on the lines and equipment as well as damage caused to lines and equipment from falling trees and tree limbs weighted down by ice. 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.

The electric power loss of use estimates provided in **0** below were calculated using FEMA's Standard Values for Loss of Service for Utilities published in the June 2009 *BCA Reference Guide*. These figures are used to provide estimated costs associated with the loss of power in relation to the populations in Dubuque County's jurisdictions. The loss of use estimates for power failure associated with winter storms is provided as the loss of use cost per person, per day of loss. The estimated loss of use provided for each jurisdiction represents the loss of service of the indicated utility for one day for 10 percent of the population. It is understood that in rural areas, the typical loss of use may be for a larger percentage of the population for a longer time during weather extremes. These figures do not take into account physical damages to utility equipment and infrastructure.

**Table 3.62. Loss of Use Estimates for Power Failure (One Day)**

<b>Jurisdiction</b>	<b>2020 Population Census</b>	<b>Estimated Affected Population 10%</b>	<b>Electric Loss of Use Estimate (\$126 per person per day)</b>
Asbury	5943	594.3	\$74,881.80
Balltown	79	7.9	\$995.40
Bankston	23	2.3	\$289.80
Bernard	114	11.4	\$1,436.40
Cascade	2386	238.6	\$30,063.60
Centralia	116	11.6	\$1,461.60

Dubuque	59667	5966.7	\$751,804.20
Durango	10	1	\$126.00
Dyersville	4477	447.7	\$56,410.20
Epworth	2023	202.3	\$25,489.80
Farley	1766	176.6	\$22,251.60
Graf	76	7.6	\$957.60
Holy Cross	356	35.6	\$4,485.60
Luxemburg	245	24.5	\$3,087.00
New Vienna	382	38.2	\$4,813.20
Peosta	1908	190.8	\$24,040.80
Rickardsville	202	20.2	\$2,545.20
Sageville	95	9.5	\$1,197.00
Sherrill	189	18.9	\$2,381.40
Worthington	382	38.2	\$4,813.20
Zwingle	84	8.4	\$1,058.40
Unincorporated Dubuque County	18743	1874.3	\$236,161.80
<b>Total</b>	<b>99266</b>	<b>9926.6</b>	<b>\$1,250,751.60</b>

Source: Loss of Use Estimates from FEMA BCA Reference Guide, 2009; Population Estimates, U.S. Census Bureau, 2023.

### ***Property Losses***

The total property loss reported by the NCDC for a total of 164 winter events that impacted the planning area during the 24-year time-period from 1993 through 2016 was \$28,000. However, damages for winter and ice storms are reported for all weather zones impacted. So, it is extremely difficult to determine the damages from these events that apply specifically to Dubuque County.

USDA crop insurance claims for cold conditions and snow for the ten-year period of 2007-2016 totaled \$570,327. The 2015 Iowa Crop Insurance Profile from USDA, RMA shows that 89 percent of crops are insured in Iowa and the adjusted losses calculate to \$640,817 for the period and \$64,082 in estimated annualized losses.

Considering the \$120 million market value of crops from the 2012 Census of Agriculture as baseline crop exposure, the estimated annual losses from cold conditions and snow was determined minimal (0.05%) compared to the value of the insurable crops.

### ***Increased Risk Populations***

Elderly populations are at increased risk to Winter Storms and associated extreme cold events. **0** in the Extreme Heat Profile Section provides the number of populations over 65 in each jurisdiction in the planning area.

### ***Future Development***

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

### ***Climate Change Impacts***

According to the 2010 report on *Climate Change Impacts on Iowa*, Iowa has experienced a long-term upward trend in temperature

- Long-term winter temperatures have increased six times more than summer temperatures.
- Nighttime temperatures have increased more than daytime temperatures since 1970.

- Since 1970, daily minimum temperatures have increased in summer and winter; daily maximum temperatures have risen in winter but declined substantially in summer.

If this trend continues, future occurrences of the extreme cold/wind chill aspects of winter storms should decrease. In addition, higher winter temperatures bring higher probability of rain, rather than snow. As a result, the amount of precipitation falling as snow should decrease.

### 3.5.15 Sinkholes

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	4	1	1.45	Low

#### **Profile**

##### ***Hazard Description***

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by ground water circulating through them. As the rock dissolves, void spaces and caverns develop underground. The sudden collapse of the land surface can be dramatic and range in size from broad, regional lowering of the land surface to localized collapse. Although subsidence can be a naturally occurring hazard, the primary causes of most incidents of subsidence are human activities: underground mining of coal, groundwater or petroleum withdraw, and drainage of organic soils. Land subsidence occurs slowly and continuously over time or on occasion abruptly, as in the sudden formation of sinkholes. Sinkholes can be aggravated by flooding.

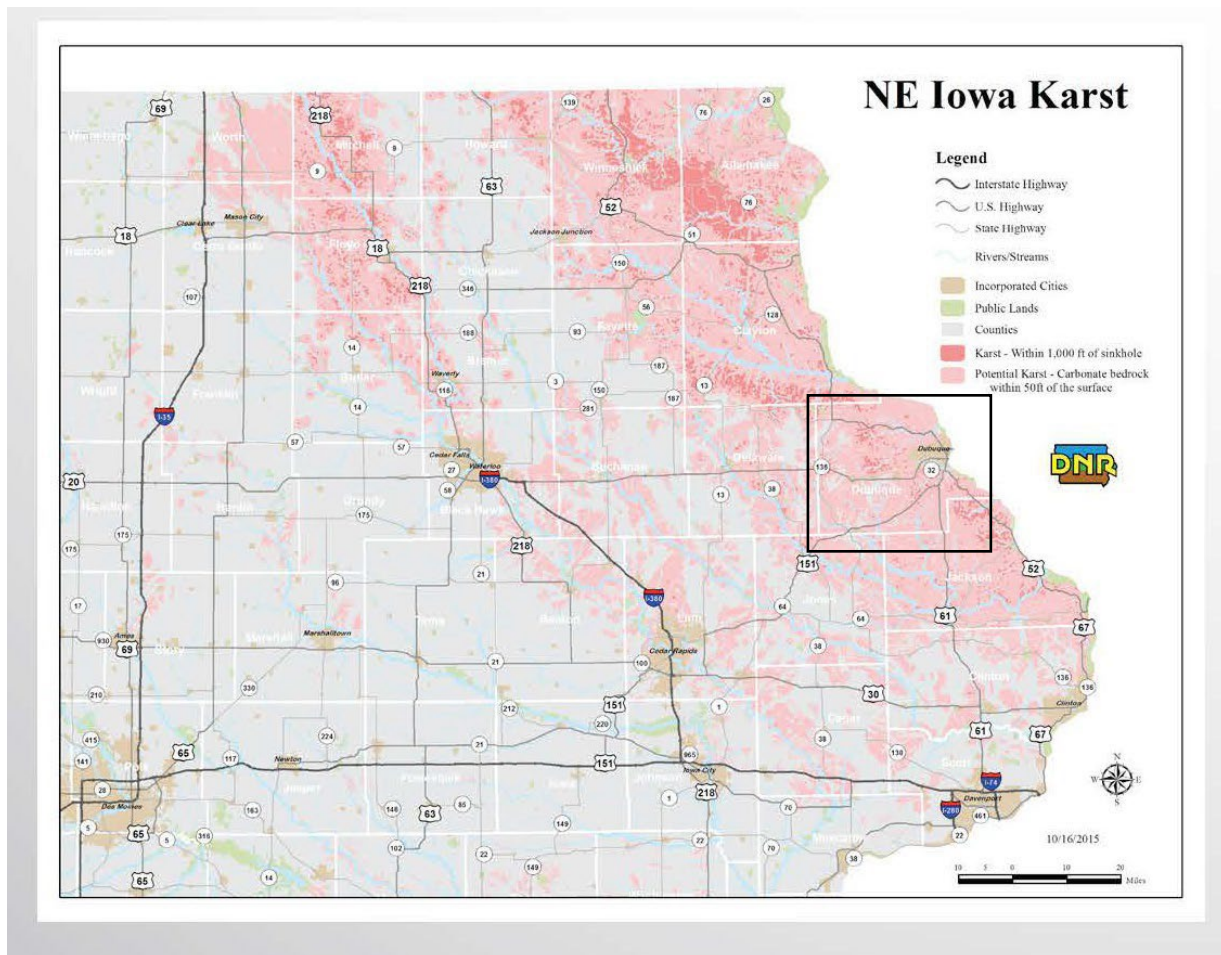
Karst is a landscape formed from the dissolution of soluble rocks including limestone, dolomite, and gypsum. Sinkholes are a common indication of karst; caves and underground drainage systems are other indicators. With limestone commonly found in northeast Iowa, sinkholes have the potential to occur.

##### ***Geographic Location/Extent***

There are three areas in Iowa where large numbers of sinkholes exist: 1) within the outcrop belt of the Ordovician Galena Group carbonates in Allamakee, Clayton, and Winneshiek Counties. 2) in Devonian carbonates in Bremer, Butler, Chickasaw and particularly Floyd and Mitchell counties; and 3) along the erosional edge of silurian carbonates in Dubuque and Clayton Counties.

According to the Department of Natural Resources, there are sinkholes as well as potential karst areas in Dubuque County (see **Figure 3.58**)

**Figure 3.58. Karst Terrain (Sinkhole Location and Potential, Dubuque County**

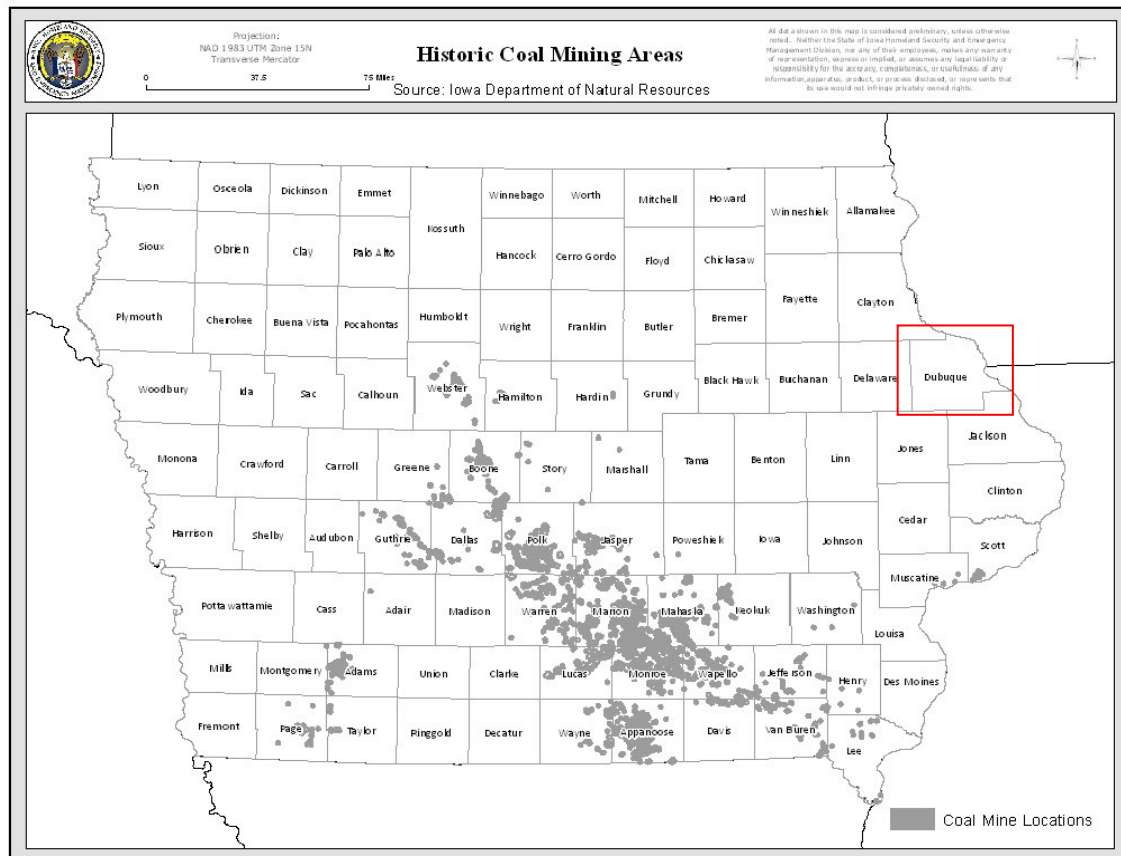


Source: Iowa Department of Natural Resources; Dubuque County identified by black rectangle

Mining activity can also lead to sinkhole development. However, mining within the planning area has been minimal as shown in **Figure 3.59**.



**Figure 3.59 Historic Coal Mining Areas**



Source: Iowa Department of Natural Resources

### ***Previous Occurrences***

The City of Dubuque has experienced sinkholes. Additionally, the Unincorporated County, City of Bankston, and City of Epworth indicated sinkhole risk. However, there is not repository of previous events to provide additional details.

### ***Probability of Future Occurrence***

Based on reports of sinkhole events as well as known sinkhole areas and Kars topography, the probability of future occurrences is "Occasional".

## **Vulnerability**

### ***Vulnerability Overview***

If a sinkhole were to form, people and structures located on or near the sinkhole are the most at risk for injury, death, and property damage.

### ***Potential Losses to Existing Development***

Due to the lack of information regarding previous occurrences of this hazard, it is not possible to estimate potential losses.

### ***Future Development***

Future development will increase vulnerability to this hazard.

### ***Climate Change Impacts***

There are no noted trends in climate change that would not have a significant effect on the occurrence of sinkholes.

## **3.5.16 Terrorism**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
1	1	4	4	1.75	Low

### **Profile**

#### ***Hazard 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 can occur when least expected.

An 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 Dubuque County. The introduction of a biological agent into the population of 135,000 cattle and calves, or the 137,271 hogs and pigs, or the 146,000 acres of corn in Dubuque County would be financially devastating and would have a major impact on the food supply of the state and the nation. 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 the County's licensed feedlots or livestock markets discussed later in the Geographic Location section.

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 like 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 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.

Radiological terrorism is the use of radiological materials against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom. Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers or by the detonation of a nuclear device underground, at the surface, in the air or at high altitude.

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 2014 there were five active hate groups in Iowa: one racist skinhead group (Aryan Strike force), three Ku Klux Klan groups (Fraternal White Knights of the KKK, Loyal White Knights of the KKK, and New Empire Knights of the KKK) and one Neo-Nazi group (National Socialist Movement).

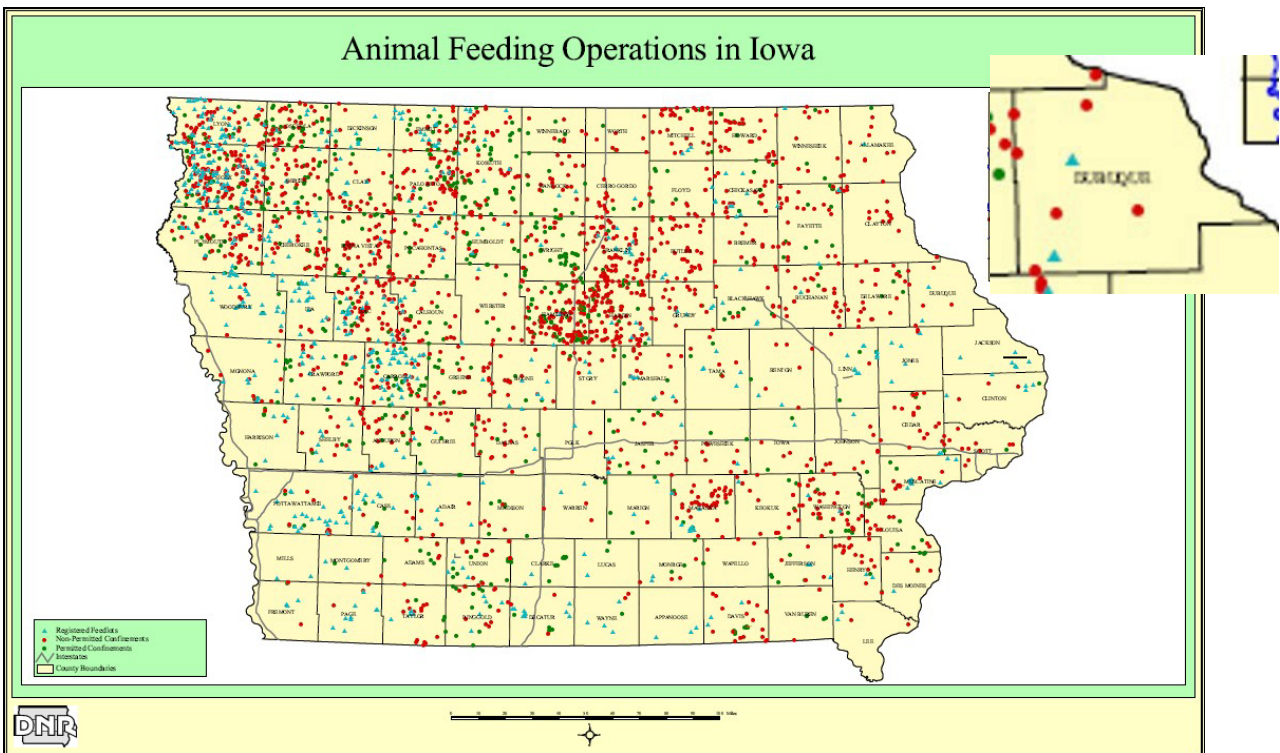
### ***Geographic Location/Extent***

The entire planning area has a low potential for terrorist activity. However, any venue with a large gathering of people could be a potential target for terrorists. The most likely targets of a conventional terrorism attack in Dubuque County include public school system facilities the Dubuque County Courthouse and law enforcement centers within Dubuque County.

In terms of cyber-terrorism, our society is highly networked and interconnected. An attack could be launched from anywhere on earth and could range in impacts from small and localized to a far-reaching global scale. Depending on the attack vector and parameters, a cyber-attack could impact all of Dubuque County and its associated municipal jurisdictions.

For agro-terrorism planning, **Figure 3.60** shows the locations of animal feeding operations in Dubuque County. Additional agricultural assets are discussed in **Section 3.5.1**, Animal/Plant/Crop Disease.

**Figure 3.60. Animal Feeding Operations in Iowa**



### **Previous Occurrences**

There have not been any large-scale enemy attacks or acts of radiological terrorism in Iowa. There have been biological and chemical agent threats, animal rights activists' vandalism and many bomb threats. In 2002, pipe bombs were found in 18 states including Iowa and six people were injured in the bombings in Iowa and Illinois. In 2005 and 2006, pipe bombs were used in attempted murder cases in two Iowa cities.

The Iowa Department of Public Safety issued a *2009 Iowa Uniform Crime Report* showing 18 hate/bias crimes were reported statewide in 2009, with an average of 33 hate/bias crimes statewide from 2000-2009.

According to the Southern Poverty Law Center, was one reported hate crime that occurred in Dubuque County in March of 2016.

### **Probability of Future Occurrence**

While difficult to estimate, the probability for a terrorist event is "Unlikely" within the next 10 years in Dubuque County.

## **Vulnerability**

### **Overview**

A terrorism event could occur in either limited area of a jurisdiction or over the entire jurisdiction at once. This hazard can directly cause substantial structural losses and potentially loss of life.

### ***Potential Losses to Existing Development***

Potential losses from Terrorism include all infrastructure, critical facilities, crops, humans, and animals. The degree of impact would be directly related to the type of incident and the target. Potential losses could include cost of repair or replacement of damaged facilities, lost economic opportunities for businesses, loss of human life, injuries to persons, loss of food supplies, disruption of the food supply chain, and immediate damage to the surrounding environment. Secondary effects of infrastructure failure could include public safety hazards, spread of disease, increased morbidity and mortality among the local and distant populations, public panic, and long-lasting damage to the environment. Terrorism events are rare occurrences and specific amounts of estimated losses for previous occurrences are not available due to the complexity and multiple variables associated with these types of hazards. In some instances, information about these events is secure and unavailable to the public to maintain national security and prevent future attacks.

As discussed previously, it is difficult to quantify potential losses in terms of the jurisdictions most threatened by CBRNE (chemical, biological, radiological, nuclear, and high yield explosive) attack events due to the many variables and human element. Therefore, for the purposes of this plan, the loss estimates will consider a hypothetical scenario. The attack scenario is staged at a Friday night high school football game. The hypothetical football stadium has approximately 500 persons in the stadium and concession areas on any home football game nights during the fall.

Analysis of vulnerable populations is aided by a program developed by Johns Hopkins University in 2006 called Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) <http://www.hopkins-cepar.org/EMCAPS/EMCAPS.html> which utilizes scenarios developed by the Department of Homeland Security.

\*\*\*\*THE FOLLOWING HYPOTHETICAL SCENARIO IS FOR INSTRUCTIONAL AND ILLUSTRATIVE PURPOSES ONLY\*\*\*\*

### ***Chemical Attack – Toxic Gas – Chlorine Release***

**Scenario Overview:** A bomb is attached to a truck trailer tanker carrying compressed chlorine and enters the high school football stadium parking lot. The entire contents of the tank escape to the atmosphere and the plume spreads to the stadium and the immediate surrounding parking lot area. This attack would cause harm to humans and could render portions of the stadium unusable for a short period in order to allow for a costly clean-up. There might also be a fear by the public of long-term contamination of the stadium and the high school subsequent closing the high school.

**Assumptions:** (1) The population density is approximately 500 persons around the high school stadium (2) Chlorine is toxic and may damage the eyes, skin, and respiratory tract. (3) The rate of “worried well” is equal to 9 times the number of infected cases or the full exposed population, whichever is least.

**Table 3.63. Described Losses from a Chemical Attack – Chlorine Scenario**

Eye pain & swelling, headache, restricted airflow – difficulty breathing, possible chemical burns	22 persons
Eye pain & swelling, headache, rapid breathing, skin irritation	42 persons
Eye pain & swelling, headache, rapid breathing, coughing, chest pain, skin irritation	86 persons
Eye irritation, headache, throat irritation, coughing, skin irritation	119 persons
Eye irritation, headache, coughing, skin irritation	82 persons
Total “Worried Well” Cases (total exposed population)	500 persons
Deaths	16 persons
Cost of Decontamination @ \$12/person (assumes all persons with skin injuries will require decontamination and approximately 1/10 of the worried well will demand to be decontaminated) - total persons =417	\$5,004

Notes: Victims will require decontamination and both long- and short-term treatment.

### **Improvised Explosive Device Attack – ANFO**

**Scenario Overview:** An Improvised Explosive Device (IED) utilizing an ammonium nitrate/fuel oil (ANFO) mixture is carried in a panel van to a high school parking area at the beginning of a home football game when people are leaving their cars and entering the stadium. Potential losses with this type of scenario include both human and structural assets.

**Assumptions:** (1) The population density in the parking lot during the beginning and ending of the game is high, at least 1 person /1 square feet. (2) The quantity of ANFO used is 500 lbs.

**Table 3.64. Described Losses from an Improvised Explosive Device Attack - ANFO**

Total Dead	86 persons
Total Traumatic Injuries	151 persons
Total Urgent Care Injuries	745 persons
Injuries not Requiring Hospitalization	279 persons
Structures and Other Physical Assets (Damages would certainly occur to vehicles and depending on the proximity of other structures, damages would occur to the stadium complex itself. The exact amount of these damages is difficult to predict because of the large numbers of factors, including the type of structures nearby and the amount of insurance held by vehicle owners.)	<p>Vehicles –</p> <p>Replacement cost for approximately 350 vehicles @ \$10,000 per vehicle inside the 200 ft. BATF described Lethal Air Blast range = \$ 3,500,000</p> <p>Repair / repainting cost for approximately 70 vehicles @ \$ 4,000 per vehicle inside the BATF described Falling Debris Hazard = \$280,000</p>

Note: These are the numbers of persons that could be injured from an IED Attack if they are in the area.

### ***Future Development***

As public events are held at various venues in the County, 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 damages of the event may increase with the increased or newly developed areas.

### ***Climate Change Impacts***

There are no known climate change impacts relevant to this hazard.

## **3.5.17 Thunderstorm with Lightning and Hail**

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
4	2	3	2	3.05	High

### **Profile**

#### ***Hazard Description***

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When the colder upper air sinks and 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. Other hazards associated with thunderstorms and lightning include heavy rains causing flash flooding (discussed separately in **Section 3.5.6**) and tornadoes and windstorms (discussed further in **Section 3.5.18**).

#### **Lightning**

All thunderstorms produce lightning, which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is a huge discharge of electricity. When lightning strikes, electricity shoots through the air and causes vibrations creating the sound of thunder. Nationwide, lightning kills 75 to 100 people each year. 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 encounter super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. If 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 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 damaged by hail. Hail has been known to cause injury to humans, occasionally, these injuries can be fatal.

**Table 3.65** below describes typical damage impacts of the various sizes of hail.

**Table 3.65. 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.

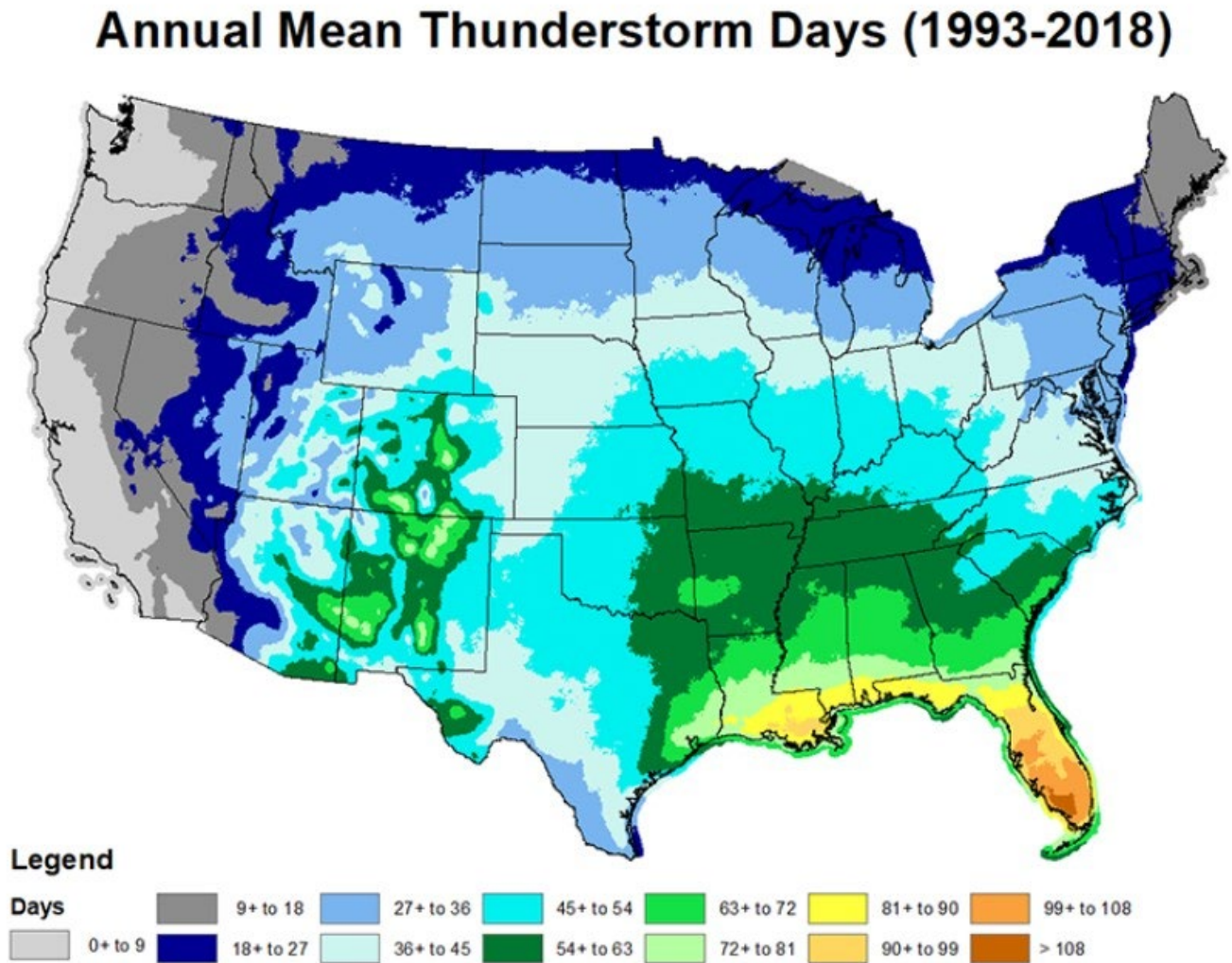
The onset of thunderstorms with lightning and hail is generally rapid. However, advancements in meteorological forecasting allow for some advance warning.

### ***Geographic Location/Extent***

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 as well as to cropland. **Figure 3.61** displays the average number of days with thunder experienced throughout different areas of the county each

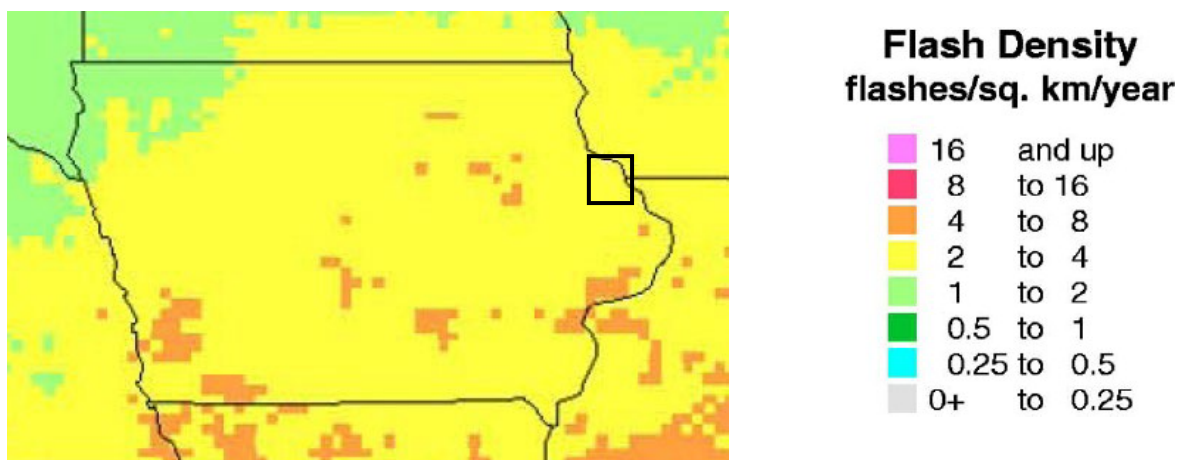
year, showing the County experiences between 40.5 to 50.4 days with thunder per year. **Figure 3.62** shows 2 to 4 lightning strikes per square kilometer per year with the yellow shaded area.

Figure 3.61. Annual Mean Thunderstorm Days (1993-2018)



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Figure 3.62. Location and Frequency of Lightning in Iowa



Source: National Weather Service, [www.lightningsafety.noaa.gov/lightning\\_map.htm](http://www.lightningsafety.noaa.gov/lightning_map.htm)  
Note: Black Square indicates approximate location of Dubuque County

### **Previous Occurrences**

Since 1965, Dubuque County has been included in 12 presidential disaster declarations that included severe storms/weather (see **Table 3.2** in the Hazard Identification Section). Some of the damages that resulted in the declarations were from tornadoes and flooding that accompanied the severe weather.

The NCDC reported 86 total thunderstorm events for the Dubuque County planning area from January 1998 through September 2023. Of the reported events, there was \$2.85 million in total property damage, five injuries and no fatalities.

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**Table 3.66. Thunderstorm Summary for Dubuque County (1998-2023)**

Hazard type	Total Events	Events with Damage	Property Damage	Injuries	Fatalities
Hail	56	5	\$1,020,000	0	0
Lightning	2	2	\$350,000	0	0
Thunderstorm Wind	86	28	\$2,852,000	5	0
<b>Totals</b>	<b>144</b>	<b>35</b>	<b>\$4,222,000</b>	<b>5</b>	<b>0</b>

Source: NCDC

### Hail

**Table 3.67** shows the number of hail events 0.75 inches and larger by the size of the hail.

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**Table 3.67. Hail Events Summarized by Hail Size**

Hail Size (inches)	# of Events 2000-2022
3.50	1
3.00	1
2.50	1
2.00	3
1.75	25
1.50	4
1.25	3
1.00	43
0.88	15
0.75	27
<b>Grand Total</b>	<b>123</b>

Source: NCDC

### Thunderstorm Winds

Information concerning tornadoes and windstorms, separate from thunderstorms, can be found in **Section 3.5.18**.

The National Weather Service (NWS) will issue a Severe Thunderstorm Warning whenever a thunderstorm is forecasted to produce wind gusts to 58 miles per hour (50 knots) or greater and/or hail size one inch (quarter-size) diameter which can produce significant damage (source: <http://www.nws.noaa.gov/oneinchhail/>). The data is kept on Iowa Environmental Mesonet, Iowa

State University Department of Agronomy website, (<http://mesonet.agron.iastate.edu/vtec/search.php>). Although NCDC provides estimates of crop losses, crop insurance payment statistics are considered a more accurate resource for this data. According to the USDA Risk Management Agency, insured crop losses in Dubuque County because of hail from 2014 to 2021 totaled \$308,179 (see **Table 3.68**) and \$1,672,077.26 from windstorms. There was no crop damage reported from lightning.

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**Table 3.68. Crop Insurance Claims Paid in Dubuque County from Hailstorms and Windstorms, 2007-2016**

Year	Hail	Wind/Excess Wind	Insurance Paid
2014	\$23,356.15	\$30,492.00	\$53,848.15
2015		\$38,058.50	\$38,058.50
2016		\$5,566.11	\$5,566.11
2017	\$284,822.85	\$256,507.50	\$541,330.35
2019		\$20,917.00	\$20,917.00
2020		\$1,133,883.15	
2021		\$186,653.00	\$186,653.00
<b>Total</b>	<b>\$308,179.00</b>	<b>\$1,672,077.26</b>	<b>\$846,373.11</b>

Source: USDA Risk Management Agency

### ***Probability of Future Occurrence***

NCDC-reported damaging lightning events occurred two (2) times from 2018 through September 2023. Since lightning accompanies thunderstorms, it can be assumed that lightning occurs more often than damages are reported. These rates of occurrence are expected to continue in the future.

Based on NCDC data, there have been 14 damaging hail events, 2 damaging lightning events and 66 damaging thunderstorm wind events. This translates to a combined annual average of 3.4 damaging events per year respectively. Based on this history, damaging hail and thunderstorm wind occur in the planning area multiple times each year making the probability for damaging events “Highly Likely” in any given year.

## **Vulnerability**

### ***Overview***

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

### ***Potential Losses to Existing Development***

Most lightning damages occur to electronic equipment located inside buildings. But structural damage can also occur when a lightning strike causes a building fire. In addition, lightning strikes can cause damages to crops if fields light on fire. Communications equipment and

warning transmitters and receivers can also be knocked out by lightning strikes. There have not been any fatalities in Dubuque County from lightning strikes.

Thunderstorm winds and hail can cause damage to property, vehicles, trees, and crops.

### **Property and Crop Losses**

**Table 3.69** provides the estimated annualized property damages resulting from Thunderstorms, including lightning, hail, and wind. This annualized damage has been compared to the total building exposure for Dubuque County and the level of damage is minimal compared to the value of building exposure.

**Table 3.69. Estimated Annualized Property Damages Resulting from Severe Thunderstorms (Hail/Lightning/Wind, 1993-2016)**

Hail/Lightning/Thunderstorm Wind Property Damages		Annualized Property Damages
Hail	\$6,715,000	\$532,775
Lightning	\$350,000	
Thunderstorm Wind	\$5,721,600	
<b>Total</b>	<b>\$12,786,600</b>	

Source NCDC

**Table 3.70** provides the insured crop losses resulting from hail and wind. The insured loss has been adjusted to estimate losses to all insurable crops by considering that 89 percent of insurable crops in the State were insured (2015 Iowa Crop Insurance Profile from USDA's Risk Management Agency).

**Table 3.70. Estimated Insurable Annualized Crop Damages Resulting from Severe Thunderstorms (Hail/Wind)**

Crop Exposure (2012)	Insurance Paid (2004-2013)		Adjusted Crop Damages Considering 89% Insured	Annualized Adjusted Crop Damages
\$ 120,053,000	Hail	\$323,986.15	\$977,032	\$97,703
	Wind/Excess Wind	\$545,572.61		
	<b>Total</b>	<b>\$869,558.76</b>		

Source: Crop value is from USDA 2012 Census of Agriculture; Crop Insurance Paid is from the USDA's Risk Management Agency for 2007-2016.; Crop Insurance Coverage is from USDAs 2015 State Crop Insurance Profile for Iowa

### **Future Development**

Any additional future development will result in more property being vulnerable to damages from severe thunderstorms, lightning, and hail. To minimize vulnerability, protective measures could be implemented such as wind-resistant construction, lightning rods, surge protection and use of materials less prone to hail/wind damage.

### **Climate Change Impacts**

According to the 2010 *Climate Change Impacts on Iowa* report, growing evidence points to stronger summer storm systems in the Midwest. Studies have not been done to conclusively say that severe storms, including hail, lightning, and strong winds, are increasing. However, with

summer temperatures becoming warmer and humidity levels increasing, an increase in the likelihood of these hazards is plausible.

### 3.5.18 Tornado/Windstorm

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Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
4	3	3	3	3.45	High

#### **Profile**

##### ***Hazard Description***

This hazard section discusses both tornado and windstorm.

Tornado: 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 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.

Windstorm: 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.

Strong winds can occur year-round in Iowa. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger the 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.

The NWS can issue High Wind Watch, High Wind Warning, and Wind Advisory to the public. The following are the definitions of these issuances:

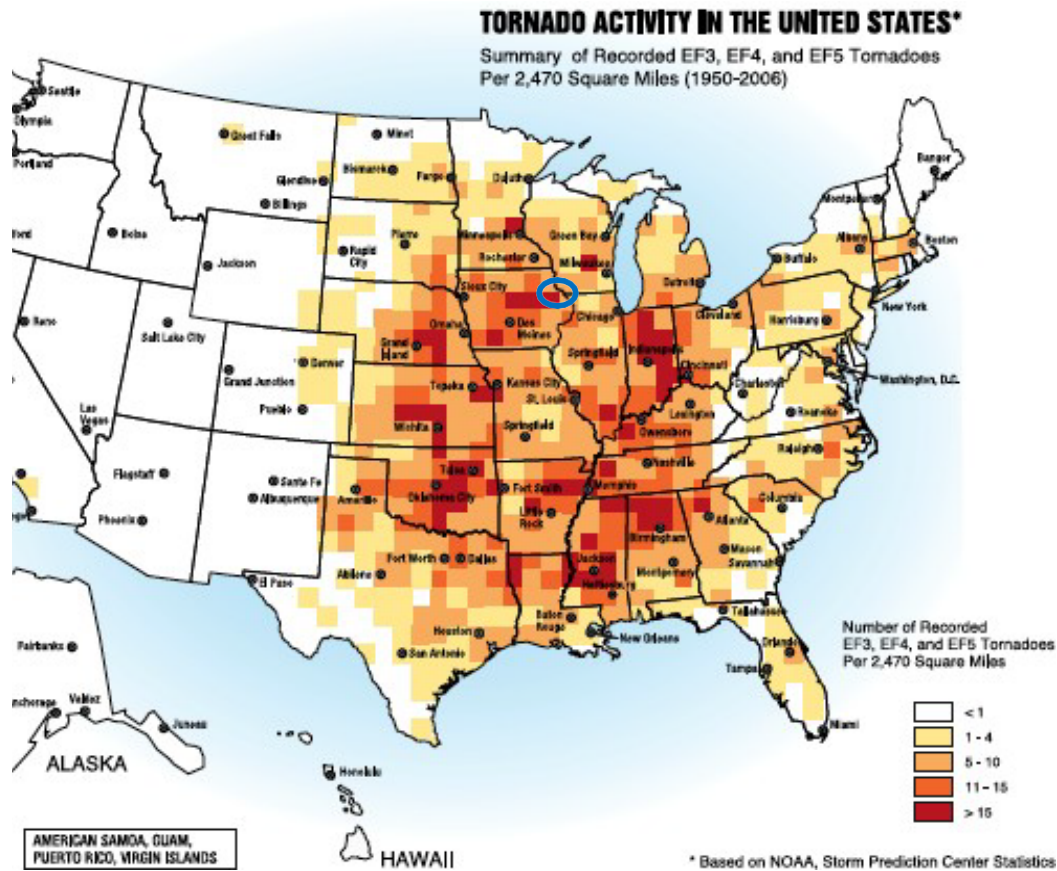
- High Wind Watch—This is issued when there is the potential of high wind speeds developing that may pose a hazard or is life-threatening.
- High Wind Warning—The 1-minute surface winds of 35 knots (40 mph) or greater lasting for one hour or longer, or winds gusting to 50 knots (58 mph) or greater, regardless 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.

### ***Geographic Location/Extent***

Iowa is in a part of the United States where tornadoes are a common occurrence. Iowa has experienced 1,517 tornadoes from 1980 through 2011 (32-year period) with 86 percent of them being rated F0 and F1, 14 percent rated F2 through F5. Only one F5 rated tornado has occurred in Iowa during this timeframe (Parkersburg in 2008). Since 1980, there have been on average 47 tornadoes per year in Iowa. Most tornadoes occurred in May and June but can occur during any month. Also, mid-afternoon until around sunset is the peak time of day for tornado activity. There have been 763 injuries and 26 deaths attributable to tornadoes (source: National Weather Service, Iowa Tornado Climatology Report 1980-2011).

Tornadoes can occur in the entire planning area. **Figure 3.63** illustrates the number of F3, F4, and F5 tornadoes recorded in the United States per 3,700 square miles between 1950 and 2006. Dubuque County is in the section with light orange and dark red shading, indicating 5 to over 15 tornadoes of this magnitude during this 57-year period.

Figure 3.63. Tornado Activity in the United States



Source: FEMA 320, Taking Shelter from the Storm, 3rd edition

Note: Blue circle is approximate location of Dubuque County

Tornadoes are classified according to the EF Scale. The Enhanced F-Scale (Table 3.7.1) 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.

**Table 3.71. 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: The National Weather Service, [www.spc.noaa.gov/faq/tornado/ef-scale.html](http://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 3.72**. 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](http://www.spc.noaa.gov/efscale/ef-scale.html).

**Table 3.72. 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 complete 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 in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

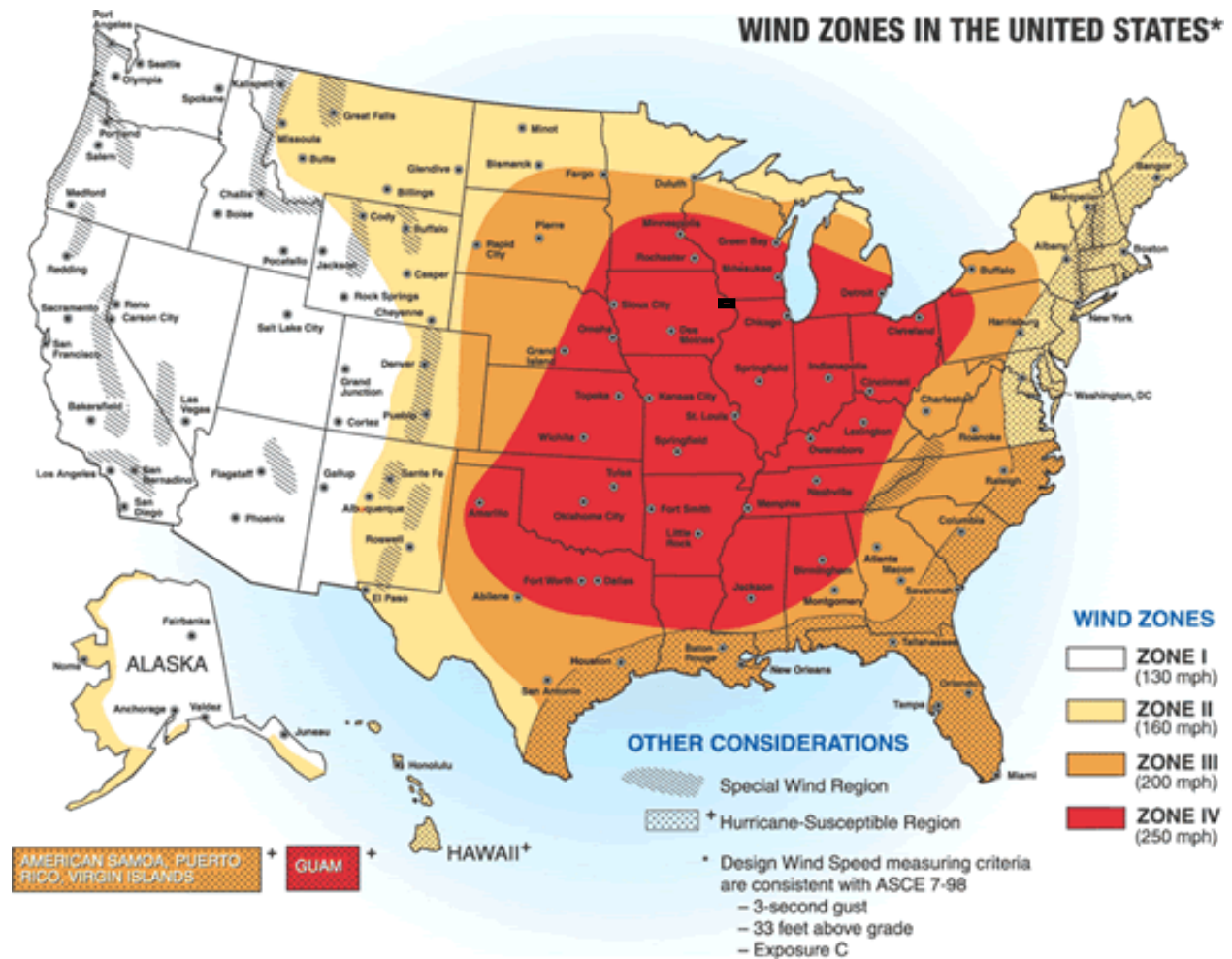
Source: NOAA Storm Prediction Center

All of Dubuque County is susceptible to high wind events. The County is in Wind Zone IV,

which is susceptible to winds up to 250 mph. All the participating jurisdictions are

Vulnerable to this hazard. Figure 3.64 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 3.64. Wind Zones in the United States**



Source: FEMA; [http://www.fema.gov/plan/prevent/saferoom/tsfs02\\_wind\\_zones.shtm](http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm)

Note: Black square indicates approximate location of Dubuque County

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. The 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.

## Previous Occurrences

### Tornadoes

According to NOAA statistics Dubuque County had 17 recorded tornado events from 1998 to 2023. Of these, one was an F4; one was an F2, seven were F1/EF1, and eight were F0/EF0. These tornadoes caused no fatalities, one injury, and over \$28 million in property damages.

**Table 3.73** summarizes these events.

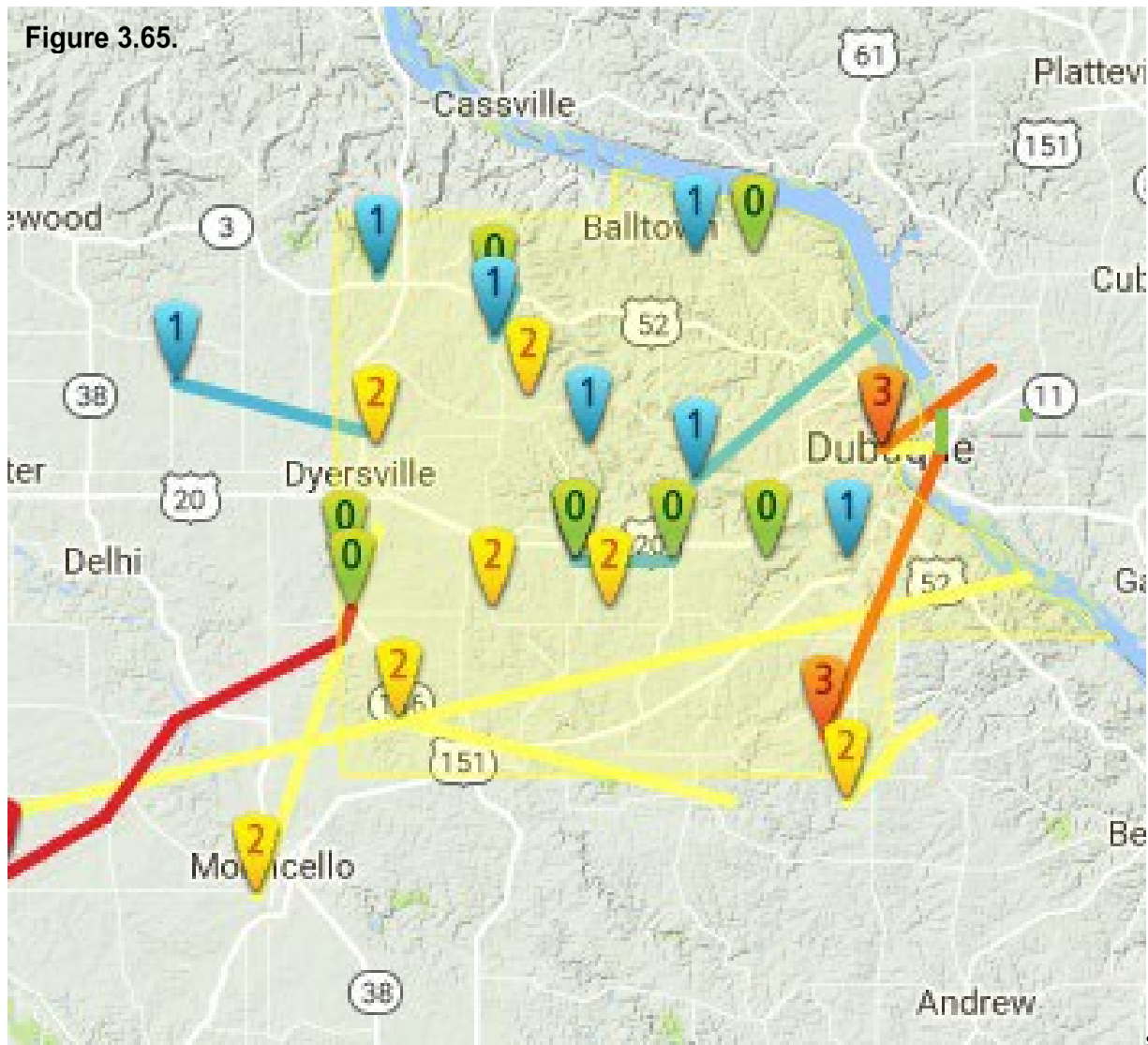
**Table 3.73. Recorded Tornadoes in Dubuque County, 1998 - 2023**

Date	Magnitude	Deaths	Injuries	Property Damages	Crop Damages	Length	Width
5/8/1988	F1	0	0	\$2,500,000	\$0	11	43
5/8/1988	F0	0	0	\$25,000	\$0	0.5	20
3/13/1990	F4	0	0	\$25,000,000	\$0	1	200
3/13/1990	F1	0	0	\$25,000	\$0	3	23
3/27/1991	F2	0	1	\$250,000	\$0	1	100
6/16/1996	F0	0	0	\$0	\$0	0.1	10
5/15/1998	F0	0	0	\$200	\$0	0.3	1
5/28/1998	F0	0	0	\$0	\$0	0.1	0.5
5/26/2007	EF0	0	0	\$1,000	\$0	0.75	50
5/25/2008	EF1	0	0	\$250,000	\$0	1.53	250
12/23/2015	EF1	0	0	\$0	\$0	1.1	25
7/23/2016	EF0	0	0	\$0	\$0	0.78	25
3/6/2017	EF0	0	0	\$5,000	\$0	5.46	25
8/5/2019	EF1	0	0	\$0	\$0	0.3	50
3/28/2020	EF1	0	0	\$0	\$0	3.8	50
6/20/2021	EF1	0	0	\$0	\$0	1.68	30
8/11/2021	EF0	0	0	\$0	\$0	0.6	20

Source: NOAA

The map in **Figure 3.65** shows the paths of the events in the table above. Note: Not all events had available latitude and longitude coordinates. As a result, not all events are displayed.

Figure 3.65.



Source:

tornadohistoryproject.com

### Windstorms

#### ***Previous Occurrences***

According to the NCDC database, there were 11 high wind events in Dubuque County from 1998 to 2023. During this time, there were no injuries or deaths. There were no property damages. Recorded wind gusts ranged from a high of 60 knots to a low of 35 knots.

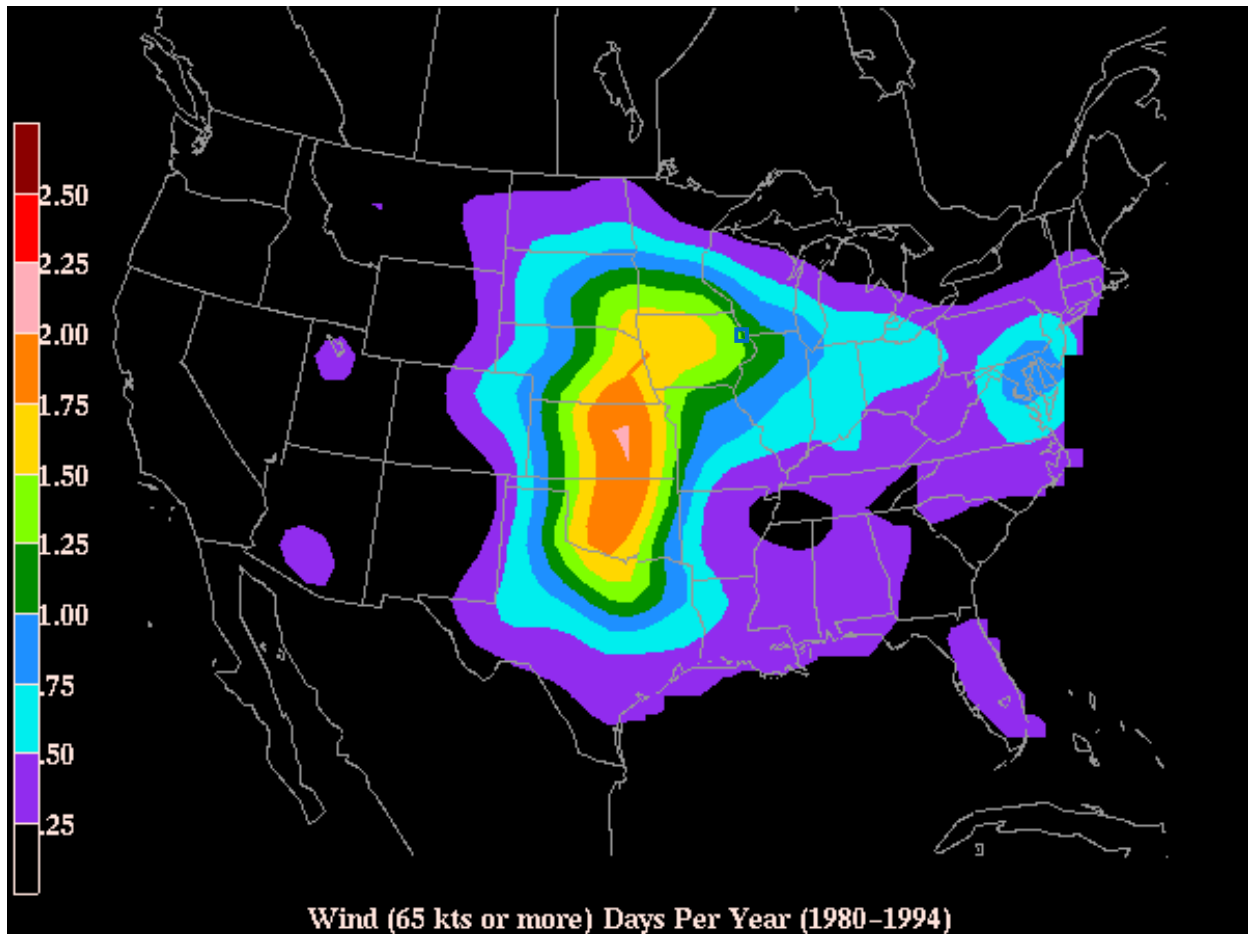
#### ***Probability of Future Occurrence***

NOAA reported 24 tornadoes in Dubuque County in a 67-year time, which calculates to a 36 percent chance of a tornado in any given year. Therefore, it is a high probability that some portion of Dubuque County will experience tornado activity in any given year.

According to NCDC, there were 11 separate high wind events from 1993 to 2016 (24-year period) in Dubuque County. Based on this data there is a 46 percent annual probability of high wind events in any given year. Therefore, the probability rating is "Highly Likely".

**Figure 3.66.**

**Figure 3.66** below shows the probability of a windstorm event (65 knots or greater) in the U.S. The Dubuque County planning area is colored lime and dark green, showing that 65+ knot winds are probable to occur 1.00 to 1.50 times a year.



Source: NSSL, [http://www.nssl.noaa.gov/users/brooks/public\\_html/bigwind.gif](http://www.nssl.noaa.gov/users/brooks/public_html/bigwind.gif);

Note: Blue square indicates approximate location of Dubuque County

## **Vulnerability**

### ***Overview***

Dubuque County is located just outside a region of the U.S. with high frequency of dangerous and destructive tornadoes and is referred to as “Tornado Alley”. **Figure 3.67** is based on areas where dangerous tornadoes are most likely to take place.



**Figure 3.67. Tornado Alley in the U.S.**



**Table 3.75. Mobile Homes per Jurisdiction**

Light frame structures, such as mobile homes, outbuildings and sheds are considered especially vulnerable to damage from tornadoes. Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to twisters. **Table 3.75** provides the number of mobile homes in each jurisdiction in Dubuque County according to the U.S. Census Bureau's 2020 US Census. In 2015, there were 2,240 mobile homes and in 2020, there are 2,517.

Jurisdiction	Number of Mobile Homes
Dubuque County	1,538
Asbury	0
Balltown	0
Bankston	0
Bernard	6
Cascade	13
Centralia	6
Dubuque	910
Durango	0
Dyersville	10
Epworth	16
Farley	0
Graf	0
Holy Cross	0
Luxemburg	0
New Vienna	5
Peosta	0
Rickardsville	0
Sageville	9
Sherrill	0
Worthington	3
Zwingle	12

Source: U.S. Cnsus 2020

The elderly (65 and older), young (less than 18 years old), 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 watches and warnings due to language barriers are also at risk.

### ***Potential Losses to Existing Development***

In Dubuque County, the NCDC estimate for past property damages resulting from tornadoes from 1998 - 2023 (25 years) was \$256,000. This translates to an annualized loss of over \$10,240. For windstorms, NCDC reports no property damages during this same time.

#### **Loss of Use**

Overhead power lines and infrastructure are also vulnerable to damages from windstorms. Potential losses would include the cost of repair or replacement of damaged facilities and lost economic opportunities for businesses. Public safety hazards include the 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. Refer to the electric power loss of use estimates provided in **0** in the Winter Storm hazard section.

#### **Crop Losses**

Crop insurance payments for wind damage are discussed in **Section 3.5.17**, Thunderstorms with Lightning and Hail.

### ***Future Development***

Public buildings such as schools, government offices, as well as other buildings with a high occupancy and mobile home parks should consider inclusion of a tornado saferoom to shelter occupants in the event of a tornado.

Windstorm is primarily a public safety and economic concern, and the planning area is in a region with very high frequency of occurrence. Windstorm can cause damage to structures and power lines which in turn create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Although windstorms occur frequently in the planning area and damages to property occurs, 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.

### ***Climate Change Impacts***

According to the 2010 *Climate Change Impacts on Iowa* report, growing evidence points to stronger summer storm systems in the Midwest. Studies have not been done to conclusively say that severe storms, including tornadoes, are increasing. However, with summer temperatures becoming warmer and humidity levels increasing, an increase in the likelihood of tornadic activity is plausible.

### 3.5.19 Transportation Incident

Hazard Score Calculation					
Probability	Magnitude/Severity	Warning Time	Duration	Weighted Score	Level
3	1	4	2	2.45	Moderate

#### **Profile**

##### ***Hazard Description***

This hazard encompasses the following: air transportation and highway transportation. There is no rail transportation in Dubuque County. The transportation incidents can involve any mode of transportation that directly threatens life, and which results in property damage and/or death(s)/injury(s) and/or adversely impact a community's capabilities to provide emergency services. Incidents involving buses and other high occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.

An air transportation incident may involve a military, commercial or private aircraft. Air transportation is playing a more prominent role in transportation. Airplanes and helicopters 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 air transportation incident.

Highway transportation incidents are very complex. Contributing factors can include a roadway's design and/or pavement conditions (e.g., rain, snow, and ice), a vehicle's mechanical condition (e.g., tires, brakes, lights), a driver's behavior (e.g., speeding, inattentiveness, and seat belt usage), the driver's condition (e.g., alcohol use, age-related conditions, physical impairment) and driver inattention by using a wireless device. In fact, the driver's behavior and condition factors are the primary cause in an estimated 67 percent of highway crashes and a contributing factor in an estimated 95 percent of all crashes.

##### **Geographic Location/Extent**

###### **Highways/Roads**

Numerous major US and state highways run through Dubuque County. The City of Dubuque is the major hub for the four-lane US Highway 20 that runs east west through Dubuque County extending into Iowa and Illinois. Four-lane US Highway 61 extends north south from the City of Dubuque and extends into Wisconsin on the north and to the Quad Cities and beyond to the south. Four-lane US Highway 151 extends from the City of Dubuque and into Wisconsin on the north and to Cedar Rapids and beyond to the southwest. US Highway 52 runs north-south generally following the Mississippi River and extending north from Dubuque County through Iowa into Minnesota and to the south through Bellevue and Sabula before entering Illinois. The major highways are listed below:

- US Highway 20
- US Highway 52

- US Highway 61
- US Highway 151
- Iowa Highway 3
- Iowa Highway 32
- Iowa Highway 136

Numerous paved county roads connect all the incorporated cities and unincorporated towns throughout the county.

**Figure 3.21** in the Hazardous Materials Incident section shows the major highways in Dubuque County.

According to the Iowa Department of Transportation, the total daily traffic in Dubuque County is 751,734 and the total daily truck traffic is 61,886. (Source: <http://iowadot.maps.arcgis.com/apps/MapSeries/index.html?appid=db6cb43313354a4f85505089ab317e7a>)

### Rail Transport

The following railroads operate in Dubuque County: Canadian Pacific Railroad (CP), Dakota, Minnesota and Eastern (DME) R.R. Company, Canadian National Railway Company. Burlington Northern Sante Fe Railroad has a line (in red) that runs down the Illinois side of the Mississippi River adjacent to Dubuque County. **Figure 3.22** in the Hazardous Materials Incident section shows the railroads that operate in Dubuque County.

### Air Transport

The Dubuque Regional Airport is located south of the City of Dubuque (see **Figure 3.23**). There are also three private airports: Dyersville Area Airport, Kleis Airport (Zwingle) and Anderson Airport (near Graf). The Dubuque Regional airport, constructed in 1948, is owned by the City of Dubuque and is located six miles south of Dubuque. Regional access to the airport is from U.S. Highway 61.

An airport commission was established by the city to manage the airport. The FAA recognizes the airport as playing a role in the national airport system and includes the airport in the National Plan of Integrated Airport Systems (NPIAS) as a non-hub primary commercial service airport. (A non-hub airport is one that enplanes more than 10,000, but less than 0.05 percent of the total U.S. passengers.) The Iowa Aviation System Plan identifies the Dubuque Regional Airport as a Commercial Service airport. Commercial Service airports support scheduled airline service and have the infrastructure and services available to support a full range of general aviation activity.

### ***Previous Occurrences***

#### Air Transportation Incidents:

**Table 3.76** provides details of air transportation incidents in Dubuque County from 1967 to 2023 (57 years) from the National Transportation Safety Board (NTSB).

**Table 3.76. Dubuque County Aircraft Incidents/Accidents (1967-2023)**

Event Date	Location	Airport Name	Injury Severity	Aircraft Damage	Make	Broad Phase of Flight
12/20/2021	Dubuque, IA	Dubuque Regional Airport	Non-Fatal	Substantial	Textron Aviation	Cruise
10/13/2014	Dubuque, IA	Dubuque Regional Airport	Fatal (1)	Destroyed	Piper	Go-Around
04/03/2011	Dubuque, IA	Dubuque Regional Airport	Incident	Minor	Embraer	Taxi
07/28/2010	Zwingle, IA	Not Reported	Non-Fatal	Substantial	Air Tractor Inc	Maneuvering
03/08/2004	Dubuque, IA	Dubuque Regional	Non-Fatal	Substantial	Cessna	Go-Around
03/28/2003	New Vienna, IA	Not Reported	Fatal (3)	Destroyed	Beech	Cruise
08/06/2002	Dyersville, IA	Dyersville Area Airport	Non-Fatal	Substantial	Cessna	Approach
03/20/2002	Cascade, IA	Not Reported	Non-Fatal	Substantial	Schweitzer	Maneuvering
10/23/2001	Dubuque, IA	Dubuque Regional Airport	Fatal (1)	Destroyed	Beech	Approach
04/09/1999	Dubuque, IA	Not Reported	Incident	Not Reported	McDonnell Douglas	Cruise
12/17/1998	Sherrill, IA	Not Reported	Fatal (1)	Destroyed	Cessna	Cruise
07/13/1998	Dyersville, IA	Not Reported	Non-Fatal	Substantial	Canadian Car & Foundry	Takeoff
07/25/1996	Dubuque, IA	Dubuque Regional Airport	Non-Fatal	Substantial	Cessna	Landing
04/29/1996	Bernard, IA	Not Reported	Fatal (3)	Destroyed	Cessna	Cruise
10/18/1995	Peosta, IA	Not Reported	Non-Fatal	Substantial	Cessna	Cruise
03/25/1994	Dubuque, IA	Dubuque Regional	Non-Fatal	Substantial	Cessna	Landing
12/05/1993	Dubuque, IA	Dubuque Municipal	Non-Fatal	Substantial	Cessna	Approach
04/19/1993	Zwingle, IA	Dubuque Regional	Fatal (8)	Destroyed	Mitsubishi	Cruise
06/27/1992	Dubuque, IA	Not Reported	Non-Fatal	Substantial	Bell	Landing
05/15/1990	Dubuque, IA	Dubuque	Non-Fatal	Substantial	Piper	Approach
07/29/1988	Dubuque, IA	Dubuque	Non-Fatal	Substantial	Shirlene Dickey	Cruise
09/29/1987	Dubuque, IA	Dubuque	Non-Fatal	Substantial	Cessna	Cruise
12/30/1985	Dubuque, IA	Dubuque Municipal	Non-Fatal	Substantial	Beech	Landing
07/01/1984	Dyersville, IA	Dyersville	Non-Fatal	Substantial	Cessna	Takeoff
05/18/1984	Dubuque, IA	Not Reported	Non-Fatal	Substantial	Piper	Maneuvering
12/24/1982	Dubuque, IA	Not Reported	Fatal (2)	Destroyed	Piper	Approach
11/16/1982	Dubuque, IA	Dubuque Muni	Non-Fatal	Substantial	Cessna	Landing
04/24/1982	Dubuque, IA	Dubuque Municipal	Non-Fatal	Substantial	Piper	Landing
07/21/1977	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Cessna	Not Reported
05/30/1976	New Vienna, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
12/22/1974	Graf, IA	Not Reported	Non-Fatal	Not Reported	Aeronca	Not Reported
07/22/1974	Dubuque, IA	Not Reported	Fatal (1)	Not Reported	Piper	Not Reported
03/20/1974	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
10/21/1972	Dubuque, IA	Not Reported	Fatal (2)	Not Reported	Piper	Not Reported
11/17/1971	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
07/03/1971	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Mooney	Not Reported
10/28/1970	Dubuque, IA	Not Reported	Incident	Not Reported	Boeing	Not Reported
07/24/1969	Epworth, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
02/07/1969	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
10/31/1968	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Piper	Not Reported
05/26/1968	Dubuque, IA	Not Reported	Fatal (2)	Not Reported	Stinson	Not Reported
04/09/1968	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Beech	Not Reported
01/30/1968	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Cessna	Not Reported
05/13/1967	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Beech	Not Reported
04/14/1967	Dubuque, IA	Not Reported	Non-Fatal	Not Reported	Cessna	Not Reported

Source: [http://www.nts.gov/ layouts/ntsb.aviation/index.aspx](http://www.nts.gov/layouts/ntsb.aviation/index.aspx).**Highway Transportation Incidents:**

The Iowa Department of Transportation's Office of Traffic and Safety maintains traffic crash statistics and location maps by county and cities in Iowa. **Table 3.77** shows the reportable crash history for urban crashes in Dubuque County, Iowa from 2013 -2022. **Table 3.78** that follows shows the reportable crash history for rural crashes in Dubuque County for the same time.

**Table 3.77. Dubuque County Urban Crashes 2013 - 2022**

Year	Crash Counts/Classification					Injury/Fatality Counts/Classification					
	Crashes	Fatal	Major	Minor	Poss/Unk	Injuries	Fatalities	Major	Minor	Possible	Unknown
2013	377	1	15	43	38	134	1	17	56	53	7
2014	351	3	9	34	46	127	6	12	46	53	10
2015	367	2	7	41	45	122	2	9	47	63	1
2016	349	3	13	30	52	136	3	18	36	75	4
2017	1561	6	10	105	239	454	6	10	128	298	12
2018	1583	1	9	118	252	484	1	9	140	321	13
2019	1698	3	11	122	261	506	3	11	143	335	14
2020	1351	2	12	110	207	413	2	14	136	242	19
2021	1487	1	9	126	238	481	1	11	146	299	24
2022	1568	5	15	134	243	512	7	18	159	276	52
<b>Total</b>	<b>15489</b>	<b>26</b>	<b>108</b>	<b>1126</b>	<b>2385</b>	<b>4626</b>	<b>28</b>	<b>124</b>	<b>1343</b>		<b>3131</b>

Source: Iowa Department of Transportation's Office of Traffic and Safety

**Table 3.78. Dubuque County Rural Crashes 2013 - 2022**

Year	Crash Counts/Classification					Injury/Fatality Counts/Classification					
	Crashes	Fatal	Major	Minor	Poss/Unk	Injuries	Fatalities	Major	Minor	Possible	Unknown
2013	377	1	15	43	38	134	1	17	56	53	7
2014	351	3	9	34	46	127	6	12	46	53	10
2015	367	2	7	41	45	122	2	9	47	63	1
2016	349	3	13	30	52	136	3	18	36	75	4
2017	401	4	8	36	46	133	4	8	54	63	4
2018	466	5	8	47	53	159	5	12	58	81	3
2019	451	5	17	43	57	155	5	21	54	69	6
2020	425	1	8	37	48	122	1	8	46	62	5
2021	460	3	14	39	46	129	3	15	48	59	4
2022	386	4	9	31	42	105	5	12	40	46	2
<b>Total</b>	<b>4033</b>	<b>31</b>	<b>108</b>	<b>381</b>	<b>473</b>	<b>1322</b>	<b>35</b>	<b>132</b>	<b>485</b>		<b>670</b>

Source: Iowa Department of Transportation's Office of Traffic and Safety

### ***Probability of Future Occurrence***

A major transportation incident can occur at any time, even though traffic engineering, inspection of traffic facilities and land use management of areas adjacent to roads and highways has increased, incidents continue to occur. The combination of cars and trucks, farm equipment, wildlife, unpredictable weather conditions, potential mechanical problems and human error always leaves the potential for a transportation accident.

## **Vulnerability**

### ***Overview***

Transportation incidents can almost always be expected to occur in specific areas, on or near airports, roadways, or other transportation infrastructure. The exception is air transportation incidents, which can occur anywhere. However, it is difficult to predict the magnitude of any specific event because these types of events are accidental and the circumstances surrounding these events will impact the extent of damage or injuries that occur. The number of urban and rural highway/roadway transportation accidents from 2013 – 2022 was a total of 19,522 crashes during this 10-year time (average nearly 2,000 per year). Fifty-seven (57) fatalities occurred during this time (averaging nearly six per year). Transportation incident has resulted in the most deaths historically in the county compared to other hazards.

### ***Potential Losses to Existing Development***

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 2023 dollars using an annual inflation rate of 2.85 percent. The costs are listed below in **Table 3.79**.

**Table 3.79. Costs of a Traffic Crash**

Severity	Cost per injury (in 2016 dollars \$)
Fatal	\$5,320,397
Evident Injury	\$73,677
Possible Injury	\$38,880
Property Damage Only	\$4,093

Source: U.S. Department of Transportation Federal Highway Administration Technical Advisory T 7570.2, 1994. Adjusted to 2023 dollars.

Using the traffic crash costs per type of severity from **Table 3.79** and combining major and minor injuries as “evident injury” and possible and unknown as “possible injury” the total costs of traffic crashes is figured in **Table 3.80** for Dubuque County based on previous events.

**Table 3.80. Costs of Traffic Crashes in Dubuque County 2016 - 2022**

Urban/Rural	Fatalities	Evident Injury	Possible Injury	Property Damage	Total
Urban	28	120	1342	11833	
Rural	35	134	486	3050	
Total	63	254	1828	14883	
<b>Estimated Cost</b>	\$335,185,011	\$18,711,418	\$71,072,640	\$60,916,119	\$485,885,188

Sources: U.S. Department of Transportation Federal Highway Administration Technical Advisory T 7570.2, 1994. Adjusted to 2023 dollars and Iowa Department of Transportation's Office of Traffic and Safety, <http://www.iowadot.gov/crashanalysis/index.htm>?

Based on the 10 years of data, the annual average cost of transportation accidents in Dubuque County is \$485,885,188. Estimated losses from rail and air transportation are not available for this analysis.

### ***Future Development***

Current population trends indicate an increase in population in Dubuque County. If the volume of traffic on the county roads, highways and interstates increases with population increase, the number of traffic accidents will likely also increase.

***Climate Change Impact***

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.



### 3.6 Hazard Analysis Summary

This table below provides a tabular summary of the hazard ranking for each jurisdiction in the planning area.

**Table 3.81. Hazard Ranking Summary by Jurisdiction**

Jurisdiction	Animal/Plant/ Crop Disease	Dam Failure	Drought	Expansive Soils	Extreme Heat	Flash Flood	Grass/Wildland Fire	Hazardous Materials Incident	Human Disease	Infrastructure Failure	Landslide	Radiological Incident	River Flood	Severe Winter Storm	Sinkholes	Terrorism	Thunderstorm/ Lightning/Hail	Tornado/Windstorm	Transportation Incident
Dubuque County, Iowa	L	H	M	L	M	H	L	M	M	M	L	L	MH	M	L	L	H	H	M
Asbury	L	N/A	M	L	M	H	L	M	M	M	L	L	L	M	L	L	H	H	M
Balltown	L	N/A	M	L	M	M	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Bankston	L	N/A	M	L	M	M	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Bernard	L	N/A	M	L	M	M	L	M	M	M	L	L	L	M	L	L	H	H	M
Cascade	L	H	M	L	M	H	L	M	M	M	L	L	H	M	L	L	H	H	M
Centralia	L	N/A	M	L	M	H	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Dubuque	L	H	M	L	M	H	L	M	M	M	M	L	H	M	M	L	H	H	M
Durango	L	N/A	M	L	M	H	L	M	M	M	L	L	M	H	M	L	H	H	M
Dyersville	L	N/A	M	L	M	H	L	M	M	M	L	L	H	M	L	L	H	H	M
Epworth	L	N/A	M	L	M	M	L	M	M	M	L	L	L	M	L	L	H	H	M
Farley	L	N/A	M	L	M	H	L	M	M	M	L	L	L	M	L	L	H	H	M
Graf	L	N/A	M	L	M	M	L	M	M	M	L	L	M	M	L	L	H	H	M
Holy Cross	L	N/A	M	L	M	H	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Luxemburg	L	N/A	M	L	M	M	L	M	M	M	L	L	L	M	L	L	H	H	M
New Vienna	L	N/A	M	L	M	H	L	M	M	M	L	L	M	M	L	L	H	H	M
Peosta	L	N/A	M	L	M	H	L	M	M	M	L	L	L	M	L	L	H	H	M
Rickardsville	L	N/A	M	L	M	M	L	M	M	M	L	L	M	M	L	L	H	H	M
Sageville	L	N/A	M	L	M	H	L	M	M	M	L	L	M	M	L	L	H	H	M
Sherrill	L	N/A	M	L	M	M	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Worthington	L	N/A	M	L	M	H	L	M	M	M	L	L	M	M	L	L	H	H	M
Zwingle	L	N/A	M	L	M	H	L	M	M	M	L	L	M	M	L	L	H	H	M
Dubuque CSD	L	H	M	L	M	M	L	M	M	M	L	L	N/A	M	L	L	H	H	M
Western Dubuque CSD	L	N/A	M	L	M	M	L	M	M	M	L	L	H	M	L	L	H	H	M
NICC	L	H	M	L	M	H	L	M	M	M	L	L	H	M	L	L	H	H	M





## 4 MITIGATION STRATEGY

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

This section presents the mitigation strategy updated by the Hazard Mitigation Planning Committee (HMPC) based on the updated 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 March 2013 *Local Mitigation Planning Handbook*:

- **Goals** are general guidelines that explain what the community wants to achieve with the plan. They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards.
- **Mitigation Actions** are specific actions that help achieve 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 goals from the 2019 *Dubuque County Hazard Mitigation Plan* were reviewed to determine if they are still valid. The HMPC participated in a facilitated discussion 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 as well. The HMPC also reviewed common categories of mitigation goals from other plans.

The revised goals for this plan update are provided below:

- Goal 1: Increase capabilities within Dubuque County entities to mitigate the effects of hazards by enhancing existing or designing and adopting new policies that will reduce damaging effects of hazards.

- Goal 2: Protect the most vulnerable populations, buildings, and critical facilities within Dubuque County through the implementation of cost effective and technically feasible mitigation projects.
- Goal 3: Improve the level of responder, government, business and citizen awareness and preparedness for disasters.
- Goal 4: Develop programs to assure that response agencies, governments, educational institutions, and local businesses can operate during times of disaster.

## 4.2 Identification and Analysis of Mitigation Actions

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**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, sample results of the risk assessment update were provided to the HMPC members. Additionally, the full draft of the Risk Assessment Chapter was provided for review by the HMPC members and to lay the framework for the impacts to be addressed by the updated mitigation strategy. Also at meeting #2, each jurisdiction was provided with a handout listing the actions they included in the previous hazard mitigation plan. The mitigation strategy of the previous plan consisted of 422 individual jurisdictional actions.

Jurisdictional representatives were instructed to work with others in their jurisdiction to update the status of each of the previous actions. The status updates were provided between meeting #2 and meeting #3. The list of the completed and deleted actions is provided in Appendix C with comments providing additional details, as available.

For a comprehensive range of mitigation actions to consider, the jurisdictions were provided relevant information and sources to be used in development of new mitigation actions including:

- Plan Goals
- Previous Actions from 2019 Plan
- Key Issues from Risk Assessment
- FEMA's Mitigation Ideas booklet
- State Priorities for Hazard Mitigation Assistance Grants
- Public Opinion from Surveys

To facilitate discussion and ideas on new actions that jurisdictions may want to submit to the plan update, the planning committee reviewed the plan goals that were updated at meeting #2. Key issues/problem statements for the hazards in the risk assessment were discussed as well as the actions from the 2019 plan that were identified relative to each hazard. The discussion was geared toward identifying any gaps that may exist between the problems identified and actions already developed to address the problems. To provide consideration of a comprehensive range of alternatives, FEMA's Mitigation Ideas Booklet was also reviewed for additional ideas/alternatives for new actions. After the committee meeting, jurisdictions reviewed the materials to determine final mitigation actions to submit to the plan update.

The jurisdictions were encouraged to be comprehensive and include all appropriate actions to

work toward becoming more disaster resistant. 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.

As part of the meeting discussion, jurisdictions were instructed to consider the potential cost of each project in relation to the anticipated future cost savings. This type of discussion allowed the committee to understand the broad priorities and enable discussion of the types of projects most beneficial to all jurisdictions within Dubuque County.

## 4.3 Implementation of Mitigation Actions

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**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.**

Jurisdictional representatives worked 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, primarily consisted 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 if/when seeking FEMA Hazard Mitigation Assistance grant funding or other 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.

To provide a mechanism for jurisdictions to prioritize actions, a modified STAPLEE worksheet was completed by the jurisdictions for each new and continued action submitted for the updated mitigation strategy. The modified STAPLEE worksheet includes elements to consider protection of life and reduction of damages. Although the STAPLEE method was a component of the prioritization method utilized for the 2019 plan, there were other scoring elements included. For the plan update, the modified STAPLEE worksheet was chosen to re-evaluate all continuing and new actions as this was deemed a more simplified approach and avoided some redundancies and double-counting of benefits that could occur with the previous method.

The STAPLEE prioritization method in general is a tool used to assess the costs and 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?
- **Addministrative**: 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 protection of historic properties and time to implement as well as elements to consider mitigation effectiveness related to protection of life and reduction of damages.

**Figure 4.1** is a sample of the Action Plan worksheet. The Prioritization Sections at the bottom of the worksheet. There is a total possible prioritization score of 19. Those actions that scored 13 or Higher were given a priority rating of “High”. Those actions that scored 7-12 were given a priority rating of “Medium”. And those actions that scored less than 7 were given a rating of “Low”.

**Figure 4.1. Action Plan Worksheet**

Dubuque County Multi-Jurisdictional Hazard Mitigation Plan Mitigation Action Plan Worksheet																								
<b>Jurisdiction:</b> _____	<b>Current Action Status</b> <input type="checkbox"/> Continue Not Started <input type="checkbox"/> Continue In-Progress <input type="checkbox"/> New		<b>Action ID:</b> _____ Refer to handout for continuing actions For new actions number with next sequential number after last action #.																					
<b>Hazards Addressed:</b> <input type="checkbox"/> Animal/Plant/Crop Disease <input type="checkbox"/> Dam /Levee Failure <input type="checkbox"/> Drought <input type="checkbox"/> Earthquake <input type="checkbox"/> Extreme Heat <input type="checkbox"/> Flash Flood	Check all that apply <input type="checkbox"/> Grass/Wildland Fire <input type="checkbox"/> Hazardous Materials Incident <input type="checkbox"/> Human Disease <input type="checkbox"/> Infrastructure Failure <input type="checkbox"/> Radiological Incident <input type="checkbox"/> River Flooding		<input type="checkbox"/> Severe Winter Storm <input type="checkbox"/> Sinkholes <input type="checkbox"/> Terrorism <input type="checkbox"/> Thunderstorm/Lightning/Hail <input type="checkbox"/> Tornado/Windstorm <input type="checkbox"/> Transportation Incident																					
<b>Action Title/Description:</b> _____																								
<b>Applicable Goal Statement:</b> Check one	<input type="checkbox"/> Goal 1: <input type="checkbox"/> Goal 2: <input type="checkbox"/> Goal 3: <input type="checkbox"/> Goal 4:																							
<b>Issue/Background:</b> Why is this action needed? What is the problem? _____																								
<b>Obstacles to Implementing?</b> _____																								
<b>Responsible Office:</b> Which department in Jurisdiction would implement/track? _____																								
<b>Partners:</b> Who would help? _____																								
<b>Potential Funding Source:</b> (Grants-specific if known, local funds, combination, etc.) Check all that may apply	<input type="checkbox"/> FEMA Hazard Mitigation Assistance Grant (HMGP, PDM, or FMA) <input type="checkbox"/> Local funds, <input type="checkbox"/> In-Kind (donated), <input type="checkbox"/> Private Non-Profit, <input type="checkbox"/> Other _____ (specify)																							
<b>Cost Estimate:</b>	<input type="checkbox"/> Little or no cost <input type="checkbox"/> Less than \$10,000 <input type="checkbox"/> \$10,000 to \$50,000 <input type="checkbox"/> \$50,000 to \$100,000 <input type="checkbox"/> \$100,000 to \$500,000 <input type="checkbox"/> \$500,000 to \$1,000,000 <input type="checkbox"/> Over \$1,000,000																							
<b>Benefits:</b> (Describe Losses Avoided) _____																								
<b>Timeline:</b> How many years to complete?	<input type="checkbox"/> 1 yr <input type="checkbox"/> 2-3 yrs <input type="checkbox"/> 3-5 yrs	<input type="checkbox"/> More than 5 yrs. <input type="checkbox"/> Other _____	<b>Completed by:</b> (name/title/phone #) _____																					
<b>Prioritization</b>																								
<b>Mitigation Effectiveness:</b> Rate the questions from 0-3 0-unlikely, 1-maybe, 2-probably, or 3-definitely	If implemented, will the action result in lives saved? <input type="checkbox"/> 0, <input type="checkbox"/> 1, <input type="checkbox"/> 2, <input type="checkbox"/> 3 If implemented, will the action result in reduced property damages? <input type="checkbox"/> 0, <input type="checkbox"/> 1, <input type="checkbox"/> 2, <input type="checkbox"/> 3 If implemented, will the action reduce the need for response actions? <input type="checkbox"/> 0, <input type="checkbox"/> 1, <input type="checkbox"/> 2, <input type="checkbox"/> 3 If implemented, will the benefits exceed the cost? <input type="checkbox"/> 0, <input type="checkbox"/> 1, <input type="checkbox"/> 2, <input type="checkbox"/> 3																							
<b>STAPLEE Rating:</b> Give the action a rating for each element as follows:  Positive (+) Neutral (0) Negative (-)	Socially Acceptable Technically Feasible Administrative Capability Politically Desirable Legal Authority Exists Economically Beneficial Environmentally Beneficial	<table border="0"> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> <tr><td><input type="checkbox"/> +</td><td><input type="checkbox"/> 0</td><td><input type="checkbox"/> -</td></tr> </table>		<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -	<input type="checkbox"/> +	<input type="checkbox"/> 0	<input type="checkbox"/> -
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The mitigation action summary table presenting the summary of continuing and new mitigation actions for each jurisdiction is provided in **Table 4.1**. In addition to the 294 actions that were continued from the previous plan, 16 new actions were identified, for a combined total of 310 actions in this updated mitigation strategy.

The Action ID for each action has been carried over from the 2019 plan for continuing actions. Completed and deleted actions were moved to **Appendix X**. New actions were assigned the next sequential Action ID for each jurisdiction. Following the action summary table, additional details are provided for each continuing and new action in **Table 4.2**. The detailed table serves as the action plan describing how each action will be implemented and administered by the local jurisdiction. The final table, **Table 4.3**, provides the results from the action prioritization.



**Table 4.1. Mitigation Action Summary—Continuing and New Actions**

H=High, M=Medium, L=Low

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Unincorporated County - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Unincorporated County - 2	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	As grant funding is available	2	M
Unincorporated County - 3	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	As funding becomes available	2	M
Unincorporated County - 4	Train personnel as weather spotters.	Continue In-Progress	Classes offered each spring - new employees are encouraged to attend	4	M
Unincorporated County - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, social media, and texts.	Continue In-Progress	Ongoing	3	H
Unincorporated County - 6	Consider building a tornado safe room for all new construction.	Continue Not Started	As needed and funding is available	2	M
Unincorporated County - 7	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Unincorporated County - 8	Acquire permanent and portable generators and infrastructure necessary to operate generators as deemed necessary by the County to provide power in the event of a power failure.	Continue Not Started	As grant funding is available	2	L
Unincorporated County - 9	Maintain the Business Continuity Plan to address day-to-day County business operations.	Continue Not Started	Staff time and no local funding	4	M
Unincorporated County - 10	Continue to enforce the Floodplain Ordinances and monitor all construction activities that are in or near a floodplain.	Continue In-Progress	Ongoing by staff from the zoning department	1	H
Unincorporated County – 11	Continue to support the efforts of the COG in their mitigation actions to reduce flooding of the Little Maquoketa River basin.	Continue In-Progress	Some property acquisition complete but other homes are still in harm's way - local funding not available	1	H
Unincorporated County – 12	Continue to support the efforts of the NRCS in Dubuque County to reduce flooding in flood prone areas and provision of educational information to farmers and use of BMPs.	Continue In-Progress	Always ongoing staff efforts	1	H
Unincorporated County – 13	Continue to maintain, promote, and administer storm water retention ordinances with other jurisdictions and update as needed.	Continue In-Progress	Ongoing by staff from the zoning department	1	H

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Unincorporated County - 14	Continue to identify probable areas for potential hazards, assess traffic capacity of highways and roads, and identify shelters for the hazards and develop best routes for evacuations.	Continue Not Started	Staff time and no local funding	2	M
Unincorporated County - 15	Continue to maintain awareness of repetitive loss properties to identify potential areas of risk to life and safety of residents and consider pursuing grant funds for the acquisition and demolition of these properties.	Continue In-Progress	Some property acquisition complete but other homes are still in harm's way - local funding not available	3	H
Unincorporated County - 16	Continue public awareness campaign, including educational programming, marketing, and public service announcements, and advertising to inform the public regarding the proper procedure during a flood.	Continue In-Progress	As needed and requested	3	H
Unincorporated County - 17	Modify the Flood Plain Management Ordinance as necessary with a target of alleviating flooding.	Continue In-Progress	Ongoing	1	H
Unincorporated County - 18	Purchase more barriers and floodgates to better block and inform drivers of flooded areas.	Continue Not Started	No local funding available	2	H
Unincorporated County - 19	Install river gauges and/or river stream sensors to measure the height of water and better enable the County to monitor river levels and potential flooding.	Continue Not Started	No local funding available	2	M
Unincorporated County - 20	Maintain Community Alert Network system that includes the auto-dial potential for all households and businesses in the line of a severe storm.	Continue In-Progress	Alert Iowa	3	H
Unincorporated County - 21	Continue program to educate residents on NOAA indoor weather radios and provide a rebate program for a portion of the purchase price for residents, or distribute as available.	Continue Not Started	No local funding available	3	H
Unincorporated County - 22	Continue to monitor public roads of concern that may require maintenance or rebuilding and repair or rebuild as deemed necessary.	Continue In-Progress	Identify projects as necessary	2	M
Unincorporated County - 23	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Updates as needed	2	M
Unincorporated County - 24	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	County developed an IT Superintendent in 2015 and allocates money to ensure data is accessible	3	M

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Unincorporated County - 25	Buy out, acquire, and demolish damaged, vulnerable, or endangered structures	Continue In-Progress	As needed	1	H
Unincorporated County – 26	Move 911 Dispatch Center to new, larger location.	New	BOS has agreed to move and working on funding agreements.	2	H
Unincorporated County – 26	Purchase and install snow plow cameras.	New		2	L
Unincorporated County – 27	River and creek restoration to reduce flood impacts and damages.	New		1	H
<b>Jurisdictions</b>					
Asbury -1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Asbury - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence. Improve stormwater culverts, and add curb and gutter in streets in flash flood areas.	Continue In-Progress	Ongoing/Re-worded.	2	L
Asbury - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Ongoing	2	H
Asbury – 4	Purchase and utilize barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	Ongoing	2	M
Asbury – 5	Train personnel as weather spotters.	Continue In-Progress	Ongoing	4	M
Asbury – 6	Continue to improve public awareness of hazardous weather through newsletters, social media, and public service announcements.	Continue In-Progress	Ongoing/Re-worded.	3	H
Asbury – 7	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress		2	H
Asbury – 8	Continue to maintain snow removal policy, including no parking on city streets within 48 hours of a severe winter storm.	Continue In-Progress		1	M
Asbury – 9	Continue to make the Fire Station available as a shelter space to persons in need on a temporary basis during periods of extreme heat.	Continue In-Progress		4	H
Asbury – 10	Maintain NFIP membership and meet all program requirements.	Continue In-Progress		1	M
Asbury – 11	Continue to use City Hall as a storm shelter and to consider the building of a safe room in conjunction with any new city building projects for the safety of current and future Asbury citizens.	Continue In-Progress	just built new city hall but no safe room	1	H
Asbury – 12	Continue to keep all seven backup generators in good repair and available.	Continue In-Progress		2	H

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Asbury – 13	Purchase two additional generators for sewer lift stations as funds become available.	Continue Not Started		2	M
Asbury – 14	Build new lift stations with generators in place as determined by the City's continued growth.	Continue Not Started		2	M
Asbury – 15	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress		3	M
Asbury – 16	Refrain from issuing burn permits in times of extreme heat or drought to prevent fires.	Continue In-Progress		1	H
Asbury – 17	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress		2	M
Asbury – 18	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	Continue – Not Started	On an as need basis	1	H
Balltown – 1	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Looking into funding	2	M
Balltown - 2	Create and maintain call down list of all critical personnel.	Continue In-Progress	Determine a call down list	3	M
Balltown - 3	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Have a plan and way we are doing it	3	M
Balltown – 4	Join and maintain NFIP membership	New	Have joined and will continue membership.		
Bankston - 1	Reconnect the city's weather siren.	Continue Not Started	No local funding available - investigate grants and funding sources to acquire a siren	3	H
Bernard - 1	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	The city continues to keep up streets and storm sewers. Making sure any wash outs or undermining is controlled Currently applied for a Grant to work on the main street in town	2	L
Bernard - 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Warning siren is checked monthly and can be set off by Bernard Fire and Dubuque County. Siren is inspected and checked monthly	2	H
Bernard - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue In-Progress	Weather Radios were distributed over 5 yrs. ago may need to update and reprog5am to make sure they are working properly and make sure all new homes have one	2	M
Bernard - 4	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	City needs to get signage we have limited signage. Available are cones and some signage from Bernard Fire.	2	M

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Bernard - 5	Train personnel as weather spotters.	Continue Not Started	Bernard Fire and Rescue controls and warns the city residents with the Siren provided by the city.	4	M
Bernard - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Create a calendar yearly to update customers of public notices, remind citizens where to go for shelter and who to contact when an emergency occurs,	3	H
Bernard - 7	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Need to be prepared for any flooding, generally not an issue.	2	H
Bernard - 8	Consider building a tornado safe room for all new construction.	Continue Not Started	The city currently needs a safe room for severe storms and tornado and other storm conditions.	2	M
Bernard - 9	Develop resources to protect people & property from hazardous materials	Continue – Not Started		2	H
Bernard - 10	Identify a location for public shelter in the event of a hazard or disaster, and stock it to ensure adequate for use as a shelter	Continue – In-Progress	Ongoing	2	H
Bernard – 11	Prepare for flash flooding through physical diversion, maintenance, and other activities to reduce water collection load	Continue – Not Started		2	H
Bernard – 12	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Bernard – 13	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Continued enhancements on GPS System will help to save lives. Updating address and adding new homes and locations.	2	M
Bernard – 14	Purchase backup generators and install hookups to provide electricity for the water supply and the main pumping station in the event of a power outage.	Continue In-Progress	Currently the Generate for the City of Bernard is set up when the power fails it will run the Water and sewer system and provide power to the City Office and Water building	2	M
Bernard – 15	Continue to make Emergency Medical Services building available in the event of a hazardous weather.	Continue In-Progress	City and Fire department can give citizens a place to stay if needed in an emergency and will allow the needed facilities	2	M
Bernard – 16	Create and maintain call down list of all critical personnel.	Continue In-Progress	Work with Bernard Fire & Rescue to maintain warning and sirens	3	M
Bernard – 17	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	City files backup and stored off premises.	3	M
Cascade - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	We will continue to do.	2	M

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Cascade - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	We have some items and will continue	2	L
Cascade - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Have not started due to funding	2	M
Cascade - 4	Purchase barricades and signage as deemed necessary to better communicate information.	Continue Not Started	As funding permits	2	M
Cascade - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Continue to look for ways to improve	3	H
Cascade - 6	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Continue to work on as budget allows.	2	H
Cascade - 7	Consider building a tornado safe room for all new construction.	Continue In-Progress	when funding available.	2	M
Cascade - 8	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	The community remains a member in good standing with the NFIP	1	M
Cascade - 9	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue Not Started	Will implement in July 2017 and continue forward	2	M
Cascade - 10	Continue to contact Dyersville and other communities to monitor flood levels upstream; obtain stream gauges for Cascade	Continue In-Progress	Ongoing	2	M
Cascade - 11	Continue to enforce floodplain management ordinances	Continue In-Progress	Continue	1	H
Cascade - 12	Create and maintain call down list of all critical personnel.	Continue In-Progress	Reviewed annually	3	M
Cascade - 13	Pursue application for future FEMA and State Funding for flood buyouts.	Continue In-Progress	Will use when and if needed.	1	M
Cascade - 14	Continue to maintain and operate current outdoor weather warning system.	Continue In-Progress	Inspect annually	2	M
Cascade - 15	Continue training weather spotters through Cascade Fire Department.	Continue In-Progress	Train new people	4	H
Cascade - 16	Install electrical distribution lines underground.	Continue In-Progress	There were overhead electric lines throughout the community. There is an underground project in progress to bury all overhead electric lines.	2	H
Cascade - 17	Pursue active maintenance in checking storm sewer	Continue In-Progress	Ongoing	2	H

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
	system for debris.				
Cascade – 18	Rebuild or upgrade floodgates and culverts to prevent flooding.	Continue In-Progress	Made improvements in 2015	3	M
Cascade – 19	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Daily on working back-ups	3	M
Centralia - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress		2	M
Centralia - 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress		2	H
Centralia - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started		2	M
Centralia - 4	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress		2	M
Centralia - 5	Train personnel as weather spotters.	Continue In-Progress		4	M
Centralia - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress		3	H
Centralia - 7	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress		2	H
Centralia - 8	Consider building a tornado safe room for all new construction.	Continue In-Progress		2	M
Centralia - 9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress		3	M
Dubuque - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Some buildings completed and others will be on line as remodeling or new construction projects	2	M
Dubuque - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Got a HUD grant to increase culvert size; community continues to make improvements	2	L
Dubuque - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Outdoor warning is critical - especially for severe weather events. System needs to expand with development of outdoor recreation areas and must be maintained to provide maximum effectiveness.	2	H
Dubuque - 4	Obtain NOAA weather radios and Personal/Family Response Kits for every home in Dubuque County.	Continue - Not Started	No local funding available	2	M
Dubuque - 5	Train personnel as weather spotters.	Continue In-Progress	Classes offered each spring -new employees are encouraged to attend	4	M

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Dubuque - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Speaking engagements as needed through PIOs in Police, Fire and EMA	3	H
Dubuque - 7	Consider building a tornado safe room for all new construction.	Continue Not Started	Funding not available	2	M
Dubuque - 8	Flood Mitigation Bee Branch Stormwater Pump Station & Gate Replacement (16th Street Detention Basin)	Continue – In-Progress	Planning underway. Funding needed.	2	H
Dubuque - 9	Impervious Surface Reduction (240 Alleys)	Continue – In-Progress	Completed the conversion of 80 of the 240 alleys into a pervious pavement system. Funding needed.	3	H
Dubuque - 10	22nd Street/Kaufmann Avenue Storm Sewer Improvements	Continue – In progress	Completed segment between Bee Branch Creek and N. Mai Street. Additional funding needed to complete from N. Main to Kane Street.	3	H
Dubuque - 11	17th Street/W. Locust Street Storm Sewer Improvements	Continue – In-Progress	Completed the segment between Pine Street to Bee Branch and from Heeb Street to Rosedale & W. Locust streets.	3	H
Dubuque – 12	Flood Mitigation Maintenance Facility	Continue – In-Progress	Funding needed.	3	H
Dubuque – 13	North End Storm Sewer Improvement (25th - 30th Streets)	Continue – In-Progress	Funding needed.	3	H
Dubuque – 14	Water Plant Flood Control (Floodwall and Stormwater Conveyances)	Continue – In-Progress	Funding needed.	3	H
Dubuque – 15	Back-Up Power for Cooling Center at Ice Arena	Continue – In-Progress	Funding needed.	2, 4	M
Dubuque – 16	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Dubuque continues to maintain NFIP Participation	1	M
Dubuque – 17	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Updates as needed	2	M
Dubuque – 18	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	City allocates money to ensure data is accessible	3	M
Dubuque – 19	Continue to maintain 25 existing generators and infrastructure to operate city facilities in the event of a power outage.	Continue In-Progress	Maintenance contracts and testing on a regular basis	2, 4	H
Dubuque – 20	Maintain a Business Continuity Plan to address day-to-day City business operations.	Continue Not Started	Departments have information needed - staff time costs	4	M
Dubuque – 21	Continue to promote the use of NOAA indoor weather radios at residences, schools, hospitals, nursing homes, etc., throughout the city.	Continue In-Progress	Obtain and provide NOAA weather radios from grant opportunities and ensure all public buildings have the radios	1	M
Dubuque – 22	Continue to maintain, enforce, and update building codes as needed.	Continue In-Progress	Staff time dedicated	3	H



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Dubuque – 23	Restore the Bee Branch Creek with open channel from the 24 <sup>th</sup> St. neighborhood to E. 16 <sup>th</sup> St. retention basin, including the acquisition of approximately 70 homes and businesses.	Continue In-Progress	In progress - see attached update. To date over 100 homes and businesses have been purchased.	2	H
Dubuque – 24	Continue ongoing maintenance and monitoring of the City of Dubuque's flood control system (floodwall) as mandated by federal law.	Continue In-Progress	Levee breach committee meetings and training. Look for ways to enhance, and improve the infrastructure – especially the I wall concrete sections.	1, 2, 4	H
Dubuque – 25	Maintain awareness of repetitive loss properties to identify potential areas of risk to life and safety of residents and consider pursuing grant funds for the acquisition and demolition of these properties.	Continue In-Progress	Dubuque has purchased properties and will make it a priority to continue in the future as properties are identified and funding is available	4	H
Dubuque – 26	Make required improvements based on the outcome of the Levee Flood Certification.	Continue In-Progress	Maintain funding and certification	2	L
Dubuque – 27	Continue to update and maintain Levee Breach Study to determine scenarios in the event of levee failure.	Continue In-Progress	The process is ongoing; process is continual and continues to be updated and maintained (change language of strategy)	2	M
Dubuque – 28	Maintain and repair storm sewers as necessary.	Continue In-Progress	Ongoing maintenance program	4	M
Dubuque – 29	Continue to monitor public retaining walls of concern that may require maintenance or rebuilding.	Continue In-Progress	As needed	3	H
Dubuque – 30	Evaluate ownership and work with responsible entities to mitigate any hazardous situations related to retaining walls in the City of Dubuque.	Continue In-Progress	As needed	2	M
Dubuque – 31	Continue to work with FEMA to buyout flood damaged homes.	Continue In-Progress	Dubuque has purchased properties and will make it a priority to continue in the future as properties are identified and funding is available	2	H
Dubuque – 32	Continue to implement storm water management and flood control improvements outlined in the Drainage Basin Master Plan	Continue In-Progress	Carter Road, 32nd	2	H
Dubuque – 33	Continue to maintain floodplain management ordinances.	Continue In-Progress	Ongoing program	1	H
Dubuque – 34	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	Continue – In-Progress	As needed.	1	H
Dubuque – 35	Purchase and install generator and equipment for Multi-Cultural Family Center as community shelter.	New	Funding needed.	2,4	M
Dubuque – 36	Purchase and install infrastructure facilities and equipment for additional community shelters, especially for vulnerable populations using a Resilience Hub mode to build community capacity.	New	Site identification and funding needed.	2,4	M

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Dubuque – 37	Make railroad crossing improvements to protect water plant, residential neighborhoods.	New	Funding needed	1,2	H
Dubuque – 38	Increase tree canopy to reduce urban heat island effect, protect from severe weather events.	New	\$1.5M urban forestry grant received in 2023.	1, 2	M
Dubuque – 39	Strengthen residential education in culturally-appropriate and accessible ways, especially regarding flooding and flood insurance.	New	Funding needed.	2	M
Durango - 1	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Money budgeted for maintenance and upkeep as needed	2	H
Durango - 2	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	No local funding available	2	M
Durango - 3	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Projects identified as needed	2	H
Durango - 4	Consider building a tornado safe room for all new construction.	Continue In-Progress	Ongoing	2	M
Durango - 5	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Durango continues to maintain NFIP Participation	1	M
Durango - 6	Continue dialog with Dubuque County & DNR regarding flood mitigation pertaining to depth/width and debris in nearby waterways, and implement any solutions identified	Continue In-Progress	No local funding available	2	M
Durango - 7	Continue to pursue flood mitigation including buyouts.	Continue In-Progress	Ongoing	2	H
Durango - 8	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	Continue – Not started	Have not needed at this time.	1	H
Dyersville - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Update as needed	2	M
Dyersville - 2	Continue to address storm water runoff through development agreements for all commercial industrial and residential subdivision developments. The Planning & Zoning Commission, along with City staff, will review developments and work to assure storm water runoff issues are addressed in development agreements when appropriate.	Continue In-Progress	We prepare an agreement on each development	3	H
Dyersville - 3	Continue to enforce storm water ordinances.	Continue In-Progress	Prepare an agreement on each development.	2	H
Dyersville - 4	Continue to enforce Dyersville floodplain ordinance and National Flood Insurance Program regulations. The City Administrator is designated as the local Floodplain Manager and enforcement person.	Continue In-Progress	Ongoing enforcement	1	H

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Dyersville - 5	Continue to closely monitor development of land surrounding the city and potential for the creation of hazards to the city. The City Administrator will monitor and review land developments around the city and provide comments as appropriate.	Continue In-Progress	Implemented comp plan and using GIS for info for monitoring.	1	L
Dyersville - 6	Continue to maintain storm sewer system including the dry runs that serve as open channel drainage ditches.	Continue In-Progress	Implemented Asset Management Software	4	H
Dyersville - 7	Continue to improve storm sewer system as a component of the City's regular street improvement program.	Continue In-Progress	Annually	1	M
Dyersville - 8	Continue to maintain and make improvements to the sanitary sewer system to reduce infiltration, including such projects as the installation of bolt- down covers on manholes in the floodplain areas and inspections of lift stations seals, etc. in the flood plain. The Public Works Department Head will recommend improvements to the City Administrator for inclusion in the city budget as funding allows.	Continue In-Progress	Annually	2	H
Dyersville - 9	Continue to work with appropriate agencies to identify effective physical means to minimize flooding.	Continue In-Progress	Annually	2	H
Dyersville – 10	Continue to identify and publicize location and availability of storms shelters, and add new shelters as required and available	Continue In-Progress	Annually	2	H
Dyersville - 11	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Annually addressed	2	L
Dyersville – 12	Continue to encourage the National Weather Service to add a weather transmitter tower to their system or relocate their existing tower to better serve the City of Dyersville.	Continue In-Progress	Added 3 monitor sites with Iowa Flood Center.	2	L
Dyersville - 13	Continue to evaluate and monitor potential risks with utility placements.	Continue In-Progress	Using Asset Management Software	4	H
Dyersville - 14	Continue to remove dead trees/prune trees and clean areas vulnerable to high winds. The Public Works Department Head will monitor trees within City right-of-way and continue to remove dead trees/prune trees vulnerable to high winds.	Continue In-Progress	Using Asset Management Software and inspect all trees	2	H
Dyersville - 15	Continue acquisition of flood-damaged properties through current and future State- and FEMA-funded programs and/or other programs and marketing of the programs to floodplain residents.	Continue In-Progress	Continue with the buyout of key properties	2	H

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Dyersville - 16	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	Using Alert Iowa and update barricades as needed	2	M
Dyersville - 17	Train personnel as weather spotters.	Continue In-Progress	Annually	4	M
Dyersville - 18	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Communicate through news media, city website and through code red	3	H
Dyersville - 19	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Annually	2	H
Dyersville - 20	Consider building a tornado safe room for all new construction.	Continue In-Progress	Encourage property owners to build	2	M
Dyersville - 21	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Floodplain Ord. updated 2020	1	M
Dyersville - 22	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Maintain our GIS system and enhanced are asset management system	2	M
Dyersville - 23	Create and maintain call down list of all critical personnel.	Continue In-Progress	Updated annually	3	M
Dyersville – 24	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Moved critical data to the cloud	3	M
Dyersville – 25	Continue flood watch protocol whereby river elevations are regularly monitored during potential flood events. Included in this protocol is the need to purchase cameras to assist in monitoring river levels from remote locations. The protocol includes defined responses to the various river elevations.	Continue In-Progress	Installed flood monitoring equipment with Iowa Flood Center	2	H
Dyersville – 26	River and creek restoration to reduce flood impacts and damages.	New	Funding needed	1	H
Dyersville – 27	Complete flood study through BRIC grant to compile data identifying potential flood impact areas and a cost/benefit analysis for capital improvement projects.	New	Received \$250,000 FEMA BRIC grant and bid from Impact 7G.		
Epworth - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Epworth - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Ongoing as needed.	2	H

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Epworth - 3	Install back flow preventers in the new construction developments.	Continue In-Progress	Ongoing as needed.	2	M
Epworth - 4	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Money budgeted through fire department budget for batteries, maintenance, and upkeep	2	H
Epworth - 5	Continue to require underground burial of power lines in new subdivisions.	Continue In-Progress	Is required per ordinance	2	H
Epworth - 6	Continue to utilize Fire Station for accommodations for persons suffering from extreme heat or wind-chill conditions.	Continue In-Progress	As needed	2	H
Epworth - 6	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	No local funding available	2	M
Epworth - 7	Train personnel as weather spotters.	Continue In-Progress	Classes offered each spring - new employees are encouraged to attend	4	M
Epworth - 8	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Speaking engagements as needed through PIOs in Police, Fire and EMA	3	H
Epworth - 9	Consider building a tornado safe room for all new construction.	Continue Not Started	No local funding available	2	M
Epworth - 10	Continue to conduct education programs at schools during Fire Prevention Week.	Continue In-Progress	annually conducted and as requested	4	H
Epworth - 11	Identify and equip potential shelters in Epworth to provide safe locations for persons during an emergency	Continue In-Progress	Ongoing	2	M
Epworth - 12	Purchase and maintain backup generators for sewer lift stations	Continue – In-progress	Generators were purchased and maintenance is ongoing	3	H
Epworth - 13	Develop a hazard recovery plan that includes hazard mitigation as part of the recovery process	Continue – Not Started		4	M
Epworth - 14	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Community continues to maintain NFIP Participation	1	M
Epworth - 15	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Updates as needed	2	M
Epworth - 16	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	City allocates money to ensure data is accessible	3	M
Epworth - 17	Buy out, acquire, and demolish damaged, vulnerable, or endangered structures	Continue – Not Started	Will implement as needed	1	H

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Farley - 1	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	1 culvert and a detention pond were completed in 2020. Lift station has not been installed yet.	2	H
Farley - 2	Protect Waste Water Treatment Center from Flooding by developing a retention/ detention area to the SW of the WWTP. Create a retention/ detention area to the SE of the WWTP with a bypass storm water pipe.	Continue In-Progress	SW is complete. SE still needs to be done when funding becomes available.	2	H
Farley - 3	Upgrade city storm sewer system to prevent future residential, business, and city infrastructure flood damage.	Continue In-Progress	Need funding	2	H
Farley - 4	Consider building a tornado safe room for all new construction.	Continue In-Progress	City has a storm shelter at new city hall but will consider with each construction project.	2	M
Farley - 5	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Farley - 6	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Farley has capability but is understaffed.	2	M
Farley - 7	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	This will be incorporated into a radium removal facility that is currently being constructed.	3	M
Farley - 8	Purchase and install generator and hookup at fire station to use in the event of an emergency.	New			
Graf - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Graf - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Ongoing	2	L
Graf - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue In-Progress	As funding permits	2	M
Graf - 4	Train personnel as weather spotters.	Continue In-Progress	Ongoing	4	M
Graf - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, and social media	Continue In-Progress	Ongoing	3	H
Graf - 6	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Have maintained flood catch basin	2	H
Graf - 7	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Community continues to maintain NFIP Participation	1	M

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Graf - 8	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Ongoing	3	M
Graf - 9	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	Continue – Not started	N/A	1	H
Holy Cross - 1	Obtain NOAA weather radios for every home in Dubuque County.	Continue In-Progress	Programs accessible for residents to acquire weather radios every year	2	M
Holy Cross - 2	Continue to pursue FEMA and other funding opportunities to replace weather siren.	Continue In-Progress	Applying for grant to replace an older siren	2	H
Holy Cross - 3	Train personnel as weather spotters.	Continue In-Progress	Managed by fire dept.	4	M
Holy Cross - 4	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Community continues to maintain NFIP Participation	1	M
Luxemburg - 1	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Money budgeted for maintenance and upkeep as needed	2	H
Luxemburg - 2	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	No local funding available	2	M
Luxemburg - 3	Continue Good Neighbor Program where volunteers check on welfare of residents following a severe weather event.	Continue In-Progress	No local funding available	2	H
Luxemburg - 4	Upgrade storm sewers to prevent flash flooding in times of heavy downfall of rain.	Continue In-Progress	No local funding available	4	H
Luxemburg - 5	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Projects identified as needed	2	H
Luxemburg - 6	Consider building a tornado safe room for all new construction.	Continue In-Progress	No local funding available	2	M
Luxemburg - 7	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Luxemburg continues to maintain NFIP Participation	1	M
New Vienna - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Fire dept/sewer system	2	M
New Vienna - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Larger lines installed	2	H
New Vienna - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue In-Progress	Give some away every year	2	H
New Vienna - 4	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	Info always available	2	M
New Vienna - 5	Establish Good Neighbor program for winter storms.	Continue In-Progress	Open communications	3	H

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New Vienna - 6	Continue to monitor river levels and areas that have experienced flash flooding in the past and add new stream gauges.	Continue In-Progress	Monitor 2 creeks during heavy rains	3	H
New Vienna - 7	Train personnel as weather spotters.	Continue In-Progress	Training updated yearly	4	H
New Vienna - 8	Continue to enforce flood plain ordinances.	Continue In-Progress	Monitored daily	2	H
New Vienna - 9	Continue to utilize Mercy St. Mary's in Dyersville, US Post Office, and VFW Club in New Vienna as facilities for individuals suffering from extreme heat.	Continue In-Progress	Facilities are available except post	1	H
New Vienna - 10	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Info always available	3	H
New Vienna - 11	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Flood wall added	2	H
New Vienna - 12	Consider building a tornado safe room for all new construction.	Continue In-Progress	Looking into different options	2	H
New Vienna - 13	Build another access road on higher ground to waste water treatment facility.	Continue In-Progress	Checking for best route	1	H
New Vienna - 14	Maintain or consider NFIP membership as required.	Continue In-Progress	Have NFIP membership	1	M
New Vienna - 15	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Upgrading our info	2	M
New Vienna - 16	Create and maintain call down list of all critical personnel.	Continue In-Progress	System upgraded	3	M
New Vienna - 17	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Upgrading as needed	3	M
New Vienna - 18	Buy out, acquire, and demolish damaged, vulnerable, or endangered structures.	Continue – Not Started	On an as needed basis	1	H
Peosta - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress		2	M
Peosta - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress		2	L
Peosta - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress		2	H
Peosta - 4	Obtain NOAA weather radios for every home in Dubuque County.	Continue In-Progress		2	M



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Peosta - 5	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress		2	M
Peosta - 6	Train personnel as weather spotters.	Continue In-Progress		4	M
Peosta - 7	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress		3	H
Peosta - 8	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	City has contracted with IIW to do a storm water study, including mapping, and identifying future capital improvement projects	2	H
Peosta - 9	Consider building a tornado safe room for all new construction.	Continue In-Progress		2	M
Peosta - 10	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Peosta 11	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress		2	M
Peosta - 12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress		3	M
Peosta - 13	Trim trees or remove trees that are potential risk to city properties and infrastructures.	Continue In-Progress		1	H
Peosta - 14	Utilize the Peosta Community Centre as a shelter for persons suffering from Extreme Heat.	Continue In-Progress		2	H
Rickardsville - 1	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Rickardsville - 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Ongoing	2	H
Rickardsville - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Ongoing	2	M
Rickardsville - 4	Train personnel and citizens as weather spotters.	Continue In-Progress	Ongoing	4	M
Rickardsville - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Ongoing	3	H
Rickardsville - 6	Establish and maintain agreement with St. Joseph Parish to designate church hall as shelter for the community in the event of extreme heat or other hazards.	Continue Not Started	Ongoing		H

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Rickardsville - 7	Continue to add needed infrastructure to mitigate flood damage at lagoon and baseball park	Continue In-Progress	Ongoing	2	H
Rickardsville - 8	Consider building a tornado safe room for all new construction.	Continue In-Progress	Ongoing	2	M
Rickardsville - 9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Ongoing	3	M
Sageville - 1	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Ongoing	2	L
Sageville - 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Ongoing	2	H
Sageville - 3	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Ongoing	2	M
Sageville - 4	Train personnel as weather spotters.	Continue In-Progress	Ongoing	4	M
Sageville - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Ongoing	3	H
Sageville - 6	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Ongoing	2	H
Sageville - 7	Consider building a tornado safe room for all new construction.	Continue In-Progress	Ongoing	2	M
Sageville - 8	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Sageville - 9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Ongoing	3	M
Sageville - 10	Continue to explore FEMA grant to assist in flood buyouts of damaged homes, land, and mobile homes.	Continue Not Started	Ongoing	2	H
Sherrill - 1	Utilize the Sherrill Fire Station with generator back up to accommodate citizens in the community during extreme heat or wind chill conditions.	Continue In-Progress	Ongoing	2	H
Sherrill - 2	Provide backup power generators and wiring for critical facilities.	Continue In-Progress	Ongoing	2	M
Sherrill - 3	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	Ongoing	2	L

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Sherrill - 4	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Ongoing	2	H
Sherrill - 5	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Ongoing	2	M
Sherrill - 6	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	Ongoing	2	M
Sherrill - 7	Train personnel as weather spotters.	Continue In-Progress	Ongoing	4	M
Sherrill - 8	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Ongoing	3	H
Sherrill - 9	Continue to add needed infrastructure to mitigate flood damage.	Continue In-Progress	Ongoing	2	H
Sherrill - 10	Consider building a tornado safe room for all new construction.	Continue In-Progress	Ongoing	2	M
Sherrill - 11	Maintain or consider NFIP membership as required.	Continue In-Progress	Ongoing	1	M
Sherrill - 12	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	Continue In-Progress	Ongoing	2	M
Sherrill - 13	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	Ongoing	3	M
Worthington - 1	Provide backup power generators and wiring for critical facilities including but not limited to Memorial Hall, Fire Station, and City Hall.	Continue In-Progress	Backup generators are in place at both sewer plant and water tower and in good working condition.	2	M
Worthington - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue In-Progress	The current sewer lift station is in good working condition; however, curb and gutter may be replaced soon on 1st Avenue East, where the biggest problem of flooding occurs. Working on grant next year.	2	L
Worthington - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue In-Progress	Tested each month, and records of their working condition is kept at City Hall.	2	H
Worthington - 4	Purchase barricades and signage as deemed necessary to better communicate information.	Continue In-Progress	Do have road barricades and traffic cones that assist with hazard/safety communication to citizens	2	M
Worthington - 5	Train personnel as weather spotters.	Continue In-Progress	The city fire department has this performed regularly	4	H

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Worthington - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue In-Progress	Critical information continues to be shared with citizens through Code Red, posting, and newsletters.	3	H
Worthington - 7	Maintain fire hydrant with current flushing and testing programs in place.	Continue In-Progress	This is regularly performed by Water/Wastewater Operator	4	H
Worthington - 8	Accommodate citizens at the Community Center in the event of extreme heat.	Continue In-Progress	This is a plan; however, the city has not done recently as no need present	2	H
Worthington - 9	Consider building a tornado safe room for all new construction.	Continue In-Progress	This is something to keep in mind for future construction, but the city has not had new construction in many years.	2	M
Worthington - 10	Maintain NFIP membership and meet all program requirements.	Continue In-Progress	Ongoing	1	M
Worthington - 11	Create and maintain call down list of all critical personnel.	Continue In-Progress	This list is maintained and kept in the City's fire station	2	M
Worthington - 12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue In-Progress	All physical and electronic data is back-upped with current software and heavy-duty, fireproof cabinets.	3	M
Worthington - 13	Buy out, acquire, and demolish damaged, vulnerable, or endangered structures	Continue – Not Started	As need arises, will address.	1	H
Worthington – 14	Upgrade cyber security devices/firewalls	New	Increase in threats – funding		
Worthington – 15	Clean river vegetation near town	New	Decrease flash flood risk	Funding	
Worthington – 16	Increase and level land behind fire station and city hall	New	Decrease flood risk	Funding	
Zwingle - 1	Provide backup power generators and wiring for critical facilities.	Continue Not Started	A backup generator is needed to keep the waste wastewater system working properly and can be set up to keep lights and power in the city facilities when the power is out.	2	M
Zwingle - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	Continue Not Started	Need to prepare to be able to set up road blocks and sand bags if needed. Need to have a plan in case of an emergency. Need to make sure we have adequate equipment cones signs etc.	2	L
Zwingle - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	Continue Not Started	Need to update the siren and test and make sure it is properly working a regular monthly check needs to be completed.	2	H
Zwingle - 4	Obtain NOAA weather radios for every home in Dubuque County.	Continue Not Started	Weather radios for each home would be great because the public is kept aware also with these radios	2	M

2024 Action ID	Action Summary	Action Status (Completed, Delete, Continue In- Progress, Continue Not Started, New)	Action Status Update	Goal Referenced	Priority
Zwingle - 5	Train personnel as weather spotters.	Continue Not Started	Educate the public to take classes also	4	M
Zwingle - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	Continue Not Started	Need to work up a emergency plan contacts, run through scenarios so we are aware of what is needed to survive	3	H
Zwingle - 7	Purchase backup generators and install hookups to provide electricity in the event of a power outage.	Continue Not Started	Backup generator is needed we also need to make sure we have the proper hookups and educated people to use it hook it up and keep it running	3	M
Zwingle - 8	Continue to add needed infrastructure to mitigate flood damage.	Continue Not Started	City needs to set up a safe shelter for the public as to weather, being homeless etc.	2	H
Zwingle - 9	Continue to employ Good Neighbor policy and Shelter in Place policy until better options are available.	Continue Not Started	In case of an emergency hold public classes such as CPR and other lifesaving education so the public can help and save someone's life.	2	H
Zwingle - 10	Consider building a tornado safe room for all new construction.	Continue Not Started	The city has the library but we need a safe place for the public to go as a shelter for safety during storms. This also could be used as a shelter if someone is displaced from their home.	2	M
Zwingle - 11	Maintain NFIP membership and meet all program requirements.	Continue in-Progress	Community continues to maintain NFIP Participation	1	M
Zwingle - 12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	Continue Not Started	Need to set up a data backup for city information and communications.	3	M
<b>SCHOOL DISTRICTS</b>					
Dubuque Public School District - 1	Develop policy to prevent construction in the floodplain of education buildings or supporting structures (such as bus barns or maintenance sheds).	Continue In-Progress	Ongoing	2	H
Dubuque Public School District – 2	Develop policy to better secure against cyber security breach	New	Recent data breach	2	
NICC - 1	Consider building a tornado safe room for all new construction.	Continue – Not Started		2	M
Western Dubuque Public School District - 1	Develop policy to prevent construction in the floodplain of education buildings or supporting structures (such as bus barns or maintenance sheds).	Continue In-Progress	We continue to review all construction projects to ensure there are no structure built in the floodplain.	1	H

**Table 4.2. Mitigation Action Implementation Strategy—Continuing and New Actions**

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
<b>Unincorporated County</b>								
Unincorporated County – 1		Funding	Dubuque County Emergency Management		Local funds	\$10,000 to \$50,000		3-5 yrs
Unincorporated County - 2		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Unincorporated County - 3		Funding	Dubuque County Secondary Roads		Local Funds	Little or no cost		3-5 yrs
Unincorporated County – 4	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills.	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Unincorporated County – 5		Funding	Dubuque Co EMA		Local funds	Little or no cost		1 yr
Unincorporated County - 6			Dubuque Zoning Administrator			\$50,000 to \$100,000		5 yrs
Unincorporated County – 7		NA	Dubuque County Zoning Administrator			Little or no cost		3-5 yrs
Unincorporated County - 8		Funding	Dubuque Co EMA		Local funds; FEMA	\$10,000 to \$50,000		
Unincorporated County - 9		Funding	Dubuque County Emergency Management		Local funds; EMPG	Little or no cost		1 yr
Unincorporated County – 10		Funding	Dubuque County Zoning Administrator			Little or no cost		3-5 yrs
Unincorporated County – 11		NA	Dubuque County Emergency Management			Little or no cost		3-5 yrs
Unincorporated County – 12		Funding	Dubuque County Emergency Management			Little or no cost		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Unincorporated County – 13		Funding	Dubuque County Zoning Administrator			Little or no cost		3-5 yrs
Unincorporated County – 14		Funding	Dubuque County Emergency Management			Less than \$10,000		3-5 yrs
Unincorporated County – 15		Funding	Dubuque County Zoning Administrator		Local funds	Less than \$10,000		3-5 yrs
Unincorporated County – 16		Funding	Dubuque County Emergency Management			Less than \$10,000		3-5 yrs
Unincorporated County – 17		Funding	Dubuque County Zoning Administrator			Little or no cost		3-5 yrs
Unincorporated County – 18		Funding	Dubuque County Secondary Roads			\$10,000 to \$50,000		1 yr
Unincorporated County – 19		Funding	Dubuque County Emergency Management			\$10,000 to \$50,000		1 yr
Unincorporated County – 20		Funding	Dubuque County Emergency Management			\$10,000 to \$50,000		3-5 yrs
Unincorporated County – 21		Funding	Dubuque County Emergency Management			\$10,000 to \$50,000		3-5 yrs
Unincorporated County – 22		Funding	Dubuque County Engineer			\$100,000 to \$500,000		3-5 yrs
Unincorporated County – 23		Funding	Dubuque County GIS		Local funds	Less than \$10,000		3-5 yrs
Unincorporated County – 24		Funding	Dubuque County Information Technology		Local funds	Less than \$10,000		1 yr
Unincorporated County – 25	Structures in the floodplain will be removed if located in a vulnerable area	Funding	Dubuque County Emergency Management		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Unincorporated County – 26	The current facility is out of space and requires expansion and new equipment.	Funding	Dubuque County BOS	City of Dubuque	County/City of Dubuque	\$5M	Better service, response time, capacity	3-5 years
Unincorporated County – 27	Safety in hazardous conditions.		Roads Dept				Safety while driving in dangerous/hazardous situations.	3-5 years.
Unincorporated County – 28	Repeated flooding has caused erosion and unstable banks, resulting in further flooding.		Engineering				Reduce flooding	3-5 years
<b>Jurisdictions</b>								
Asbury -1	Certain facilities are critical for the continuing operation, life safety and general needs of the community. Electrical outages can be caused by a variety of hazards, and can wreak havoc on the continued operations of these facilities. Backup generators provide an insurance policy that the benefits these critical facilities provide are available during a disaster situation	Funding	Asbury City Administrator		Local funds	\$10,000 to \$50,000	Redundancy for valuable information	3-5 yrs
Asbury - 2	Infrastructure in the floodplain can and should be strengthened or removed	Funding	Asbury City Administrator		Local funds	\$500,000 to \$1,000,000	Reduced vulnerability in hazard areas	3-5 yrs
Asbury - 3	Warning systems require continuous upgrades to ensure continued effectiveness for the community	NA	Asbury Public Works		FEMA Grant, Local funds	Less than \$10,000	Improved public safety	3-5 yrs
Asbury – 4		Funding	Asbury Public Works		Local Funds	Little or no cost	Improved public safety	3-5 yrs
Asbury – 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost	Improved public safety	1 yr



2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Asbury - 6		Funding	Asbury City Administrator		Local funds	\$10,000 to \$50,000	Improved public safety	1 yr
Asbury - 7			Asbury/Public Works		Local funds	Little or no cost		More than 5 yrs
Asbury - 8			Asbury/Fire Dept		Local funds; FEMA	Little or no cost		3-5 yrs
Asbury - 9	Asbury is mapped and continues to be a member in good standing in the NFIP	NA	Asbury City Administrator		Unknown	Little or no cost	Develop and implement good flood practices	More than 5 yrs
Asbury - 10		Funding	Asbury/ City Council		Local funds; FEMA grants	\$500,000 to \$1,000,000		3-5 yrs
Asbury - 11		Funding	Asbury/Public Works		Local funds	\$10,000 to \$50,000		3-5 yrs
Asbury - 12		Funding	Asbury/Public Works		Unknown	\$50,000 to \$100,000		More than 5 yrs
Asbury - 13		Funding	Asbury/Public Works		Unknown	\$100,000 to \$500,000		3-5 yrs
Asbury 14		Funding	Asbury Fire Department		Local funds	Little or no cost		More than 5 yrs
Asbury 15		Funding	Asbury City Administrator		Local funds	Less than \$10,000		3-5 yrs
Asbury - 16		Funding	Asbury City Administrator		Local funds	Less than \$10,000		1 yr
Asbury – 17		Funding	Public Works					
Asbury – 18	Not needed yet, but could become a concern.	NA	Administrator		Unknown	\$50,000 to \$100,000	Remove safety hazard.	Unknown
Balltown - 1		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Balltown - 2		Funding	Balltown Mayor		Local funds	Little or no cost		1 yr
Balltown - 3		Funding	Balltown Mayor		Local funds	Less than \$10,000		1 yr
Balltown – 4		None	City Clerk		Local funds	Staff time		

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Bankston - 1	To warn the citizens of Bankston of a tornado. The city siren is disconnected due to building was taken down.	Lack of funds	Bankston Mayor	None identified	FEMA Grant, Local funds, In-Kind	Less than \$10,000		2-3 yrs
Bernard - 1		Funding	Bernard City Council		Local funds	Little or no cost		3-5 yrs
Bernard - 2		NA	Bernard Fire Department		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Bernard - 3		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Bernard - 4		Funding	Bernard Mayor and City Council		Local Funds	Little or no cost		3-5 yrs
Bernard - 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	\$100,000 to \$500,000		1 yr
Bernard - 6		Funding	Bernard City Council		Local funds	Little or no cost		1 yr
Bernard - 7		Funding	Bernard City Council		Local funds	Little or no cost		More than 5 yrs
Bernard - 8			ALL		Unknown	\$50,000 to \$100,000		3-5 yrs
Bernard - 9	Account of hazardous materials that are being transported across the community and	Cost	Bernard Mayor and City Council	Fire Dept, EMA	FEMA Grant	\$100,000 to \$500,000	Protection from death and health issues	3-5 yrs
Bernard - 10	We currently have no place for our citizens that do not have a basement for protection. Keeping infrastructure and utilities available for citizens	Cost	Bernard Mayor, council, and Fire Department	EMA, Fire Dept.	FEMA Grant, In-Kind	\$100,000 to \$500,000	Protect and save life, keep people healthy	3-5 yrs
Bernard – 11	Our community has a high-water level table, when we get heavy rains our system cannot handle it and water goes where we do not need it	Cost - no local money available	Bernard Mayor and City Council	County EMA	FEMA Grant	\$50,000 to \$100,000	Keeping water out of basements and city utilities	3-5 yrs
Bernard – 12		NA	Bernard City Council		Unknown	Little or no cost		3-5 yrs
Bernard – 13		Funding	Bernard City Council		Local funds	Less than \$10,000		3-5 yrs
Bernard 14		Funding	Bernard Mayor and City Council		Unknown	\$10,000 to \$50,000		3-5 yrs
Bernard – 15		NA	Bernard City Council			Little or no cost		1 yr

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Bernard – 16		Funding	Bernard Mayor		Local funds	\$10,000 to \$50,000		1 yr
Bernard – 17		Funding	Bernard Mayor		Local funds	Less than \$10,000		1 yr
Cascade - 1		Funding	Cascade City Administrator		Local funds	\$10,000 to \$50,000		3-5 yrs
Cascade - 2		Funding	Cascade City Council		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Cascade - 3		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Cascade - 4		Funding	Cascade Public works		Local Funds	Little or no cost		3-5 yrs
Cascade - 5		Funding	Cascade City Administrator		Local funds	Little or no cost		1 yr
Cascade - 6		Funding	Cascade/Public Works Director		Local funds	\$10,000 to \$50,000		More than 5 yrs
Cascade - 7			Cascade City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Cascade - 8		NA	Cascade City Administrator		Unknown	Over \$1,000,000		3-5 yrs
Cascade - 9		Funding	Cascade City Administrator		Local funds	Less than \$10,000		3-5 yrs
Cascade - 10		NA	Cascade Fire		Local funds	Little or no cost		1 yr
Cascade - 11		NA	Cascade City Administrator		Local funds	Little or no cost		3-5 yrs
Cascade - 12		Funding	Cascade City Administrator		Local funds	Little or no cost		1 yr
Cascade - 13		Funding	Cascade City Administrator		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Cascade - 14		Funding	Cascade Public works		Local funds	Over \$1,000,000		3-5 yrs
Cascade - 15		NA	Cascade Fire	Dubuque County EMA	Local funds	Little or no cost		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Cascade - 16	There were overhead electric lines throughout the community. There is an underground project in progress to bury all overhead electric lines.	Time - obtaining necessary easements	Cascade Municipal Utilities	None identified	Local funds	\$500,000 to \$1,000,000	Electric lines will not come down during summer or ice storms	More than 5 yrs
Cascade - 17		NA	Cascade Public works		Unknown	NA		3-5 yrs
Cascade - 18		Funding	Cascade City Administrator		Local funds	Less than \$10,000		1 yr
Cascade - 19	Structures in the floodplain will be removed if located in a vulnerable area	Funding	City Administrator		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Centralia - 1		Funding	Centralia Mayor		Local funds	\$10,000 to \$50,000		3-5 yrs
Centralia - 2		NA	City of Centralia		FEMA Grant, Local funds	\$500,000 to \$1,000,000		3-5 yrs
Centralia - 3		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Centralia - 4		Funding	Centralia Mayor		Local Funds	Little or no cost		3-5 yrs
Centralia - 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Centralia - 6		Funding	Centralia Mayor and EMA		Local funds	Little or no cost		1 yr
Centralia - 7		Funding	Centralia/EMC/May or		Local funds	\$10,000 to \$50,000		More than 5 yrs
Centralia - 8			Centralia City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Centralia - 9		Funding	Centralia City Council		Local funds	Less than \$10,000		1 yr

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dubuque - 1		Funding	City of Dubuque Engineering Department		Local funds	\$10,000 to \$50,000		3-5 yrs
Dubuque - 2		Funding	City of Dubuque Engineering Department		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Dubuque - 3	Outdoor warning siren is critical - especially for severe weather events. System needs to expand with development of outdoor recreation areas and must be maintained to provide maximum effectiveness	Funding through Fire Dept. budget for maintenance, funding for expansion and acceptable locations for installation	City of Dubuque Fire Dept and EMA	Local electric utility and City Public Works, 911 Comm Center and County EMA	FEMA Grant, Local funds	\$50,000 to \$100,000	Early warning of severe weather or other hazard to people that are outdoors in an affected area	3-5 yrs
Dubuque - 4		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Dubuque - 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Dubuque - 6		Funding	Dubuque Public Information Office and EMA		Local funds	Little or no cost		1 yr
Dubuque - 7			Dubuque Housing Services		Unknown	\$50,000 to \$100,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dubuque - 8	Improve street drainage by improving upstream detention and by improving the storm sewer system on Hillcrest Road, east of Rosemont	Funding, private property ownership	City of Dubuque Engineering Department		FEMA Grant, Local funds	\$10,000 to \$50,000	Improving pavement drainage in the area would reduce private property damage and transportation safety due to flooding on Hillcrest Rd during heavy rain events.	3-5 yrs
Dubuque - 9	Replace impervious surfaces in 240 alleys throughout the city	Funding	City of Dubuque Engineering Department			Over \$1,000,000		More than 5 yrs
Dubuque - 10	Improvements necessary to the storm sewer on 22nd street	Funding	City of Dubuque Engineering Department			Over \$1,000,000		3-5 yrs
Dubuque - 11	Improvements necessary to the storm sewer on 17th street	Funding	City of Dubuque Engineering Department			Over \$1,000,000		3-5 yrs
Dubuque - 12		Funding	City of Dubuque Engineering Department			Over \$1,000,000		3-5 yrs
Dubuque - 13		Funding	City of Dubuque Engineering Department			Over \$1,000,000		More than 5 yrs
Dubuque - 14		Funding	City of Dubuque Water Plant Manager			Over \$1,000,000		More than 5 yrs
Dubuque - 15	The Ice Arena currently serves as a cooling center during extreme heat events, but during peak energy usage hours, the Arena may be forced to accept a power interruption. Providing a backup generator to the facility will ensure continued operation as a community cooling center.		City of Dubuque Leisure Services and EMA	Mystique Ice Center	FEMA Grant	\$10,000 to \$50,000	Will ensure residents have a place to go to stay cool during extreme heat events	3-5 yrs
Dubuque - 16		NA	City of Dubuque Planning Services		Unknown	Little or no cost		3-5 yrs
Dubuque - 17		Funding	Dubuque GIS		Local funds	Less than \$10,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dubuque - 18		Funding	City of Dubuque Information Services Manager		Local funds	Less than \$10,000		1 yr
Dubuque - 19	Maintenance of existing generator equipment helps assure that the equipment will perform as designed when needed.	None currently	Public Works/Water/Water and Resources Recovery Center/Fire Building/Leisure Services	Private generator service contractors	Local funds	\$10,000 to \$50,000		3-5 yrs
Dubuque - 20		Funding	City of Dubuque EOC Committee and Department Heads		Unknown	Little or no cost		1 yr
Dubuque - 20		Funding	EMA		Unknown	Little or no cost		3-5 yrs
Dubuque - 21		Funding	Dubuque Housing Services		Unknown	Less than \$10,000		3-5 yrs
Dubuque - 22	Maintenance of the existing flood control system helps ensure that the equipment will perform as designed when needed. The Bee Branch gates have been identified as a project in need of replacement. The gates and pumping system were in place prior to the construction of the flood control system and is need of replacement and upgrades. Design of the "T" walls are also under review.	Additional funding to maintain the existing flood control system	Dubuque Public Works/Engineering Dept.	US Army Corps of Engineers	FEMA Grant, Local funds, In-Kind	Over \$1,000,000	Reduce damage and loss business due to Mississippi River flooding	More than 5 yrs
Dubuque - 23		Funding	City of Dubuque Planning Services		Unknown	Little or no cost		3-5 yrs
Dubuque - 24		Funding	City of Dubuque Public Works and Engineering		Unknown	Less than \$10,000		3-5 yrs
Dubuque - 28		Funding	City of Dubuque Engineering Department		Unknown	Little or no cost		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dubuque - 29		Funding	City of Dubuque Public Works and Engineering		Unknown	Less than \$10,000		3-5 yrs
Dubuque 30		Funding	City of Dubuque Engineering Department		Unknown	Less than \$10,000		3-5 yrs
Dubuque - 31		Funding	City of Dubuque Engineering Department		Unknown	\$500,000 to \$1,000,000		3-5 yrs
Dubuque - 32		Funding	City of Dubuque Planning Services		Unknown	Over \$1,000,000		3-5 yrs
Dubuque - 33		Funding	City of Dubuque Public Works and Engineering			\$500,000 to \$1,000,000		3-5 yrs
Dubuque - 34		NA	Dubuque Planning Services Manager		Unknown	Little or no cost		3-5 yrs
Dubuque - 35	Structures in the floodplain will be removed if located in a vulnerable area	Funding	City of Dubuque Public Works and Engineering		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Dubuque - 36								
Dubuque – 37								
Dubuque – 38			Parks & Recreation Manager			\$1.5M grant	Reduce heat	3-5 years
Dubuque – 39		Funding/staff	Public Information		Local funds	Less than \$10,000	Better preparedness	1-3 years
Durango - 1		NA	Durango Mayor and EMA		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Durango - 2		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs



2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Durango - 3		Funding	Durango Mayor		Local funds	\$10,000 to \$50,000		More than 5 yrs
Durango - 4			Durango City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Durango – 5		NA	Durango Mayor		Unknown	Little or no cost		3-5 yrs
Durango – 6		Funding	City of Durango Mayor, Council and ECIA		Unknown	\$500,000 to \$1,000,000		3-5 yrs
Durango – 7	Structures in the floodplain will be removed if located in a vulnerable area	Funding	City of Durango Mayor, Council and ECIA		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Dyersville - 1		Funding	Dyersville City Administrator		Local funds	\$10,000 to \$50,000		3-5 yrs
Dyersville - 2		Funding	Dyersville/Planning & Zoning/City Staff		Unknown	\$10,000 to \$50,000		3-5 yrs
Dyersville - 3		Funding	Dyersville/Planning & Zoning/City Staff		Unknown	Little or no cost		3-5 yrs
Dyersville - 4		Funding	Dyersville/Planning & Zoning/City Staff		Unknown	Little or no cost		3-5 yrs
Dyersville - 5		Funding	Dyersville/Planning & Zoning/City Staff		Unknown	\$10,000 - \$25,000		3-5 yrs
Dyersville - 6		Funding	Dyersville City Administrator		Local funds	Little or no cost		3-5 yrs
Dyersville – 7		Funding	City of Dyersville Administrator		Local funds	\$100,000 to \$500,000		1 yr
Dyersville – 8		Funding	Dyersville EMA and City Administrator		Local funds	Over \$1,000,000		3-5 yrs
Dyersville – 9		Funding	Dyersville City Administrator		Unknown	Over \$1,000,000		3-5 yrs
Dyersville – 10		Funding	Dyersville City Administrator		Unknown	Little or no cost		3-5 yrs
Dyersville – 11		Funding	Dyersville City Administrator		Local funds	\$500,000 to \$1,000,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dyersville – 12	Dyersville Continue to encourage the National Weather Service to add a weather transmitter tower to their system or relocate their existing tower to better serve the city.	Funding	Dyersville EMA and City Administrator		Unknown	Little or no cost		3-5 yrs
Dyersville – 13		Funding	Dyersville City Administrator		Unknown	Little or no cost		3-5 yrs
Dyersville – 14		Funding	Dyersville Public Works		Unknown	\$10,000 to \$50,000		3-5 yrs
Dyersville – 15		Funding	Dyersville City Administrator		Unknown	Over \$1,000,000		3-5 yrs
Dyersville – 16		Funding	Dyersville Public Works		Local Funds	Little or no cost		3-5 yrs
Dyersville – 17	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Dyersville – 18		Funding	Dyersville EMA and City Administrator		Local funds	Little or no cost		1 yr
Dyersville – 19		Funding	Dyersville City Administrator		Local funds	\$10,000 to \$50,000		More than 5 yrs
Dyersville – 20			Dyersville/Planning & Zoning/City Staff		Unknown	\$50,000 to \$100,000		3-5 yrs
Dyersville – 21		NA	Dyersville City Administrator		Unknown	\$100,000 to \$500,000		3-5 yrs
Dyersville – 22		Funding	Dyersville City Administrator		Local funds	Less than \$10,000		3-5 yrs
Dyersville – 23		Funding	Dyersville City Administrator		Local funds	Little or no cost		1 yr
Dyersville – 24		Funding	Dyersville City Administrator		Local funds	Less than \$10,000		1 yr
Dyersville – 25		Funding	Dyersville City Administrator		Unknown	\$50,000 to \$100,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Dyersville – 26		Funding	Dyersville City Administrator		Unknown	\$500,000		3-5 yrs
Dyersville – 27	River and creeks have not been maintained for years and new practice will help reduce flood impacts & damage due to flash flood events.	In progress	Dyersville City Administrator		FEMA	\$250,000 FEMA grant		1 -3 years
Epworth - 1		Funding	Epworth Public Works		Local funds	Over \$1,000,000		3-5 yrs
Epworth - 2	Reduce effects of flooding	Costs	Epworth Public Works	None identified	Local funds	\$500,000 to \$1,000,000	Property loss avoidance	3-5 yrs
Epworth - 3		NA	Epworth City Council		Unknown	Less than \$10,000		3-5 yrs
Epworth - 4		NA	Epworth Public Works		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Epworth - 5		NA	Epworth City Council		Unknown	Little or no cost		1 yr
Epworth - 6		NA	Epworth Fire Department and EMA		Unknown	Less than \$10,000		3-5 yrs
Epworth - 6		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Epworth - 7	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Epworth - 8		Funding	Epworth Clerk and Fire		Local funds	Little or no cost		1 yr
Epworth - 9			Epworth City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Epworth - 10	Epworth Continue to conduct education programs at schools during Fire Prevention Week		Epworth Fire		Unknown	Little or no cost		1 yr

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Epworth - 11	To offer shelter to vulnerable populations in the event of extreme heat or tornado/windstorm	Awareness and lack of transport	Epworth Public Works	Volunteers, City officials	In-Kind	Little or no cost	Ensuring safety of citizens	2-3 yrs
Epworth - 12	Backup power to sewer lift stations	Cost	Epworth Public Works	None identified	Local funds	Less than \$10,000	Portable units allow for use where need it	3-5 yrs
Epworth - 13	Recovery Plan and relocation for temporary operations	Unknown	Epworth Mayor and City Council	City officials	FEMA Grant, Local funds, In-Kind	\$10,000 to \$50,000	Avoid interruption of city services and response	1 yr
Epworth - 14		NA	Epworth City Council		Unknown	Little or no cost		3-5 yrs
Epworth - 15		Funding	Public Works		Local funds	Less than \$10,000		3-5 yrs
Epworth - 16			All departments		Local funds	Less than \$10,000		1 yr
Epworth - 17	Structures in the floodplain will be removed if located in a vulnerable area	Funding	Epworth City Council		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Farley - 1	Need to elevate lift station out of flood zone and add curb and gutters to street in flood zone. Also need to increase culvert size.	Funding	Public Works	None identified	Local funds	\$50,000 to \$100,000	Reduce flooding of properties during heavy rain events.	3-5 yrs
Farley – 2	During heavy rains, our waste water treatment plant sometimes floods causing untreated wastewater to get into the stream.	Funding	Farley Public Works	None identified	Local funds	\$50,000 to \$100,000	Avoid untreated wastewater getting into stream	More than 5 yrs
Farley – 3	Properties flood during major rain events	Funding	Farley Public Works	None identified	Local funds	\$100,000 to \$500,000	Reduce flooding of properties during heavy rain events.	3-5 yrs
Farley – 4			Farley City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Farley – 5		NA	Farley City Council	Unknown	Local funds	Little or no cost	ALL	3-5 yrs
Farley 6	Infrastructure cannot be easily located due to outdated and incomplete maps.	None	Farley City Clerk	None identified	Local funds	Less than \$10,000	Water and sewer infrastructure will be more easily accessible.	3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Farley – 7			Farley – All departments	None identified	Local funds	Less than \$1,000		1 year
Farley – 8			Farley – Fire Chief	Funding	FEMA/Local Funds	\$50,000		3-5 years
Graf - 1	Targeted to city hall and other critical facilities	Funding	Graf Mayor		Local funds	Over \$1,000,000		3-5 yrs
Graf - 2		Funding	Graf Mayor		Local funds	Over \$1,000,000		3-5 yrs
Graf - 3		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Graf - 4	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Graf - 5		Funding	Graf Mayor		Local funds	Little or no cost		1 yr
Graf - 6		Funding	Graf Mayor		Local funds	\$10,000 to \$50,000		More than 5 yrs
Graf - 7		NA	Graf Mayor		Unknown	Little or no cost		3-5 yrs
Graf - 8		Funding	Graf City Clerk		Local funds	Less than \$10,000		1 yr
Graf - 9	Structures in the floodplain will be removed if located in a vulnerable area	Funding	Graf Mayor		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Holy Cross - 1		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Holy Cross - 2		Funding	Holy Cross Fire and Dubuque EMA		Unknown	Less than \$10,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Holy Cross - 3	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Holy Cross - 4		NA	Holy Cross Mayor		Unknown	\$10,000 to \$50,000		3-5 yrs
Luxemburg - 1		NA	Luxemburg Mayor and Council		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Luxemburg - 2		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Luxemburg - 3		NA	Luxemburg City Council		Unknown	\$500,000 to \$1,000,000		3-5 yrs
Luxemburg - 4		Funding	Luxemburg Mayor and Council		Unknown	\$10,000 to \$50,000		1 yr
Luxemburg - 5		Funding	Luxemburg Mayor and Council		Local funds	\$10,000 to \$50,000		More than 5 yrs
Luxemburg - 6			Luxemburg City Council		Unknown	\$50,000 to \$100,000		3-5 yrs
Luxemburg - 7		NA	Luxemburg Mayor and Council		Unknown	\$10,000 to \$50,000		3-5 yrs
New Vienna - 1	We do not have a generator at station for a prolonged event	Funding	City of New Vienna	Volunteer fire fighters	Local funds	\$10,000 to \$50,000		3-5 yrs
New Vienna -2	Some sewer lines not large enough	Funding	City of New Vienna	None identified	Local funds	\$50,000 to \$100,000		3-5 yrs
New Vienna - 3	Some people do not have weather alert radios	Funding	Dubuque County Emergency Management	None identified	FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
New Vienna - 4		Funding	New Vienna Public Works		Local Funds	Little or no cost		3-5 yrs
New Vienna - 5		NA	New Vienna City Council		Unknown	Little or no cost		1 yr
New Vienna - 6		NA	New Vienna Fire Department and Police		Unknown	Little or no cost		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
New Vienna - 7	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	None	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
New Vienna - 8		NA	New Vienna City Council		Unknown	Little or no cost		3-5 yrs
New Vienna - 9	Need a place with air conditioning for people to go to cool off if power outage occurs		New Vienna Fire Department and Police	None identified	Local funds	Less than \$10,000		3-5 yrs
New Vienna -10		Funding	New Vienna City Council		Local funds	Little or no cost		1 yr
New Vienna 11		Funding	New Vienna Public Works		Local funds	Over \$1,000,000		More than 5 yrs
New Vienna - 12	No place for people to go to in tornado event if they are at Ball Diamond	Funding	City of New Vienna	None identified	Local funds	\$50,000 to \$100,000		3-5 yrs
New Vienna - 13	Cannot get to sewer plant if creek floods	Funding	City of New Vienna Public Works Director	None identified	Local funds	\$50,000 to \$100,000		Other
New Vienna - 14		NA	New Vienna Mayor		Unknown	\$500,000 to \$1,000,000		3-5 yrs
New Vienna - 15		Funding	New Vienna Clerk		Local funds	Less than \$10,000		3-5 yrs
New Vienna - 16		Funding	New Vienna Mayor		Local funds	Little or no cost		1 yr
New Vienna - 17		Funding	New Vienna City Clerk		Local funds	Less than \$10,000		1 yr
New Vienna - 18	Structures in the floodplain will be removed if located in a vulnerable area	Funding	New Vienna Mayor		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Peosta - 1		Funding	Peosta City Administrator and Public Works		Local funds	\$10,000 to \$50,000		3-5 yrs
Peosta - 2		Funding	Peosta City Administrator		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Peosta - 3		NA	Peosta Public Works		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Peosta - 4		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Peosta - 5		Funding	Peosta Public Works		Local Funds	Little or no cost		3-5 yrs
Peosta - 6	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Peosta - 7		Funding	Peosta City Administrator		Local funds	Little or no cost		1 yr
Peosta - 8		Funding	Peosta Public Works and City Administrator		Local funds	\$10,000 to \$50,000		More than 5 yrs
Peosta - 9			Peosta City Administrator and Zoning Commission		Unknown	\$50,000 to \$100,000		3-5 yrs
Peosta - 10		NA	Peosta City Administrator and Clerk		Unknown	Little or no cost		3-5 yrs
Peosta 11		Funding	Peosta City Clerk and Administrator		Local funds	Less than \$10,000		3-5 yrs
Peosta - 12		Funding	Peosta City Administrator		Local funds	Less than \$10,000		1 yr
Peosta - 13		Funding	Peosta Public Works		Unknown	Less than \$10,000		2-3 yrs
Peosta - 14		NA	Peosta City Council		Unknown	Less than \$10,000		3-5 yrs
Rickardsville - 1		Funding	Rickardsville Mayor		Local funds	\$10,000		3-5 yrs
Rickardsville - 2		NA	Rickardsville Mayor		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Rickardsville - 3		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs



2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Rickardsville - 4	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Rickardsville - 5		Funding	Rickardsville Mayor		Local funds	Little or no cost		1 yr
Rickardsville - 6		NA	Rickardsville Mayor			Little or no cost		1 yr
Rickardsville - 7		Funding	Rickardsville Mayor		Local funds	\$10,000 to \$50,000		More than 5 yrs
Rickardsville - 8			Rickardsville City Council			\$50,000 to \$100,000		3-5 yrs
Rickardsville - 9		Funding	Rickardsville Mayor		Local funds	Less than \$10,000		1 yr
Sageville - 1		Funding	City Clerk and ECIA			\$10,000 to \$50,000		3-5 yrs
Sageville – 2		Funding	Sageville Mayor and Council		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Sageville – 3		NA	Sageville Mayor		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Sageville – 4		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Sageville – 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Sageville – 6		Funding	Sageville City Council		Local funds	Little or no cost		1 yr
Sageville – 7		Funding	Sageville Council		Local funds	\$10,000 to \$50,000		More than 5 yrs
Sageville – 8			Sageville City Council			\$50,000 to \$100,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Sageville – 9		NA	Sageville Mayor and Council			Little or no cost		3-5 yrs
Sageville – 10		Funding	Sageville City Clerk		Local funds	Less than \$10,000		1 yr
Sageville – 11	Structures in the floodplain will be removed if located in a vulnerable area	Funding	Sageville Mayor and Council		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Sherrill - 1		NA	Sherrill Fire Department			Less than \$10,000		3-5 yrs
Sherrill - 2		Funding	Sherill Mayor and Council		Local funds	\$10,000 to \$50,000		3-5 yrs
Sherrill - 3		Funding	Sherrill Mayor and Council		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Sherrill - 4		NA	Sherill Fire Department		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Sherrill - 5		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Sherrill - 6		Funding	Sherrill Mayor and Council		Local Funds	Little or no cost		3-5 yrs
Sherrill - 7	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Sherrill - 8		Funding	Sherrill City Council		Local funds	Little or no cost		1 yr
Sherrill - 9		Funding	Sherrill Council		Local funds	\$10,000 to \$50,000		More than 5 yrs
Sherrill - 10			Sherrill City Council			\$50,000 to \$100,000		3-5 yrs
Sherrill - 11	Community needs to be mapped	NA	Sherill Mayor and Council			Little or no cost		3-5 yrs
Sherrill - 12		Funding	Sherrill City Clerk		Local funds	Less than \$10,000		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Sherrill - 13		Funding	Sherrill City Clerk		Local funds	Less than \$10,000		1 yr
Worthington -1		Funding	Worthington Public Works Director		Local funds	\$10,000 to \$50,000		3-5 yrs
Worthington -2		Funding	Worthington Mayor and Council		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Worthington -3		NA	Worthington Public Works Director		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Worthington -4		Funding	Worthington Mayor and Council		Local Funds	Little or no cost		3-5 yrs
Worthington -5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	None	Dubuque County Emergency Management	City Hall	Local funds	Little or no cost	Potentially lives/property damage avoided	1 yr
Worthington - 6	Citizens need to be aware of disasters to protect themselves, others, and property	None	City Hall	Fire Dept.	Local funds	Little or no cost	Potentially lives/property damage avoided	1 yr
Worthington -7	Need to make sure hydrants in good working condition for water use	None	Worthington Public Works Director	Water/Se wer Depts.	Local funds	Little or no cost	Lives/Property in case of fires	3-5 yrs
Worthington - 8	During extreme heat incidents, citizens need a safe, cool place to go	NA	Worthington Fire Department and City Clerk			Less than \$10,000		
Worthington -9		Funding	Worthington Mayor and Council			\$10,000 to \$50,000		2-3 yrs
Worthington - 10	Certain areas of City receive heavy flooding	None	Worthington Public Works Director	None identified	Local funds, Other - grants	\$10,000 to \$50,000	Home/Property damage avoided	More than 5 yrs
Worthington - 11			Worthington/ Mayor & City Council			\$50,000 to \$100,000		3-5 yrs
Worthington - 12		NA	Worthington Mayor and Council			Little or no cost		3-5 yrs

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
Worthington - 13	Increasing cybersecurity threats.	Funding	Worthington City Clerk		Local funds	Less than \$10,000		1 yr
Worthington - 14	Decrease Flash Flood Risk	Funding	Public Works		Local funds	Less than \$10,000		1 yr
Worthington - 15	Structures in the floodplain will be removed if located in a vulnerable area	Funding	Worthington Mayor and Council		Federal funds; local funds	\$500,000 to \$1,000,000	Decreased impacts and damage in vulnerable areas	3-5 yrs
Zwingle - 1		Funding	Zwingle Mayor		Local funds	\$10,000 to \$50,000		3-5 yrs
Zwingle - 2		Funding	Zwingle Mayor		Local funds	\$500,000 to \$1,000,000		3-5 yrs
Zwingle - 3		NA	Zwingle Mayor		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Zwingle - 4		Funding	Dubuque County Emergency Management		FEMA Grant, Local funds	Less than \$10,000		3-5 yrs
Zwingle - 5	Weather spotters provide a valuable service during a severe weather event. The community will support continued training of these weather spotters as new people become interested in learning these skills	Funding	Dubuque County Emergency Management		Local funds	Little or no cost		1 yr
Zwingle - 6		Funding	Zwingle City Council		Local funds	Little or no cost		1 yr
Zwingle - 7		Funding	Zwingle Mayor			\$10,000 to \$100,000		3-5 yrs
Zwingle - 8		Funding	Zwingle Mayor		Local funds	\$10,000 to \$50,000		More than 5 yrs
Zwingle - 9		NA	Zwingle Mayor			Little or no cost		1 yr
Zwingle - 10			Zwingle City Council			\$50,000 to \$100,000		3-5 yrs
Zwingle - 11		NA	Zwingle Mayor			Little or no cost		3-5 yrs
Zwingle - 12		Funding	Zwingle Mayor		Local funds	Less than \$10,000		1 yr

2019 Action ID	Issue/ Background	Obstacles to Implementing	Responsible Office	Partners	Funding Source(s)	Cost Estimate	Benefits	Timeline
<b>SCHOOL DISTRICTS</b>								
Dubuque Public School District - 1		NA	School administration		Unknown	Little or no cost		1 yr
Dubuque Public School District - 2	Recent data breeches, cyber attacks.	Funding	IT		Local	\$50,000 - \$100,000	Secure data, prevent cyber attacks and leaks of critical information	1 -3 years
NICC - 1			NICC Facilities Director		Unknown	\$50,000 to \$100,000		3-5 yrs
Western Dubuque Public School District - 1		NA	WD School administration			Little or no cost		1 yr

**Table 4.3. Action Prioritization**

2019 Action ID	Action Summary	Lives Saved?	Reduced Property Damage?	Reduced need for response actions?	Will Benefits Exceed Cost?	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Score	Priority
		0-unlikely, 1-maybe, 2-probably, or 3-definitely				Positive (1) Neutral (0) Negative (-1)								
UNINCORPORATED COUNTY														
Unincorporated County - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Unincorporated County - 2	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Unincorporated County - 3	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Unincorporated County - 4	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M

2019 Action ID	Action Summary	Lives Saved?	Reduced Property Damage?	Reduced need for response actions?	Will Benefits Exceed Cost?	Social	Technical	Administrative	Political	Legal	Economic	Environmental	Score	Priority
		0-unlikely, 1-maybe, 2-probably, or 3-definitely												
Unincorporated County - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Unincorporated County - 6	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Unincorporated County - 7	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Unincorporated County - 8	Acquire permanent and portable generators and infrastructure necessary to operate generators as deemed necessary by the County to provide power in the event of a power failure.	2	1	0	2	1	-1	1	1	1	-1	-1	6	L
Unincorporated County - 9	Maintain the Business Continuity Plan to address day-to-day County business operations.	1	1	1	2	1	1	1	1	1	0	1	11	M
Unincorporated County – 10	Continue to enforce the Floodplain Ordinances and monitor all construction activities that are in or near a floodplain.	2	3	2	3	1	1	1	1	1	1	1	17	H
Unincorporated County – 11	Continue to support the efforts of the COG in their mitigation actions to reduce flooding of the Little Maquoketa River basin.	1	3	2	2	1	1	1	1	1	1	1	15	H
Unincorporated County – 12	Continue to support the efforts of the NRCS in Dubuque County to reduce flooding in flood prone areas and provision of educational information to farmers and use of BMPs.	1	3	2	2	1	1	1	1	-1	1	1	13	H
Unincorporated County – 13	Continue to maintain, promote, and administer storm water retention ordinances with other jurisdictions and update as needed.	1	3	2	2	1	1	1	1	1	1	1	15	H
Unincorporated County – 14	Continue to identify probable areas for potential hazards, assess traffic capacity of highways and roads, and identify shelters for the hazards and develop best routes for evacuations.	1	0	1	2	1	1	1	1	1	1	1	11	M
Unincorporated County – 15	Continue to maintain awareness of repetitive loss properties to identify potential areas of risk to life and safety of residents and consider pursuing grant funds for the acquisition and demolition of these properties.	2	3	3	2	1	0	0	1	1	1	1	15	H

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		0-unlikely, 1-maybe, 2-probably, or 3-definitely	Social	Technical	Administrative	Political	Legal	Economic	Environmental					
Unincorporated County – 16	Continue public awareness campaign, including educational programming, marketing, and public service announcements, and advertising to inform the public to proper procedure during a flood.	3	0	2	3	1	1	1	1	1	1	1	15	H
Unincorporated County – 17	Modify the Flood Plain Management Ordinance as necessary with a target of alleviating flooding.	1	3	2	3	1	1	1	1	1	1	1	16	H
Unincorporated County – 18	Purchase more barriers and floodgates to better block and inform drivers of flooded areas.	3	0	2	3	1	1	1	1	1	0	1	14	H
Unincorporated County – 19	Install river gauges and/or river stream sensors to measure the height of water and better enable the County to monitor river levels and potential flooding.	1	0	2	2	1	0	1	1	1	-1	1	9	M
Unincorporated County – 20	Maintain Community Alert Network system that includes the auto-dial potential for all households and businesses in the line of a severe storm.	2	0	2	2	1	1	1	1	1	1	1	13	H
Unincorporated County – 21	Continue program to educate residents on NOAA indoor weather radios and provide a rebate program for a portion of the purchase price for residents or distribute as available.	2	0	2	2	1	1	1	1	1	1	1	13	H
Unincorporated County – 22	Continue to monitor public roads of concern that may require maintenance or rebuilding and repair or rebuild as deemed necessary.	1	1	2	2	1	-1	-1	1	1	1	1	9	M
Unincorporated County – 23	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Unincorporated County – 24	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Unincorporated County – 25	Buy out, acquire, and demolish damaged, vulnerable, or endangered structures.	1	1	1	2	1	1	1	1	1	-1	1	10	M
Unincorporated County - 26	Purchase and install snow plow cameras	1	3	1	3	1	1	1	1	1	1	1	15	H
Unincorporated County – 27	River and creek restoration to reduce flood impacts and damages.	1	1	1	1	1	1	1	1	1	1	1	11	M

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Asbury -1	Provide backup power generators and wiring for critical facilities.													
Asbury - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence. Improve stormwater culverts, and add curb and gutter in streets in flash flood areas.													
Asbury - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.													
Asbury – 4	Purchase and utilize barricades and signage as deemed necessary to better communicate information.													
Asbury – 5	Train personnel as weather spotters.													
Asbury – 6	Continue to improve public awareness of hazardous weather through newsletters, social media, and public service announcements.													
Asbury – 7	Continue to add needed infrastructure to mitigate flood damage.													
Asbury – 8	Continue to maintain snow removal policy, including no parking on city streets within 48 hours of a severe winter storm.													
Asbury – 9	Continue to make the Fire Station available as a shelter space to persons in need on a temporary basis during periods of extreme heat.													
Asbury – 10	Maintain NFIP membership and meet all program requirements.													
Asbury – 11	Continue to use City Hall as a storm shelter and to consider the building of a safe room in conjunction with any new city building projects for the safety of current and future Asbury citizens.													
Asbury – 12	Continue to keep all seven backup generators in good repair and available.													



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Asbury – 13	Purchase two additional generators for sewer lift stations as funds become available.													
Asbury – 14	Build new lift stations with generators in place as determined by the City's continued growth.													
Asbury – 15	Maintain procedure to backup all critical data to prevent loss in the event of hazard.													
Asbury – 16	Refrain from issuing burn permits in times of extreme heat or drought to prevent fires.													
Asbury – 17	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.													
Asbury – 18	Buy out, acquire, and demolish damaged, vulnerable or endangered structures													
Balltown – 1	Obtain NOAA weather radios for every home in Dubuque County.													
Balltown - 2	Create and maintain call down list of all critical personnel.													
Balltown - 3	Maintain procedure to backup all critical data to prevent loss in the event of hazard.													
Balltown – 4	Join and maintain NFIP membership													
Bankston - 1	Reconnect the city's weather siren.													
Bernard - 7	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Bernard - 8	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Bernard - 9	Develop resources to protect people & property from hazardous materials	1	1	2	3	1	1	1	1	1	1	1	14	H
Bernard - 10	Identify a location for public shelter in the event of a hazard or disaster, and stock it to ensure adequate for use as a shelter	3	1	2	3	1	1	1	1	1	1	1	16	H
Bernard - 11	Prepare for catastrophic event	1	1	3	3	1	1	1	1	1	1	1	15	H

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Bernard - 12	Prepare for flash flooding through physical diversion, maintenance and other activities to reduce water collection load	1	2	2	3	1	1	1	0	1	1	1	14	H
Bernard - 13	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Bernard - 14	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Bernard 15	Purchase backup generators and install hookups to provide electricity for the water supply and the main pumping station in the event of a power outage.	0	1	2	2	1	0	0	1	1	-1	1	8	M
Bernard 16	Continue to make Emergency Medical Services building available in the event of a hazardous weather.	1	0	2	2	1	1	1	1	1	1	1	12	M
Bernard - 17	Continue to employ Good Neighbor policy and Shelter in Place policy until better options are available.	2	0	1	3	1	1	1	1	0	1	1	12	M
Bernard - 18	Create and maintain call down list of all critical personnel.	1	0	1	3	1	1	1	1	1	1	1	12	M
Bernard - 19	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Cascade - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Cascade - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Cascade - 3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Cascade - 4	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Cascade - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H

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Cascade - 6	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Cascade - 7	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Cascade - 8	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Cascade - 9	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Cascade - 10	Continue to contact Dyersville and other communities to monitor flood levels upstream; obtain stream gauges for Cascade	1	0	1	2	1	1	1	1	1	1	1	11	M
Cascade - 11	Continue to enforce floodplain management ordinances	1	2	2	3	1	1	1	1	1	1	1	15	H
Cascade - 12	Create and maintain call down list of all critical personnel.	1	0	1	3	1	1	1	1	1	1	1	12	M
Cascade - 13	Pursue application for future FEMA and State Funding for flood buyouts.	2	3	3	2	1	0	0	0	0	-1	0	10	M
Cascade - 14	Continue to maintain and operate current outdoor weather warning system.	2	0	1	2	1	1	1	1	1	1	1	12	M
Cascade - 15	Continue training weather spotters through Cascade Fire Department.	1	2	1	2	1	1	1	1	1	1	1	13	H
Cascade - 16	Install electrical distribution lines underground.	1	2	3	3	1	1	1	1	1	1	1	16	H
Cascade - 17	Pursue active maintenance in checking storm sewer system for debris.	1	2	2	3	1	1	1	1	1	1	1	15	H
Cascade – 18	Rebuild or upgrade floodgates and culverts to prevent flooding.	1	2	1	2	1	-1	0	1	1	-1	1	8	M
Cascade – 19	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Cascade – 20	Buy out, acquire and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Centralia – 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M

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Centralia - 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Centralia - 3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Centralia - 4	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Centralia - 5	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Centralia - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Centralia - 7	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Centralia - 8	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Centralia - 9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Dubuque - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Dubuque - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Dubuque - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	1	1	1	0	1	0	15	H
Dubuque - 4	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Dubuque - 5	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Dubuque - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Dubuque - 7	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M

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Dubuque - 8	Flood Mitigation Gate Replacement (16th Street Detention Basin) - Hillcrest Road and Rosemont St. storm sewer drainage improvements	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque - 9	Impervious Surface Reduction (240 Alleys)	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque - 10	22nd Street Storm Sewer Improvements	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque - 11	17th Street Storm Sewer Improvements	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque – 12	Flood Mitigation Maintenance Facility	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque – 13	North End Storm Sewer Improvement (25th - 30th Streets)	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque – 14	Water Plant Flood Control (Floodwall and Stormwater Conveyances)	1	3	3	2	1	1	1	1	1	1	1	16	H
Dubuque – 15	Back-Up Power for Cooling Center at Ice Arena	2	0	1	2	1	1	1	1	1	0	0	10	M
Dubuque – 16	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Dubuque – 17	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Dubuque – 18	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Dubuque – 19	Continue to maintain 25 existing generators and infrastructure to operate city facilities in the event of a power outage.	1	3	3	3	1	1	1	1	1	1	1	17	H
Dubuque – 20	Maintain a Business Continuity Plan to address day-to-day City business operations.	0	1	1	2	1	1	1	1	1	1	1	11	M
Dubuque – 21	Continue to promote the use of NOAA indoor weather radios at residences, schools, hospitals, nursing homes, etc., throughout the city.	1	0	1	2	1	1	1	1	1	1	1	11	M
Dubuque – 22	Continue to maintain, enforce and update building codes as needed.	1	2	1	3	1	1	1	1	1	1	1	14	H
Dubuque – 23	Continue ongoing maintenance and monitoring of the City of Dubuque's flood control system (floodwall) as mandated by federal law.	2	3	3	3	1	1	1	1	1	1	1	18	H
Dubuque – 24	Maintain awareness of repetitive loss properties to identify potential areas of risk to life and safety of residents and consider pursuing grant funds for the acquisition and demolition of these properties.	2	3	2	2	1	1	0	1	1	1	1	15	H
Dubuque – 25	Make required improvements based on the outcome of the Levee Flood Certification.	1	1	1	2	0	0	0	1	1	-1	1	7	L

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						Positive (1)		Neutral (0)		Negative (-1)				
Dubuque – 26	Continue to update and maintain Levee Breech Study to determine scenarios in the event of levee failure.	1	1	1	2	1	1	1	1	1	1	1	12	M
Dubuque – 27	Maintain and repair storm sewers as necessary.	1	2	1	2	1	1	1	1	1	-1	1	11	M
Dubuque 28	Continue to monitor public retaining walls of concern that may require maintenance or rebuilding.	1	2	2	2	1	1	1	1	1	1	1	14	H
Dubuque – 29	Evaluate ownership and work with responsible entities to mitigate any hazardous situations related to retaining walls in the City of Dubuque.	1	2	2	2	0	0	0	0	0	0	1	8	M
Dubuque – 30	Continue to work with FEMA to buyout flood damaged homes.	0	3	3	2	0	1	1	1	1	1	1	14	H
Dubuque – 31	Continue to implement storm water management and flood control improvements outlined in the Drainage Basin Master Plan	1	2	2	2	1	1	1	1	1	1	1	14	H
Dubuque – 32	Continue to maintain floodplain management ordinances.	1	2	1	3	1	1	1	1	1	1	1	14	H
Dubuque – 33	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Dubuque – 34	Purchase and install generator and equipment for Multi-Cultural Family Center as a community shelter.	2	0	1	2	1	0	0	1	0	0	0	7	L
Dubuque – 35	Purchase and install infrastructure facilities and equipment for additional community shelters, especially for vulnerable populations using a Resilience Hub mode to build community capacity.	2	0	1	2	1	0	0	1	0	0	0	7	L
Dubuque – 36	Make railroad crossing improvements to protect water plant, residential neighborhoods.	2	2	2	3	1	1	1	1	1	0	0	14	H
Dubuque – 37	Increase tree canopy to reduce urban heat island effect, protect from severe weather events.	1	0	1	3	1	1	1	1	1	1	1	12	M
Durango - 1	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Durango - 2	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Durango - 3	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Durango - 4	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M

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Durango - 5	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Durango - 6	Continue dialog with Dubuque County & DNR regarding flood mitigation pertaining to depth/width and debris in nearby waterways, and implement any solutions identified	1	1	2	2	1	1	1	0	1	1	1	12	M
Durango - 7	Continue to pursue flood mitigation including buyouts.	1	3	3	3	1	0	0	1	1	-1	1	13	H
Durango - 8	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Dyersville - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Dyersville - 2	Continue to address storm water runoff through development agreements for all commercial industrial and residential subdivision developments. The Planning & Zoning Commission, along with City staff, will review developments and work to assure storm water runoff issues are addressed in development agreements when appropriate.	1	3	2	3	1	1	1	1	1	1	1	16	H
Dyersville - 3	Continue to enforce storm water ordinances.	1	2	2	3	1	1	1	1	1	1	1	15	H
Dyersville - 4	Continue to enforce Dyersville floodplain ordinance and National Flood Insurance Program regulations. The City Administrator is designated as the local Floodplain Manager and enforcement person.	1	2	2	3	1	1	1	1	1	1	1	15	H
Dyersville - 5	Continue to closely monitor development of land surrounding the city and potential for the creation of hazards to the city. The City Administrator will monitor and review land developments around the city and provide comments as appropriate.	1	2	1	2	0	0	0	0	0	0	1	7	L
Dyersville - 6	Continue to maintain storm sewer system including the dry runs that serve as open channel drainage ditches.	1	2	2	3	1	1	1	1	1	-1	1	13	H
Dyersville – 7	Continue to improve storm sewer system as a component of the City's regular street improvement program.	1	2	2	2	1	1	1	1	1	-1	1	12	M

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Dyersville – 8	Continue to maintain and make improvements to the sanitary sewer system to reduce infiltration, including such projects as the installation of bolt-down covers on manholes in the floodplain areas and inspections of lift stations seals, etc. in the flood plain. The Public Works Department Head will recommend improvements to the City Administrator for inclusion in the city budget as funding allows.	1	2	2	3	1	1	1	1	1	-1	1	13	H
Dyersville – 9	Continue to work with appropriate agencies to identify effective physical means to minimize flooding.	2	2	2	2	1	1	1	1	1	1	1	15	H
Dyersville – 10	Continue to identify and publicize location and availability of storms shelters, and add new shelters as required and available	3	0	2	2	1	1	1	1	1	1	1	14	H
Dyersville – 11	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Dyersville – 12	Continue to encourage the National Weather Service to add a weather transmitter tower to their system or relocate their existing tower to better serve the City of Dyersville.	1	0	1	2	1	0	0	-1	-1	0	0	3	L
Dyersville – 13	Continue to evaluate and monitor potential risks with utility placements.	1	2	2	2	1	1	1	1	1	1	1	14	H
Dyersville – 14	Continue to remove dead trees/prune trees and clean areas vulnerable to high winds. The Public Works Department Head will monitor trees within City right-of-way and continue to remove dead trees/prune trees vulnerable to high winds.	2	2	2	3	1	1	1	1	1	1	1	16	H
Dyersville – 15	Continue acquisition of flood-damaged properties through current and future State- and FEMA- funded programs and/or other programs and marketing of the programs to floodplain residents.	2	3	3	2	1	1	1	1	1	-1	1	15	H
Dyersville – 16	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M



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Dyersville – 17	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Dyersville – 18	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Dyersville – 19	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Dyersville – 20	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Dyersville – 21	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Dyersville – 22	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Dyersville – 23	Create and maintain call down list of all critical personnel.	1	0	1	3	1	1	1	1	1	1	1	12	M
Dyersville – 24	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Dyersville – 25	Continue flood watch protocol whereby river elevations are regularly monitored during potential flood events. Included in this protocol is the need to purchase cameras to assist in monitoring river levels from remote locations. The protocol includes defined responses to the various river elevations.	2	1	1	2	1	1	1	1	1	1	1	13	H
Dyersville – 26	River and creek restoration to reduce flood impacts and damages.	1	3	3	3	1	1	1	1	1	1	1	17	H
Dyersville – 27	Complete flood study through BRIC grant to compile data identifying potential flood impact areas and a cost/benefit analysis for capital improvement projects.	2	3	2	2	1	0	0	1	1	0	1	13	H
Epworth - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M

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		0-unlikely, 1-maybe, 2-probably, or 3-definitely	Positive (1) Neutral (0) Negative (-1)											
Epworth - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	1	3	2	3	1	1	1	1	1	1	1	16	H
Epworth - 3	Install back flow preventers in the new construction developments.	1	2	2	2	1	0	0	0	0	0	1	9	M
Epworth - 4	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Epworth - 5	Continue to require underground burial of power lines in new subdivisions.	2	1	2	2	1	1	1	1	1	1	1	14	H
Epworth - 6	Continue to utilize Fire Station for accommodations for persons suffering from extreme heat or wind-chill conditions.	3	0	2	3	1	1	1	1	1	1	1	15	H
Epworth - 6	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Epworth - 7	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Epworth - 8	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Epworth - 9	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Epworth - 10	Continue to conduct education programs at schools during Fire Prevention Week.	2	0	1	3	1	1	1	1	1	1	1	13	H
Epworth - 11	Identify and equip potential shelters in Epworth to provide safe locations for persons during an emergency	2	0	1	0	1	1	1	1	1	0	0	8	M
Epworth - 12	Purchase backup generators for sewer lift stations	1	2	2	2	1	1	1	1	1	1	1	14	H
Epworth - 13	Develop a hazard recovery plan that includes mitigation as part of the recovery process.	2	1	0	3	1	1	1	1	1	1	0	12	M
Epworth - 14	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M

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						Positive (1)		Neutral (0)		Negative (-1)				
Epworth - 15	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Epworth - 16	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Epworth - 17	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Farley - 1	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	2	3	2	3	1	-1	0	0	1	1	1	13	H
Farley – 2	Protect Waste Water Treatment Center from Flooding by developing a retention/ detention area to the SW of the WWTP. Create a retention/ detention area to the SE of the WWTP with a bypass storm water pipe.	2	3	2	3	1	0	1	0	1	0	1	14	H
Farley – 3	Upgrade city storm sewer system to prevent future residential, business, and city infrastructure flood damage.	1	3	2	3	1	0	1	0	1	1	1	14	H
Farley – 4	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Farley – 5	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1					11	M
Farley 6	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	3	1	3	0	1	1	0	0	0	1	11	M
Farley – 7	Purchase and install power generator and hookup at fire station to use in the event of an emergency.	1	0	1	1	1	1	1	1	1	-1	0	7	L
Graf - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Graf - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L

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Graf - 3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Graf - 4	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Graf - 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Graf - 6	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Graf - 7	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Graf - 8	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Graf - 9	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Holy Cross - 1	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Holy Cross - 2	Continue to pursue FEMA and other funding opportunities to replace weather siren.	2	0	1	3	1	1	1	1	1	1	1	13	H
Holy Cross - 3	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Holy Cross - 4	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Luxemburg - 1	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Luxemburg - 2	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Luxemburg - 3	Continue Good Neighbor Program where volunteers check on welfare of residents following a severe weather event.	2	0	1	3	1	1	1	1	1	1	1	13	H
Luxemburg - 4	Upgrade storm sewers to prevent flash flooding in times of heavy downfall of rain.	2	3	3	2	1	1	1	1	1	1	1	17	H
Luxemburg - 5	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Luxemburg - 6	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Luxemburg - 7	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M

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New Vienna - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	1	1	1	1	1	1	11	M
New Vienna - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	1	3	1	1	1	1	1	1	1	13	H
New Vienna - 3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	1	1	1	1	1	1	15	H
New Vienna - 4	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
New Vienna - 5	Establish Good Neighbor program for winter storms.	2	0	1	3	1	1	1	1	1	1	1	13	H
New Vienna - 6	Continue to monitor river levels and areas that have experienced flash flooding in the past and add new stream gauges.	2	1	2	2	1	1	1	1	1	1	1	14	H
New Vienna - 7	Train personnel as weather spotters.	2	2	2	2	1	1	1	1	1	1	1	15	H
New Vienna - 8	Continue to enforce flood plain ordinances.	2	3	2	3	1	1	1	1	1	1	1	17	H
New Vienna - 9	Continue to utilize Mercy St. Mary's in Dyersville, US Post Office, and VFW Club in New Vienna as facilities for individuals suffering from extreme heat.	2	1	1	3	1	1	1	1	1	1	1	14	H
New Vienna - 10	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
New Vienna - 11	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
New Vienna - 12	Consider building a tornado safe room for all new construction.	3	1	1	3	1	1	1	1	1	1	1	15	H

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New Vienna - 13	Build another access road on higher ground to waste water treatment facility.	1	1	1	3	1	1	1	1	1	1	1	13	H
New Vienna - 14	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
New Vienna - 15	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
New Vienna - 16	Create and maintain call down list of all critical personnel.	1	0	1	3	1	1	1	1	1	1	1	12	M
New Vienna - 17	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
New Vienna - 18	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Peosta - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Peosta - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Peosta - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Peosta - 4	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Peosta - 5	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Peosta - 6	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Peosta - 7	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Peosta - 8	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Peosta - 9	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M

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		0-unlikely, 1-maybe, 2-probably, or 3-definitely	Positive (1)	Technical	Administrative	Political	Neutral (0)	Legal	Economic	Environmental	Negative (-1)			
Peosta - 10	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Peosta 11	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Peosta - 12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Peosta - 13	Trim trees or remove trees that are potential risk to city properties and infrastructures.	1	2	2	2	1	1	1	1	1	1	1	14	H
Peosta - 14	Utilize the Peosta Community Centre as a shelter for persons suffering from Extreme Heat.	3	0	1	2	1	1	1	1	1	1	1	13	H
Rickardsville -1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Rickardsville -2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Rickardsville -3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Rickardsville -4	Train personnel and citizens as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Rickardsville -5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Rickardsville -6	Establish and maintain agreement with St. Joseph Parish to designate church hall as shelter for the community in the event of extreme heat or other hazards.	3	0	1	2	1	1	1	1	1	1	1	13	H
Rickardsville -7	Continue to add needed infrastructure to mitigate flood damage at lagoon and baseball park	2	3	2	3	1	1	1	1	1	1	1	17	H
Rickardsville -8	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Rickardsville -9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M

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Sageville – 1	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Sageville – 2	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Sageville – 3	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Sageville – 4	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Sageville – 5	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Sageville – 6	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Sageville – 7	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Sageville – 8	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Sageville – 9	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Sageville – 10	Continue to explore FEMA grants to buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Sherrill – 1	Utilize the Sherrill Fire Station with generator back up to accommodate citizens in the community during extreme heat or wind chill conditions.	3	0	1	2	1	1	1	1	1	1	1	13	H
Sherrill – 2	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Sherrill - 3	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L



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Sherrill - 4	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Sherrill - 5	Obtain NOAA weather radios for every home.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Sherrill - 6	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Sherrill - 7	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Sherrill - 8	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Sherrill - 9	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Sherrill - 10	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Sherrill - 11	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Sherrill - 12	Maintain, enhance, or install GIS System to better track critical facilities and vulnerable populations as well as respond to emergencies.	1	1	1	3	1	1	1	1	1	0	1	12	M
Sherrill - 13	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Worthington - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Worthington - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Worthington - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Worthington - 4	Purchase barricades and signage as deemed necessary to better communicate information.	2	1	0	3	1	1	-1	1	0	1	1	10	M
Worthington - 5	Train personnel as weather spotters.	2	2	1	3	1	1	1	1	1	1	1	15	H

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Worthington - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Worthington - 7	Maintain fire hydrant with current flushing and testing programs in place.	2	2	1	3	1	1	1	1	1	1	1	15	H
Worthington - 8	Accommodate citizens at the Community Center in the event of extreme heat.	3	0	2	2	1	1	1	1	1	1	1	14	H
Worthington - 9	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Worthington -10	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Worthington -11	Create and maintain call down list of all critical personnel.	1	0	1	3	1	1	1	1	1	1	1	12	M
Worthington-12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Worthington - 13	Buy out, acquire, and demolish damaged, vulnerable or endangered structures	2	3	3	3	1	1	1	1	1	1	1	18	H
Worthington – 14	Upgrade cyber security devices/firewalls	0	3	1	3	1	1	1	1	1	1	0	13	H
Worthington - 15	Increase and level land behind fire station and city hall	1	3	1	2	1	1	1	1	1	1	1	14	H
Zwingle - 1	Provide backup power generators and wiring for critical facilities.	1	1	1	1	1	0	1	1	1	-1	1	8	M
Zwingle - 2	Purchase or elevate structures, add lift stations, increase/reinforce culvert size, and add curb and gutter to streets in areas in flood zones with severe and repetitive flood damage to prevent reoccurrence.	0	2	2	3	1	0	-1	0	0	0	0	7	L
Zwingle - 3	Continue to maintain existing outdoor warning siren systems and ensure appropriate coverage for population.	3	1	3	3	1	0	1	1	1	-1	1	14	H
Zwingle - 4	Obtain NOAA weather radios for every home in Dubuque County.	2	1	2	3	1	0	0	0	0	-1	1	9	M
Zwingle - 5	Train personnel as weather spotters.	1	2	1	2	1	1	1	1	1	0	1	12	M
Zwingle - 6	Continue to improve public awareness of hazardous weather through newsletters, public notices, strolling signs, etc.	1	1	1	3	1	1	1	1	1	1	1	13	H
Zwingle - 7	Purchase backup generators and install hookups to provide electricity in the event of a power outage.	2	1	1	2	1	1	1	1	1	1	0	12	M

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Zwingle - 8	Continue to add needed infrastructure to mitigate flood damage.	2	3	2	3	1	1	1	1	1	1	1	17	H
Zwingle - 9	Continue to employ Good Neighbor policy and Shelter in Place policy until better options are available.	3	1	2	3	1	1	1	1	1	1	0	15	H
Zwingle - 10	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Zwingle - 11	Maintain or consider NFIP membership as required.	0	1	1	2	1	1	1	1	1	1	1	11	M
Zwingle - 12	Maintain procedure to backup all critical data to prevent loss in the event of hazard.	0	0	1	3	1	1	1	1	1	1	1	11	M
Dubuque Public School District – 1	Develop policy to prevent construction in the floodplain of education buildings or supporting structures (such as bus barns or maintenance sheds).	1	3	1	1	1	1	1	1	1	0	1	12	M
Dubuque Public School District – 2	Develop policy to better secure against cyber security breach.	0	1	2	3	1	1	1	1	1	1	1	13	H
NICC - 1	Consider building a tornado safe room for all new construction.	3	1	1	3	1	0	0	0	0	-1	1	9	M
Western Dubuque Public School District - 1	Develop policy to prevent construction in the floodplain of education buildings or supporting structures (such as bus barns or maintenance sheds).	2	3	2	3	1	1	1	1	1	1	1	17	H



## 5 PLAN MAINTENANCE PROCESS

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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

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**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 Dubuque County Emergency Management Coordinator, agree to:

- Meet annually to review the Hazard Mitigation 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 Dubuque 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, town, 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 to monitor progress, discuss recent hazard events, changes in development that impact vulnerability, and update the mitigation strategy. The Dubuque County Emergency Management Coordinator will be responsible for initiating the plan reviews which will be integrated into the regularly scheduled Emergency Management Commission meetings.

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.

### **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 because of implementing recommended actions,
- Increased vulnerability because of failed or ineffective mitigation actions, and/or
- Increased vulnerability because of new development (and/or annexation).

The annual reviews and 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.

To best evaluate the mitigation strategy during plan review and update, 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 the action status on an annual basis to the jurisdictional HMPC member and providing input on any completion details or whether the

action still 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.
- As part of the annual review process, the Dubuque County Emergency Management Coordinator will provide the updated Mitigation Strategy with status of each mitigation action to the County Board of Supervisors and County Department Heads as well as all Mayors, City Clerks, and School District Superintendents requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms.

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 Dubuque County HMPC deems appropriate and necessary, and as approved by the Dubuque County Board of Supervisors and the governing boards of the other participating jurisdictions.

## 5.2 Incorporation into Existing Planning Mechanisms

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**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.**

Many of the small jurisdictions in Dubuque County do not have standing formal planning mechanisms such as a Comprehensive Plan or Capital Improvements Plan through which formal integration of mitigation actions can be documented. As a result, activities that occur in these small communities are developed through, annual budget planning, regular City Council Meetings, and other community forums rather than a formal planning process. Planning mechanisms in the participating jurisdictions include:

- Comprehensive Plans—Cities of Asbury, Bernard, Dyersville, Epworth, Farley, Rickardsville, Zwingle
- Various ordinances of participating jurisdictions, including floodplain management ordinances in NFIP-participating communities;
- Dubuque County Emergency Operations Plan;
- Capital Improvement Plans—Cities of Bernard, Dyersville, Farley, Zwingle, as well as the community college and public-school districts

For a detailed summary of planning mechanisms and other mitigation-related capabilities, see Table 2.8 in Chapter 2.

### ***Incorporation of Previous Hazard Mitigation Plan into Existing Planning Mechanisms***

Instances of incorporation of the plan into previous planning mechanisms varied across

jurisdictions. A review of the completed actions and other identified and/or completed mitigation initiatives demonstrates that mitigation has been accomplished through existing planning mechanisms.

### ***Incorporation of Updated Hazard Mitigation Plan into existing Planning Mechanisms Going Forward***

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. After the annual review of the Hazard Mitigation Plan, the Dubuque County Emergency Management Coordinator will provide the updated Mitigation Strategy with the status of each mitigation action to the County Commission and County Department Heads as well as all Mayors, City Clerks, and School District Superintendents requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms. Jurisdiction-specific implementations may include:

1. Incorporation into annual emergency management training, planning, and purchasing plans
2. Coordination of mitigation strategy with County's Emergency Management Grant Fund, as well as seeking additional funding opportunities
3. Integration of risk assessment into future updates of the Comprehensive Emergency Operations Plan
4. Integration of mitigation strategy into county and community comprehensive plans
5. Integration of mitigation strategy into county and community capital improvement plans
6. Integration of mitigation strategy into annual budget planning processes

## **5.3 Continued Public Involvement**

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**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. The public will be involved in the plan maintenance process by publication of a Press Release after each annual review indicating the committee has met with a summary of mitigation action status updates and highlights of specific completed mitigation actions, as applicable. 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 through available website postings and social media outlets.

## APPENDIX A: REFERENCES

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**APPENDIX B: PLANNING  
PROCESS**

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The following materials are provided to document the planning process:

*B.1 Dubuque County Hazard Mitigation Planning Committee (HMPC) Members ..... 2*

*B.2 Kick-off Meeting Invite ..... 6*

*B.3 Kick-Off Meeting Agenda ..... 9*

*B.4 Kickoff Meeting Minutes ..... 10*

*B.5 Meeting #2 Agenda ..... 18*

*B.6 Meeting #2 Minutes ..... 20*

*B.7 Meeting #2 Sign-In Sheets ..... 24*

*B.8 Meeting #3 Agenda ..... 30*

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*B.10 Meeting #3 Sign-In Sheets ..... 36*

*B.11 Public Notice During Drafting Stage ..... 40*

*B.12 Public Outreach Social Media Posts ..... 41*

*B.13 Plan Summary/Questionnaire for Public Comment during Drafting Stage ..... 44*

*Announcement for Final Public Comment Period                      46*