

ADLM Regional Hazard Mitigation Plan



FEMA Approved: 3-01-2022



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Executive Summary

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. The counties of Appanoose, Davis, Lucas, and Monroe (ADLM) Counties and participating jurisdictions developed this regional multi-jurisdictional local hazard mitigation plan update to reduce future losses to the region due to 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 ADLM Regional Multi-Jurisdictional Hazard Mitigation Plan covers the following jurisdictions that participated in the planning process:

Appanoose County

- Unincorporated County
- Centerville
- Cincinnati
- Exline
- Moravia
- Moulton
- Mystic
- Numa
- Plano
- Rathbun
- Udell
- Unionville
- Centerville Community Schools
- Moravia Community Schools
- Moulton-Udell Community Schools
- MercyOne Medical - Centerville

Davis County

- Unincorporated County
- Bloomfield
- Drakesville
- Floris

Davis County – cont’d

- Pulaski
- Davis County Community Schools
- Davis County Hospital
- Soap Creek Watershed Board

Lucas County

- Unincorporated County
- Chariton
- Derby
- Lucas
- Russell
- Williamson
- Chariton Community Schools
- Lucas County Hospital

Monroe County

- Unincorporated County
- Albia
- Lovilia
- Melrose
- Albia Community Schools
- Monroe County Hospital
- South Central Iowa Cedar Creek WMA

The ADLM Region, the incorporated jurisdictions, and public school district listed above developed separate FEMA approved County Multi-Jurisdictional Hazard Mitigation Plans in 2016 and 2019. Therefore, this current planning effort serves to update the previous plans and will supersede those upon FEMA approval.

Additional stakeholders were also invited to include private businesses, community groups, private non-profit entities, adjacent communities, state and federal agencies, academia, and local regional agencies that have a stake in mitigation planning in region.

The plan update process followed a methodology prescribed by FEMA, which began with the assembly of the Hazard Mitigation Planning Committee (HMPC) comprised of representatives from Appanoose County, Davis County, Lucas County, Monroe County and participating jurisdictions and stakeholders. The HMPC updated

the risk assessment that identified and profiled hazards that pose a risk to the regional 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 committee recognized that individual county goals were all similar. The emphasis was the same but had slight variation in verbiage. The members constructed goals that were derived from the previous goals and considered the State of Iowa's 2018 Hazard Mitigation Plan. The following goals were agreed upon:

- 1. Protect the health and safety of residents, visitors, staff, and emergency personnel (paid and volunteer) during hazard events.**
- 2. Minimize losses to existing and future structures in hazard areas. Critical facilities are priority structures.**
- 3. Maintain local services and infrastructure to reduce community, economic and environmental disruption during and after hazard events.**
- 4. Educate residents and visitors about local hazards and the resources available in the community.**
- 5. Apply public funds to hazard mitigation projects in an efficient and fair manner to minimize dependence on Federal resources.**

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

Prerequisites

44 CFR requirement 201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

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 C.

Plan Approval and Adoption

This multi-jurisdictional hazard mitigation plan was adopted by each county in the ADLM Region. An initial review of the plan will be completed by Iowa's hazard mitigation reviewer and then was submitted to the FEMA Region 7 plan reviewers for final review and approved on March 1, 2022 and will expire March 1, 2023. Local adoption for the initial plan through a resolution on:

Appanoose County: 6/07/2021

Davis County: 5/17/2021

Lucas County: 5/19/2021

Monroe County: 5/18/2021

Resolution # 2021-23

**Adopting the ADLM Regional Multi-Jurisdictional Local Hazard
Mitigation Plan
(Counties of Appanoose, Davis, Lucas, and Monroe, Iowa)**

Whereas, Appanoose County 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, Appanoose County 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 "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas, Appanoose County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption by the governing body for Appanoose County 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 Appanoose County Board of Supervisors adopts the "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, Appanoose County 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.

Approval Date: 6-7-21

LINDA DEMAY
Certifying Official:

Linda Demay
Signature of Certifying Official:

Attest: Kelly Howard

Resolution # 51721

**Adopting the ADLM Regional Multi-Jurisdictional Local Hazard
Mitigation Plan
(Counties of Appanoose, Davis, Lucas, and Monroe, Iowa)**

Whereas, Davis County 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, Davis County 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 "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas, Davis County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption by the governing body for Davis County 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 Davis County adopts the "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, Davis County 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.

Approval Date: 5/17/21

Matt Greiner
Certifying Official: Chairman, Bd. of Supervisors

Matt Greiner
Signature of Certifying Official:

Attest: Linda Humphrey
Davis County Auditor

Resolution

**Adopting the ADLM Regional Multi-Jurisdictional Local Hazard
Mitigation Plan
(Counties of Appanoose, Davis, Lucas, and Monroe, Iowa)**

WHEREAS the (Lucas County Board of Supervisors 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 (Lucas County Board of Supervisors) 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 "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS the Lucas County Board of Supervisors desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan; and

WHEREAS adoption by the governing body for the Lucas County Board of Supervisors 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 Lucas County Board of Supervisors adopts the "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, The Lucas County Board of Supervisors 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.

Approval Date: 05/19/2021

Cathy Reece
Certifying Official:

Cathy Reece
Signature of Certifying Official:

Attest: Julie L Masters
Julie L Masters, Auditor

Resolution #
**Adopting the ADLM Regional Multi-Jurisdictional Local Hazard
Mitigation Plan**
(Counties of Appanoose, Davis, Lucas, and Monroe, Iowa)

Whereas, Monroe County 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, Monroe County 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 "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas, Monroe County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption by the governing body for Monroe County 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 Monroe County adopts the "ADLM Regional Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, Monroe County 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.

Approval Date: 5/18/21

Dennis Amoss
Certifying Official:

Dennis Amoss
Signature of Certifying Official:

Attest: Amanda P. Hauer

Introduction

Local Hazard Mitigation Planning Overview

The primary purpose of hazard mitigation planning is to identify how a community can minimize the negative impacts such as death, injury, property damage and community disruption of natural, technological, and human-caused hazards. For the State of Iowa, Appanoose, Davis, Lucas, and Monroe Counties there are recurring natural disasters such as windstorms, flooding, and severe winter storms have made local hazard mitigation planning an essential activity. Communities that engage in hazard mitigation planning to maintain a local governments eligibility to apply for FEMA's Hazard Mitigation Assistance funding, which includes the grant programs of: Hazard Mitigation Grant Program, Pre-Disaster Mitigation, and Flood Mitigation Assistance.

Local hazard mitigation plans are required to:

1. Document the planning process.
2. Identify hazards and risks.
3. Document jurisdictions; mitigation strategies and priorities
4. If applicable provide an update to the previously approved plan(s)
5. The participating jurisdictions are required to formally adopt the plan for the plan to be approved by FEMA.

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 the ADLM region 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.

Plan Background

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

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

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.

This plan is a multi-jurisdictional, regional hazard mitigation plan for Appanoose, Davis, Lucas, and Monroe Counties in southern Iowa. Three counties had individual county multi-jurisdictional plans that were approved in July 2016 and Davis County in early 2019. The development of the plan was funded by "ADLM Emergency Management" (symbolizing the Counties of Appanoose, Davis, Lucas & Monroe).

ADLM Emergency Management contacted Chariton Valley Planning & Development (CVPD) Council of

Governments to create this document. CVPD was contracted through ECICOG to complete the work on behalf of the state’s request.

This planning effort creates a regional document for ADLM Emergency Management. This will serve as an update to Appanoose, Davis, Lucas, and Monroe counties. Their previous strategies were reviewed to determine if they were still valid or had been accomplished. New strategies and those carried forward were merged into a collaborative document.

This plan fulfills the requirements of the Stafford Act, DMA 2000, and Title 44 of the Code of Federal Regulations 201.6. Throughout the development of this plan, the consultant balanced applicable federal legislation and local priorities to provide the region with an approved and valuable plan.

Plan development began in fall of 2020 and occurred over an eight (8) month period that involve collaboration among local officials, staff, county representatives, EMA and CVPD. The planning consultant facilitated research, public meetings, and a public comment period. The plan was submitted to Iowa Homeland Security and Emergency Management Department (HSEMD) and FEMA for review July 14, 2021. Upon approval and adoption by participating jurisdictions, this plan is effective for five years and maintains eligibility for HMA funding.

Plan Participants

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

The ADLM region invited the incorporated cities, public school districts and various other stakeholders to participate in mitigation planning. The jurisdictions that elected to participate in this plan are listed below. The ADLM region requires that each jurisdiction that participates in the planning process must officially adopt the multi-jurisdictional hazard mitigation plan.

The planning area for this multi-jurisdictional hazard mitigation plan includes four counties and communities and unincorporated area that lie within those boundaries. The planning area also includes six school districts.

Exhibit 1: ADLM Multi-Jurisdictional Regional Hazard Mitigation Plan Participants	
Participants	Participant in this Regional Plan
Appanoose County	
Unincorporated County	Gary Anderson, Kris Laurson, Brad Skinner, Dianna Daly-Husted, Stacie Price, Mark McGill
Centerville	Mike O’Connor, Jay Dillard, Tom Demry, Jason Fraser, Mike Bogle, Diane Dalponte
Cincinnati	James McGill
Exline	Diane DalPonte
Moravia	Sharla Stogdill
Moulton	John Replogle
Mystic	Phil Hudson
Numa	Community provided information
Plano	Community provided information
Rathbun	Community provided information
Udell	Community provided information
Unionville	Community provided information
Centerville Comm School	Tim Kaster, Tom Rubel
Moravia Comm Schools	School provided information
Moulton-Udell Com School	School provided information
MercyOne Medical-Centerville	Hospital provided information

Davis County	
Unincorporated County	Dave Davis, Lynn Fellingner, Ronna Gingerich, Denyse Gipple, Teri Hanna, Josh O'Dell, Ryan Schock, Josh Sinnott, Alan Yahnke, Ron Bride, Lynn Fellingner, Jerry Parker, Diana Daly-Husted, Stacie Price
Bloomfield	Jeff McClure
Drakesville	Rock Johnson
Floris	Marcie Bengel & Gage Reistroffer
Pulaski	Dean Graham
Davis County School	Dan Roberts
Davis County Hospital	Teri Hanna
Lucas County	
Unincorporated County	Cathy Reece, Larry Davis, Todde Folkerts, Cameron Willis
Chariton	Laura Liegois, Steve Davis, Barry Smith, Earl Comstock
Derby	
Eddyville	Gene Rouze
Lucas	Community provided information
Russell	Mark McCurdy
Williamson	Nancy Stansberry
Chariton Community School	Molly Cusic
Lucas County Health Center	Jayma Hoch, Lindsey Rosenbaum
Monroe County	
Unincorporated County	Jeremiah Selby, Dan Johnson, Kim Huguen, Cameron Willis, Diana Daly-Husted
Albia	Richard Clark
Lovilia	Jess Hutchinson
Melrose	Linda Heller
Albia Community School	Kevin Crall
Monroe County Hospital	Cory Billings
Regional Neighbors Invited	Wayne County Emergency Management, Wapello Emergency Management, Area XV Planning Commission, Southern Iowa Council of Governments, & public flyers posted

PLAN DEVELOPMENT

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.

The hazard mitigation plan is a product of a multi-year planning process that involves collaboration between officials, staff and residents participating jurisdictions. In Iowa, the process typically is completed by a coordinator, usually a planner, HSEMD and FEMA region 7. The primary goals of the coordinator are to ensure the planning process and final document focus on the mitigation priorities of participating jurisdictions and fulfill regulatory requirements.

Planning Consultant

ADLM Emergency Management has collaborated with Chariton Valley Planning & Development on previous mitigation plans and has been confident the agency’s capability to develop a regional plan. Planning staff at CVPD possess knowledge and experience in hazard mitigation planning and having the previously approved hazard mitigation plans for Appanoose, Lucas, Monroe, and Wayne Counties. For more information visit the agency website www.charitonvalleyplanning.com.

Chariton Valley Planning and Development’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.

Review and Research

Throughout the plan development process, existing documents and data for each jurisdiction were reviewed for relevance and potential inclusion in this plan. Other documents incorporated into the content of this plan include local regulatory documents, planning, and procedure documents and mapping. Jurisdictions included in this plan are diverse in purpose and size so the types of documents available vary for each one. In each jurisdiction’s Operations & Resources table, the jurisdiction-specific documents incorporated into the content of this plan are described. A valuable source of information referenced in this plan is the *Iowa Hazard Mitigation Plan 2018* prepared by HSEMD.

In addition to existing documents, extensive research was completed to include current information for each jurisdiction in the plan. The bulk of this research consists of database searches for hazard event information relevant to the region. The databases are cited throughout the document.

To ensure this plan meets regulatory requirements, the October 2011 version of the Local Mitigation Plan Review Guide, provided by FEMA, was referenced frequently in the development process. The planning process was designed to meet or exceed the basic requirements presented in the guide for a multi-jurisdictional plan.

Planning Meetings & Public Involvement

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. 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.

This document was developed during the COVID-19 pandemic when social distancing was encouraged and holding large public meetings was discouraged. Kick-off information and outreach documents were distributed on April 20, 2021.

Separate planning efforts were held for school districts to cover the topics and allowed for districts to complete the update to their portions of the plan. Because school districts have less infrastructure to maintain than cities, their planning meetings are typically shorter, and their mitigation strategies tend to include fewer projects.

Exhibit 2: Plan Development Process	
Community Rating System (CRS) Planning Steps (Activity 510)	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
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)
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	
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	
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)

At the kick-off meeting, the committee 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 on CVPD Facebook page.

The public survey was developed specific to the ADLM Regional Hazard 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 and throughout the region. A copy of the survey is provided in Appendix B.

In addition to notification through media outlets described above, committee members distributed the survey link to members of the public and key stakeholders in their own jurisdiction via email and Facebook. The survey asked the public and stakeholders to indicate their opinion on the likelihood for each hazard to impact their jurisdiction.

CVPD manages a public Facebook page that disseminates information, education, and solicit information from readers. Information regarding hazard mitigation was posted multiple times throughout the planning process.

Public Comment

The 30-day public comment period for this plan was completed. A draft of the plan was available on CVPD’s website and a news release with information about the public comment period was sent to each participating jurisdiction, local media, and emergency management coordinators in the surrounding counties. Specifically inviting surrounding counties to participate in the public comment period allows for potential regional cooperation beyond the planning area because the mitigation strategies and action plans are not yet finalized.

Before the full draft plan of the document was released for public comment, the planning consultant gave local planning committees the option to review and verify that the plan information reflects the discussion at planning meetings.

Coordination with other Departments & Agencies

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. 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 ADLM Region. Coordination with these organizations and other community planning efforts is vital to the success of this plan. Many stakeholder agencies were contacted throughout the planning process to obtain data in preparation of the Risk Assessment. This included contact with specific representatives of stakeholder agencies, as well as accessing stakeholder data that has been made available to the public via the internet. These sources have been identified where data is presented. In addition, neighboring counties were invited, as well as other local, state, and federal departments and agencies and institutions of higher learning to review and comment on the final draft of the ADLM Regional Hazard Mitigation Plan prior to final submittal to FEMA.

Exhibit 3: Stakeholder Involvement			
Stakeholder	Type	Provided Data for Risk Assessment	Invited to Comment on Final Draft
Iowa State University, Iowa Flood Center	Academia	X	X
Wapello County	Adjacent County		X
Clarke County	Adjacent County		X
Van Buren County	Adjacent County		X
Jefferson County	Adjacent County		X
Mahaska County	Adjacent County		X
Marion County	Adjacent County		X
Warren County	Adjacent County		X
Wayne County	Adjacent County		X
Scotland County, Missouri	Adjacent County		X
Schuylar County, Missouri	Adjacent County		X
Environmental Protection Agency	Federal Agency	X	X
Federal Emergency Management Agency	Federal Agency	X	X
National Weather Service	Federal Agency	X	X
U.S. Army Corps of Engineers	Federal Agency	X	X
U.S. Geological Survey	Federal Agency	X	X
Area 15 Regional Planning Commission	Regional Planning		X
Iowa Department of Agriculture and Land Stewardship	State Agency	X	X
Iowa Department of Natural Resources	State Agency	X	X
Iowa Homeland Security and Emergency Management	State Agency	X	X

In addition, input was solicited from many other agencies and organizations that provided information. As part of the coordination with other agencies, the HMPC collected and reviewed existing technical data, reports, and plans. These included:

- 2018 Iowa Hazard Mitigation Plan.
- Davis County Hazard Mitigation Plan (July 2018).
- Appanoose, Lucas & Monroe County Multi-Jurisdictional Hazard Mitigation Plans 2016
- National Flood Insurance Program Policy and Loss Statistics.
- Flood Insurance Administration, Repetitive/Severe Repetitive Loss Property Data.
- Flood Insurance Rate Map.
- Iowa Department of Natural Resources, Dam Safety Program Inventory.
- National Inventory of Dams.
- National Levee Database.
- Various local plans such as Comprehensive Plans, Economic Development Plans, Capital Improvement Plans, etc.
- 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 B.

Plan Approval and Adoption

This multi-jurisdictional hazard mitigation plan was submitted for public comment, review, and approval on _____ . An initial review of the plan was completed by Iowa’s hazard mitigation reviewer and then was submitted to the FEMA Region 7 plan reviewers for final review and approval on _____ . Local adoption for the initial draft plan through a resolution on:

Appanoose County: 6/07/2021

Davis County: 5/17/2021

Lucas County: 5/19/2021

Monroe County: 5/18/2021

Plan 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 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. Objectives are specific actions that help achieve the goal. Throughout the development process of this plan, goals were used as a guide for planning committee decisions and final decision making. Jurisdiction representatives reviewed the goals in the 2017-2022 hazard mitigation plan. The counties of Appanoose, Lucas and Monroe had similar goals of:

1. Protect critical facilities, infrastructure, services, and other community assets from the impacts of hazards.
2. Protect the health, safety, and quality of life of Appanoose/Lucas/Monroe County residents by minimizing the vulnerability of people and property in the county.
3. Reduce losses due to natural and man-made hazards.

ADLM Regional Goals

While similar, yet slightly different, Davis County had the following established goals:

1. Protect the health and safety of residents (students), visitors, staff, and emergency personnel, paid or volunteer, during and after hazard events.
2. Minimize losses to existing and future structures in hazard areas. Critical facilities are priority structures.
3. Maintain local services and infrastructure to reduce community, economic and environmental disruption during and after hazard events.
4. Educate residents (or students) and visitors about local hazards and the resources available in the community.
5. Apply public funds to hazard mitigation projects in an efficient and fair manner to minimize dependence on state and federal resources.
6. Protect the health and safety of residents, visitors, staff, and emergency personnel (paid and volunteer) during hazard events.
7. Minimize losses to existing and future structures in hazard areas. Critical facilities are priority structures.
8. Maintain local services and infrastructure to reduce community, economic and environmental disruption during and after hazard events.
9. Educate residents and visitors about local hazards and the resources available in the community.
10. Apply public funds to hazard mitigation projects in an efficient and fair manner to minimize dependence on Federal resources.

Regional Profile

The ADLM region is comprised of Appanoose, Davis, Lucas, and Monroe counties in south central Iowa. The soils that are found within the region are well suited to agricultural uses, including crop production and pasture, but are susceptible to erosion. The highest elevation in the ADLM region is about 1,070 feet above sea level in Appanoose County and the lowest elevation is about 504 feet above sea level and occurs in Lucas County. Davis County has the least variation in elevation. Appanoose, Lucas, and Monroe Counties are comprised of gently rolling hills and average an elevation variation of approximately 550 feet.

The region has a total area of 1,889 square miles. There are several highways and county roads including U.S Highway 63 in Davis County; Iowa Highway 2, which travels east and west through Appanoose and Davis Counties; Iowa Highway 202, which passes through a small portion of southwestern Davis County and Appanoose County; Iowa Highway 5 that travels north and south through Appanoose and Monroe Counties; U.S. Highway 34 extends east/west through Lucas and Monroe Counties; Iowa Highway 14 provides traffic north/south through Lucas County and U.S. Highway 65 is at the western edge of Lucas County traveling north and south. The rest of the roads in the county are county highways and local roads.

The ADLM region crosses four watersheds as follows:

- 07100009 Lower Des Moines
- 07110001 Bear-Wyaconda
- 07110002 North Fabius
- 10280201 Upper Chariton

Exhibit 4: Iowa Watersheds

Source: Environmental Protection Agency, <https://cfpub.epa.gov/surf/locate/index.cfm>



Iowa DNR identifies Rathbun Lake Watershed and Rathbun Lake Sub-watersheds of southcentral Iowa:

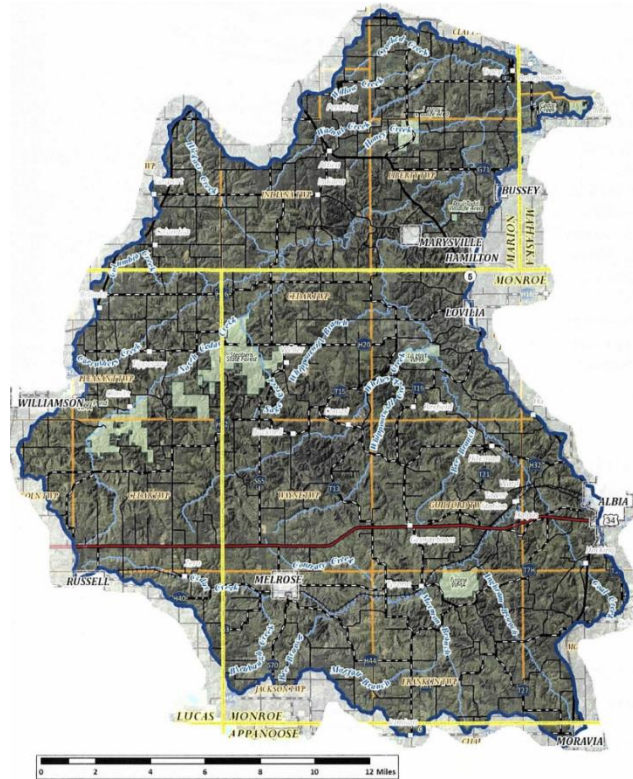
Exhibit 5: ADLM Regional Watersheds

South Central Iowa Cedar Creek WMA

Cedar Creek has a large watershed covering 269,512 acres and is comprised of 14 sub-watersheds that extends into 5 local counties: Appanoose, Lucas, Mahaska, Marion, and Monroe. The headwaters start in Lucas County and at the Appanoose- Monroe County line, where it extends northward into Marion County, out letting at the Des Moines River two miles south of Tracy, Iowa, which is approximately 16 miles north of Eddyville, Iowa.

Due to water quality issues caused by severe flooding and erosion problems, a local non-profit group known as a Watershed Management Authority (WMA), was organized to collaborate and implement solutions address-, these issues to improve water quality.

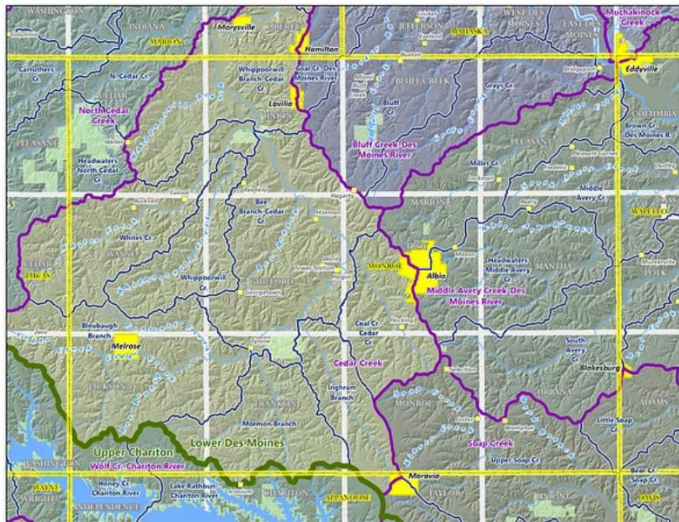
On August 13, 2015, with full support from Appanoose, Lucas, Mahaska, Marion and Monroe Soil Water Conservation Districts, County Board of Supervisors and Watershed Municipalities, a working agreement (28E) was established formally founding the "South Central Iowa Cedar Creek Watershed Management Authority" (WMA). The WMA has prioritized getting a hydrology study and develop a watershed management plan. This information will be obtained from assessments and scientific data collected which will guide the implementation of conservation practices to reduce flood and erosion damage. Anticipated plan approval is in 2022.



Soap Creek WMA

The Soap Creek Watershed is located within four counties in Southeastern Iowa: Appanoose, Davis, Monroe, and Wapello. The total drainage area is 162,000 acres. Floods occur on Soap Creek and its tributaries nearly every year; most of the flooding occurs during the months of March, April, May, and June. Improvements in the Soap Creek Watershed began in the 1960s and founded the Soap Creek Watershed Board in 1986, which consists of a county supervisor and district commissioner representative from each of the counties.

Their goal was to reduce floodwater and sediment damage. Floodwater affects crops, pasture, land quality, roads, bridges, rural water lines, and fences. The 1988 Watershed Plan-Environmental Impact Statement (Watershed Plan) reported that the annual benefit of this project is \$536,030. Without the project, the cost of annual damage would be \$327,660. The resulting benefit to cost ratio is 1.6 to 1.0. The project has greatly



reduced flooding and flood damage caused by heavy rains, saving soil, farmland productivity, and money.

Since 1986, Soap Creek WMA in partnership with the NRCS PL566 program improved the watershed by securing 5,000 acres of easements to construct 132 erosion/flood control structures. A 2013 University of Iowa study illustrated how these 132 structures are providing a vital role in reducing 100-year storm effects by 40%. The planning process has come full circle as many of the landowners are concerned that structures are filling with sediment derived primarily from gully erosion in upland forests. In 2007 the Appanoose SWCD received an assessment grant from IDALS-

DSCWQ to conduct a sheet/rill and gully assessment of 12 structures in the watershed. In 2012, the Iowa NRCS State Office completed a detailed sedimentation study concluding that many of the structures may not reach their intended 50-year service life.

In February 2016, a technical Advisory Group assembled by Soap Creek WMA agreed that successfully maintaining a healthy watershed in forested areas requires a comprehensive approach. The group concluded that timber stand improvement, prescribed Burning and log weirs should be used together to treat issues of excess soil loss, soil health and gully erosion within the forests of the watershed.

Current projects include Cedar Creek, Lake Miami, Miller Creek, Lake Rathbun, Soap Creek, and Bluff Creek Watershed.

Climate

The climate in the region is described as hot-summer humid continental with cold winters and hot and humid summers. The average winter temperature is 25.9 degrees Fahrenheit, with an average snowfall of 23 inches. The average summer temperature is 73.3 degrees Fahrenheit, with an average annual rainfall of 39 inches.

The coldest winter month is January with an average low of 14.2 degrees Fahrenheit and the hottest summer month is July with an average high of 85.4 degrees Fahrenheit. Seasons fluctuate from being very wet to very dry, and temperatures can fluctuate greatly in spring and autumn months. ADLM's rainy season occurs from May through September, with a peak precipitation normal of 5.31 inches in May.

Population

According to the U.S. Census Bureau, the ADLM region's population has been experiencing slight decline each year for approximately 10 years.

Exhibit 6: ADLM Regional Population				
Jurisdiction	2010 Census Population	2019 Population Estimate	# Change 2010-2019	% Change 2010-2019
Appanoose County	12,887	12,426	-461	-3.58%
Davis County	8,753	9,000	+247	+2.75%
Lucas County	8,898	8,600	-298	-3.35%
Monroe County	7,970	7,707	-263	-3.30%
Regional Total	38,508	37,733	-775	-2.02%

Vulnerable Populations

Exhibit 7: ADLM Region Vulnerable Population 2019 ACS								
Jurisdictions	Population 65yrs & older	% Over 65yrs	Population 18 years & younger	% Under 18yrs	Population living below poverty guidelines	% In poverty	Residents living with a diagnosed disability	% With Disability
TOTAL APPANOOSE COUNTY	2,884	23%	2,788	22%	2,200	18%	2,375	19%
TOTAL DAVIS COUNTY	1,555	17%	2,621	29%	868	10%	1,037	12%
TOTAL LUCAS COUNTY	1,787	22%	2,002	23%	1,015	12%	1,435	27%
TOTAL MONROE COUNTY	1,533	20%	1,840	24%	809	11%	962	13%
TOTAL REGIONAL	7,759	21%	9,251	25%	4,892	13%	3,671	18%

Exhibit 8: ADLM Regional Occupational Types

Geography	Civilian employed population 16 years & over	Management, business, science, & arts occupations (%)	Service occupations (%)	Sales and office occupations (%)	Natural resources, construction, & maintenance occupations (%)	Production, transportation, & material moving occupations (%)
Appanoose County	5,201	26.3%	14.9%	23.7%	12.2%	22.7%
Davis County	3,853	32.8%	11.7%	20.1%	15.1%	20.2%
Lucas County	4,113	27.4%	15.2%	21.5%	8.9%	26.8%
Monroe County	3,785	31.0%	17.8%	16.9%	14.7%	19.3%

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

Jurisdiction Profiles

The various communities in Appanoose County are in relatively proximity to one another and share many of the same topographic and geographic features in addition to socio-economic characteristics. Each community will be addressed separately in this section to ensure that the needs of each are adequately covered. The following profiles are divided into official jurisdictions; unincorporated communities are lumped into Appanoose County as the county is the most direct level of government for them.

APPANOOSE COUNTY

General Information

Population: 12,452	Floodplain: Yes
Unincorp Region: 4747	NFIP Participant: No
65 years & Older: 23%, 2827	Historic District: Yes
5 years & older in school: 5%, 673	Comprehensive Plan: Yes
School buildings: None	Zoning Ordinance: Yes
Places of Worship: 4	Subdivision Ordinance: No
Land Area: 516 sq miles	Building Permits required: Yes
Most Recent Codification:	

Geography

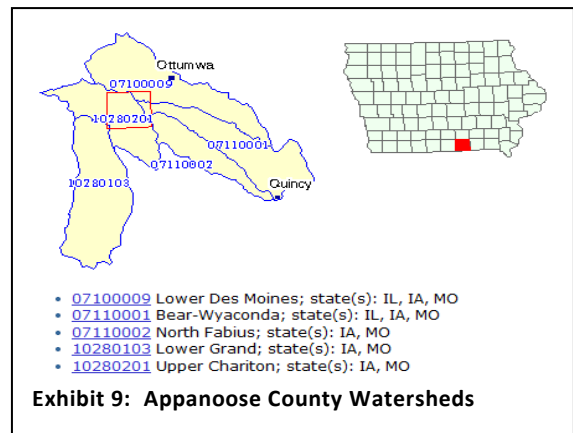
Appanoose County is in the southern tier of counties in Iowa adjoining the Missouri border. There are twenty-four unincorporated communities in Appanoose County and eleven incorporated cities.

Appanoose County is in the south-central sector of Iowa at coordinates 40° 44' 17" N, 92° 52' 2" W and bordering the Missouri counties of Putnam and Schuyler. The Iowa counties surrounding Appanoose are as follows, Davis, Wapello, Monroe, Lucas, and Wayne. Appanoose County encompasses an area of 516 square miles with a population density of 25 people per square mile according to the 2019 ACS.

Rathbun Lake is located primarily in Appanoose County covering a total area of 12,040 acres in four counties. Rathbun Lake is the second largest water body in Iowa. Fourteen rivers and creeks cross through Appanoose County, the most significant of which is the Chariton River which created Rathbun Lake once dammed in the 1970's.

Appanoose County's terrain is predominantly undulating topography that characterizes the rolling hills of the Southern Iowa Drift Plain.

Appanoose County is in 5 different watersheds, all within the Mississippi Basin. The Upper Chariton watershed encompasses most of the county and extends into Missouri.



Population Data

As of the 2019 ACS, the total population of Appanoose County was 12,452 with a total of 5253 households. This is down 435 persons since the 2010 Census count of 12,887 people and down 374 households. According to Iowa State University’s Regional Capacity Analysis Program (ReCAP), Appanoose County has faced nearly a century of decline starting around 1910. The decline has been evening out in recent decades with the smallest amount of population loss between 1990 and 2000.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 2.9% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 673 (5% of total population) children under the age of five years. The population over the age of 65 years account for 23% (2827 people) in Appanoose County.

The remaining “at risk” category would be individuals that have a disability. It is estimated that approximately 2375 (19%) residents of Appanoose County have a confirmed disability.

The combination of all these populations qualifies nearly 50% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Appanoose County was up to \$40,167 from \$34,689 in the 2010 Census. Nearly 44% of the households in unincorporated Appanoose County had incomes under \$35,000 annually. In 2019, 18% of residents in the unincorporated population of Appanoose County were determined to be under the Federal Poverty Guidelines.

Exhibit 10: Woods & Poole Population Projection for Appanoose County

AREA	2025	2030	2035	2040
APPANOOSE	12,811	12,739	12,310	12,231
PERCENT CHANGE	-0.91%	-0.57%	-3.3%	-.64%

Source: Iowa State Data Center, <http://www.iowadatacenter.org>

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

More than one-third of the housing stock (35%) in Appanoose County was constructed before 1940 suggesting that the structural integrity of the buildings likely does not meet newer building codes designed to ensure the safety of residents. These structures are likely the most vulnerable to various hazards due to their age and the changes in construction techniques which have improved in many ways since they were built. A larger proportion of the older housing stock is found in incorporated communities in Appanoose

County, however. Median year built of the homes in Appanoose County is 1948, meaning that half of the homes were built before and half after this year. Approximately 18% of homes were built in the 1970's.

Another potential concern is the prevalence of bottled fuels such as LP gas, kerosene, and oil used as heating fuel in the homes in unincorporated Appanoose County; 37% of homes use LP gas as heating fuel. While LP tanks can be safe forms of fuel containment and transport, liquefied petroleum gas is flammable and can explode. LP gas is heavier than air and so it will sink to the lowest level possible; if inhaled it can cause asphyxiation through oxygen deprivation but is otherwise nontoxic. A further concern is that 227 homes (4%) in 2010 reported using wood as the primary heating fuel. This becomes a concern due to its potential fire hazard but also to carbon monoxide poisoning in the home if a chimney is blocked.

Approximately 29% of the owner-occupied homes in Appanoose County were valued at less than \$50,000 as of the 2019 ACS. Approximately 62% of homes in Appanoose County are valued less than \$100,000 and one quarter are valued below \$50,000.

Jurisdiction Assets

Lake Rathbun, Honey Creek Resort, Campgrounds, etc.

Rathbun Lake is maintained by the U.S. Army Corps of Engineers. Its 11,000 acres are popular for water sports and fishing spring through fall, locally the lake is called Iowa's Ocean. An abundance of public-use land around the lake provides additional recreation opportunities.

Access to the lake is easy from five Corps parks, Honey Creek State Park, and two marinas. Top water sports include sail boating, motor boating, water skiing, and fishing. Three areas are designated swimming beaches. Fishing is popular: in spring for crappie, in summer for walleye and bass, and for catfish, late summer through fall.

There are eight campgrounds around the lake. On the northern shore of the lake Honey Creek State Park offers 828 acres of camping and trails. Marinas at both the east and west ends of the lake provide supplies, slip rentals, campgrounds, and a hotel.

Public-use land around the lake is open for off-lake activities. Hunting, for a variety of birds; pheasant, turkey, duck, quail, and geese, and for deer, is open in designated areas. Snowmobile trails along the lake's north shore provide 35 miles of winter fun. Birdwatching is popular along the one-third mile Oxbow Trail in the Chariton River Valley. South of the lake, a 125-acre abandoned rock quarry provides year-round off-road trails for motorcycle and ATVs. Below the dam, the Rathbun Fish Hatchery raises catfish, walleye, and largemouth bass that stock lakes and rivers statewide. It is open for self-guided tours during weekdays.

Campgrounds are conveniently located around Rathbun Lake. The Corps manages five of these campgrounds Buck Creek, Prairie Ridge, Bridge View, Island View, and Rolling Cove Parks. The Iowa Department of Natural Resources manages Honey Creek campground. A private concessionaire manages the South Fork and Buck Creek Marina campgrounds. User fees are charged for camping in parks that the Corps of Engineers operates. The amount of the fee is based on the type of facilities provided.

Campgrounds contain level campsites, many with electrical hookups, lantern hanging posts, picnic tables, and fire rings. Shower buildings, sanitary dump stations, playgrounds, and fish cleaning stations are in

most parks. Please click on campground specific information for a complete list of amenities and fees for each campground. Entrance stations are located at most campgrounds and all campgrounds are patrolled routinely by Park Rangers and Appanoose County Sheriff's Deputies.

The U.S. Army Corps of Engineers has the responsibility for managing the 55 square miles of land and water at Rathbun Lake.

Lands around the lake are managed by the Corps of Engineers to preserve their natural value. Land management practices such as prairie restoration, prescribed burning and tree planting help conserve soil and benefit wildlife.

Rathbun Lake provides flood protection for 149,300 acres of land along the Chariton River downstream from the dam and is part of a network of Corps Lakes that help control flooding on the Missouri and Mississippi River. Rathbun Lake was constructed and is operated by the U.S. Army Corps of Engineers. Located at Chariton River mile marker 142, approximately 7 miles north of Centerville Iowa, in Appanoose County, it is one of the largest lakes in Iowa. The lake was constructed to control flooding, provide recreation opportunities, abate stream pollution, fish, and wildlife enhancement, and maintain minimum stream flow on the Chariton, Missouri, and Mississippi Rivers.

The Chariton and South Fork of the Chariton River are the major sources of water flowing into Rathbun Lake. The Chariton River Basin drains a total of 2,309 square miles, of which 549 square miles are located above the dam. The basin runs generally from north to south. The drainage area has a maximum width of 25 miles and an average width of 12 miles. Rathbun Lake has a flood control pool of 20,948 surface acres and a multipurpose pool of 11,013 surface acres. Rathbun Lake averages about one mile in width and has 155 miles of shoreline at the top of multipurpose pool elevation. At full pool elevation, the lake has 319 miles of shoreline and extends generally westward a distance of about 21 miles into Lucas, Wayne, and Monroe Counties.

The dam consists of a rolled earth fill embankment with an uncontrolled spillway located approximately 3,000 feet westward of the right abutment. Discharges enter a concrete stilling basin. Rathbun Dam is considered a "High Hazard Dam" in the *2018 State of Iowa Mitigation Plan*. The Army Corp of Engineer's has an entire Emergency Plan to prevent and handle such an event if it were to occur. This plan is a confidential document housed at the Army Corp of Engineer's headquarters. The community of Rathbun lies directly downstream of the dam and its discharge. This entire small community would be inundated with water if there was a breach in the dam. The emergency sounds would alert residents to evacuate but there may not be enough time allowed.

Lake Sundown

Sundown Lake was built as a recreational lake in the early 1970's. It is located 7 miles southeast of Moravia, IA and just 1.5 hours southeast of Des Moines. The lake was privately owned and held until 2005. Secluded Land Company LLC purchased the lake in 2005 with the intention of making Lake Sundown one of the best private lakes in Iowa.

The Sundown Lake development is comprised of over 2400 acres of land that encompasses the lake, which is 400+ acres. The lake is entirely private, meaning that only owners and their guests have the authority to use the lake. The development consists of 350 lots that include lake front, lake view, and large acreage lake access lots. Besides enjoying water sports and fantastic views, residents at the lake can take advantage of the wooded areas for hunting or larger lots that provide additional privacy. The lake

also offers a public beach, bathhouse, public docks, and common areas for picnics or other outdoor activities.

There are approximately 90 homes at Lake Sundown that are occupied by residents.

Lake Sundown dam is currently identified as a “High Hazard Dam” in Appanoose County. This indicates that if there were a failure of the dam it would probably result in a loss of life.

Tubaugh Wildlife Management Area

Tubaugh Wildlife Management Area incorporates 533 acres of public land that can be used to hunt deer, turkey, squirrel, rabbit, and quail. This land is located eight miles east of Moravia and is adjacent to Stephen’s State Forest- Unionville Unit.

Soap Creek Wildlife Area- Appanoose

Soap Creek Wildlife Area in Appanoose County offers 250 acres of timber. This public land is located 3 miles northeast of Unionville on County highway T61. Species to hunt include deer, turkey, and squirrels.

Sedan Bottoms Wildlife Management Area

Nestled in southern Appanoose County, Sedan Bottoms Wildlife Management Area is a protected paradise. Prairies, oak savannas, forests, and floodplains along the Chariton River. The 6,741 acres is located four miles west of Moulton. One-quarter of the habitat is Upland, 25% us timber and 25% of it is marsh.

The land hosts several plant and wildlife species, including milkweed, Indiangrass and the federally endangered Indiana bat. The land, like the rest of Sedan Bottoms, provides ample avian habitat. The site is a Bird Conservation Area (BCA), and several species, including those of Greatest Conservation Need, find a home here. Visitors have the chance to spot one of the 253 species recorded at the BCA, including Red-headed woodpeckers, Cerulean warblers, and Bobolinks. The land is excellent habitat for deer, turkey, neotropical migratory birds and other non-game species.

Transportation

There are no US highways in Appanoose County. Three distinct state highways connect Appanoose County communities to one another and connect to communities in surrounding counties. State Highways 2 and 5 are major arterials for the county. Highway 202 extends access to Davis County and into Missouri. No interstate routes cross Appanoose County. There are eight county highways that consist of: J18, S70, J5T, J3T, T61, T30, T20, AND J46. There are snowmobile trail runs along the northern half of Rathbun Lake and the Island View Trail is in Island View Park on the southeast portion of Rathbun Lake. One other trail is in Appanoose County, the Lelah Bradley Hike & Bike Trail in the southwest portion of Centerville, connecting to the Lower Centerville Reservoir.

Six natural gas pipelines cross or are in Appanoose County in addition to one crude oil / petroleum pipeline. Two distinct railroads are in the county, the Appanoose Community Railroad (DBA Iowa Southern Railway), a short line, and the IMRL line now operated by Iowa, Chicago, and Eastern Railroad. According to preliminary crash analysis released 2012 by the Iowa DOT, Highway S70 ending about 600 feet west of 137th Ave is considered a “high crash horizontal curve.”

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration
ADLM	12307 Hwy 5, Centerville	X		X	
Rathbun Regional Water Assoc	16166 Hwy J29, Centerville	X			X
MFA Oil & Propane	21694 Hwy J46, Centerville	X		X	
DOT Maintenance Shed	West Hwy 2				
Honey Creek Resort				X	X
Water Towers		X			
Electrical towers/sub-stations		X			
ITC Midwest – Appanoose	32768 535 th St, Moulton				X
Rathbun Fish Hatchery	15053 Hatchery Place, Moravia				X
Sidles Top Crop	23918 218 th Ave, Centerville				X
L&W Quarries, Walnut City #5	14593 Hwy J5T, Mystic				X
L&W Quarries, Clarkdale #8	19037 200 th St, Mystic				X
L&W Quarries shop	12020 455 th St, Plano				X
US Cellular - Blakesburg	2632 690 th Moravia				X
Crop Production Services, Inc 1334	2774 Hwy 5, PO Box 282, Moravia				X
Private In-Home Daycare	23749 430 th St, Moravia		X		
Private In-Home Daycare	27778 610 th St, Moulton		X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Mark McGill, Appanoose County Board of Supervisors, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Appanoose County’s Unincorporated County is most concerned about Human disease, River Flood, Anima/Plant/Crop Disease, and Transportation Incident.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Appanoose Unincorporated County

1. River Flood
2. Transportation Incident
3. Flash Flood
4. Hazardous Material Incident
5. Infrastructure Failure
6. Levee & Dam Failure
7. Grass/Wildland Fire
8. Sinkholes
9. Radiological Incident
10. Landslide

Overall – Appanoose County Rankings

1. Tornado & Windstorm
2. Human Disease
3. Thunderstorm, Lightning & Hail
4. Severe Winter Storm
5. Infrastructure Failure
6. Hazardous Materials Incident
7. Flash Flood
8. Terrorism
9. Grass & Wildland Fire
10. Extreme Heat
11. Transportation Incident
12. Animal, Plant & Crop Disease
13. Earthquake
14. Drought
15. Sinkholes
16. Radiological Incident
17. River Flood
18. Expansive Soils
19. Landslide
20. Levee & Dam Failure

CITY OF CENTERVILLE

General Information

Population: 5,458	Floodplain: Yes
Median Age: 44yrs	NFIP Participant: Yes, #190009
65 years & Older: 1,079 20%	Historic District: Yes
5 years & older in school: 5% 280	Comprehensive Plan: Yes, 2019
School buildings: 11	Zoning Ordinance: Yes
Places of Worship: 15	Subdivision Ordinance: Yes
Land Area: 4.892 Sq miles	Building Permits required: Yes
Most Recent Codification: 1/13/15	Fire Insurance Rating: 4

Geography

Centerville is approximately the center of the county at coordinates 40° 43' 47" N, 92° 52' 19" W. The city encompasses an area of 4.8 square miles with a population density of 1,130 people per square mile according to the 2019 ACS. Cooper Creek runs through the northwest corner of the city and the Lower Centerville Reservoir extends outside of the municipal boundaries to the southwest.

City of Centerville annexed a housing subdivision in May 2015 that contains 52 homes and 1 lift station and 1 water main pit for Rathbun Regional Water.

Population Data

As of the 2019 ACS, the total population of Centerville was 5,458 with a total of 2,460 households. Between 2010 and 2019, Centerville lost 70 people and decreased 30 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 Census, the census estimated that 1.6% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 280 (5.1% of total population) children under the age of five years. The population over the age of 65 years account for 20% (1079 people) in Centerville.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 1122 residents of Centerville have a confirmed disability. That accounts for approximately 21% of the population.

The combination of all these populations qualifies nearly 47% of the total population deemed "at risk".

In the 2019 Census, median household income for Centerville was up to \$34,805 from \$32,551 in the 2010 Census. More than 50% of the households in Centerville had incomes less than \$50,000 in 2019. Approximately 23% of the population of Centerville have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Ancor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly half (43%) of residential structures in Centerville were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 15% of the housing stock built during this decade. Nearly 57% of homes (29 homes) in Centerville are heated with utility gas and 15 homes reported were heated by firewood in 2019.

Over 81% of the owner-occupied homes in Centerville were valued at less than \$100,000 and 100% of homes were valued at less than \$200,000.

Community Assets

MercyOne Medical Campus

It could be state that all patients of the Health Care Center are considered vulnerable and at risk due to their physical or mental health state that is requiring additional care. In this situation, all 45 beds would give as an estimated number to be considered “at risk” for this facility.

Centerville's Mercy Medical Hospital is one of Iowa's oldest continually operating and busiest rural hospitals. In the fiscal year 2020, the hospital saw over 1379 patient days and 272 total discharges. The total revenue was \$69,907,098 for 2020.

This facility offers a 25 critical care beds, 20 long term care beds, 24/7 emergency room physicians and ambulance service. Care is provided by over 240 employees. Primary medical care is provided by 9 family practice physicians, 2 general surgeons, 1 OB-GYN, 1 internal medicine, 2 pediatricians and 5 emergency medical practitioners.

Centerville Community Schools

Centerville Public Schools is in the county seat of Appanoose County, Centerville. The school district serving Centerville, Mystic, and Cincinnati is the K-12 Centerville Community School District. Its facilities include:

<i>Exhibit 11: Centerville Community School Statistics</i>	
<i>2018-2019 School Year</i>	<i>Centerville School District</i>
Student Enrollment	1,409
Student/Teacher Ratio	14.50
Eligible for Free/Reduced Meals	912
Minority Ethnicity (any other than white)	70
Classroom Teachers (FTE)	97
ELL Students	7
Students with IEP's	199
<i>National Center for Education Statistics</i>	

Appanoose County identified at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. The combination of all these populations is illustrated above and qualifies much of the district population as “at risk”. The Centerville Community Schools operates 24 buses throughout the district to provide transportation to all enrolled families.

Indian Hills Community College

The Centerville Campus of Indian Hills Community College is located on the northwestern edge of the city of Centerville, Iowa. Students at this campus may take Arts & Sciences courses, as well as enroll in several Advanced Technology programs. This includes Construction Technology, Sustainable Agriculture and Entrepreneurship, and Viticulture. The Health Sciences: Associate Degree Nursing and Practical Nursing programs are also available. The Centerville Campus is also home to the Falcons (the Indian Hills baseball team), as well as the beautiful Pat Daugherty Field. Also, on campus, is the "The Barn," which is the Student Union. This is a congregate site for students and staff.

Indian Hills has on-campus housing is available on the Centerville campus. Rooms range from modern, apartment-style units to traditional double-occupancy.

2020-21 School Year	Floodplain: No
Student enrollment: 360	OTHER PLANS:
# Students on campus Housing: 69 (full)	Safety- (ALICE training, & building/door number system
School buildings: 21	Evacuation plans for every building;
# Of FT teachers: 15	Storm Shelter available in
# Of FT staff: 17	Administration Building
# Of PT staff: 15	

Also located on the college campus is a preschool/daycare facility, Kid’s World. Kids World Day Care and Preschool is a Licensed Center in Centerville. It has maximum capacity of 82 children. The provider may also participate in the subsidized childcare program. Approximately 6 adults are employed at this facility. Dean Noel Gordon met with CVPD staff to review hazard mitigation goals and he supplied information regarding the college. She indicated the college is most concerned about Thunderstorms & Lightning, Tornadoes and Windstorms. The college could possibly be interested in a safe room to protect on campus residents and those attending sporting events on campus.

Lelah Bradley Park & Campgrounds

Lelah Bradley Park offers fishing, boating, hiking trails, hunting, camping, picnicking, and nature study. There are also six cabins available to rent and multiple camping slots. The Park is in the southwest part of Centerville.

Lower Centerville Reservoir is on a tributary of Cooper Creek in Appanoose County, Iowa and is used for drinking water and recreation purposes. Construction was completed in 1912. It has a normal surface area of 28 acres. It is owned by the City of Centerville. Lower Centerville Reservoir Dam is of earthen construction. The core is assumed to be homogeneous. The foundation is assumed to be soil. Its height is 39 feet with a length of 530 feet. Its capacity is 575-acre feet. Normal storage is 380-acre feet. It drains an area of 3.97969 square miles.

Appanoose County Fairgrounds

Appanoose County Fairgrounds are located at 703 West Franklin Street in the city limits of Centerville. The annual county fair is held each July and brings residents and guests from throughout the region. The public land is owned by the county.

Exhibit 12: 2017 Agriculture Census	
2017 Census of Agriculture	
Total Land in Farms (acres)	179,274
Number of Farms	675
Average Farm Size (acres)	266
Market Value of All Farm Products	\$44,483,000
Market Value of All Crops	\$24,420,000
Market Value of All Livestock	\$18,063,000
Production Expenses	\$40,465,000
Hogs & Pigs Inventory (head)	778
All Cattle and Calves	29,419

Transportation

Highways 2 and 5 crosses in Centerville slightly north and east of the center of the municipal boundaries. There are about 54 miles of roadway in Centerville. The Southern Iowa Railroad enters the community from the southeast and crosses the southern portion of town with a stub connecting to the industrial park. A natural gas pipeline connects to Centerville from the north. The Lelah Bradley Hike and Bike Trail connects the east and south sides of the Centerville Reservoir to a park in the southwestern part of town.

The Centerville Municipal Airport is owned and operated by the City of Centerville but is managed by the local Centerville Airport Commission. The airport is included in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS designates the Centerville Municipal Airport as a general aviation airport and the Iowa Aviation System Plan (IASP) Airport Summary Report (ASR) identifies it as a General Service Airport.

General Service airports in Iowa provide an important means of accessing the communities and regions they serve and provide a link to the national transportation system. The Centerville Municipal Airport serves the general aviation needs of Appanoose County and the City of Centerville. The airport is mainly utilized by single engine aircraft. The airport offers an aircraft maintenance and repair service on an “on-call” basis. The airport also offers Jet A, 100LL and mogas fuel, aircraft apron tie-downs, hanger parking spaces and overnight storage.

A variety of aeronautical activities are offered at Centerville Municipal Airport, including rental aircraft, on-call flight instruction, and a pilot area offering food and beverage, and a courtesy car as ground transportation.

The Centerville Municipal Airport is in Appanoose County approximately 4 miles south of the City of Centerville and near the small community of Numa.

1. Existing facilities and services – The Centerville Municipal Airport offer one runway. Runway 16/34 is paved and is 4,100 feet in length and 75 feet wide. The runway has MIRL Lightning system on the entire runway strip. The airport has a rotating beacon, lighted wind indicator, and AWOS weather reporting equipment. Landsite facilities include apron tie-downs, 24 hanger parking spaces, and overnight itinerant aircraft locations. The facility does have Jet A fuel, 10LL, and mogas available. Pilots are offered a private area, food and beverage, restrooms and use of a computer for internet.
2. Airport Facility & Service Needs –The IASP ASR recommends maintaining services and facilities at the Centerville Airport. Specific needs are identified in Iowa DOT Aviation Plan.

CITY OF CENTERVILLE

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg. (SF)
Appanoose County Historical Museum	100 W Maple St				X	X	9,590 sq ft
St Mary's Catholic church & school	838 S 13 th St.		X		X		6,084 sq ft
Drake Public Library	115 Drake St			X		X	11,142 sq ft
Centerville Center Library	721 N 1 st St			X		X	7,360 sq ft
18-80 Club	West State		X	X			4,280 sq ft
Golden Age Care Center	1915 S 18 th St		X				41,142 sq ft
Centerville Nursing & Rehab	1208 E Cross St		X				18,557 sq ft
The Continental @ St Joseph's	19999 St Joseph Dr		X				55,956 sq ft
Maple Grove Senior Living	1917 S 18 th St		X				11,280 sq ft
New Focus	102 Washington		X				6,520 sq ft
Headstart/ Kids World	722 N 1 st St		X				9,004 sq ft
Proffitt's Residential Care Home	615 W Washington		X				2,952 sq ft
Seneca Agency on Aging	308 N 12 th St		X				1,880 sq ft
Center for Behavioral Services	221 E State St		X				4,944 sq ft
Low Rent Housing Agency	317 E Oak St		X				36,190sq ft
UIHC Centerville Medical Clinic	19876 St Joseph Dr	X	X	X			10,378 sq ft
Centerville Valley Medical Center	707 S Main St	X	X	X			5,573 sq ft

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Centerville Family Care Clinic	236 West Maple St	X	X	X			6,532 sq ft
River Hills Medical Center		X	X	X			14,615 sq ft
Centerville Fire Dept	312 E Maple	X			X		9,426 sq ft
Centerville Police Dept	1125 W Van Buren	X			X		5,310 sq ft
Appanoose County Courthouse	201 N 12 th	X			X	X	17,763 sq ft
Hy Vee Food Store	609 N 18 th			X			23,599 sq ft
Aldi's	215 S Main			X			11,366 sq ft
Fareway Store	217 S 18 th			X			21,113 sq ft
J&K Market	113 W Van Buren			X			3,240 sq ft
Alliant Energy	719 N 18 th			X			N/A
Interstate Power Light power	310 E Green			X			N/A
Rathbun Area Solid Waste Commission	3020 McCarty			X			22,093 sq ft
Hills Sanitary Services	111 N 13 th			X			2,150b sq ft
Appanoose Community RR	1303 S 21 st			X			N/A
Quick Shop	1023 Main			X			3,999 sq ft
Kum & Go	401 w Maple			X			1,736 sq ft
Bratz Texaco	102 S Drake Ave			X			4,772sq ft
Elliott Oil comp	104 S 18 th			X			1,017sq ft
Casey's General Store	708 E Van Buren			X			2,829 sq ft
Kum & Go	830 N 18 th			X			2,784 sq ft
Heritage Christian School	914 N Park		X				2,583sq ft
Historic Courthouse Square District (119 businesses)	12 & 13 th Van Buren Jackson State Street, N & S Main		X	X	X	X	548,065 sq ft
Appanoose Co Public Health	209 E Jackson	X	X		X		
Kids World Daycare & Preschool	722 N 1 st		X				
Walmart	Hwy 5 South	X		X			
Bemis Company, Inc	1400 E O'Neal St				X		
Inhance Technologies	2800 Industrial Park				X		
Interstate Light & Power	1625 N 14 th	X					

Windstream – Iowa Telecom	236 W Maple	X					
Smith Fertilizer & Grain	1605 S 24 th				X		
Wells Manufacturing & Distribution	2700 Dewey Rd				X		
C & C Machining	22233 230 th Ave				X		
Hill Phoenix Specialty	22450 Dewey Rd				X		
Iowa Steel & Wire Co	1500 Van Buren				X		
SIEDA Child Development	111 N Main		X				
Golden Age Skilled Nursing	1917 S 18 th		X				
Private In-Home Daycare	501 E Short		X				
Private In-Home Daycare	203 E Grant		X				
Private In-Home Daycare	520 N 7 th		X				
Private In-Home Daycare	1110 E Cross Apt 10		X				
Private In-Home Daycare	602 E State		X				
Private In-Home Daycare	1014 S 11 th		X				
Private In-Home Daycare	514 N Main		X				
Private In-Home Daycare	1003 S 11 th		X				
Private In-Home Daycare	219 S 15 th		X				
Private In-Home Daycare	615 N 6 th		X				
Private In-Home Daycare	1497 N 14 th		X				
Private In-Home Daycare	1423 S 16 th		X				
Private In-Home Daycare	212 E Orchard		X				

Centerville Public School Buildings

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Centerville Early Childhood	722 N 1 st St		X				9,004 sq ft
Lincoln Preschool	603 N 10 th St		X				8,160 sq ft
Central Ward - vacant	320 Drake Ave		X				23,408 sq ft
Centerville HS	600 CHS Dr		X				123,502 sq ft
Howar Jr HS	850 S Park Ave		X				65,571 sq ft
Lakeview Elementary	1800 S 11 th		X				72,684 sq ft
Bus Barn							

Mercy Medical Center Campus Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Mercy Medical Center	1 St Joseph Dr	X	X	X			105,806 sq ft
Mercy Medical Ambulance	1 St Joseph Dr	X			X		2,040 sq ft

Indian Hills Community College Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Art Bldg.	N 1 st St		X	X			1,624 sq ft
Bldg. #4	N 1 st St		X	X			1,624 sq ft
Bldg. #17	N 1 st St		X	X			1,624 sq ft
Bldg. #18	N 1 st St		X	X			1,624 sq ft
Bldg. #15-16	N 1 st St		X	X			1,624 sq ft
Bldg. #19-20	N 1 st St		X	X			1,624 sq ft
Bldg. #21S1	N 1 st St		X	X			3,168 sq ft
Student Union – Bldg. B	N 1 st St		X	X			4,760 sq ft
Baseball Complex	N 1 st St		X	X			--
Admin Bldg. – Bldg. C	N 1 st St		X	X			4,800 sq ft
Multi-purpose Bldg. D	N 1 st St		X	X			18,768 sq ft
Dormitory	N 1 st St		X	X	X		11,000 sq ft
Faculty Office	N 1 st St		X	X			1,908 sq ft
Industrial Ed Bldg. G	N 1 st St		X	X			6,697 sq ft
Science Bldg. H	N 1 st St		X	X			6,697 sq ft
Library Bldg. I	N 1 st St		X	X			6,697 sq ft
Business Ed Bldg. J	N 1 st St		X	X			1,624 sq ft
Sustainable Ag – Bldg. K	N 1 st St		X	X			5,768 sq ft
Maintenance Bldg. – S3	N 1 st St					X	2,400 sq ft
Storage Bldg.	N 1 st St					X	720 sq ft

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Jason Fraser, Centerville City Administrator, and Mike Bogle, Centerville Fire Department, completed the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards. Centerville is most concerned about Thunderstorm, Lightning, & Hail, Grass/Wildland Fire, and Tornado & Windstorm in the jurisdiction.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Centerville

1. Grass/Wildland Fire
2. Radiological Incident
3. Sinkholes
4. Hazardous Materials Incident
5. Flash Flood
6. Transportation Incident
7. Infrastructure failure
8. River Flood
9. Landslide
10. Levee & Dam Failure

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Law Center for City & county police in the city limits
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- Designated emergency Red Cross shelter sites established.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 7/1/1987.
- Tree trimming or management is currently handled by utility services.
- Fire fighters & emergency personnel have handheld radios.
- Rescue personnel are trained in emergency water search & rescue.
- Storm water drainage system improvement during the past five years
- Multiple street repairs & replacement (that also included water system upgrades at the same time)
- Stop sign replacements in portions of the city
- Demolition of 12 dilapidated structures
- New storm warning sirens
- Monthly SWAT training/meetings

CITY OF CINCINNATI

General Information

Population: 340	Floodplain: N.A.
Median Age: 55yrs	NFIP Participant: N.A.
65 years & Older: 28%, 94	Historic District: None
5 years & older in school: 4%, 14	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 1.749 sq miles	Building Permits required: Yes
Most Recent Codification: 2011	Fire Insurance Rating:

Geography

Cincinnati is the southern-most incorporated community in Appanoose County at coordinates 40° 37' 49" N, 92° 55' 25" W. The city encompasses an area of 1.7 square miles with a population density of 198 people per square mile according to the 2019 ACS. Shoal Creek and South Shoal Creek each run by Cincinnati, about one mile to the north-east and to the south-west, respectively.

Population Data

As of the 2019 ACS, the total population of Cincinnati was 340 with a total of 136 households. Between 2010 and 2019, Cincinnati lost 17 people and increased 23 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 1.2% residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 14 (4% of total population) children under the age of five years. The population over the age of 65 years account for 28% (94 people) in Cincinnati.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 77 residents of Cincinnati have a confirmed disability. That accounts for approximately 23% of the population.

The combination of all these populations qualifies nearly 56% of the total population deemed "at risk".

In the 2019 ACS, median household income for Cincinnati was up to \$50,000 from \$21,510 in the 2010 Census. More than 38% of the households in Cincinnati had incomes less than \$35,000 in 2019. Approximately 14% of the population of Cincinnati have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly 37% of residential structures in Cincinnati were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 15% of the housing stock built during this decade. Nearly 4% of homes in Cincinnati are heated with bottled fuels, 75% heat by utility gas and 5 homes reported were heated by firewood in 2019. Over 85% of the owner-occupied homes in Cincinnati were valued at less than \$100,000 and 100% of homes were valued at less than \$200,000.

Transportation

Highway 5 passes through Cincinnati and a natural gas pipeline connects to the town from the west. A crude oil / petroleum pipeline passes Cincinnati approximately one mile to the east. There are a little over 7 miles of roadways in Cincinnati (6.55 miles).

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Fire Hall	East Pleasant	X			X		5,280 sq ft
Community Center	East Pleasant			X			1,920 sq ft
Sewer Lift Station		X					N/A
Cincinnati City Hall	101 Alpine	X					9,300 sq ft
Piper's Bar				X			
Church of Christ	Highway 5				X		
United Methodist Church	Highway 5				X		
Private In-Home Daycare	400 Beecher		X				
Private In-Home Daycare	412 Sevier		X				
Post Office		X			X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. CVPD mailed out materials for city to review and to complete for community events, mitigation accomplishments, and new information regarding the city. Cincinnati is most concerned about severe winter storms, thunderstorms & lightning, tornado, and windstorms.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Cincinnati

1. Transportation Incident
2. Flash Flood
3. Hazardous Materials Incident
4. Infrastructure Failure
5. Radiological Incident
6. Grass & Wildland Fire
7. Sinkholes

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information for firefighters
- Fire Station has a dated storm warning siren that only works on occasion.
- City owns 2 generators that can power the community center & fire hall.
- City Hall building has been designated as a Red Cross Shelter site.
- Mobile communication trailer(s) located at Law Center; about 5-6 hours are needed to mobilize
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- Currently 12 volunteer fire fighters & are now certified as "Fire Fighter I".
- Sewer system improvement plans for city in next two years.
- Demolition of one dilapidated commercial building & 3 residential structures in past 5 years.
- Fire department has received new fire truck & plans to purchase new tanker truck soon.

CITY OF EXLINE

General Information

Population: 186	Floodplain: No
Median Age: 45yrs	NFIP Participant: N.A.
65 years & Older: 31% 57	Historic District: No
5 years & older in school: 7% 13	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 633 acres	Building Permits required: No
Most Recent Codification: 2013	Fire Insurance Rating:

Geography

Exline is in southern third of the county at coordinates 40° 39' 0" N, 92° 50' 24" W. The city encompasses an area of 1 square mile with a population density of 161.6 people per square mile according to the 2019 ACS. Shoal Creek runs past Exline about one mile to the south-west.

Population Data

As of the 2019 ACS, the total population of Exline was 186 with a total of 75 households. Between 2010 and 2019, Exline increased 29 people and decreased 19 household in alignment to the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that there are 1.2% of residents who have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 13 (7% of total population) children under the age of five years. The population over the age of 65 years account for 31% (57 people) in Exline.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 47 residents of Exline have a confirmed disability. That accounts for approximately 25% of the population.

The combination of all these populations qualifies nearly 64% of the total population deemed "at risk".

In the 2019 ACS, median household income for Exline was up to \$ 31,125 from \$17,500 in the 2010 Census. More than 58% of the households in Exline had incomes less than \$35,000 in 2010.

Approximately 16% of the population of Exline have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly half (47%) of residential structures in Exline were built prior to 1940 though there was a spike in new homes built in the 2000-2009 with nearly 8% of the housing stock built during this decade. Nearly 43% of homes in Exline are heated with bottled fuels and 7% homes reported were heated by firewood in 2019.

Over 83% of the owner-occupied homes in Exline were valued at less than \$100,000 and 58% of homes were valued at less than \$50,000.

Transportation

State Highway 5 passes Exline about 1.5 miles to the west. County highway spur, T30, intersects that heart of the small community and passes down into Missouri. A crude oil / petroleum pipeline passes about one-quarter of a mile to the west of town. There are about 5.6 miles of roads in Exline.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
First Responders	114 W Main St	X					2,100 sq ft
Sewer Lift Station		X					N/A
Exline Museum	103 W Main St					X	3,750 sq ft
Community Center/City Hall	112 W Main St				X		3,301 sq ft
County Store	102 W Main St			X	X		4,312 sq ft
Coal Miner's Inn	220 West Main St		X				8,720 sq ft
Post Office	100 W Main	X					2,000 sq ft

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. Diane DalPonte, Exline resident, to complete the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Exline

1. Hazardous Materials Incident
2. Infrastructure Failure
3. Transportation Incident
4. Flash Flood
5. Sinkholes
6. Radiological Incident
7. Grass/Wildland Fires
8. Landslide

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information for firefighters.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.

CITY OF MORAVIA

General Information

Population: 611	Floodplain: Yes
Median Age: 41yrs	NFIP Participant: Yes, #190623
65 years & Older: 30% 186	Historic District: No
5 years & older in school: 4% 27	Comprehensive Plan: No
School buildings: 1	Zoning Ordinance: No
Places of Worship: 3	Subdivision Ordinance: No
Land Area: 1.12 sq miles	Building Permits required: No
Most Recent Codification: 2002	Fire Insurance Rating:

Geography

Moravia is located at the northern border of the county at coordinates 40° 53' 26" N, 92° 48' 57" W. The city encompasses an area of 1.1 square miles with a population density of 571 people per square mile according to the 2019 ACS. No streams or rivers pass through or near Moravia.

Population Data

As of the 2019 ACS, the total population of Moravia was 611 with a total of 266 households. Between 2010 and 2019, Moravia lost 54 people and decreased 35 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 1% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 27 (4% of total population) children under the age of five years. The population over the age of 65 years account for 30% (186 people) in Moravia.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 147 residents of Moravia have a confirmed disability. That accounts for approximately 24% of the population.

The combination of all these populations qualifies nearly 59% of the total population deemed "at risk".

In the 2019 ACS, median household income for Moravia was up to \$45,357 from \$32,831 up from in the 2010 ACS. More than 53% of the households in Moravia had incomes less than \$35,000 in 2019. Approximately 14% of the population of Moravia have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly 26% of residential structures in Moravia were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 16% of the housing stock built during this decade. Nearly 71% heat with utility gas and 27% homes reported were heated by electricity in 2019.

Over 64% of the owner-occupied homes in Moravia were valued at less than \$100,000 and 29% of homes were valued at less than \$50,000.

Community Assets

Moravia Public Schools

Moravia Public School is in Moravia, Iowa in Appanoose County. It is in the south-central sector of Iowa. Neighboring school districts for comparison include Albia, Eddyville-Blakesburg-Fremont, Cardinal, Centerville, Davis County, Moulton-Udell, Ottumwa, Seymour, Twin Cedars, and Wayne County Schools. No streams or rivers pass through or near Moravia.

District Facts:

<i>Exhibit 13: Moravia Community School Statistics</i>	
<i>2018-2019 School Year</i>	<i>Moravia School District</i>
Student Enrollment	392
Student/Teacher Ratio	11.53
Eligible for Free/Reduced Meals	190
Minority Ethnicity (any other than white)	16
Classroom Teachers (FTE)	34
ELL Students	0
Students with IEP's	49
<i>National Center for Education Statistics</i>	

Appanoose County identified at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. The combination of all these populations is illustrated above and qualifies much of the total district population deemed "at risk". The school manages sixteen (16) buses to the 1,104 students enrolled in the Moravia Community Schools.

Transportation

State Highway 5 passes by Moravia on its western side, crossing through only a small part of town. County highway J18 enters the community from the west and J3T extends from the east of the community southeast to Unionville. Two railroads cross paths in the Moravia municipal boundary on the southwest part of town. A natural gas pipeline passes Moravia on the eastern side of town from one-tenth of a mile and one-third of a mile. There are almost ten miles of roadway in Moravia.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	116 S William	X			X		7,200 sq ft
Fire Hall	116 s William	X					4,800 sq ft
Sewer Lift Station		X					N/A
Wabash Depot Museum	800 W North St					X	1,250 sq ft
Moravia Public Library	100 E Moravia			X	X		3,962 sq ft
Spencer Grocery	107 E Moravia			X			2,200 sq ft
CD's	308 N Frontage Rd			X			18,576 sq ft
Elliott's General Stores	23828 Highway J18			X			3,048 sq ft
Agriland FS, Inc	802 W North St			X			
Private In-home Daycare	902 Deborah		X				

Moravia Public School Buildings

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Moravia High School	505 N Trussell Ave, Moravia		X				73,325 sq ft
Moravia Elementary	Same		X				Included
Bus Barn							

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Sharla Stogdill, Moravia City Clerk, was given the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards. Moravia is most concerned about Grass/Wildland Fire, Thunderstorms, Lightning & Hail, and Tornado & Windstorm.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Moravia

1. Grass/Wildland Fire
2. Hazardous Materials Incident
3. Flash Flood
4. Infrastructure Failure
5. Sinkholes
6. Radiological Incident
7. Transportation Incident

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Law Center (in Centerville) has contact information for firefighters.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow).
- Designated Red Cross shelters at the Nazarene church, which also has a backup generator.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 7/1/1987.
- Tree trimming or management is currently handled to an extent by utility services.
- Emergency shelter site established at Nazarene church and is equipped the large generator.

CITY OF MOULTON

General Information

Population: 613	Floodplain: N. A
Median Age: 33yrs	NFIP Participant: N.A.
65 years & Older: 16% 96	Historic District: No
5 years & older in school: 5% 32	Comprehensive Plan: No
School buildings: 1	Zoning Ordinance: No
Places of Worship: 3	Subdivision Ordinance: No
Land Area: 1.012 Sq Miles	Building Permits required: No
Most Recent Codification: 2015	Fire Insurance Rating:

Geography

Moulton is in the south-eastern quadrant of the county at coordinates 40° 41' 7" N, 92° 40' 40" W. The city encompasses an area of 1 square mile with a population density of 574 people per square mile according to the 2019 ACS. No streams or rivers pass through or near Moulton.

Population Data

As of the 2019 ACS, the total population of Moulton was 613 with a total of 235 households. Between 2010 and 2019, Moulton added 8 people and increased 29 households in contrary of the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that .7% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 32 (5% of total population) children under the age of five years. The population over the age of 65 years account for 16% (96 people) in Moulton.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 121 residents of Moulton have a confirmed disability. That accounts for approximately 20% of the population.

The combination of all these populations qualifies nearly 42% of the total population deemed "at risk".

In the 2019 ACS, median household income for Moulton was up to \$38,125 from \$24,564 in the 2010 ACS. More than 61% of the households in Moulton had incomes less than \$50,000 in 2019.

Approximately 20% of the population of Moulton have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Approximately one quarter (23%) of residential structures in Moulton were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 24% of the housing stock built during this decade. Nearly 6.4% of homes in Moulton are heated with bottled fuels, 55% heat by utility gas and 17 homes reported were heated by firewood in 2019.

Over 98% of the owner-occupied homes in Moulton were valued at less than \$100,000 and 44% of homes were valued at less than \$50,000.

Community Assets

Moulton-Udell Public School

Moulton-Udell Public School is in Moulton, Iowa in Appanoose County. It is in the south-central sector of Iowa. Neighboring school districts for comparison include Albia, Eddyville-Blakesburg-Fremont, Cardinal, Centerville, Davis County, Moravia, Ottumwa, Seymour, Twin Cedars, and Wayne County Schools. No streams or rivers pass through or near Moulton.

District Facts

<i>Exhibit 14: Moulton-Udell School District Statistics</i>	
<i>2018-2019 School Year</i>	<i>Moulton-Udell School District</i>
Student Enrollment	196
Student/Teacher Ratio	20.84
Eligible for Free/Reduced Meals	119
Minority Ethnicity (any other than white)	15
Classroom Teachers (FTE)	21
ELL Students	0
Students with IEP's	41
<i>National Center for Education Statistics</i>	

Appanoose County identified at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. The combination of all these populations is illustrated above and qualifies much of the total district population deemed "at risk".

Transportation

State Highway 202 connects Moulton to State Highway 2 to the north and extends into Missouri and Davis County south of town. The Appanoose Community Railroad connects Moulton to Centerville, Udell, and Moravia and passes through the western portion of Moulton. A natural gas pipeline owned by Moulton Municipal Gas connects into town from the north. Nearly 13 miles of roadway are contained within the municipal boundaries of Moulton.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	111 S Main St	X			X		2,500 sq ft
Fire Hall	105 E 3 rd St	X					3,600 sq ft
Sewer Lift Station		X					N/A
Garrett Memorial Library	123 S Main			X			2,759 sq ft
Volunteer Ambulance	109 S Main St	X					3,750 sq ft
Konvenience Korner	101 S Main St			X			4,856 sq ft
Farmer’s Mutual Telephone Co-op	101 N Main St			X			N/A
Moulton Gas & Wash	109 N Main St			X			1,956 sq ft
Post Office	Main St	X					

Moulton-Udell Public School Buildings

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Moulton-Udell Public Schools	305 E 8 th		X		X		75,615 sq ft
Bus Barn							

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Vicki Withrow, Moulton City Clerk, was given the needed city information to be completed. The numbers were then added to achieve a weighted score that prioritized the hazards. Moulton is most concerned about thunderstorm/lightning/hail, tornado/windstorm, and earthquakes in their area.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Moulton/Moulton-Udell Community School

1. Transportation Incident
2. Flash Flood
3. Hazardous Materials Incident
4. Infrastructure Failure
5. Grass & Wildland Fire
6. Radiological Incident
7. Sinkholes

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Law Center (in Centerville) has contact information for firefighters.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow).
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 1/1/1950.
- Tree trimming or management is currently handled to an extent by utility services.
- Sewer system replacement/re-lining
- New street re-surfacing and sidewalks

CITY OF MYSTIC

General Information

Population: 364	Floodplain: Yes
Median Age: 48yrs	NFIP Participant: Yes, #190010
65 years & Older: 22% 80	Historic District: No
5 years & older in school: 3% 12	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 2.919 sq miles	Building Permits required: Yes
Most Recent Codification: Uncertain	Fire Insurance Rating:

Geography

The City of Mystic is in northwest quadrant of Appanoose County, Iowa in the south-central sector of Iowa at coordinates 40° 46' 43.02" N, 92° 56' 41.76" W. Elevations in Mystic peak at 1,050 feet above sea level, with an average elevation of 899 feet. Mystic has a total land area of 2.9 square miles and has a population density of 140 people per square mile. The city is primarily served by county highway T14.

No major rivers run through or near Mystic, however Walnut Creek does and is in the area where the August 2007 flood damage took place. Little Walnut Creek runs north of Mystic, both creeks feeding into the Chariton River which is about two miles northeast of Mystic.

Population Data

As of the 2019 ACS, the total population of Mystic was 364 with a total of 166 households. Between 2010 and 2019, Mystic lost 61 people and decreased 15 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that no residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 12 (3% of total population) children under the age of five years. The population over the age of 65 years account for 22% (80 people) in Mystic.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 68 residents of Mystic have a confirmed disability. That accounts for approximately 19% of the population.

The combination of all these populations qualifies nearly 44% of the total population deemed "at risk".

In the 2019 ACS, median household income for Mystic was up to \$ 31,458 from \$32,670 in the 2010 ACS. More than 54.1% of the households in Mystic had incomes less than \$35,000 in 2019.

Approximately 18% of the population of Mystic have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Ancor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly 36% of residential structures in Mystic were built prior to 1940 though there was a spike in new homes built in the 1970’s with nearly 24.6% of the housing stock built during this decade. Nearly 51% of homes in Mystic are heated with bottled fuels and 10 homes reported were heated by firewood in 2010.

Over 78% of the owner-occupied homes in Mystic were valued at less than \$100,000 and 56% of homes were valued at less than \$50,000.

Transportation

Mystic is served by one primary county highway, T14; four local roads provide access into and out of Mystic. Most of the roads in Mystic are gravel and one street is brick. There is a railroad track that runs through town.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	304 W Main	X					720 sq ft
Fire Hall	505 N 1st						4,400 sq ft
Sewer Lift Station & Lagoons		X					N/A
Community Center	W Main St			X			2,400 sq ft
Mystic Community Bldg./Museum	500 Clarkdale Rd		X				7,410 sq ft
Mystic Municipal Housing Apt			X				6,419 sq ft
South Bridge	T14 over Walnut Creek					X	
North Bridge	T14 over Little Walnut Creek					X	
City Shop	2 nd Street by railroad					X	
Post Office	312 W Main St	X					
Bridge	6 th Street	X					
Bridge	4 th Street	X					

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Mystic City Clerk was given the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards. Mystic is most concerned about thunderstorm, lightning & hail, tornado & windstorms, and flash flood in their region.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Mystic

1. Sinkholes
2. Grass Wildland/Fire
3. River Flood
4. Transportation Incident
5. Hazardous Materials Incident
6. Radiological Incident
7. Infrastructure Failure
8. Levee & Dam Failure
9. Landslide

Current Mitigation Strategies

- Fire Station has a storm warning system.
- Law Center (in Centerville) has contact information for Mystic firefighters.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow).
- Legion Hall, Mystic Community Church, and Community Center can / have been utilized as temporary shelters and gathering places in the event of disasters.
- There is a yard clean-up ordinance, but it is difficult to enforce (affects tornado and high-wind debris hazards).
- Railroad works well and promptly with the City of Mystic on railroad incidents
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- Firefighters and mayor have spread the word of impending hazard events, such as flooding, including going door-to-door.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 1/30/1978; however few residents have purchased flood insurance (NFIP Compliance date: 10/15/1976).
- The city requires mobile home tie-downs.
- Tree trimming or management is currently handled to an extent by utility services in Mystic.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management: a copy of the plan is present in the Appanoose County Supervisors' office.
- The city has released the water from the City Reservoir that had an eroding dam but has not been able to locate funds to assist with re-building it.
- The city is in the final stages of completing a voluntary Acquisition and Demolition project funded by FEMA and Iowa's Homeland Security to mitigate 8 structures.

- The city has improved the Community Center/Emergency Shelter site by replacing the roof and making modifications to the restrooms.
- New community center & emergency shelter site

CITY OF NUMA

General Information

Population: 78	Floodplain: N.A.
Median Age: 46yrs	NFIP Participant: N.A.
65 years & Older: 2.2% 2	Historic District: No
5 years & older in school: 15.2% 14	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 282 acres	Building Permits required: No
Most Recent Codification: 10/2/12	Fire Insurance Rating:

Geography

Numa is in the south-west quadrant of the county at coordinates 40° 41' 8" N, 92° 58' 43" W. The city encompasses an area of .4 square miles with a population density of 200.9 people per square mile according to the 2019 ACS. Cooper Creek and Shoal Creek pass Numa to the north and south, respectively, within about one-half of a mile.

Population Data

As of the 2019 ACS, the total population of Numa was 78 with a total of 33 households. Between 2010 and 2019, Numa lost 14 people and decreased 11 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that no residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 3 (3.3% of total population) children under the age of five years. The population over the age of 75 years account for 3% (3 people) in Numa.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 16 residents of Numa have a confirmed disability. That accounts for approximately 21% of the population.

The combination of all these populations qualifies nearly 27% of the total population deemed "at risk".

In the 2019 ACS, median family income for Numa was up to \$60,313 from \$21,667 in the 2010 Census. Approximately 73% of the households in Numa had incomes less than \$35,000 in 2019. Approximately 12% of the population of Numa have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Well over half (60%) of residential structures in Numa were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 23% of the housing stock built during this decade. Nearly 39% of homes in Numa are heated with bottled fuels and 8 (24%) homes reported were heated by firewood in 2010.

Over 83% of the owner-occupied homes in Numa were valued at less than \$100,000 and 43% of homes were valued at less than \$50,000.

Transportation

Numa is not connected to any state or US highways and is accessed by county highway J46 and county roads. No railroads pass Numa, but a natural gas pipeline does pass Numa on the east by less than one-tenth of a mile. Less than three and a half miles of roadway are contained within Numa's municipal boundary.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall/Community Bldg.				X			1,280 sq ft

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Numa City Clerk was given the information regarding the city. Numa is most concerned about thunderstorm/lightning/hail, tornado/windstorm, and earthquakes in their area.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Numa

1. Transportation Incident
2. Flash Flood
3. Hazardous Materials Incident
4. Infrastructure Failure
5. Grass & Wildland Fire
6. Radiological Incident
7. Sinkholes
8. Landslide

Existing Mitigation Strategies

- Centerville firefighters respond to Numa fire calls.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- Tree trimming or management is currently handled to an extent by utility services.

CITY OF PLANO

General Information

Population: 64	Floodplain: N.A.
Median Age: 38 yrs.	NFIP Participant: N.A.
65 years & Older: 27% 17	Historic District: N.A.
5 years & older in school: 6% 4	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 358 acres	Building Permits required: No
Most Recent Codification: 2010	Fire Insurance Rating: N.A.

Geography

Plano is the western-most incorporated community of the county at coordinates 40° 45' 22" N, 93° 2' 47" W. The city encompasses an area of .6 square miles with a population density of 118.79 people per square mile according to the 2019 ACS. Walnut Creek passes within one mile of Plano to the south and south-east.

Population Data

As of the 2019 ACS, the total population of Plano was 64 with a total of 27 households. Between 2010 and 2019, Plano lost 6 people and decreased 3 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that no residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 4 (6% of total population) children under the age of five years. The population over the age of 65 years account for 27% (17 people) in Plano.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 10 residents of Plano have a confirmed disability. That accounts for approximately 16% of the population.

The combination of all these populations qualifies nearly 49% of the total population deemed "at risk".

In the 2019 ACS, median household income for Plano was up to \$49,688 from \$44,375 in the 2010 Census. More than 33% of the households in Plano had incomes less than \$35,000 in 2019.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly 31% of residential structures in Plano were built prior to 1940 though there was a spike in new homes built in the 1970’s with nearly 34% of the housing stock built during this decade. Nearly 78% of homes (9 homes) in Plano are heated with bottled fuels and 2 homes reported were heated by firewood in 2019.

Over 35% of the owner-occupied homes in Plano were valued at less than \$50,000 and 87% of homes were valued at less than \$150,000.

Transportation

Plano is connected to State Highway 2 to the south by county highway S70 which also extends north. A railroad and natural gas pipeline both pass Plano over 1 mile to the southeast of town. There are about three miles of roadway in Plano’s municipal boundaries.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	Wells St			X			648 sq ft
Sewer Lift Station		X					N/A
Private In-Home Daycare	302 4 th		X				

Hazard Scoring & Ranking

Community representatives were responsible for scoring/prioritizing each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction. CVPD mailed out documents requesting information on events or progress for the City of Plano. The city’s profile for approval and provided specific hazard data. Plano is most concerned about infrastructure, flash flood, and hazardous materials in their community.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Plano

1. Infrastructure Failure
2. Flash Flood
3. Hazardous Materials Incidents
4. Transportation Incident
5. Sinkholes
6. Radiological Incident
7. Grass/Wildland Fire

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information of elected officials.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place with surrounding jurisdictions for fire protection (Seymour) and hazardous materials containment.
- Emergency storm shelter site & Defibrillator paddles housed at church.
- All private homes were given weather radios within past couple years.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.

CITY OF RATHBUN

General Information

Population: 57	Floodplain: N.A.
Median Age: 64yrs	NFIP Participant: N.A.
65 years & Older: 42% 24	Historic District: No
5 years & older in school: 0	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 141 acres	Building Permits required: No
Most Recent Codification: No	Fire Insurance Rating:

Geography

Rathbun is located near the center of the county at coordinates 40° 48' 5" N, 92° 53' 18" W. The city encompasses an area of .2 square miles with a population density of 396.31 people per square mile according to the 2019 ACS. Walnut Creek and Little Walnut Creek meet just east of Rathbun and each pass-through extremities of town.

Population Data

As of the 2010 ACS, the total population of Rathbun was 57 with a total of 38 households. Between 2010 and 2019 ACS, Rathbun lost 32 person and decreased 4 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated there are no residents who have a primary language that is other than English and would be considered linguistically isolated.

There are not any children under the age of five years. The population over the age of 65 years account for 42% (24 people) in Rathbun.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 11 residents of Rathbun have a confirmed disability. That accounts for approximately 19% of the population.

The combination of all these populations qualifies nearly 61% of the total population deemed "at risk".

In the 2019 ACS, median household income for Rathbun was down to \$ 35,909 from \$38,125 in the 2010 Census. More than 45% of the households in Rathbun had incomes less than \$35,000 in 2019. There are few residents of Rathbun who have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Almost half (44%) of residential structures in Rathbun were built prior to 1940 though there was a slight increase in new homes built recently in the 1900’s. Nearly 71% of homes in Rathbun are heated with bottled fuels.

Over 44% of the owner-occupied homes in Rathbun were valued at less than \$50,000 and 33% of homes were valued \$50,000 - \$100,000.

Transportation

Rathbun is connected to state highway 5 by county highway J29 and is accessed by rural and county roads. One railroad passes through the southeastern portion of town, but no pipelines are located near Rathbun. About 2 ½ miles of roadway are located within Rathbun’s municipal boundary.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Rathbun Bait Shop	Elm St			X			1,664 sq ft
City Hall/Community Center		X					

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The Rathbun City Clerk was given the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards. Rathbun is most concerned about Flash Flood, Levee & Dam Failure, Terrorism and Hazardous Materials Incident.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Rathbun

1. Flash Flood
2. Levee & Dam Failure
3. Infrastructure Failure
4. Hazardous Materials Incident
5. Transportation Incident
6. Grass/Wildland Fire
7. Sinkholes
8. Radiological Incident
9. River Flood
10. Landslide

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information for elected officials.
- County Sheriff's office patrols.
- Fire and rescue services are provided through Centerville.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- New city hall facility

CITY OF UDELL

General Information

Population: 54	Floodplain: N.A.
Median Age: 40 yrs.	NFIP Participant: N.A.
65 years & Older: 9% 5	Historic District: None
5 years & older in school: 4% 2	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 205 acres	Building Permits required: No
Most Recent Codification: uncertain	Fire Insurance Rating:

Geography

Udell is in the south-west quadrant of the county at coordinates 40° 46' 48" N, 92° 44' 29" W. The city encompasses an area of .3 square miles with a population density of 134.8 people per square mile according to the 2019 ACS. No stream or river passes within one mile of Udell.

Population Data

As of the 2019 ACS, the total population of Udell was 54 with a total of 25 households. Between 2010 and 2019, Udell added 7 people and increased 4 households in contrast to the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that there are no residents who have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 2 (4% of total population) children under the age of five years. The population over the age of 65 years account for 9% (5 people) in Udell.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 8 residents of Udell have a confirmed disability. That accounts for approximately 6% of the population.

The combination of all these populations qualifies nearly 19% of the total population deemed "at risk".

In the 2019 ACS, median household income for Udell was up to \$74,375 from \$54,444 in the 2010 Census. More than 20% of the households in Udell had incomes less than \$35,000 in 2019. No resident of Udell lives below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Approximately 40% of residential structures in Udell were built prior to 1940 though there was a spike in new homes built in the 2000’s with nearly 17% of the housing stock built during this decade. Nearly 96% of homes (24 homes) in Udell are heated with bottled fuels and 1 home reported were heated by electric in 2019.

Over 50% of the owner-occupied homes in Udell were valued at less than \$50,000 and 88% of homes were valued \$50,000- \$100,000.

Transportation

No state or US highways connect to Udell and is accessed by rural and county roads. The Appanoose Community Railroad passes through town and a crude oil / petroleum pipeline crosses through the extreme southeastern corner of Udell. Less than 3 miles of roadways are contained within the municipal boundaries of the community.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
No critical structures							

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. City of Udell was given the needed updated city information, review the city profile, and provide progress made on mitigation strategies. Udell is most concerned about infrastructure failure, flash flood, and hazardous materials in their community.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Udell

1. Infrastructure Failure
2. Flash Flood
3. Hazardous Materials
4. Transportation Incident
5. Sinkholes
6. Grass/ Wildland Fire
7. Radiological Incident
8. Landslide

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information for elected officials.
- Moulton Fire Department responds to all fire calls in Udell.
- There is an early storm warning siren.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment with Moulton.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.

CITY OF UNIONVILLE

General Information

Population: 86	Floodplain: yes
Median Age: 48yrs	NFIP Participant: yes #190923
65 years & Older: 27% 23	Historic District: No
5 years & older in school: 6% 5	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 479 acres	Building Permits required: No
Most Recent Codification: 2015	Fire Insurance Rating: N.A.

Geography

Unionville is in the south-west quadrant of the county at coordinates 40° 49' 7" N, 92° 41' 40" W. The city encompasses an area of .7 square miles with a population density of 127.52 people per square mile according to the 2019 ACS. South Soap Creek passes just over half of a mile to the north of Unionville.

Population Data

As of the 2019 ACS, the total population of Unionville was 86 with a total of 44 households. Between 2000 and 2010, Unionville lost 16 people and decreased 5 households in alignment with the County's loss in both population and households.

Appanoose County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that no residents that have a primary language that is other than English and to be considered linguistically isolated.

There are approximately 5 (6% of total population) children under the age of five years. The population over the age of 65 years account for 27% (23 people) in Unionville.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 15 residents of Unionville have a confirmed disability. That accounts for approximately 17% of the population.

The combination of all these populations qualifies nearly 50% of the total population deemed "at risk".

In the 2019 ACS, median household income for Unionville was up to \$36,250 from \$31,429 in the 2010 Census. More than 50% of the households in Unionville had incomes less than \$35,000 in 2019.

Approximately 17% of the population of Unionville have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

12 major employers are identified in Appanoose County by www.iowasouth.com

Centerville Community Schools	Hill Phoenix
Amcor	MercyOne
Hy-Vee	Rathbun Regional Water Assoc
Mercy Medical Center – Centerville	Wal-Mart
Wells Vehicle Electronics	Fareway Stores Inc
Lee Container	C & C Machining

Structures

Nearly 54% of residential structures in Unionville were built prior to 1940 though there was a spike in new homes built in the 1990's with nearly 11% of the housing stock built during this decade. Over 68% of homes in Unionville are heated with bottled fuels and 18% homes reported were heated by electricity in 2019.

Over 66% of the owner-occupied homes in Unionville were valued at less than \$100,000.

Transportation

Unionville is accessible by county highways J3T and T61. There are slightly more than 3 miles of roadways in the municipal boundaries of Unionville. No railroad comes close to Unionville; however, a crude oil / petroleum pipeline passes through the extreme northwestern corner of town.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Community Center	Union St				X		3,444 sq ft
Tim's Gas Station	South St			X			1,560 sq ft
Baptist Church	Union St				X		3,688 sq ft
Post Office		X					
Legion				X			
City Hall		X					
Methodist Church					X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The City of Unionville was provided the necessary information regarding the city. The City of Unionville is most concerned about Thunderstorm, Lightning & Hail, Tornado & Windstorms, and severe Winter Storms in their region.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Unionville

1. Grass/Wildland Fire
2. Hazardous Materials Incident
3. Infrastructure Failure
4. Sinkholes
5. Radiological Incident
6. Transportation Incident
7. River Flood
8. Flash Flood
9. Landslide

Existing Mitigation Strategies

- Law Center (in Centerville) has contact information for elected officials.
- Moravia fire department covers all Unionville emergency fire calls.
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Appanoose County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 7/1/1988.
- Tree trimming or management is currently handled to an extent by utility services.

DAVIS COUNTY

General Information

Population: 8920	Floodplain: Yes
Unincorp Region:	NFIP Participant:
65 years & Older: 1555 17%	Historic District: Yes
5 years & older in school: 805 9%	Comprehensive Plan: Yes
School buildings: None	Zoning Ordinance: no
Places of Worship:	Subdivision Ordinance:
Land Area: 505 sq miles	Building Permits required: no
Most Recent Codification:	

Geography

Davis County is in the southern tier of counties in Iowa adjoining the Missouri border. There are four unincorporated communities in Davis County and four incorporated cities.

Davis County is in the south-central sector of Iowa at coordinates 40.6914° N, 92.3814° W and bordering the Missouri counties of Scotland and Schuyler. The Iowa counties surrounding Davis are as follows Jefferson and Van Buren. Davis County encompasses an area of 505 square miles with a population density of 17 people per square mile according to the 2019 ACS.

Davis County's terrain is predominantly undulating topography that characterizes the rolling hills of the Southern Iowa Drift Plain.

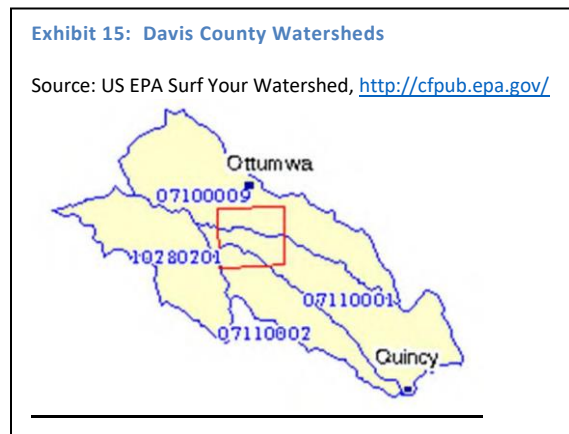
Davis County is in 5 different watersheds, all within the Mississippi Basin. The Upper Chariton watershed encompasses most of the county and extends into Missouri.

Population Data

As of the 2019 ACS, the total population of Davis County was 8,920 with a total of 3,176 households. This is down 233 persons since the 2010 Census count of 8,687 people with 54 more households now. According to Iowa State University's Regional Capacity Analysis Program the county experienced a steady decline from 1920's through the 1990's. More recent trends from 2015 to 2021 show a small annual growth for the area.

Davis County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 20% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 805 (9% of total population) children under the age of five years. The population over the age of 65 years account for 17% (1,555 people) in Davis County.



The remaining “at risk” category would be individuals that have a disability. It is estimated that approximately 1,037 (12%) residents of Davis County have a confirmed disability.

The combination of all these populations qualifies nearly 58% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Davis County was up to \$63,404 from \$46,597 in the 2010 Census. Nearly 25% of the households in unincorporated Davis County had incomes under \$35,000 annually. In 2019, 10% of residents in the unincorporated population of Davis County were determined to be under the Federal Poverty Guidelines.

Exhibit 16: Woods & Poole Population Projection for Davis County

AREA	2025	2030	2035	2040
DAVIS	8,698	8,753	8,809	8,868
PERCENT CHANGE	-2.5%	+0.7%	+0.7%	+0.7

Source: Iowa State Data Center, <http://www.iowadatacenter.org>

Major Employers

Ten major employers are identified in Davis County by www.iowasouth.com

Davis County Schools	Davis County Hospital
Performance Pipe	Davis County
City of Bloomfield	M3 Fabrication
Davencorp	Crop Protection
Cargill	Hill Phoenix

Structures

More than one-third of the housing stock (34%) in Davis County was constructed before 1940 suggesting that the structural integrity of the buildings likely does not meet newer building codes designed to ensure the safety of residents. These structures are likely the most vulnerable to various hazards due to their age and the changes in construction techniques which have improved in many ways since they were built. A larger proportion of the older housing stock is found in incorporated communities in Davis County, however. Approximately 17% of homes were built in the 1970’s.

Another potential concern is the prevalence of bottled fuels such as LP gas, kerosene, and oil used as heating fuel in the homes in unincorporated Davis County; 34% of homes use LP gas as heating fuel. While LP tanks can be safe forms of fuel containment and transport, liquefied petroleum gas is flammable and can explode. LP gas is heavier than air and so it will sink to the lowest level possible; if inhaled it can cause asphyxiation through oxygen deprivation but is otherwise nontoxic. A further concern is that 549 homes (17%) in 2019 reported using wood as the primary heating fuel. This becomes a concern due to its potential fire hazard but also to carbon monoxide poisoning in the home if a chimney is blocked.

Approximately 10% of the owner-occupied homes in Davis County were valued at less than \$50,000 as of the 2019 ACS. Approximately 36% of homes in Davis County are valued less than \$100,000 and one quarter are valued below \$50,000.

Jurisdiction & Population	Property Type	Building Counts	Improved Value*	Content Value*	Total Value*
Bloomfield 2,622	Agriculture	14	\$14,938	\$14,938	\$29,876
	Commercial	127	\$170,254	\$170,254	\$340,508
	Education	1	\$1,360	\$1,360	\$2,720
	Government	3	\$7,884	\$7,884	\$15,768
	Industrial	24	\$41,095	\$61,643	\$102,738
	Religion	10	\$12,776	\$12,776	\$25,552
	Residential	1,096	\$363,797	\$181,899	\$545,696
	Total	1,275	\$612,104	\$450,753	\$1,062,857
Drakesville 184	Agriculture	1	\$222	\$222	\$444
	Commercial	1	\$386	\$386	\$772
	Education	0	\$0	\$0	\$0
	Government	3	\$3,028	\$3,028	\$6,056
	Industrial	2	\$1,098	\$1,647	\$2,745
	Religion	0	\$0	\$0	\$0
	Residential	77	\$24,479	\$12,240	\$36,719
	Total	84	\$29,213	\$17,523	\$46,736
Floris 138	Agriculture	1	\$462	\$462	\$924
	Commercial	4	\$2,192	\$2,192	\$4,384
	Education	0	\$0	\$0	\$0
	Government	1	\$198	\$198	\$396
	Industrial	0	\$0	\$0	\$0
	Religion	0	\$0	\$0	\$0
	Residential	62	\$18,939	\$9,470	\$28,409
	Total	68	\$21,791	\$12,322	\$34,113
Pulaski 260	Agriculture	2	\$706	\$706	\$1,412
	Commercial	4	\$3,198	\$3,198	\$6,396
	Education	0	\$0	\$0	\$0
	Government	2	\$2,828	\$2,828	\$5,656
	Industrial	2	\$1,322	\$1,983	\$3,305
	Religion	1	\$956	\$956	\$1,912
	Residential	118	\$40,468	\$20,234	\$60,702
	Total	129	\$49,478	\$29,905	\$79,383
Unincorporated 5,564	Education	2	\$2,412	\$2,412	\$4,824
	Government	0	\$170	\$170	\$340
	Industrial	35	\$20,519	\$30,779	\$51,298
	Religion	10	\$9,880	\$9,880	\$19,760
	Residential	2,002	\$641,099	\$320,550	\$961,649
	Total	2,261	\$780,442	\$470,152	\$1,250,594
Pop Total: 8,768	Grand Total	3,817	\$1,493,028	\$980,654	\$2,473,682

*All values are in thousands of dollars, a value of \$0 does not necessarily mean \$0 but less than \$1,000.

Sources: Population Estimate, U.S. Census Bureau, American Community Survey 2016 5-Year Estimates; Building/Improvement Count and Values, HAZUS MH 4.0. Contents Exposure derived by applying multiplier to Building Exposure based on HAZUS MH 2.2 standard contents multipliers per usage type as follows: Residential (50%), Agricultural, Commercial, Education, Government, Religion (100%), Industrial (150%).

Community Assets

Lake Wapello State Park

The parks include 1,150 acres of beautiful, wooded hillsides, shaded picnic areas and lake provide a quiet elegance which makes Lake Wapello one of southern Iowa's best-kept secrets. Several watershed erosion control structures were installed throughout the park. These improvements have made water quality fishing superb. Canoeing, kayaking, fishing, and pleasure cruising are very enjoyable on this lake. The lake offers 289 acres of a no wake zone.

Picnicking/Shelters provide shaded and grassy picnic areas are attractive spots for leisurely outdoor meals as well as great views of Lake Wapello. Three open picnic shelters area available and one may be reserved online.

The campground offers full hook-up, electric and non-electric sites, modern shower, and restroom facilities, as well as a trailer dump station. The campground is located adjacent to the lake.

Lake Wapello State Park has eleven cedar-sided family cabins to rent April through October and two-family cabins that are available year-round. They accommodate four people comfortably and feature a restroom, shower, stove/oven, microwave, and refrigerator.

Lake Fisher Park

Lake Fisher is located two miles northwest of the City of Bloomfield. It is 82 acres that is approximately 23 feet deep. Amenities include accessible pier, picnic area, playground, restrooms, camping hard surface boat ramp and accessible shoreline.

Soap Creek Wildlife

Soap Creek Wildlife is located adjacent to the Stephen's State Forest – Unionville Unit. Soap Creek Wildlife provides 781 acres of timber habitat for hunting of deer, turkey, and squirrel.

McGowen Recreation and Wildlife Area

This is a 290-acre, multi-purpose conservation area which includes a diverse blend of recreational developments for the public. The developments include development and maintenance of top-quality wildlife habitat areas, pond management, prairie management, and providing environmental education programs.

There is a variety of game and non-game wildlife species. With diverse terrain, it features ponds, timbers, open grasslands, wetlands, and crops. The ponds are stocked with bluegill, largemouth bass, catfish, and red-ear sunfish. The area contains two small native, tall-grass prairie remnants, which contain a variety of forbs and grasses native to southern Iowa and native reconstructed prairie.

Eldon Wildlife Area

This public land encompasses 1,290 acres approximately four miles east of Floris on county highway J15 and one mile north. Three-quarters of the land is timber, and the remaining is upland. Public hunting allows hunters to pursue deer, turkey, and squirrel.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

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.

Exhibit 17: Properties/Landmarks on the National Register of Historic Places, Davis County

City	Resource	Address	Year Listed
Eldon	Lockkeeper's House	Whitefish Trail	2009
Bloomfield	Bloomfield Square	Madison, Jefferson, Franklin, and Washington Streets	1976
Bloomfield	Davis County Courthouse	Bloomfield Town Sq.	1974
Bloomfield	Findley, William, House	302 E. Franklin St.	1978
Centerville	Stringtown House	E of Centerville on IA 2	1974
Bloomfield	Trimble-Parker Historic Farmstead District	23981 240th St.	2003
Troy	Troy Academy	Off IA 2	1976
Bloomfield	Weaver, James B., House	Weaver Park Rd. (U.S. 63)	1975
West Grove	West Grove United Methodist Church	21944 Echo Ave.	2004
Bloomfield	Wilson, Asa, House	207 S. Washington	1982
Bloomfield	Wishin, Henry, House	406 W. Jefferson St.	2004

Exhibit 18: 2017 Census of Agriculture

Total Land in Farms (acres)	198,596
Number of Farms	826
Average Farm Size (acres)	240
Market Value of All Farm Products	\$91,912,000
Market Value of All Crops	\$28,465,000
Market Value of All Livestock	\$63,447,000
Production Expenses	\$84,800,000
Hogs & Pigs Inventory (head)	126,064
All Cattle and Calves	30,240

Transportation

Three distinct state highways connect Davis County communities to one another and connect to communities in surrounding counties. State Highways 2 and 63 are major arterials for the county. There are six county highways that consist of: J15, V42, J40, V20, J51, and J2T.

Trails

Lake Wapello State Park has a seven-mile Lake Shore Trail that goes around the lake and through the park. Cross-country skiing is a popular activity in the winter and there are several areas designated for cross-country skiers. The Park also offers multi-use trails for hiking and snowmobiling. A nature trail is located on the north side of the park.

There are no railroad lines in the county.

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The County Representative was Alan Yahnke from the Board of Supervisors. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The numbers were then added to achieve a weighted score that prioritized the hazards. Davis County is greatest concerns are with Tornado/windstorm, transportation incident, infrastructure failure, and severe winter storm.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Unincorporated Davis County

1. Transportation Incident
2. Infrastructure Failure
3. Flash Flood
4. River Flood
5. Grass/Wildland Fire
6. Levee & Dam Failure
7. Radiological Incident
8. Hazardous Materials Incident
9. Sinkholes
10. Landslide

Overall – Davis County Rankings

1. Transportation Incident
2. Tornado & Windstorm
3. Infrastructure Failure
4. Severe Winter Storm
5. Extreme Heat
6. Thunderstorm, Lightning & Hail
7. Flash Flood
8. Drought
9. Terrorism
10. Human Disease
11. Grass/Wildland Fire
12. Animal, Plant & Crop Disease
13. Hazardous Materials Incident
14. Radiological Incident
15. River Flood
16. Earthquake
17. Expansive Soils
18. Levee & Dam Failure
19. Sinkholes
20. Landslide

CITY OF BLOOMFIELD

General Information

Population: 2,658	Floodplain: Yes
Median Age: 38	NFIP Participant: Yes, #
65 years & Older: 492 19%	Historic District: Yes
5 years & older in school: 181 6.8%	Comprehensive Plan: Yes
School buildings:	Zoning Ordinance: Yes
Places of Worship:	Subdivision Ordinance: Yes
Land Area: 2.286 Sq miles	Building Permits required: Yes
Most Recent Codification:	Fire Insurance Rating:

Geography

Bloomfield is in approximately the center of the county at coordinates 40.7517° N, 92.4149° W. The city encompasses an area of 2.3 square miles with a population density of 1,173 people per square mile according to the 2019 ACS.

Population Data

As of the 2019 Census, the total population of Bloomfield was 2,658 with a total of 1,120 households. Between 2010 and 2019, Bloomfield increased 28 people and increased 16 households in contrast with the County's loss in both population and households.

Davis County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 Census, the census estimated that 0.6% people have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 181 (6.8% of total population) children under the age of five years. The population over the age of 65 years account for 18.5% (492 people) in Bloomfield.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 341 residents of Bloomfield have a confirmed disability. That accounts for approximately 13% of the population. The combination of all these populations qualifies nearly 39% of the total population deemed "at risk".

In the 2019 Census, median household income for Bloomfield was up to \$47,738 from \$44,336 in the 2010 Census. More than 52% of the households in Bloomfield had incomes less than \$50,000 in 2019. Approximately 13% of the population of Bloomfield have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Davis County by www.iowasouth.com

Davis County Schools	Davis County Hospital
Performance Pipe	Davis County
City of Bloomfield	M3 Fabrication
Davencorp	Crop Protection
Cargill	Hill Phoenix

Structures

Approximately (38%) of residential structures in Bloomfield were built prior to 1940 though there was a spike in new homes built in the 1970’s with nearly 18% of the housing stock built during this decade. Nearly 75% of homes in Bloomfield are heated with utility gas and 2% homes reported were heated by firewood in 2019.

Over 55% of the owner-occupied homes in Bloomfield were valued at less than \$100,000 and 17% of homes were valued at less than \$50,000.

Community Assets

Davis County Hospital & Clinics

Davis County Hospital & Clinics is a critical access care facility that is locally owned by the county. This 25-bed facility provide emergency services and general care. The previous year had 153 total discharges and 825 total patient days. (www.ahd.com) One hundred of inpatients were Medicare eligible and one-third of services provided at that time were for medicine, nearly one-quarter for pulmonology and seventeen for orthopedic surgery. The total annual revenue was approximately \$52M.

Davis County Public Schools

Davis County Public Schools is in the county seat of Davis County, Bloomfield. The school district serving Bloomfield, Pulaski, and Drakesville is the K-12. Its facilities include:

<i>Exhibit 18: Davis County Community Schools Statistics</i>	
<i>2019-2020 School Year</i>	<i>Davis County Community School District</i>
Student Enrollment	1,167
Student/Teacher Ratio	15
Eligible for Free/Reduced Meals	43%
Minority Ethnicity (any other than white)	5%
Classroom Teachers (FTE)	92
<i>National Center for Education Statistics</i>	

Davis County identified at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. The combination of all these populations is illustrated above and qualifies much of the district population as “at risk”.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

<i>Critical Facilities</i>	
Facility Type	Bloomfield
Air Facility	1
Communications	
Day Care Center	
Fire Station	1
Hospital	1
Law Enforcement	1
Local EOC	
National Shelter System Facility	
Nursing Home	
Power Plant	
Public Health Department	
School K-12	3
Tier II Facility	5
Wastewater Treatment Plant	
Grand Total	

Bloomfield Parks

Lake Fisher Park

Lake Fisher Park features beautiful scenery, excellent fishing and wildlife, shelter housings and recently incorporated a newly constructed campground. The Park contains a 100-acre lake just west of Bloomfield.

Bloomfield City Park

The Bloomfield City Park is a great place for family and friends to enjoy the outdoors. The park includes two playground structures, basketball courts, and a swimming pool where everyone can relax.

Transportation

US highway 63 passes through the heart of Bloomfield (north and south) and to the east of the Davis County Courthouse. Iowa Highway 2 intersects the southern edges of the light industrial region of the Bloomfield corporate city limits.

The Bloomfield Municipal Airport is located south of the city but is located on City land that is zoned Heavy Industrial. The Bloomfield Municipal Airport is owned and operated by the City of Bloomfield but is managed by the local Bloomfield Airport Commission. The airport is not included in the National Plan of Integrated Airport Systems (NPIAS). The Iowa Aviation System Plan (IASP) Airport Summary Report (ASR) identifies it as a Basic Service Airport.

Basic service airports in Iowa provide an important means of accessing the communities and regions they serve and provide a link to the national transportation system. The Bloomfield Municipal Airport serves the general aviation needs of Davis County and the City of Bloomfield. The airport is mainly utilized by single engine aircraft. The airport offers 100LL fuel, 12 aircraft apron tie-downs, 12 hanger parking spaces.



A variety of aeronautical activities are offered at Bloomfield Municipal Airport, including: a pilot area, a restroom, and a computer.

The Bloomfield Municipal Airport is in Davis County approximately 3 miles south of the City of Bloomfield.

1. Existing facilities and services – The Bloomfield Municipal Airport offer one runway. The Runway is 18/36 and is 3,401 feet in length and 50 feet wide. The runway has MIRL Lightning system on the entire runway strip. The airport has a rotating beacon and lighted wind indicator.

2. Airport Facility and Service Needs – The IASP ASR

recommends maintaining services and facilities at the Bloomfield Airport are outlined in the Iowa DOT aviation plan.

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The numbers were then added to achieve a weighted score that prioritized the hazards. Bloomfield is most concerned about Tornado/Windstorm, Transportation Incident, Infrastructure Failure and Severe Winter Storms.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Bloomfield

1. Transportation Incident
2. Infrastructure Failure
3. Flash Flood
4. Hazardous Materials Incident
5. Grass/Wildland Fire
6. River Flood
7. Levee & Dam Failure
8. Radiological Incident
9. Sinkholes
10. Landslide

Existing Mitigation Strategies

- Fire Station has a storm warning system
- Law Center for City & county police in the city limits
- Mobile communication trailer(s) located at Law Center; about 1-2 hours are needed to mobilize
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- Designated emergency Red Cross shelter sites established.

- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Davis County Supervisors' office.
- Tree trimming or management is currently handled by utility services
- Fire fighters & emergency personnel have handheld radios
- Rescue personnel are trained in emergency water search & rescue
- Storm water drainage system improvement during the past five years
- Multiple street repairs & replacement (that also included water system upgrades at the same time)
- Monthly SWAT training/meetings

CITY OF DRAKESVILLE

General Information

Population: 180	Floodplain:
Median Age: 51	NFIP Participant:
65 years & Older: 47 26%	Historic District:
5 years & older in school: 10 6%	Comprehensive Plan:
School buildings:	Zoning Ordinance:
Places of Worship:	Subdivision Ordinance:
Land Area: .25 sq miles	Building Permits required:
Most Recent Codification:	Fire Insurance Rating:

Geography

Drakesville is the southern-most incorporated community in Davis County at coordinates 40.7984° N, 92.4816° W. The city encompasses an area of .25 square miles with a population density of 736 people per square mile according to the 2019 ACS.

Population Data

As of the 2019 ACS, the total population of Drakesville was 180 with a total of 89 households. Between 2010 and 2019, Drakesville lost 10 people and increased 9 households in alignment with the County’s loss in both population and households.

Davis County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that no residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 18 (6% of total population) children under the age of five years. The population over the age of 65 years account for 26% (47 people) in Drakesville.

The remaining “at risk” category would be individuals that have a disability. It is estimated that 33 residents of Drakesville have a confirmed disability. That accounts for approximately 18% of the population.

The combination of all these populations qualifies nearly 50% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Drakesville was \$58,431 down from \$59,355 from in the 2010 Census. More than 56% of the households in Drakesville had incomes less than \$35,000 in 2010. Approximately 14% of the population of Drakesville have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Davis County by www.iowasouth.com

Davis County Schools	Davis County Hospital
Performance Pipe	Davis County
City of Bloomfield	M3 Fabrication
Davencorp	Crop Protection
Cargill	Hill Phoenix

Structures

Nearly 30% of residential structures in Drakesville were built prior to 1940 though there was a spike in new homes built in the 1970’s with nearly 43% of the housing stock built during this decade. Nearly 67% of homes in Drakesville are heated with bottled fuels and 20% homes reported were heated by electricity in 2019.

Over 80% of the owner-occupied homes in Drakesville were valued at less than \$100,000 and 31% of homes were valued at less than \$50,000.

Transportation

Two local county black top roads lead to Drakesville on 180th Street and Iris Boulevard.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities	
Facility Type	Drakesville
Air Facility	0
Communications	
Day Care Center	0
Fire Station	1
Hospital	0
Law Enforcement	0
Local EOC	
National Shelter System Facility	
Nursing Home	0
Power Plant	
Public Health Department	0
School K-12	0
Tier II Facility	0
Wastewater Treatment Plant	1
Grand Total	

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. Drakesville is most concerned about Tornado/Windstorm, Transportation Incident, Infrastructure Failure and Severe Winter Storms.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Davis County School District

1. Transportation Incident
2. Infrastructure Failure
3. Flash Flood
4. Grass/Wildland Fire
5. Hazardous Materials Incident
6. Radiological Incident
7. Sinkholes
8. Landslide

Existing Mitigation Strategies

- Fire Station has a dated storm warning siren that only works on occasion.
- City Hall building has been designated as a Red Cross Shelter site.
- Regional Mobile communication trailer(s) located at Law Center; about 5-6 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Davis County Supervisors' office.

CITY OF FLORIS

General Information

Population: 193	Floodplain:
Median Age: 30	NFIP Participant:
65 years & Older: 24 12%	Historic District: No
5 years & older in school: 50 26%	Comprehensive Plan: No
School buildings:	Zoning Ordinance: No
Places of Worship:	Subdivision Ordinance: No
Land Area: acres	Building Permits required: No
Most Recent Codification:	Fire Insurance Rating:

Geography

Floris is in southern third of the county at coordinates 40.8650° N, 92.3330° W. The city encompasses an area of .48 square mile with a population density of 288 people per square mile according to the 2019 ACS.

Population Data

As of the 2019 ACS, the total population of Floris was 193 with a total of 62 households. Between 2010 and 2019, Floris increased 64 people and increased 9 households in contrast to the County’s loss in both population and households.

Davis County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that there are no residents who have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 50 (26% of total population) children under the age of five years. The population over the age of 65 years account for 12% (24 people) in Floris.

The remaining “at risk” category would be individuals that have a disability. It is estimated that 47 residents of Floris have a confirmed disability. That accounts for approximately 15% of the population.

The combination of all these populations qualifies nearly 53% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Floris was up to \$47,500 from \$26,250 in the 2010 Census. More than 39% of the households in Floris had incomes less than \$35,000 in 2019.

Approximately 27% of the population of Floris have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Davis County by www.iowasouth.com

Davis County Schools	Davis County Hospital
Performance Pipe	Davis County
City of Bloomfield	M3 Fabrication
Davencorp	Crop Protection
Cargill	Hill Phoenix

Structures

Nearly half (47%) of residential structures in Floris were built prior to 1940 though there was a spike in new homes built in the 1970's and from 2000-2009 with nearly 15.6% of the housing stock built during each decade. Nearly 69% of homes in Floris are heated with bottled fuels and 24% homes reported were heated by firewood in 2019.

Over 59% of the owner-occupied homes in Floris were valued at less than \$100,000 and 20% of homes were valued at less than \$50,000.

Transportation

Two local roads (J15/Floris Road and Quail Avenue) provide access to and from Floris.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

<i>Critical Facilities</i>	
Facility Type	Floris
Air Facility	0
Communications	
Day Care Center	0
Fire Station	1
Hospital	0
Law Enforcement	0
Local EOC	
National Shelter System Facility	
Nursing Home	0
Power Plant	
Public Health Department	0
School K-12	0
Tier II Facility	0
Wastewater Treatment Plant	1
Grand Total	

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The numbers were then added to achieve a weighted score that prioritized the hazards. Floris is most concerned about Tornado/Windstorm, Transportation Incident, Infrastructure Failure and Severe Winter Storms.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Floris

1. Transportation Incident
2. Infrastructure Failure
3. Flash Flood
4. River Flood
5. Grass/Wildland Fire
6. Levee & Dam Failure
7. Hazardous Materials Incident
8. Radiological Incident
9. Sinkholes
10. Landslide

Existing Mitigation Strategies

- Regional Mobile communication trailer(s) located at Bloomfield Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Davis County Supervisors' office.

CITY OF PULASKI

General Information

Population: 364	Floodplain:
Median Age: 32	NFIP Participant:
65 years & Older: 41 11%	Historic District:
5 years & older in school: 52 14%	Comprehensive Plan:
School buildings:	Zoning Ordinance:
Places of Worship:	Subdivision Ordinance:
Land Area: sq miles	Building Permits required:
Most Recent Codification:	Fire Insurance Rating:

Geography

The City of Pulaski is in southeast quadrant of Davis County, Iowa in the south-central sector of Iowa at coordinates 40.6970° N, 92.2732° W. Pulaski has a total land area of .51 square miles and has a population density of 766 people per square mile. The city is primarily served by Iowa Highway 2.

Population Data

As of the 2019 ACS, the total population of Pulaski was 364 with a total of 130 households. Between 2010 and 2019, Pulaski increased 106 people and increased 30 households in contrast with the County's loss in both population and households.

Davis County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 4.5% of residents have a primary language that is other than English and would be considered linguistically isolated.

There are approximately 52 (14% of total population) children under the age of five years. The population over the age of 65 years account for 11% (41 people) in Pulaski.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 56 residents of Pulaski have a confirmed disability. That accounts for approximately 15.4% of the population.

The combination of all these populations qualifies nearly 45% of the total population deemed "at risk".

In the 2019 ACS, median household income for Pulaski was up to \$65,179 from \$42,500 in the 2019 ACS. More than 14.7% of the households in Pulaski had incomes less than \$35,000 in 2019.

Approximately 30% of the population of Pulaski have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Davis County by www.iowasouth.com

Davis County Schools	Davis County Hospital
Performance Pipe	Davis County
City of Bloomfield	M3 Fabrication
Davencorp	Crop Protection
Cargill	Hill Phoenix

Structures

Nearly 61% of residential structures in Pulaski were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 10% of the housing stock built during this decade. Nearly 82% of homes in Pulaski are heated with bottled fuels and 10% homes reported were heated by firewood in 2019.

Over 89% of the owner-occupied homes in Pulaski were valued at less than \$100,000 and 40% of homes were valued at less than \$50,000.

The Pulaski Park includes an old railroad depot, an old freight wagon and vintage telephone switchboard equipment. It is also home to the Pulaski Corn Show held in September.

Transportation

Pulaski is served by one state highway, Iowa Highway 2, and the local road of Timber Avenue.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

<i>Critical Facilities</i>	
Facility Type	Pulaski
Air Facility	0
Communications	
Day Care Center	0
Fire Station	1
Hospital	0
Law Enforcement	0
Local EOC	
National Shelter System Facility	
Nursing Home	0
Power Plant	
Public Health Department	0
School K-12	2
Tier II Facility	0
Wastewater Treatment Plant	1
Grand Total	

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The numbers were then added to achieve a weighted score that prioritized the hazards. Pulaski is most concerned about Tornado/Windstorm, Transportation Incident, Infrastructure Failure and Severe Winter Storms.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Pulaski

1. Transportation Incident
2. Infrastructure Failure
3. Flash Flood
4. Grass/Wildland Fire
5. Hazardous Materials Incident
6. Radiological Incident
7. Sinkholes
8. Landslide

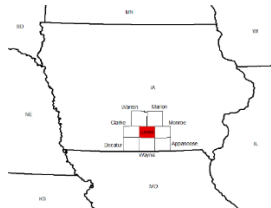
Current Mitigation Strategies

- Regional Mobile communication trailer(s) located at Bloomfield Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow).
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- The city requires mobile home tie-downs.
- Tree trimming or management is currently handled to an extent by utility services in Pulaski.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Davis County Supervisors' office.

LUCAS COUNTY

General Information

Population: 8583	Floodplain: Yes
Median Age: 44	NFIP Participant: #190195
65 years & Older: 1836 21%	Historic District: No
5 years & Under: 507 6%	Comprehensive Plan: Yes
School buildings: 0	Zoning Ordinance: Yes
Places of Worship: 5	Subdivision Ordinance: Yes
Land Area: 434 sq. miles	Building Permits required: Yes
Most Recent Codification:	

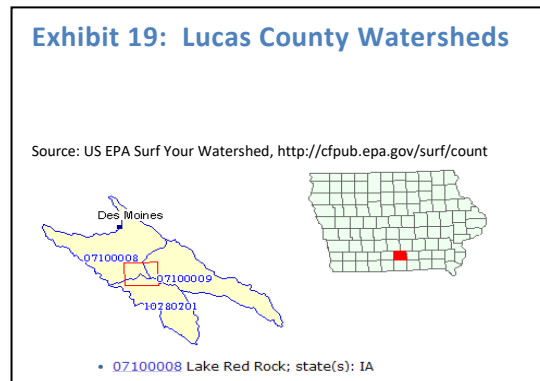


Geography

Lucas County is in the south-central sector of Iowa at coordinates 41° 1' 34" N, 93° 19' 42" W. The counties surrounding Lucas are as follows, Marion, Lucas, Appanoose, Decatur, Clarke, and Warren.

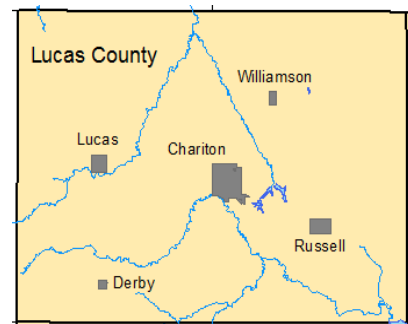
Lucas County encompasses an area of 434 square miles with a population density of 20 people per square mile according to the 2019 ACS.

Rathbun Lake is located primarily in Appanoose County, but extends into Lucas County covering a total area of 12,040 acres across four counties. Rathbun Lake is the second largest water body in Iowa. Four smaller bodies of water exist within the county. Those include Lake Morris, Lake Ellis, Red Haw Lake, and Crystal Lake. Eight rivers and creeks cross through Lucas County, the most significant of which is the Chariton River which created Rathbun Lake once dammed in the 1970's. Lucas County's terrain is predominantly undulating topography that characterizes the rolling hills of the Southern Iowa Drift Plain. Lucas County is in 3 different watersheds, all within the Mississippi Basin. The Lake Red Rock watershed encompasses slightly more of the county than the other two.



Population Data

As of the 2019 ACS, the total population of Lucas County was 8,583 with a total of 3,701 households. This is down 315 persons since the 2010 Census count of 8898 people and added 12 households; According to Iowa State University's Regional Capacity Analysis Program¹ (ReCAP), Lucas County has faced five decades of decline starting in 1920 through 1970. A slight population increase occurred between 1970 and 1980 followed by a 12% population decline in the 1980's. There was a modest growth occurred as captured in the 2000 Census, however, now the new data indicates a significant decrease of 524 in 2010.



The population of the unincorporated county is over half of the total population of the count in 1417 households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 5.2% people have a primary language that is other than English and would be considered linguistically isolated in Lucas County. There are approximately 507 (6% of total population) children under the age of five years. The population over the age of 65 years account for 21% (1836 people) in Lucas County.

The remaining “at risk” category would be individuals that have a disability. It is estimated that 1435 residents of Lucas County have a confirmed disability. That accounts for approximately 17% of the population.

The combination of all these populations qualifies nearly 49% of the total population deemed “at risk”.

Exhibit 20: Woods & Poole Population Projection for Lucas County

AREA	2025	2030	2035	2040
LUCAS	9,143	9,118	9,094	9,073
PERCENT CHANGE	0.86%	-.27%	-.26%	-.23%

Source: Iowa State Data Center, <http://www.iowadatacenter.org>

In the 2019 Census, median household income for Lucas County was \$55,205 up from \$43,005 in the 2010 ACS. Approximately 44% households in unincorporated Lucas County had incomes under \$35,000 annually. In 2019, 11.8% of people in Lucas County were determined to be under the Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

One-third of the housing stock (33%) in Lucas County was constructed before 1940 suggesting that the structural integrity of the buildings likely does not meet newer building codes designed to ensure the safety of residents. These structures are likely the most vulnerable to various hazards due to their age and the difference in construction techniques which have improved in many ways since they were built. A larger proportion of the older housing stock is found in incorporated communities in Lucas County. Median year built of the homes in Lucas County is 1948, meaning that half of the homes were built before and half after this year.

Another potential concern is the prevalence of bottled fuels such as LP gas, kerosene, and oil used as heating fuel in the homes in Lucas County; 26% of homes use LP gas as heating fuel and approximately 40% have utility gas for a heating source. While LP tanks can be safe forms of fuel containment and

transport, liquefied petroleum gas is flammable and can explode. LP gas is heavier than air and so it will sink to the lowest level possible; if inhaled it can cause asphyxiation through oxygen deprivation but is otherwise nontoxic. A further concern is that 171 homes (4.6%) in 2019 reported using wood as the primary heating fuel. This becomes a concern due to its potential fire hazard but also to carbon monoxide poisoning in the home if a chimney is blocked.

About 22% of the owner-occupied homes in unincorporated Lucas County was valued at less than \$50,000 as of the 2019. About 26% of the homes in Lucas County are valued between \$100,000 and \$200,000.

Community Assets

Red Haw Lake

The 649-acre park is filled with hawthorns, oaks, maples, pines, and redbud trees which line the roadways and the shoreline. During the summer months visitors can enjoy swimming, camping, fishing, and boating. In winter, ice skating, sledding, skiing, and snowmobiling. Hiking trails wind through the park and around the sparkling clear 72-acre lake. Red Haw's shady campground overlooks the beautiful lake. There are 80 camping units (58 with electrical hookups), paved roads, modern rest rooms, showers, and a trailer dumping station. A playground provides fun for little campers. A boat ramp is conveniently located near the campground. The land offers public hunting for deer, pheasants, waterfowl, quail, and dove.

Stephens State Forrest

Stephens State Forest is in south-central Iowa and is divided into seven unit totaling over 15,000 acres. The forest is dispersed over five counties: Lucas, Clarke, Lucas, Appanoose, and Davis. Stephens State Forest is administered by the Iowa DNR - Bureau of Forestry. A majority of Iowa's largest forest is in Lucas Co. with over 7,300 acres, providing a forest wilderness experience as well as recreational opportunities. There are 31 miles of equestrian trails, rustic campgrounds, 4 stocked ponds and the entire area is open for public hunting.

Lucas, White breast, and Woodburn Units

These units are contiguous and are located southwest of the town of Lucas, Iowa. Most of the recreational development on Stephens State Forest has taken place on these units. Recreational activities include fishing, picnicking, camping, hunting, hiking, equestrian riding, snowmobiling, cross-country skiing, mountain biking, and wildlife watching.

The Woodburn Unit has over six miles of backpacking trails and five pack-in (backcountry) campsites. This unit has an all-weather road along its west side and through the middle of the unit. Parking and trail head for the backpack trail system is on 330th Avenue in Clarke County. These sites are primitive; there is no electricity, no modern restroom facilities, and no water available on site. There is a picnic table and fire ring at each campsite. There is no fee for the pack-in sites, and they are first-come, first serve.



The Whitebreast Unit has two lakes, three equestrian campgrounds, and one group-camp area. This unit also has 25 miles of multi-use trails that can be utilized for hiking, mountain biking, cross country skiing, and equestrian riding. This unit is served by an all-weather road. The North

Pond has recently completed improvements including an access road, parking area, aquatic habitat, and sediment basin.

The Lucas Unit has two small lakes and three campgrounds. There are 10 miles of trails that can be utilized for hiking, snowmobiling, and cross-country skiing. This unit is served by an all-weather road.

Cedar Creek, Chariton, and Thousand Acres Unit

These units do not have any developed recreational facilities such as picnic areas, campgrounds, or designated trails. They are less well served by all-weather roads; however, there are many dirt roads and access lanes. These units are well suited to hunting, hiking, and wildlife watching.

The Cedar Creek Unit is four miles east and one mile south of the town of Williamson. This unit is bisected by an all-weather road.

The Chariton Unit is six miles east of the town of Williamson. An all-weather road runs along its east side.

The Thousand Acres Unit is northeast of and contiguous with the Chariton Unit. The all-weather county line road serves as the boundary between the Thousand Acres Unit and the Chariton Unit, and the east side of the Thousand Acres Unit is assessable by graveled roads. (Iowa DNR)

Lake Ellis

The Lake Ellis is in Lucas County in the State of Iowa. The Lake Ellis is located at the latitude and longitude coordinates of 41.0124999 and -93.2593751 at an elevation of 281 feet.

Lake Morris

Lake Morris is a reservoir in Lucas County. Lake Morris is located within the Lincoln Township or three miles east of Chariton at latitude 41.0134 and longitude -93.2515. It covers 141 acres and has a maximum depth of 20 feet.

Browns Slough

This DNR managed property is 194 acres of mostly timber and 1/3 upland. This public land offers deer, turkey, squirrel, quail, and dove for hunters to pursue. This land is located approximately 6 miles southeast of Russell.

Colyn Wildlife Area

Located approximately six miles southwest of Russell is Colyn Wildlife Area. This public land encompasses 853 acres of marsh, timber, and upland. Hunters can pursue deer, turkey, pheasant, waterfowl, quail, and dove.

Goshen Wildlife Area

Goshen Wildlife Area is 415 acres of Chariton River Bottom that contains deer, pheasant, waterfowl, and quail. It is located 5 miles south of the City of Lucas on State Highway 65.

Williamson Pond

Williamson Pond includes 123 acres of timber, lake, and ponds approximately three miles east of Williamson. Hunters can pursue deer, turkey, squirrel, and rabbits. It was built and owned for many years by the Rock Island railroad, then transferred to what now is the Iowa Department of Natural Resources but maintained and managed by the Lucas County Conservation Board. This is a 126-acre reserve with 30 acres of water

surrounded by mixed woodland (many oaks and walnut) at the head of English Creek two miles east of Williamson.

Lucas County Fairgrounds

The Lucas County Fairground is located at the edge of Chariton’s city limits. Multiple events are held there throughout the year. The largest event is the County fair when local families Exhibit projects. Hundreds of people are on the facility at any given point throughout the week in July. The property also now offers twelve camping slots.

Exhibit 21: 2017 Census of Agriculture	
Total Land in Farms (acres)	175,437
Number of Farms	567
Average Farm Size (acres)	309
Market Value of All Farm Products	\$50,113,000
Market Value of All Crops	\$22,710,000
Market Value of All Livestock	\$27,403,000
Production Expenses	\$51,154,000
Hogs & Pigs Inventory (head)	44,499
All Cattle and Calves	32,543

Transportation

One state highway and one U.S. Highway crossing through Lucas County, state highway 34 running east to west and U.S. Highway 65 running north to south. Four distinct county highways are in the county S23, S45, H32, and S56. Highway 14 is the only state highway in Lucas County. Two railroads cross through the county, one running east-west and one running north-south. A natural gas pipeline connects to Chariton from the north and a branch of the pipeline connects to Williamson mid-way between the two communities. A pedestrian trail, Cinder Path, connects Derby and Chariton and extends south into Wayne County.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Electrical Substations (4)		X					--
Landfill		X					40 acres
Lake Red Haw					X		--
Rural Water towers		X					--
IDOT roads maintenance shop					X		6,000 sq ft
Iowa DOT	Hwy 34				X		4,800 sq ft
ITC Midwest	50415 State Hwy 14,				X		
South Central Coop	49297 215 th St, Chariton				X		
HyVee Perishable Distribution Center	21591 490 th St, Chariton				X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Cathy Reece, Lucas County Board of Supervisors, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Lucas County’s unincorporated region is most concerned about Thunderstorm, Lightning & Hail, Human Disease, Infrastructure Failure, and Drought.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Unincorporated Lucas County

1. Infrastructure Failure
2. Grass/Wildland Fire
3. Radiological Incident
4. River Flood
5. Levee/Dam Failure
6. Transportation Incident
7. Hazardous Materials Incident
8. Flash Flood
9. Sinkholes

Existing Mitigation Strategy

- Law Center (Chariton) provides service to entire county.
- Mobile communication trailer(s) located at Appanoose Law Center available to neighboring counties; needs about 1-2 hours are needed to mobilize

- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions County-wide Emergency Operations Plan (EOP updated in July) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Lucas County Supervisors' office.
- Tree trimming or management is currently handled by utility services provided throughout the county.
- Chariton emergency personnel are certified in waterway rescue.

Overall – Lucas County Rankings

1. Severe Winter Storm
2. Thunderstorm, Lightning & Hail
3. Tornado & Windstorm
4. Drought
5. Transportation Incident
6. Animal, Plant & Crop Disease
7. Extreme Heat
8. Sinkholes
9. Human Disease
10. Hazardous Materials Incident
11. Infrastructure Failure
12. Grass/Wildland Fire
13. Radiological Incident
14. River Flood
15. Flash Flood
16. Terrorism
17. Levee & Dam Failure
18. Expansive Soils
19. Landslide
20. Earthquake

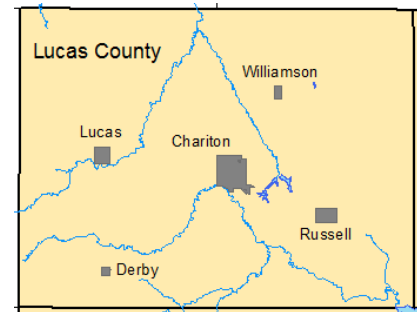
CITY OF CHARITON

General Information

Population: 4149	Floodplain: Yes
Median Age: 40	NFIP Participant: Yes, #190195
65 years & Older: 21% 869	Historic District: Yes
5 years & older in school: 5% 225	Comprehensive Plan:
School buildings: 9	Zoning Ordinance: Yes
Places of Worship: 13	Subdivision Ordinance: Yes
Land Area: 3.8 Square Miles	Building Permits required: Yes
Most Recent Codification:	Fire Insurance Rating: 6

Geography

The county seat of Chariton is located approximately in the center of the county at coordinates 41° 0' 58" N, 93° 18' 27" W. Chariton encompasses an area of 3.8 square miles with a population density of 1,082 people per square mile according to the 2019 Census.



Population Data

As of the 2019 ACS, the total population of Chariton was 4,149 with a total of 1,884 households. Between 2010 and 2019, Chariton lost 172 people and decreased 213 households in alignment with the County's loss in both population and households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 7.3% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 225 (5% of total population) children under the age of five years. The population over the age of 65 years account for 21% (869 people) in Chariton.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 798 residents of Chariton have a confirmed disability. That accounts for approximately 20% of the population.

The combination of all these populations qualifies nearly 53% of the total population deemed "at risk".

In the 2019 ACS, median household income for Chariton was up to \$48,676 from \$28,696 in the 2010 Census. More than 39% of the households in Chariton had incomes less than \$35,000 in 2019. Approximately 18% of the population of Chariton have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

Nearly half (35%) of residential structures in Chariton were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 21% of the housing stock built during this decade. Nearly 70% of homes in Chariton are heated with utility gas and 29% homes reported were heated by electricity in 2019.

Over 71% of the owner-occupied homes in Chariton were valued at less than \$100,000 and 28% of homes were valued at less than \$58,000.

Community Assets

Chariton Public Schools

Chariton Public School is in the county seat of Chariton, which is located approximately in the center of the county at coordinates 41° 0' 58" N, 93° 18' 27" W. The district is approximately 379 square miles. Neighboring school districts for comparison include Albia, Clarke, Knoxville, Melcher-Dallas, Mormon Trail, Pleasantville, Southeast Warren, Seymour, Twin Cedars and Wayne County Schools.

District Facts

<i>Exhibit 22: Chariton Community School District Statistics 2018-2019 School Year</i>	<i>Chariton Community School District</i>
Student Enrollment	1,278
Student/Teacher Ratio	14.24
Eligible for Free/Reduced Meals	675
Minority Ethnicity (any other than white)	76
Classroom Teachers (FTE)	90
ELL Students	81
Students with IEP's	188
<i>National Center for Education Statistics</i>	

Lucas County identified at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. The combination of all these populations is illustrated above and qualifies nearly 65% of the student population could be deemed "at risk". Chariton Community Schools offers transportation to enrolled students throughout the district. Twenty-six (26) buses travel throughout the district to transport children to and from school.

Lucas County Health Center

Construction on what would become Lucas County Memorial Hospital began in the fall of 1959. A Grand Opening was held May 1, 1961, to announce the community's modern medical facility was open for business.

The hospital was so well used by area residents, that a 48-bed addition was constructed in 1969. A two-unit ambulance service was added in 1970. To meet the growing needs of Lucas County residents, a four-bed intensive care unit was equipped in 1971 with the latest technology.

As healthcare needs continued to evolve, the Lucas County Memorial Hospital Board of Directors kept pace. In 1985, Northridge Living Center was developed to meet the growing need for residential facilities for the elderly.

The 1990s brought more changes to the hospital, including a name change. Lucas County Memorial Hospital was renamed Lucas County Health Center. A spacious medical office building was added to the north side of the building, a project that included the construction of an airy atrium entrance to the Health Center.

The LCHC Mammography Center began offering on-site mammography every weekday in 1999. Neal Sokol, D. O., joined the LCHC staff in 1999 as general surgeon before opening his own practice, Surgical Clinic of Southern Iowa, P.C. on Court Avenue in Chariton two years later. Nearly 1,000 surgeries were performed from 1999 to 2000. Procedures performed by Dr. Sokol, and other visiting physicians now include general surgeries; ear, nose, and throat; oncology; podiatric; orthopedic, cataract removal and many others.

Other LCHC departments include physical, occupational and speech therapies, athletic training services, counseling services, women's health services, and obstetrics. LCHC also has a comprehensive laboratory and full radiology services with the latest technology offered through CT, and mobile MRI and digital mammography. The Health Center also offers sleep studies, cardiac and pulmonary rehabilitation, infusion therapies, diabetes education, and wound healing treatment. It could be state that all patients of the Health Care Center are considered vulnerable and at risk due to their physical or mental health state that is requiring additional care. In this situation, all 22 beds would be given as an estimated number to be considered "at risk" for this facility.

Also located on the property of Lucas County Health Center is "Kids' Life Discovery Center", a childcare service of the Health Center and is licensed to meet the physical and developmental needs of up to 135 children from 5:30 a.m. to 6:30 p.m. Monday through Friday. Trained and educated staff members foster a nurturing environment of acceptance and welcome for all children.

Kids' Life Discovery Center is an extension of the family unit, serving as a supplement to - not a replacement for - the family. Young children develop optimally through close, affectionate relationships with older people, particularly adults. Each child has a unique rate of development and level of ability, which is expected, valued, and accepted at Kids' Life Discovery Center.

Lucas County Health Center is one of the major employers in Lucas County. There are approximately 180 employees at the location in Chariton.

Transportation

US Highway 34, running east-west, and State Highway 14, running north-south, cross near the southern boundary of Chariton. Likewise, two railroads cross near the southern border of the city as well. A natural gas pipeline enters Chariton from the north in the northwest corner of the city. There are about 46 miles of roadway within the municipal boundaries of Chariton. The Cinder Path pedestrian trail enters Chariton from the west.

The Chariton Municipal Airport is owned and operated by the City of Chariton but is managed by the local Chariton Airport Commission. The airport is not included in the National Plan of Integrated Airport Systems (NPIAS). The Iowa Aviation System Plan (IASP) Airport Summary Report (ASR) identifies it as a Basic Service Airport.

Basic service airports in Iowa provide an important means of accessing the communities and regions they serve and provide a link to the national transportation system. The Chariton Municipal Airport serves the general aviation needs of Lucas County and the City of Chariton. The airport is mainly utilized by single engine aircraft. The airport offers 100LL fuel, 12 aircraft apron tie-downs, 21 hanger parking spaces and overnight storage.



A variety of aeronautical activities are offered at Chariton Municipal Airport, including: a pilot area, a restroom, and a courtesy car as ground transportation. The Chariton Municipal Airport is in Lucas County approximately 3 miles west of the City of Chariton.

1. Existing facilities and services – The Chariton Municipal Airport offer two runways. The first Runway is 10/28 and is 4,000 feet in length and 75 feet wide. The runway has MIRL Lightning system on the entire runway strip for both. The second is 17/35 and is 2,800 feet in length and 75 feet wide. The airport has a rotating beacon, lighted wind indicator and AWOS weather reporting equipment. Landside facilities include 12 apron tie-downs, 21 hanger parking spaces, and overnight itinerant aircraft locations. The facility does have 10LL fuel available. Pilots are offered a small private area and a restroom.
2. Airport Facility and Service Needs – The IASP ASR recommends maintaining services and facilities at the Chariton Airport. Specific improvements are identified in the Iowa DOT Aviation Plan.



Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Lucas County Historical Museum	217 N 17 th St					X	2,268 sq ft
Chariton Public Library	803 Braden Ave			X	X		5,160 sq ft
Lucas County Public Health	117 S Grand St	X	X	X	X		
SENECA Area on Aging	117 S Grand St		X				6,067 sq ft
Circle of Friends Home Care	1010 N 7 th St		X				3,044 sq ft
Circle of Life Hospice House	220 Northwestern						
Hammer Medical Supply	110 N Grand St			X			7,647 sq ft
Lucas County Health Center	1200 N 7 th St	X	X				16,657 sq ft
Chariton Fire Hall & City Hall	115 S Main St	X		X	X		9,796 sq ft
Lucas County Courthouse		X			X	X	11,868 sq ft
Hy-Vee Store	2001 Court Ave			X			22,600 sq ft
ShopKo	1900 Court Ave			X			22,500 sq ft
Dollar General	1635 N Grand St			X			8,405 sq ft
Family Dollar	307 N Grand						
Lucas Co Sherriff's office	22 nd St	X			X		5,016 sq ft
Farmer's Coop	2120 Osceola Ave			X			7,200 sq ft
Casey's General Store	1421 Court Ave			X			2,376 sq ft
Casey's	335 Main St			X			2,400 sq ft
Elliott Oil Comp	Hwy 34& 1 st			X			5,350 sq ft
Casey's General Store	418 S 7 th St			X			10,320 sq ft
South Central Coop	2120 Osceola St				X		
BP	107 Grace St				X		
Southern Iowa Oil, fuel, Propane	2130 Court						
Sewer Lift Stations		X					120 sq ft
Historic Courthouse Square		X	X	X	X	X	
Southgate Apartments	429 S Main St		X				
Autumn Park	330 N Main St		X				
Chariton Airport				X			
Landfill	220 th Ave	X					
Chariton Head Start	418 N Main St		X				

Discovery Preschool Center	1711 Osceola St		X				
HyVee Fuel Station	Osceola St				X		
Community Bldg.	Main St	X					
North Ridge Assisted Living	1110 N 6 th St		X				
Chariton Nursing & Rehab Center	1214 N 7 th St		X				
ITC - Midwest	6 th & Roland					X	
Windstream- Iowa Telecom	220 N Grand St					X	
HyVee Grocery Distribution Center	1801 Osceola Ave					X	
HyVee HBC Distribution Center	1800 Osceola Ave					X	
Private In-Home Daycare	511 Orchard Ave		X				
Private In-Home Daycare	26986 550 th St		X				
Private In-Home Daycare	1120 N Grand St		X				
Private In-Home Daycare	720 N 7 th St		X				
Private In-Home Daycare	334 N 7 th St		X				
Private In-Home Daycare	1721 Ilion Ave		X				
Private In-Home Daycare	437 Court Ave		X				
Private In-Home Daycare	806 S 7 th St		X				
Private In-Home Daycare	1430 Franklin Ave		X				
Private In-Home Daycare	311 S 12 th St		X				

School Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Chariton High School	501 N Grand St		X	X	X		70,000 sq ft
Chariton Middle School	1300 N 16 th St		X	X	X		50,000 sq ft
Van Allen Elementary	1129 Ashland		X	X	X		31,000 sq ft
Columbus Elementary	1215 Linden Ave		X	X	X		15,500 sq ft
The Other Hand, Alternative Ed	1516 Court Ave		X	X	X		1,400 sq ft
Bus Barn							

Lucas County Health Center Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Lucas County Health Center	1200 N 7 th St	X	X	X	X		84,000 sq ft

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Steve Davis (Chariton Fire Department), Laura Liegois (City Administrator), Earl Comstock and Barry Smith completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards for the entire county. Chariton is most concerned about Infrastructure failure, Drought, Tornado & Windstorm, and Human Disease.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Chariton

1. Infrastructure Failure
2. Transportation Incident
3. Sinkholes
4. Hazardous Materials Incident
5. Levee & Dam Failure
6. Radiological Incident
7. Flash Flood
8. River Flood
9. Grass/Wildland Fire
10. Landslide

Existing Mitigation Strategies

- City now has three storm warning sirens. Two sirens were added to South Gate & North Park.
- 35 firemen linked by fire pagers for effective communication, 20+ hand-held radios, 10+ mobile truck radios.
- Backup generators are currently located at the fire station, public health, Lucas County Health Center, and the City’s sewer systems. There are additional (older) generators at the county.
- Mobile communication trailer(s) located at Appanoose County Law Center & is available to neighboring counties; about 1-2 hours are needed to mobilize.

- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- Designated Red cross shelters established.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) was approved in July 2014 and maintained by ADLM Emergency Management; a copy of the plan is present in the Lucas County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 7/1/1987.
- Tree trimming or management is currently handled by utility services.
- Rescue personnel are trained in emergency water search & rescue.
- Multiple street improvements
- Infrastructure improvements including improvements to the sanitary sewer system.

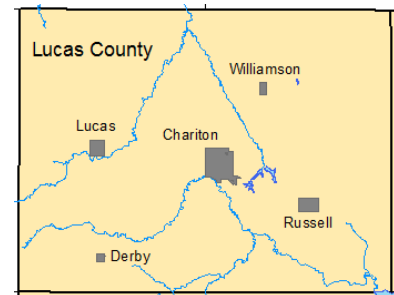
CITY OF DERBY

General Information

Population: 127	Floodplain: No
Median Age: 35 yrs.	NFIP Participant: N.A.
65 years & Older: 18 ppl 14%	Historic District: No
5 years & older in school: 4% 5ppl	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 0	Subdivision Ordinance: No
Land Area: 166 acres	Building Permits required: No
Most Recent Codification: Not sure	Fire Insurance Rating: 9

Geography

Derby is the southern-most incorporated community in Lucas County in the south-west portion of the county at coordinates 40° 55' 51" N, 93° 27' 25" W. The city encompasses an area of 166 acres with a population density of 430.77 people per square mile according to the 2019 ACS. Chariton River passes Derby a little over a mile to the north and the source of Five Mile Creek is located about two miles east of Derby.



Population Data

As of the 2019 ACS, the total population of Derby was 127 with a total of 50 households. Between 2010 and 2019, Derby added 12 people and 3 households in contrast to the County's loss in both population and households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 3.3% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 5 (4% of total population) children under the age of five years. The population over the age of 65 years account for 14% (18 people) in Derby.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 29 residents of Derby have a confirmed disability. That accounts for approximately 29% of the population.

The combination of all these populations qualifies nearly 50% of the total population deemed "at risk".

In the 2019 ACS, median household income for Derby was \$40,833, down from \$46,250 in the 2010 Census. Approximately 38% of the households in Derby had incomes less than \$35,000 in 2019. About 27% of the population of Derby have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

Well beyond half (69%) of homes in Derby were built prior to 1940 though there was a spike in new homes built in the 1990's with about 16% of the housing stock built during this decade. Nearly 50% of homes (25 homes) in Derby are heated with bottled fuels/gas and 22% heat by wood.

Approximately 93% of the owner-occupied homes in Derby were valued at less than \$100,000 in 2019. Approximately 56% of the homes were valued at less than \$50,000 as of the 2019 ACS.

Transportation

The City of Derby has a small highway that passes through the community. County Highway H50 connects state highway 14 and US highway 65, which are approximately 10 miles apart.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall/Fire Hall					X		1,800 sq ft
Sewer Lift Station		X					60
Elevator/COOP				X			
Derby Community Center					X		1,800 sq ft
Private In-Home Daycare	554 Prairie Ave		X				

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Chris Chapman, Mayor, completed the comprehensive scoring chart for the city. The numbers were then added to achieve a weighted score that prioritized the hazards. Derby is most concerned about Animal, Plant & Crop Disease, Drought and Extreme Heat in the area.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Derby

1. Flash Flood
2. Transportation Incident
3. Sinkholes
4. Hazardous Materials Incident
5. Infrastructure Failure
6. Grass/Wildland Fire
7. Radiological Incident

Existing Mitigation Strategies

- Fire department comprised of volunteers.
- Mobile communication trailer(s) located at Appanoose County Law Center & is available to neighboring counties; about 1-2 hours are needed to mobilize.
- Law Center (in Chariton) has contact information for firefighters.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- County-wide Emergency Operations Plan (EOP) was approved in 2014 and maintained by ADLM Emergency Management: a copy of the plan is present in the Lucas County Supervisors' office.

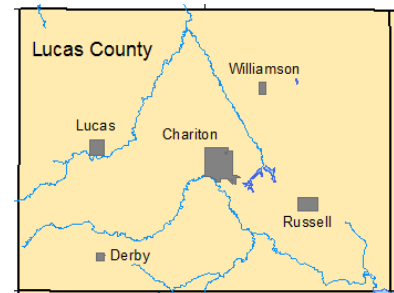
CITY OF LUCAS

General Information

Population: 134	Floodplain: Yes
Median Age: 55yrs	NFIP Participant: Yes, #190196
65 years & Older: 31% 42 ppl	Historic District: No
5 years & older in school: 0%	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 628 acres	Building Permits required: No
Most Recent Codification: uncertain	Fire Insurance rating:

Geography

Lucas is in the western third of Lucas County at coordinates 41° 1' 47" N, 93° 27' 42" W. The city encompasses an area of 628 acres with a population density of 216 people per square mile according to the 2019 ACS. White Breast Creek passes just to the south of Lucas.



Population Data

As of the 2019 ACS, the total population of Lucas was 134 with a total of 72 households. Between 2010 and 2019, Lucas lost 82 people and lost 17 households in alignment with the County's loss in both population and households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that less than 1.5% people have a primary language that is other than English and would be considered linguistically isolated. There are no children under the age of five years. The population over the age of 65 years account for 31% (42 people) in Lucas.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 39 residents of Lucas have a confirmed disability. That accounts for approximately 29% of the population.

The combination of all these populations qualifies nearly 62% of the total population deemed "at risk".

In the 2019 ACS, median household income for Lucas was up to \$46,250 from \$25,000 in the 2010 Census. Approximately 47% of the households in Lucas had incomes less than \$50,000 in 2019. Nearly 18% of the population of Lucas have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

Almost half (45%) of homes in Lucas were built prior to 1940 though there was a spike in new homes built in the 1970’s with about 15% of the housing stock built during this decade. Nearly 53% of homes (38 homes) in Lucas are heated with bottled fuels and 29% homes were heated by firewood in 2019.

Over 38% of the owner-occupied homes in Lucas were valued at less than \$50,000 and 72% of homes are valued below \$100,000 in the 2019 ACS. Recent new construction has developed nearly 10% of the homes to be valued over \$500,000.

Transportation

The City of Lucas has two major highways that are on the edge of the community. US Highway 65 and State Highway 14 are critical roadways providing access to more resources. BNSF and Amtrak railway is on the edge of the community near Highway 14.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall					X		1,800 sq ft
Fire Hall		X					6,000 sq ft
Water plant		X					
Water tower		X					
City Maintenance/ Storage					X		1,860 sq ft
Lagoon		X					20 acres
Gas & Go				X			
John L Lewis Mining & Labor Museum	102 Division St					X	3,200 sq ft
Lucas Community Center					X		1,800 sq ft
Southern Iowa Petroleum, LLC	Highways 5 & 34			X			2,400 sq ft
In-Home Private Daycare	506 Vine St			X			

Hazard Scores & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. The City of Lucas was provided the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards for the entire county. City of Lucas is most concerned about Tornado & Windstorm, flash flood, and human disease in their region.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Lucas

1. Flash Flood
2. River Flood
3. Landslide
4. Transportation Incident
5. Hazardous Material Incident
6. Radiological Incident
7. Infrastructure Failure
8. Levee & Dam Failure
9. Sinkholes
10. Grass/Wildland Fires

Existing Mitigation Strategies

- Fire Station has a storm warning system activated by members pagers.
- Mobile communication trailer(s) located at Appanoose County Law Center & is available to neighboring counties; about 1-2 hours are needed to mobilize.
- Red Cross trailer housed at fire station.
- Law Center (in Chariton) has contact information for firefighters.
- Blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) was approved in 2014 and maintained by ADLM Emergency Management; a copy of the plan is present in the Lucas County Supervisors' office.
- Tree trimming or management is currently handled to an extent by utility services.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 2/16/198

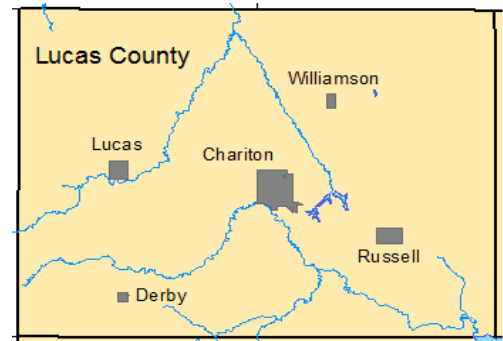
CITY OF RUSSELL

General Information

Population: 593	Floodplain: No
Median Age: 39	NFIP Participant: N.A.
65 years & Older: 19% 111	Historic District: No
5 years & older in school: 9% 51	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 3	Subdivision Ordinance: No
Land Area: 1.039 sq miles	Building Permits required: No
Most Recent Codification: Unsure	Fire Insurance Rating: 8

Geography

Russell is in the south-east quadrant of Lucas County at coordinates 40° 58' 57" N, 93° 11' 55" W. The city encompasses an area of 1 square mile with a population density of 516.88 people per square mile according to the 2019 ACS. No stream or river passes within one mile of Russell.



Population Data

As of the 2019 ACS, the total population of Russell was 593 with a total of 237 households. Between 2010 and 2019, Russell added 39 people and 25 households in contrast to the County’s loss in both population and households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 1.3% people have a primary language that is other than English and would be considered linguistically isolated in Russell. There are approximately 51 (9% of total population) children under the age of five years. The population over the age of 65 years account for 19% (111 people) in Russell.

The remaining “at risk” category would be individuals that have a disability. It is estimated that 83 residents of Russell have a confirmed disability. That accounts for approximately 14% of the population.

The combination of all these populations qualifies nearly 43% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Russell was up to \$44,917 from \$36,146 in the 2010 Census. Approximately 37% of the households in Russell had incomes less than \$50,000 in 2019. About 6% of the population of Russell have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

Approximately 48% of homes in Russell were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 17% of the housing stock built during this decade. Nearly 60% of homes in Russell are heated with bottled fuels and 74 homes were heated by electricity in 2019.

Over 40% of the owner-occupied homes in Russell were valued at less than \$50,000 and 92% of homes were valued below \$100,000 in the 2019 ACS.

Transportation

County Highway S56 travels north and south through the heart of Russell. The city maintains the streets of the community that is approximately 12 city blocks by 13 city blocks. Burlington Northern railroad has a track line that enters the northern half of the city from the east and west.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall					X		600 sq ft
Fire Hall		X					1,200 sq ft
Community Bldg.					X		2,800 sq ft
Water plant		X					--
Water tower		X					--
City Maintenance/ Storage					X		1,860 sq ft
Lagoon		X					20 acres
Public Library/Russell Historical Society Museum	106 S Prairie St					X	2,000 sq ft
D&D Market	114 S Prairie St			X			1,859 sq ft

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Mark McCurdy, Russell Fire Department, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Russell is most concerned about Transportation Incident, Tornado & Windstorm, Thunderstorm, Lightning, & Hail and Radiological Incident.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Russell

1. Transportation Incident
2. Radiological Incident
3. Hazardous Materials Incident
4. Sinkholes
5. Flash Flood
6. Infrastructure Failure
7. Grass/Wildland Fire
8. Animal, Plant & Crop Disease
9. Landslide

Existing Mitigation Strategies

- Fire Station has a storm warning system activated manually.
- Mobile communication trailer(s) located at Appanoose County Law Center & is available to neighboring counties; about 1-2 hours are needed to mobilize.
- Red Cross shelter established at community center.
- Law Center (in Chariton) has contact information for firefighters.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Has trained volunteers on fire department & first responders.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Lucas County Supervisors' office.
- Tree trimming or management is currently handled to an extent by utility services.

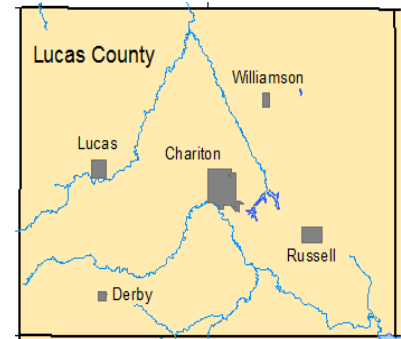
CITY OF WILLIAMSON

General Information

Population: 179	Floodplain: No
Median Age: 30yrs	NFIP Participant: N.A.
65 years & Older: 13 7%	Historic District: No
5 years & older in school: 13 7%	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 0	Subdivision Ordinance: No
Land Area: .32 sq miles	Building Permits required: No
Most Recent Codification: not sure	Fire Insurance Rating: 9

Geography

Williamson is in the south-east quadrant of Lucas County at coordinates 41° 5' 22" N, 93° 15' 20" W. The city encompasses an area of 1 square mile with a population density of 479.75 people per square mile according to the 2019 ACS. No stream or river passes within one mile of Williamson.



Population Data

As of the 2019 ACS, the total population of Williamson was 179 with a total of 65 households. Between 2010 and 2019, Williamson added 27 people and 27 households in contrast to the County's loss in both population and households.

Lucas County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 20% people have a primary language that is other than English and would be considered linguistically isolated in Williamson. There are approximately 13 (7% of total population) children under the age of five years. The population over the age of 65 years account for 7% (13 people) in Williamson.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 36 residents of Williamson have a confirmed disability. That accounts for approximately 20% of the population.

The combination of all these populations qualifies nearly 54% of the total population deemed "at risk".

In the 2019 ACS, median household income for Williamson was up to \$52,917 from \$34,375 in the 2010 Census. Approximately 52% of the households in Williamson had incomes less than \$50,000 in 2019. About 3% of the population of Williamson have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Eight major employers are identified in Lucas County by www.iowasouth.com

Fat Baggers, Inc.	Johnson Machine Works
Chariton Public Schools	C & C Cycle
Chariton Nursing & Rehab Ctr	Lucas County Health Center
Seats Inc	
Hy-Vee	

Structures

Approximately 68% of homes in Williamson were built prior to 1940 though there was a spike in new homes built in the 1950's with nearly 17% of the housing stock built during this decade. Nearly 82% of homes in Williamson are heated with utility gas and 12% homes were heated by electricity in 2019.

Over 39% of the owner-occupied homes in Williamson were valued at less than \$50,000; no homes were valued above \$100,000 in the 2019 ACS.

Transportation

County Highway H20 connects the City of Williamson to state Highway 14. The city maintains the streets of the community that includes about twenty city blocks. Union Pacific Railroad has a track line that enters intersects the heart of the city from north to south.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Fire station	201 N Main	X		X			
Community Bldg.				X			
Water tower	Main St	X					
City Maintenance/ Storage				X	X		
Shelter House		X					

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Nancy Stansbery, City Clerk, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards for the entire county. Williamson is most concerned about Thunderstorm, Lightning & Hail, Tornado & Windstorms, Flash Flood and Transportation Incident.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Williamson

1. Flash Flood
2. Transportation Incident
3. Sinkholes
4. Radiological Incident
5. Hazardous Materials incident
6. Infrastructure Failure
7. Grass/Wildland Fire

Existing Mitigation Strategies

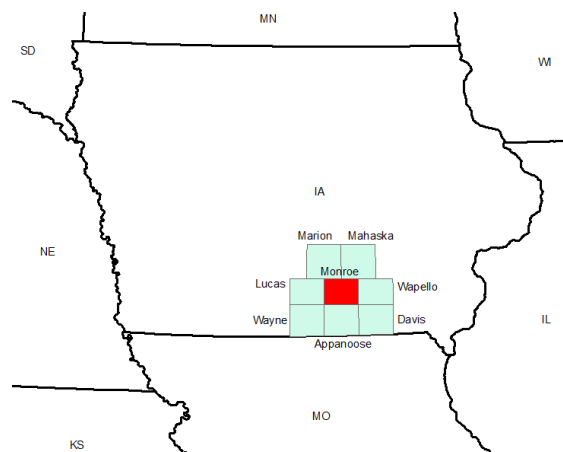
- Fire Station has a storm warning system.
- Mobile communication trailer(s) located at Appanoose County Law Center & is available to neighboring counties; about 1-2 hours are needed to mobilize.
- Law Center (in Chariton) has contact information for firefighters.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow)
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- Hydro Clean, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Lucas County Supervisors' office.
- Tree trimming or management is currently handled to an extent by utility services.

MONROE COUNTY

General Information

Population: 7,807	Floodplain: Yes
Unincorporated pop: 3554	NFIP Participant: No
65 years & Older: 1533 20%	Historic District: No
5 years & older in school: 438 6%	Comprehensive Plan: Yes
School buildings: 0	Zoning Ordinance: Yes
Places of Worship: 3	Subdivision Ordinance: Yes
Land Area:433 Sq. miles	Building Permits required: Yes
Most Recent Codification: 2020	Fire Insurance Rating: 10

Exhibit 23: Location of Monroe County



Source: National Atlas and IA DOT GIS data compiled by Chariton Valley Planning and Development

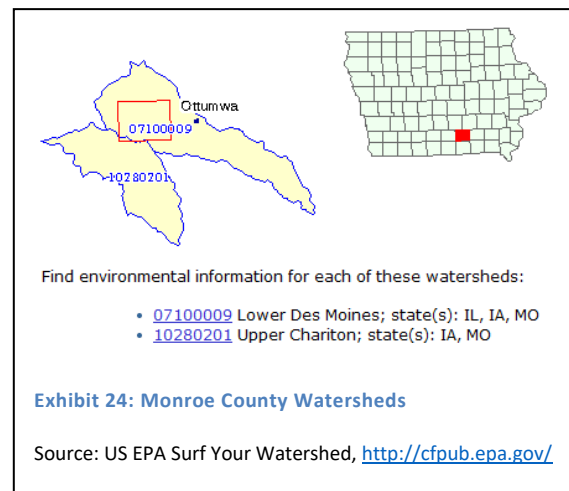
Geography

Monroe County is in the southern tier of counties in Iowa one county from the Missouri border. There are twenty-three unincorporated communities in Monroe County and four incorporated cities. Eddyville has only about one acre of land which has one garage structure in Monroe County and is covered under Wapello County’s Hazard Mitigation Plan. For these reasons, Eddyville is not addressed in this plan.

Monroe County is in the south-central sector of Iowa at coordinates 41° 1’ 42” N, 92° 52’ 12” W. The counties surrounding Monroe are as follows, Marion, Mahaska, Wapello, Davis, Appanoose, Wayne, and Lucas. Monroe County encompasses an area of 433 square miles with a population density of 18 people per square mile according to the 2019 ACS.

Rathbun Lake is located primarily in Appanoose County, but extends into Monroe County covering a total area of 12,040 acres across four counties. Rathbun Lake is the second largest water body in Iowa. Seven creeks cross through Monroe County, the most significant of which is Cedar Creek which stretches from south to north, west of Albia. (See Monroe County’s terrain is predominantly undulating topography that characterizes the rolling hills of the Southern Iowa Drift Plain.

Monroe County is in 2 different watersheds, all within the Mississippi Basin. The majority of Monroe County is in the Lower Des Moines watershed.



Population Data

As of the 2019 ACS, the total population of Monroe County was 7,807 with a total of 3,294 households. This is down 163 persons since the 2000 Census count of 7970 people and down 80 households. According to Iowa State University’s Regional Capacity Analysis Program² (ReCAP), Monroe County has faced nearly a century of decline starting around 1910. The decline has been evening out in recent decades with the smallest amount of population loss between 1990 and 2000. The population of the unincorporated county is approximately 45% of the total population of the county.

Monroe County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 3% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 438 (6% of total population) children under the age of five years. The population over the age of 5 years account for 20% (1533 people) in Monroe County.

The remaining “at risk” category would be individuals that have a disability. It is estimated that approximately 13% residents of Monroe County have a confirmed disability.

The combination of all these populations qualifies nearly 42% of the total population deemed “at risk”.

In the 2019 ACS, median household income for Monroe County was up to \$58,269 from \$43,245 in 2010. Almost half of the households in unincorporated Monroe County (43%) had incomes under \$35,000 annually. In 2019, 809 people (10.5%) in Monroe County were determined to be under the Federal Poverty Guidelines.

Exhibit 25: Woods & Poole Population Projection for Lucas County

Area	2025	2030	2035	2040
Monroe	7,262	7,183	7,106	7,031
Percent Change	-	-2.54%	-2.73%	-2.19%

Source: Iowa State Data Center, <http://www.iowadatacenter.org>

Major Employers

Ten major employers are identified in Monroe County by www.iowasouth.com

Cargill Inc	AYM Inc
Ajinomoto Health & Nutrition	Preferred Wholesale
RELCO Locomotives	Kness Pest Control
Superior Machine	Hawkeye Molding
Iowa Aluminum	Zero Connect

Structures

Approximately one-quarter of the housing stock (26%) in Monroe County was constructed before 1940 suggesting that the structural integrity of the buildings likely does not meet newer building codes designed to ensure the safety of residents. These structures are likely the most vulnerable to various hazards due to their age and the changes in construction techniques which have improved in many ways since they were built. A larger proportion of the older housing stock is found in incorporated communities in Monroe County, however. Median year built of the homes in Monroe County is 1948, meaning that half of the homes were built before

and half after this year. The median age of housing is earlier for all three of the incorporated communities in this plan.

Another potential concern is the prevalence of bottled fuels such as LP gas, kerosene, and oil used as heating fuel in the homes in unincorporated Monroe County; 27% of homes use LP gas as heating fuel. While LP tanks can be safe forms of fuel containment and transport, liquefied petroleum gas is flammable and can explode. LP gas is heavier than air and so it will sink to the lowest level possible; if inhaled it can cause asphyxiation through oxygen deprivation but is otherwise nontoxic. A further concern is that 100 homes (3%) in 2019 reported using wood as the primary heating fuel. This becomes a concern due to its potential fire hazard but also to carbon monoxide poisoning in the home if a chimney is blocked.

Approximately 17% of the owner-occupied homes in Monroe County were valued at less than \$50,000 as of the 2019 ACS. About half (50%) of the homes in Monroe County are valued less than \$100,000.

Exhibit 26: National Register of Historic Places			
Property	Address	City	Date Listed
Albia Square and Central Commercial Historic District	Roughly bounded by the alley of S. and N. Clinton E. and W. A Ave. N. and S. 2nd Street and E. and W. 2nd Ave	Albia	1/3/1985
Brick Gothic House	1.25 mi. S. of Albia 0.75 mi. E of IA 5 0.5 mi W of T35	Albia	4/14/1994
Buxton Historic Townsite	Address Restricted	Lovilia	8/9/1983
Clark Round Barn	CR T7H	Tyrone	6/30/1986
Elbert-Bates House	106 2nd Ave. W.	Albia	6/27/1985
Jenkins Dr. George A. House	223 S. C Street	Albia	2/5/1987
Monroe County Courthouse	Main Street	Albia	7/2/1981
Noble-Kendall House	209 E. Benton Ave.	Albia	4/12/1984
Perry T. B. House	212 Benton Ave. W.	Albia	7/14/1983
Saint Patrick's Roman Catholic Church	US 34 W of Albia	Albia	5/6/1992
White Arvine and Elizabeth W. House	309 N. Main Street	Albia	9/8/1994

Source: <http://www.nps.gov/history/nr/>

Community Assets

Lake Miami

Lake Miami is a 135-acre, man-made lake located 5 miles east of Lovilia on an 879-acre park. Lake Miami was constructed in 1967. The lake is governed by the Monroe County Conservation Board. Lake Miami offers full-service facilities for camping. There are camp slots available for rent. Lake Miami also offers picnic areas, fishing, hunting, hiking, and outdoor recreations, as well as cabin rentals. Hunters can pursue deer, turkey, rabbits, quail, and dove.

Cottonwood Pits Wildlife Area

This DNR managed public hunting area offers 55 acres that is mostly upland and 1/3 of the area is lake. Hunters can find pheasants and rabbits. This facility is located 3 miles southeast of Albia.

LaHart Wildlife Area

LaHart Wildlife Area has 556 acres of which half is timber and half upland. On this public land, hunters can find deer, turkey, rabbit, and quail at this property four miles southwest of Lovilia.

Tyrone Wildlife Area

This public hunting area is home to deer, turkey, and squirrels on these 1,080 acres of land. Most of the land is timber but does include some upland. The facility is located approximately 10 miles southeast of Albia.

Green Acres

“Green Acres” is a mobile home complex includes approximately 108 structures near Lake Rathbun. There are some year-round residents, but most of the tenants are seasonal.

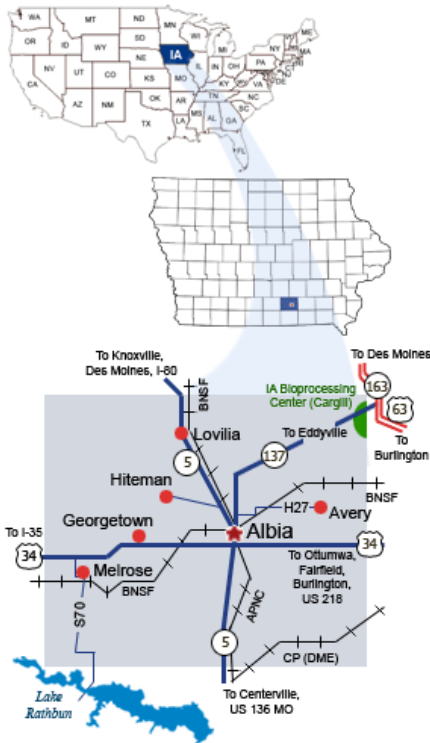
Lazy Daz Ranch & Estates

“Lazy Daz Ranch” is located just northwest of Lake Rathbun or just south of Melrose on Highway S-70 in Monroe, County. There are approximately 91 private homes that surround a small pond. Lazy Daz Estates is located to the north of Lazy Daz Ranch. There are approximately a dozen permanent housing structures and multiple campers on a seasonal basis. Most residents are present seasonally and on weekends.

Monroe County Fairgrounds

The Monroe County Fairgrounds is located at 6393 170th Street north of Albia. This land is owned by the county and hosts multiple events throughout the year. The local county fair occurs annually in July.

Exhibit 27: 2017 Census of Agriculture	
Total Land in Farms (acres)	193,082
Number of Farms	618
Average Farm Size (acres)	312
Market Value of All Farm Products	\$61,621,000
Market Value of All Crops	\$29,583,000
Market Value of All Livestock	\$32,038,000
Production Expenses	\$55,259,000
Hogs & Pigs Inventory (head)	29,401
All Cattle and Calves	32,584



Iowa Bioprocessing Center

The Iowa Bioprocessing Center (IBC) located in South Central Iowa consists of 1600 acres where four international companies have clustered together, investing more than \$1.5 billion dollars in plants engaging in value-added agriculture. Ajinomoto Food Ingredients, LLC and its subsidiary Ajinomoto Heartland LLC are located on the north side of the property. This is a part of the complex, which focuses on the manufacture of enzymes, amino acids, sweeteners, and other ingredients for human and animal products. Ajinomoto Heartland LLC manufactures and distributes cost effective feed-grade amino acids and is the frontrunner in amino acid nutritional research and technical expertise. Also located in Monroe County in this development are Cargill (Vitamin E), ITC Midwest, and Cargill Sweeteners. Other partners include TECUS, Indian Hills Community College/IBTC, and Wacker Chemical Corporation. The list below displays chemicals and products created at the Iowa Bioprocessing Center.

The Iowa Bioprocessing Center produces a variety of products. Whether high fructose corn syrup that is found in many of today's food products or lysine that feeds livestock or ethanol that powers our automobiles, the Iowa Bioprocessing Center manufactures products that

are part of everyday life.

The foundation for these products is Cargill's corn wet milling process that helps to supply a variety of co-products made at the Center. Some of these products include:

Cargill – Corn Milling (High Fructose Corn Syrup, Corn Syrup, Dextrose, Crude Corn Oil, Corn Gluten Meal, and Sweet Bran) Acidulants – Citric Acid, Anhydrous Citric Acid, Liquid Citric Acid, Sodium Citrate, Potassium Citrate, and Glucosamine.

Health & Food Technologies- Natural Vitamin E, D-Alpha Tocopheryl Acetate, Phytosterols, FFA, and FAME.

Biofuel –Ethanol

Ajinomoto Food Ingredients LLC- Monosodium Glutamate, Custom Dry Blends for flavor enhancement

Ajinomoto Heartland - Feed Grad Threonine & Feed Grade Lysine

HF Chlor-Alkali, LLC - Hydrochloric acid, bleach, and caustic soda

Wacker - Cyclodextrins

Transportation

One US Highways crosses through Monroe County, highway 34 running east to west. Seven distinct county highways are in the county, and two state highways (5 and 137) converge inside the Albia municipal boundaries. Three different railroad owners operate within Monroe County: Burlington Northern has several railroad tracks throughout the county and the City of Albia; Dakota, Minnesota & Eastern Railroad Company

intersects the southeast corner of the county; Union Pacific has a few miles of track extending north in the northeastern corner of the county; and locally owned short line extends up the middle of the county into the southern edge of Albia city limits. Amtrak runs trains along the Burlington Northern lines, through Albia.

Two natural gas pipelines enter the county, one from the north connecting to Lovilia and one from the south connecting to Albia. There are no pedestrian trails in rural Monroe County.

According to preliminary crash analysis released by the Iowa DOT, state highways 137 and 5 are considered “high crash horizontal curves.” The portion of Highway 137 of concern is about 1,000 feet southwest and about 750 feet northeast of 710th Avenue. For Highway 5, the area of concern is about 1,100 feet south of 139th Trail to 139th Trail.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Electrical Substations (4)	Scattered locations	X					
Landfill				X			
Lake Miami Campground	N Hwy 5		X				
Rural Water towers (3)	Scattered location	X					
IDOT roads maintenance shop	South Hwy 5			X			
Lake Miami dam	N Hwy 5				X		
Halley’s Trailer Park (35 homes)	East Hwy 34		X				
Cargill (Ag & Industrial)	N Hwy 34 Eddyville			X			
Lazy-Daz Ranch (91 structures)	Melrose		X		X		
Green Acres Mobile homes (108 structures)	Melrose		X		X		
Monroe County Fairgrounds (land& structures)	North Hwy 5			X			
Lazy Daz Ranch Estates (21 structures)	Melrose		X		X		
Willow Park	Melrose		X		X		
Wacker Chemical Corp	NE corner of county			X	X		

Ajinomoto Heartland, LLC	1116 Hwy 137, Eddyville			X	X		
Ajinomoto USA Inc/ Ajinomoto Food	1 Ajinomoto Dr, Eddyville			X	X		
Agriland FS Inc	6281 160 th St. Albia				X		
Crop Production Services	2774 Hwy 5, Moravia				X		
Cargill Sweeteners	1 Cargill Dr, Eddyville				X		
Cargill – Vitamin E	1194 720 th Ave, Eddyville				X		
ITC Midwest	1 Cargill Drive, Eddyville				X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Jeremiah Selvy, Monroe County Engineer, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Monroe County’s unincorporated region is most concerned about Human Disease, Thunderstorm, Lightning, & Hail, Extreme Heat, and Terrorism.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Unincorporated Monroe County

1. Flash Flood
2. Infrastructure Failure
3. Transportation Incident
4. Hazardous Materials Incident
5. Grass/Wildland Fire
6. Levee & Dam Failure
7. Sinkholes
8. Radiological Incident
9. River Flood
10. Landslide

Existing Mitigation Strategies

- Monroe County Sherriff’s office (in Albia) provides service to the entire county.
- Mobile communication trailer(s) located at Appanoose County Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place (Updated in 2015) with surrounding jurisdictions for fire protection and hazardous materials containment.
- SIRG (Southern Iowa Recovery Group) is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.

- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Monroe County Supervisors' office.
- Tree trimming or management is currently handled by utility services provided throughout the county.
- Local Fire Department volunteers receive a minimum of 24hrs of training per year.
- Immunizations are offered at the County Public Health on an ongoing basis.
- County-wide recycling is offered.
- Radon and Lead testing kits are available at County Public Health Department & ADLM
- Railroad tie replacement occurred along the APNC railroad.
- County Courthouse, Law Center, and sewer systems have backup generators.
- Weather Service has launched educational public service announcements.
- "Safe Shed" (have capacity to shelter 16 people) are now located at Lake Miami campgrounds, IDOT Secondary Roads facilities (along major highway), and the Monroe County Public Health office.
- All Monroe County communities have evacuation plans cited in the ESF plan.
- Bridge repair or replacement occurred on multiple structures.
- Monroe County Communication Center is a newly constructed facility that will improve first responder's communication abilities, house law enforcement units and is a jail.

Overall - Monroe County Rankings

1. Flash Flood
2. Thunderstorm, Lightning, & Hail
3. Tornado & Windstorm
4. Sinkholes
5. Severe Winter Storm
6. Human Disease
7. Hazardous Materials Incident
8. Extreme Heat
9. Drought
10. Terrorism
11. Transportation Incident
12. Infrastructure Failure
13. River Flood
14. Grass/Wildland Fire
15. Levee & Dam Failure
16. Animal, Plant & Crop Disease
17. Radiological Incident
18. Expansive Soils
19. Landslide
20. Earthquake

CITY OF ALBIA

General Information

Population: 3,727	Floodplain: Yes
Median Age: 44	NFIP Participant: Yes, #190465
65 years & Older: 20 % 739	Historic District: Yes
5 years & older in school: 6% 210	Comprehensive Plan: Yes 1990
School buildings: 6	Zoning Ordinance: Yes
Places of Worship: 6	Subdivision Ordinance: Yes
Land Area: 3.2 Sq Miles	Building Permits required: Yes
Most Recent Codification:	Fire Insurance Rating: 6

Geography

Albia is located slightly east of the center of the county at coordinates 41° 1' 36" N, 92° 48' 19" W. Albia encompasses an area of 3.2 square miles with a population density of 1,146 people per square mile according to the 2019 ACS. The city has not seen enough growth that any boundaries or zoning were changed.

Population Data

As of the 2019 ACS, the total population of Albia was 3,727 with a total of 1,663 households. Between 2010 and 2019, Albia lost 39 people and added 108 households in contrast to the unincorporated county's loss in both population and households.

Monroe County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that .5% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 210 (6% of total population) children under the age of five years. The population over the age of 65 years account for 20% (739 people) in Albia.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 474 residents of Albia have a confirmed disability. That accounts for approximately 13% of the population.

The combination of all these populations qualifies nearly 40% of the total population deemed "at risk".

In the 2019 ACS, median household income for Albia was up to \$46,332 from \$31,557 in the 2010 Census. More than 52% of the households in Albia had incomes less than \$50,000 in 2019. About 14% of the population of Albia have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Monroe County by www.iowasouth.com

Cargill Inc	AYM Inc
Ajinomoto Health & Nutrition	Preferred Wholesale
RELCO Locomotives	Kness Pest Control
Superior Machine	Hawkeye Molding
Iowa Aluminum	Zero Zonect

Structures

Nearly 35% of homes in Albia were built prior to 1940 though there was a spike in new homes built in the 1970's with about 24% of the housing stock built during this decade. About 68% of homes in Albia are heated with utility gas and about 28% of homes (469 homes) were heated primarily by electricity in 2019.

Over 61% of the owner-occupied homes in Albia were valued at less than \$100,000 and 9% of Albia homes are valued below \$200,000. Approximately 20% are valued below \$50,000.

One government agency is in Albia. The United States Department of Agriculture rents an office building in the southern portion of the community.

Community Assets

General Information

Albia Public School

Albia Public Schools is in the county seat of Monroe County, Albia. It is in the south-central sector of Iowa. Neighboring school districts for comparison include Eddyville-Blakesburg-Fremont, Chariton, Centerville, Knoxville, Melcher-Dallas, Moravia, Moulton-Udell, Ottumwa, Seymour, Twin Cedars and Oskaloosa Schools.

District Facts

<i>Exhibit 28: Albia Community School District Statistics</i>	
<i>2018-2019 School Year</i>	<i>Albia Community School District</i>
Student Enrollment	1,198
Student/Teacher Ratio	15.32
Eligible for Free/Reduced Meals	169
Minority Ethnicity (any other than white)	123
Classroom Teachers (FTE)	78
ELL Students	8
Students with IEP's	147
<i>National Center for Education Statistics</i>	

Monroe County Hospital

Monroe County Hospital and Clinics is a general medical and surgical hospital in Albia, IA, with 25 beds.

Employed Staff:

- Licensed Practical or Vocational Nurses: 8
- Other salaried personnel: 67
- Respiratory Therapists: 1
- Medical Social Worker: 1
- Nurse Practitioners: 1
- Registered Professional Nurses: 27
- Registered Pharmacists: 1
- Diagnostic Radiology Technicians: 6

Transportation

US Highway 34, running east-west, and State Highway 5, running north-south, cross near the southern boundary of Albia and State Highway 137 joins Highway 5 in the northern third of the city. Several railroads cross through and join up in the city as well. A natural gas pipeline enters Albia from the south. There are about 40 miles of roadway within the municipal boundaries of Albia.

The Albia Municipal Airport is owned and operated by the City of Albia but is managed by the local Albia Airport Commission. The airport is not included in the National Plan of Integrated Airport Systems (NPIAS). The Iowa Aviation System Plan (IASP) Airport Summary Report (ASR) identifies it as a Local Service Airport.

Local service airports in Iowa provide an important means of accessing the communities and regions they serve and provide a link to the national transportation system. The Albia Municipal Airport serves the general aviation needs of Monroe County and the City of Albia. The airport is mainly utilized by single engine aircraft but is utilized by a few multi-engine planes. The airport offers 100LL fuel, 7 aircraft apron tie-downs, 15 hanger parking spaces.



The Albia Municipal Airport is in Monroe County approximately 3 miles south-southeast of the City of Albia.

1. Existing facilities and services – The Albia Municipal Airport offer one runway. The Runway is 13/31 and is 3,400 feet in length and 60 feet wide. The runway has MIRL Lightning system on the entire runway strip. The airport has a rotating beacon and lighted wind indicator. Landside facilities include 7 apron tie-downs and 15 hanger parking spaces. The facility does have 10LL fuel available.
2. Airport Facility and Service Needs – The IASP ASR recommends maintaining services and facilities at the Albia Airport. Iowa DOT Aviation Plan has identified specific future improvement projects.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Albia Public Library	203 Benton Ave			X		X	6,936 sq ft
Monroe Co Historical Museum	114 A Ave East			X		X	8,678 sq ft
Albia City Hall/Community Center	120 S A St	X			X		3,332 sq ft
Brees Rest Home	210 Washington Ave		X				2,686 sq ft
Monroe Co Care Center	120 N 13 th St		X				22,076 sq ft
Oakwood Nursing & Rehab	200 16 th Ave East		X				24,570 sq ft
Parkview Cottage	645 8 th St		X				4,469 sq ft
Monroe co Medical Clinic	Avery Rd		X				8,830 sq ft
Albia Fire station	115 2 nd Ave	X			X		6,000 sq ft
Monroe Co Sheriff's office/Albia Police Dept	103 2 nd Ave	X			X		4,608 sq ft
Benton Place Apt	520 Benton Ave West		X				33,586 sq ft
First Responder bldg. (Ambulance)							3,399 sq ft

Sewage Disposal Plant	120 S A St	X					
Albia Sewage Lagoon	Hwy 137	X					2,100 sq ft
Albia Sewer	Hwy 137	X					486 sq ft
Monroe Co Courthouse	10 Benton Ave East			X		X	18,669 sq ft
Albia Municipal waterworks	120 S A St	X					
Chariton Valley Electric Coop	2090 Hwy 5 South	X		X			13,779 sq ft
Lift stations	SE/NE/ SW/ NW	X					
Iowa Telecommunications	202 Washington Ave East	X		X			5,076 sq ft
Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg. In Square feet
Quality Ag Services	6385 196 th St			X			
Casey's	1117 S Clinton Ave			X			2,376 sq ft
Kum & Go	204 S Main St			X			2,052 sq ft
Casey's	122 N Main St			X			1,920 sq ft
Albia Amoco	21 A Ave East			X			1,869sq ft
Albia Stop & Shop	300 N Hwy 5			X			2,981sq ft
Smith Grain & Fertilizer	805 N Hwy 5			X			
Ferrell gas	121 10 th St			X			
McGee Sanitation	16 Washington Ave	X		X			12,144 sq ft
Relco-Locomotives	1 Relco Ave			X			
Burlington Northern-Santa Fe Railway	300 A St N			X			
Dollar General	900 Princeton Dr			X			10,458 sq ft
Jim & Charlie's AFF Foods	121 N Clinton			X			8,592 sq ft
Hy-Vee	Hwy 34			X			19,927 sq ft
Pamida	Hwy 34			X			26,817 sq ft
Snack Shack	906 S Clinton St			X			1,200 sq ft
Vitko's Sinclair	113 Benton Ave W			X			2,031 sq ft
Preferred Wholesale	201 S Main St			X			
Trailer court	South Hwy 5		X				
Albia Historic Square	Hwy 5 & Benton Ave					X	
Albia Industrial Park (8 businesses)	South Hwy 5			X			
Monroe County Professional Mang	15 A Ave				X		
House of Kids Daycare	304 S Main St		X				
King's Kids Preschool	1115 A Ave		X				
Albia Daycare Preschool	100 N 2 nd St		X				
USDA Office	1709 S B St			X	X		
Private In-Home Daycare	1933 Hwy 137		X				
Private In-Home Daycare	6427 160 th St		X				

Private In-Home Daycare	703 A Ave W		X				
Private In-Home Daycare	120 Linden Lane		X				
Private In-Home Daycare	306 S Clinton Ave		X				
Private In-Home Daycare	11 Hickory Cr		X				
Private In-Home Daycare	216 S Clinton Ave		X				
Private In-Home Daycare	517 S 9 th St		X				
Private In-Home Daycare	1671 631 st Lane		X				
Private In-Home Daycare	806 F Ave E		X				
Private In-Home Daycare	403 Washington Ave E		X				

Albia Public School Buildings

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Albia High School	503 B Ave East, Albia		X				60,830 sq ft
Albia Jr. High School	505 C Ave East, Albia		X				35,454 sq ft
Lincoln Center	222 N 2 nd St, Albia		X				40,723 sq ft
Grant Elementary	520 S Clinton St, Albia		X				17,622 sq ft
Kendall Elementary	701 Washington Ave, Albia		X				10,574 sq ft
Albia School of Success	503 B Ave		X				

Monroe County Hospital Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
Monroe Co Hospital	6580 165 th St	X	X	X	X		

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Richard Clark, Mayor, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Albia is most concerned about sinkholes, flash flood, hazardous materials incident, and severe winter storms in their community.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Albia

1. Sinkholes
2. Flash Flood
3. Hazardous Materials Incident
4. Radiological Incident
5. Infrastructure Failure
6. Levee & Dam Failure
7. Transportation Incident
8. Grass/Wildland Fire
9. Expansive Soils
10. Landslide

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Monroe County Sheriff's office & City of Albia police Department has contact information for Monroe County firefighters.
- Mobile communication trailer(s) located at Appanoose County Law Center; about 1-2 hours are needed to mobilize.
- Sand or blade trucks are / can be used to clear paths for first responders in the event of road blockage (debris or heavy snow).
- Legion Hall, Churches, and Community Center can / have been utilized as temporary shelters and gathering places in the event of disasters.
- There is a yard clean-up ordinance, but it is difficult to enforce (affects tornado and high-wind debris hazards).
- Railroad works well and promptly with the City of Albia County on railroad incidents.
- 28E agreements in place with surrounding jurisdictions for fire protection and hazardous materials containment.
- SIRG is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 6/10/1980, however few residents have purchased flood insurance.
- The city requires mobile home tie-downs
- Tree trimming or management is currently handled to an extent by utility services in Monroe County.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Monroe County Supervisors' office.
- Fire Department volunteers receive a minimum of 24hrs of training per year.
- Immunizations are offered at the County Public Health on an ongoing basis.
- Countywide recycling is offered.
- Radon and Lead testing kits are available at County Public Health Department & ADLM
- Railroad bridge replacement & tie replacement occurred on the south section of town along the APNC railroad.
- City street improvement occurred along the edge of the golf course and 13th Street.
- County Courthouse, Law Center, and sewer systems have backup generators.
- Weather Service has launched educational public service announcements.
- "Safe Shed" (have capacity to shelter 16 people) are now located at Lake Miami campgrounds, IDOT Secondary Roads facilities (along major highway), and the Monroe County Public Health office.
- All Monroe County communities have evacuation plans cited in the ESF plan.
- Albia Public School hosted an Active Shooter training.
- Sanitary Sewer improvements occurred in 2014-15.

CITY OF LOVILIA

General Information

Population: 623	Floodplain: No
Median Age: 33 yrs.	NFIP Participant: No
65 years & Older: 18% 114	Historic District: No
5 years & older in school: 6% 35	Comprehensive Plan: February 1998
School buildings: 0	Zoning Ordinance: January 1999
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 319 Acres	Building Permits required: Yes
Most Recent Codification: October 2015	Fire Insurance Rating: 8

Geography

Lovilia is the northern-most incorporated community in Monroe County, excluding Eddyville, at coordinates 41° 7' 57" N, 92° 54' 22" W. The city encompasses an area of 319 acres with a population density of 986 people per square mile according to the 2019 ACS.

Population Data

As of the 2019 ACS, the total population of Lovilia was 623 with a total of 256 households. Between 2010 and 2019, Lovilia added 85 people and gained 6 households in contrast to the County's loss in both population and households.

Monroe County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 ACS, the census estimated that 1% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 35 (6% of total population) children under the age of five years. The population over the age of 65 years account for 18% (114 people) in Lovilia.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 38 residents of Lovilia have a confirmed disability. That accounts for approximately 27% of the population.

The combination of all these populations qualifies nearly 52% of the total population deemed "at risk".

In the 2019 ACS, median household income for Lovilia was up to \$52,083 from \$43,750 in the 2010 Census. About 48% of the households in Lovilia had incomes less than \$50,000 in 2019. About 9% of the population of Lovilia have incomes below the 2019 Federal Poverty Guidelines

Major Employers

Ten major employers are identified in Monroe County by www.iowasouth.com

Cargill Inc	AYM Inc
Ajinomoto Health & Nutrition	Preferred Wholesale
RELCO Locomotives	Kness Pest Control
Superior Machine	Hawkeye Molding
Iowa Aluminum	Zero Zonnect

Structures

Approximately 36% of homes in Lovilia were built prior to 1940 though there was a spike in new homes built in the 1970's with about 20% of the housing stock built during this decade. About 86% of homes in Lovilia are heated by utility gas.

Approximately 80% of the owner-occupied homes in Lovilia were valued at less than \$100,000 in 2019. About 26% of the homes were valued at less than \$50,000 as of the 2019 ACS.

Transportation

State Highway 5 intersects the city the entire length north to south. The Burlington Northern Santa Fe railroad runs parallel to Highway 5 the distance of the city. The community is approximately 20 city blocks by 10 city blocks in dimension.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	1613 South E St				X		3,186 sq ft
Fire Hall	605 W 17 th St	X			X		1,600 sq ft
Community Bldg.	608 W 17 th St				X		
Water plant	606 W 17 th St	X					1,088 sq ft
Water tower	606 W 17 th St	X					--
City Maintenance/ Storage	1611 E Ave So				X		1,239 sq ft
Lagoon	6057 115 th Trail	X					375 sq ft
Casey's	1807 Highway 5			X			1,962sq ft
Lovilia Head Start	302 S H Ave			X			

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Jess Hutchinson, Lovilia Fire Department, completed the comprehensive scoring chart for the community. The numbers were then added to achieve a weighted score that prioritized the hazards. Lovilia Hazardous Material Incident, Transportation Incident, Thunderstorm, Lightning, & Hail, and Tornado & Windstorms in their community.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Lovilia

1. Hazardous Materials Incident
2. Transportation Incident
3. Infrastructure Failure
4. Flash Flood
5. Sinkholes
6. Grass/Wildland Fire
7. Radiological Incident

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Mobile communication trailer(s) located at Appanoose County Law Center; about 1-2 hours are needed to mobilize.
- 28E agreements in place (Updated in 2015) with surrounding jurisdictions for fire protection and hazardous materials containment.
- SIRG, based in Des Moines, is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Monroe County Supervisors' office.
- Tree trimming or management is currently handled by utility services.
- Fire Department volunteers receive a minimum of 24hrs of training per year.
- Immunizations are offered at the County Public Health on an ongoing basis.
- Countywide recycling is offered.
- Radon and Lead testing kits are available at County Public Health Department & ADLM

CITY OF MELROSE

General Information

Population: 141	Floodplain: Yes
Median Age: 47 yrs.	NFIP Participant: Yes #190465
65 years & Older: 33% 46	Historic District: No
5 years & older in school: 4% 6	Comprehensive Plan: No
School buildings: 0	Zoning Ordinance: No
Places of Worship: 1	Subdivision Ordinance: No
Land Area: 1.0 Square Mile	Building Permits required: No
Most Recent Codification: 2013	Fire Insurance Rating: 8

Geography

Melrose is the western-most incorporated community in Monroe County at coordinates 40° 58' 31" N, 93° 3' 0" W. The city encompasses an area of 1 square mile with a population density of 101 people per square mile according to the 2019 ACS.

Population Data

As of the 2019 ACS, the total population of Melrose was 141 with a total of 64 households. Between 2010 and 2019, Melrose added 29 people and 13 households in contrast to the County's loss in both population and households.

Monroe County at risk groups are identified as young children, the elderly, those with disabilities, and those that are linguistically isolated. As of the 2019 Census, the census estimated that 2.2% people have a primary language that is other than English and would be considered linguistically isolated. There are approximately 6 (4% of total population) children under the age of five years. The population over the age of 65 years account for 33% (46 people) in Melrose.

The remaining "at risk" category would be individuals that have a disability. It is estimated that 38 residents of Melrose have a confirmed disability. That accounts for approximately 27% of the population.

The combination of all these populations qualifies nearly 66% of the total population deemed "at risk".

In the 2019 ACS, median household income for Melrose was down to \$44,375 from \$47,000 in the 2010 Census. About 54.8% of the households in Melrose had incomes less than \$50,000 in 2019. Over 8% of the population of Melrose have incomes below the 2019 Federal Poverty Guidelines.

Major Employers

Ten major employers are identified in Monroe County by www.iowasouth.com

Cargill Inc	AYM Inc
Ajinomoto Health & Nutrition	Preferred Wholesale
RELCO Locomotives	Kness Pest Control
Superior Machine	Hawkeye Molding
Iowa Aluminum	Zero Zonnect

Structures

More than half (53%) of homes in Melrose were built prior to 1940 though there was a spike in new homes built in the 1970's with nearly 17% of the housing stock built during this decade. More than 80% of homes (51 homes) in Melrose are heated with bottled fuels/gas and 11% homes were heated primarily by firewood in 2010.

About 25% of the owner-occupied homes in Melrose were valued at less than \$50,000 and 97% of homes were valued below \$150,000 in the 2019 ACS.

Transportation

County highway S70 intersects the heart of the city from north to south. This roadway passes onto the Main Street of the city near the post office, city hall, community center and church. The Burlington Northern Santa Fe railroad enters the community on the southern edge.

Critical Facilities

Types of facilities were identified as follows:

Critical Facility – Those facilities that are essential in providing utility or direction in either during the response to an emergency or during the recovery operation.

Essential Facility – Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.

High Potential Loss Facility – Those facilities that would have a high loss or impact on the community.

Transportation and Lifeline Facility – Those facilities and infrastructure that are critical to transportation, communications, and necessary utilities.

Critical Facilities

Name of Asset	Location	Critical Facility	Vulnerable population	Economic Asset	Special Consideration	Historic/ Other	Size of Bldg.
City Hall	117 Shamrock				X		
Fire Hall	100 Shamrock				X		
Sewer Lift Station		X					
Quality Ag	502 Erin Ave			X			
Melrose Market	115 Erin St						

Hazard Scoring & Ranking

Community representatives were responsible for scoring each hazard based on probability, severity, warning time, and duration of the event. The identified hazards of the plan were included for each jurisdiction to rate. The scoring guidelines were provided by Iowa Homeland Security and was utilized by the committee members. Linda Heller, Melrose City Clerk, completed the comprehensive scoring chart for the county. The numbers were then added to achieve a weighted score that prioritized the hazards. Melrose is most concerned about Tornado & Windstorm, Extreme Heat, Sinkholes, and Human Disease in their community.

Jurisdictional hazard rankings beyond region wide events (Tornado & Windstorm; Human Disease; Thunderstorm, lightning & hail; Severe Winter Storm; Terrorism; Extreme Heat; Animal, Plant, & Crop Disease; Earthquake; Drought; and Expansive Soils)

Melrose

1. Sinkholes
2. River Flood
3. Radiological Incident
4. Transportation Incident
5. Hazardous Materials Incident
6. Infrastructure Failure
7. Grass/Wildland Fire
8. Landslide

Existing Mitigation Strategies

- Fire Station has a storm warning system.
- Monroe County police patrol in the city limits.
- Mobile communication trailer(s) located at Appanoose County Law Center; about 1-2 hours are needed to mobilize
- 28E agreements in place (Updated 2015) with surrounding jurisdictions for fire protection and hazardous materials containment.
- SIRG is the designated hazardous materials clean-up agent; local fire fighters perform containment actions.
- County-wide Emergency Operations Plan (EOP) is in place and maintained by ADLM Emergency Management; a copy of the plan is present in the Monroe County Supervisors' office.
- The City participates in the National Flood Insurance Program (NFIP) with a Flood Insurance Rate Map dated 7/2/1987
- Tree trimming or management is currently handled by utility services
- Fire Department volunteers receive a minimum of 24hrs of training per year.
- Immunizations are offered at the County Public Health on an ongoing basis.
- Countywide recycling is offered.
- Radon and Lead testing kits are available at County Public Health Department.
- Sewer systems have backup generators.
- Weather Service has launched educational public service announcements.
- All Monroe County communities have evacuation plans cited in the ESF plan.

Risk Assessment Introduction

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.

A risk assessment was completed in a basic three-step process for the ADLM region. First, hazards that can affect the planning region were identified. Second, possible impacts of each hazard were identified. And third, based on historical occurrences, potential severity and local knowledge, a priority level was assigned to each hazard.

Hazard Identification

In the Iowa Comprehensive Emergency Plan- Part B: *Iowa Hazard Mitigation Plan 2018*, a statewide risk assessment identifies a broad spectrum of hazards that can occur in the state, including natural, technological, and human-caused hazards. For the ADLM region, all the hazards in the statewide plan are included in the risk assessment to prepare as complete a mitigation strategy as possible. All hazards considered are in the following risk assessment.

Type of Hazards identified by State of Iowa

Natural Hazards

A natural hazard is an event occurring due to climate, geology, or hydrology that will negatively impact people or the environment.

- A. Animal, plant & Crop Disease
- B. Drought
- C. Earthquake
- D. Expansive Soils
- E. Extreme Heat
- F. Flood
- G. Grass or Wildland Fire
- H. Human Disease
- I. Landslide
- J. Severe Winter Storm
- K. Sinkholes
- L. Thunderstorm, Lightning, and Hail
- M. Tornado and Windstorm

Technological Hazards

A technological hazard is an event involving a man-made structure, equipment, or substance that will negatively impact people or the environment.

- A. Hazardous Materials Incident
- B. Infrastructure Failure
- C. Levee and Dam Failure
- D. Radiological Incident
- E. Transportation Incident

Human Caused Hazards

A human-caused hazard is an event occurring due to intentional human actions that will negatively impact people or the environment.

- ❖ Terrorism

Hazard Impact Assessment

To understand the potential impacts of hazards that can occur in the ADLM region, profiles were prepared using historical data, existing hazard mitigation plans, local knowledge, and the risk assessment criteria in the *Iowa Hazard Mitigation Plan 2018*. Hazard profiles include a description of the hazard and possible areas of impact. Although the ADLM region is a small portion of Iowa, there are variations in where hazards are likely to occur. For the risk assessment, hazards are categorized as region wide or local hazards. The hazard profiles also summarize the probability of future occurrences, potential magnitude and severity, amount of warning time, and typical duration of each hazard.

Hazard Prioritization Criteria

The information provided in the hazard impact assessment- probability, magnitude and severity, warning time, and duration – reflects the criteria used to assess risk. To determine the extent a mitigation strategy should focus on one or more hazards, the full set of hazards that can potentially affect the ADLM region was prioritized using these criteria. Each criterion of the prioritization process is detailed in Exhibits 29-32. In the hazard profiles, each element of the assessment is discussed in the context of the ADLM region.

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. See scoring criteria in Exhibit 29.

Exhibit 29: Probability Scoring Criteria		
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.		
	Score	Description
1	Unlikely	Less than 10% probability in any given year, history of events is less than 10% or event is unlikely but there is a possibility of occurrence.
2	Occasional	Greater than 10% up to 19% probability in any given year, history of events is greater than 10% up to 19%, or the event could possibly occur.
3	Likely	Greater than 19% up to 33% probability in any given year, history of events is greater than 20% up to 33% or the event is likely to occur.
4	Highly Likely	More than 33% probability in any given year, history of events is greater than 33% likely or the event is likely to occur.

The magnitude and severity of the impacts of a hazard event is related directly to the extent that a hazard affects a community. It is rated using technical measures specific to the hazard, which are ideally determined with standard scientific tables. This is also a function of when the event occurs, year-round or seasonal, the location affected, the resilience of a community, and the effectiveness of emergency response and disaster recovery efforts. See scoring criteria in Exhibit 30.

Exhibit 30: Magnitude/Severity Scoring Criteria

The magnitude and severity of the impacts of a hazard event is related directly to the extent that a hazard affects the community. It is rated using technical measures specific to the hazard, which are ideally determined with standard scientific scales. This is also a function of when the event occurs, year-round or seasonal, the location affected, the resilience of the community, and the effectiveness of emergency response and disaster recovery efforts.

	Score	Description
1	Negligible	Less than 10% of property severely damaged, shutdown of facilities and services for less than 24hrs and/or injuries/ illness treatable with first aid.
2	Limited	Less than 10% up to 25% of property severely damaged, shutdown of facilities and services for more than a week and/or injuries/illness do not result in permanent disability.
3	Critical	Less than 25% up to 50% of property severely damaged, shutdown of facilities and services for up to 2 weeks and/or injuries/ illness 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 or the speed of onset is the amount of warning time available before a hazard occurs. The average rather than shortest or longest warning time is considered in the hazard assessment. For many natural hazards, there is a considerable amount of warning time as opposed to the human caused hazards that occur instantaneously or without any significant warning time. See Exhibit 31.

Exhibit 31: Warning Time Scoring Criteria

Warning time or the speed of onset is the amount of warning time available before a hazard occurs. The average rather than shortest or longest warning time is considered in the hazard assessment.

Score	Description
1	More than 24hrs warning time
2	More than 12 up to 24 hours warning time
3	6-12 hours warning time
4	Minimal or no warning (less than 6 hrs. warning)

Duration is the typical amount of time that the community is impacted by a hazard. As an example, a snowstorm will likely last several hours, whereas a lightning strike would last less than a second. See Exhibit 32.

Exhibit 32: Duration Scoring Criteria

Duration is the typical amount of time that the community is impacted by a hazard.

Score	Description
1	Less than 6 hours
2	Less than 1 day
3	Less than 1 week
4	More than 1 week

Data Limitation

Data collected for many of the natural hazards is from the National Centers for Environmental Information (NCEI). This database is the most comprehensive and detailed available for natural hazards; however, there are some limitations. Information from this source can be queried by county, but the data returned is for an event. For example, if a tornado started in Lucas County, it would be counted as one event. Data for injuries, fatalities, and storm damage would be presented for the whole event in a set of query results for Lucas County, even if some of those effects occurred outside of that county.

Conversely, NCEI data is for reported effects, so damage that occurred may not be represented in the data. For example, if a blizzard event on 12/12/2012 has an episode narrative that begins, “A tremendous blizzard, one of the worst in memory...” and goes on to outline the closing of major shutdowns in one neighboring county and a death of a person in another adjacent county. The episode record in the queried table reports property damage and fatalities as \$0 and 0, respectively. Despite these limitations, the NCEI data provides a comprehensive overview of frequency of hazard events, and often detailed information about hazard effects is included.

Ranking based on Scores

Using the rating scales described in the tables 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 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 committee determined overview hazard ranking scores for the regional planning area. The results of this overview are provided below in Exhibit 33. Individual jurisdiction hazard prioritization can be found in Appendix A.

Exhibit 33: Regional Planning Area Hazard Prioritization Results							
Hazard	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance	Hazard Rank
<i>Animal, Plant & Crop Disease</i>	1.6	1.5	2.3	3.4	1.91	Low	17
<i>Drought</i>	2.55	1.48	1.13	3.41	2.01	Moderate	12
<i>Extreme Heat</i>	3.03	1.82	1.37	3.34	2.46	Moderate	8
<i>Flash Flood</i>	2.50	1.57	3.21	2.1	2.60	Moderate	6
<i>River Flood</i>	2.18	1.40	2.09	2.63	1.99	Low	13
<i>Human Disease</i>	2.23	2.46	2.23	3.76	2.55	Moderate	7
<i>Severe Winter Storm</i>	3.41	1.93	1.96	2.96	2.68	Moderate	3
<i>Sinkholes</i>	1.48	1.27	3.06	2.27	1.92	Low	16
<i>Thunderstorm, Lightning, & Hail</i>	3.58	1.86	2.82	1.96	2.81	Moderate	2
<i>Tornado & Windstorm</i>	2.72	2.44	3.13	1.51	2.96	Moderate	1
<i>Hazardous Materials Incident</i>	2.06	1.41	3.96	2.03	2.30	Moderate	10

<i>Infrastructure Failure</i>	2.34	1.82	3.68	3.06	2.67	Moderate	4
<i>Levee & Dam Failure</i>	1.42	1.66	3.52	3.52	1.88	Low	18
<i>Radiological Incident</i>	1.1	1.46	3.56	3.00	1.96	Low	14
<i>Transportation Incident</i>	2.46	2.20	3.76	2.63	2.67	Moderate	5
<i>Terrorism</i>	1.20	2.00	3.86	3.26	2.29	Moderate	11
<i>Landslide</i>	1.00	1.00	4.00	2.60	1.49	Low	20
<i>Expansive Soils</i>	2.50	1.00	1.00	1.00	1.70	Low	19
<i>Earthquake</i>	1.00	2.00	4.00	3.00	1.95	Low	15
<i>Grass & Wildland Fire</i>	2.63	1.69	4.00	1.00	2.39	Moderate	9

Natural Hazards

A.) Animal, Plant and Crop Disease

This natural hazard is an outbreak of disease or infestation that can be transmitted from animal to animal or plant to plant. The outbreak may have an adverse effect on human health, significant economic implications, cause significant crop production losses, and/or significant environmental damage.

Potential Hazard Area

The potential hazard area for the animal, plant, and crop disease hazard in ADLM region is primarily rural or recreation areas throughout the counties, although this hazard could affect urban areas as well.

An outbreak of disease that can be transmitted from animal to animal. The disease outbreak will likely have a significant economic implications or public health impact. The crop/plant pest infestation will likely have severe economic implications, cause significant crop production losses, or significant environmental damage. The crop/plant pests may also have implications for public health.

The movement of people, animals, animal products, wildlife, plants, crops, and potential disease/pest vectors could all cause the introduction of diseases/pests. Diseases/pests could also be introduced naturally, for example by hurricanes or jet streams. Emerging disease is also a threat such as West Nile Virus, new more virulent influenza strains, etc. Because many diseases/pests are not present in Iowa, our populations of animals, crops, and plants have no immunity and are highly susceptible.

Exhibit 34: Animal, Plant & Crop Disease Exposure

2017 U.S. Agriculture Census

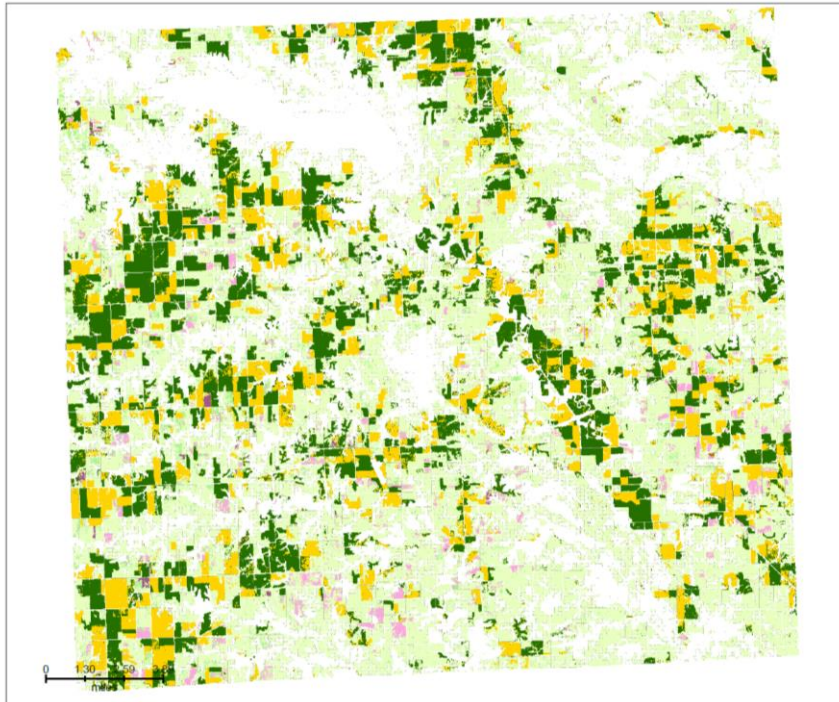
<i>County</i>	<i>Number of County Farms</i>	<i>Estimated Market Values per Farm</i>	<i>Type of Livestock</i>	<i>Estimated # in County</i>
APPANOOSE COUNTY	675			
Land & Buildings per farm		\$1,079,752	Cattle & Calves	29,419
Ag Machinery & Equipment per farm		\$87,526	Hogs & pigs	778
Avg Ag Product sold per farm		\$65,901		
County Total Cropland	108,260 acres			
DAVIS COUNTY	826			
Land & Buildings per farm		\$941,546	Cattle & Calves	30,240
Ag Machinery & Equipment per farm		\$125,282	Hogs & pigs	126,064
Avg Ag Product sold per farm		\$111,274		
County Total Cropland	121,756 acres			
LUCAS COUNTY	567			
Land & Buildings per farm		\$1,055,881	Cattle & Calves	32,543
Ag Machinery & Equipment per farm		\$108,610	Hogs & pigs	44,499
Avg Ag Product sold per farm		\$88,382		
County Total Cropland	106,942 acres			
MONROE COUNTY	618			
Land & Buildings per farm		\$1,314,106	Cattle & Calves	32,584
Ag Machinery & Equipment per farm		\$119,256	Hogs & pigs	29,401
Avg Ag Product sold per farm		\$99,711		
County Total Cropland	113,909 acres			
REGIONAL TOTALS	2,686 farms			
Land & Buildings per farm		\$4,391,285 Total	Cattle & Calves	124,786 Total
Ag Machinery & Equipment per farm		\$440,674 Total \$110,169 Avg/farm	Hogs & pigs	200,742 Total
Avg Ag Product sold per farm		\$365,268 Total \$91,317 Avg/farm		
County Total Cropland	450, 867 acres			

As seen in Exhibits 35 the greatest USDA Cropland Data Layers are shown as grass/pasture, soybeans, and corn.

Exhibit 35: USDA Crop Coverage Maps



CDL2020 CDL, Appanoose County, Iowa



Land Cover Categories
(by decreasing acreage)

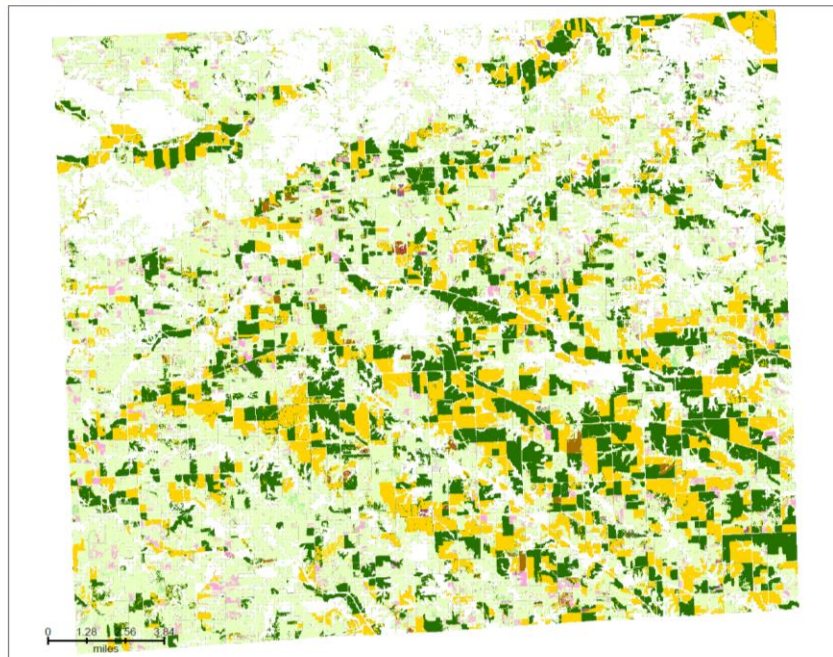
AGRICULTURE

- Grass/Pasture
- Soybeans
- Corn
- Alfalfa
- Other Hay/Non Alfalfa
- Oats
- Winter Wheat
- Clover/Wildflowers
- Fallow/Idle Cropland
- Millet
- Sorghum
- Dbt Crop WinWht/Com
- Rye
- Sod/Grass Seed

Produced by CropScape - <http://nassgeodata.gmu.edu/CropScape>



CDL2020 CDL, Davis County, Iowa



Land Cover Categories
(by decreasing acreage)

AGRICULTURE*

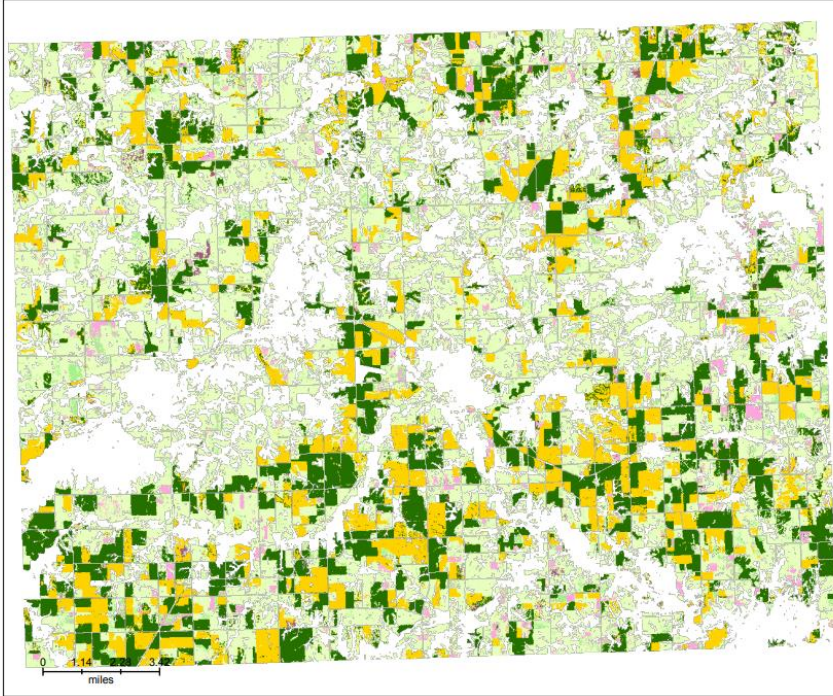
- Grass/Pasture
- Soybeans
- Corn
- Alfalfa
- Other Hay/Non Alfalfa
- Winter Wheat
- Oats
- Rye
- Sorghum
- Clover/Wildflowers
- Fallow/Idle Cropland
- Dbt Crop WinWht/Com
- Millet
- Other Crops
- Dbt Crop WinWht/Soybeans
- Triticale

Produced by CropScape - <http://nassgeodata.gmu.edu/CropScape>

* Only top 18 agriculture categories are listed.



CDL2020 CDL, Lucas County, Iowa



Land Cover Categories
(by decreasing acreage)

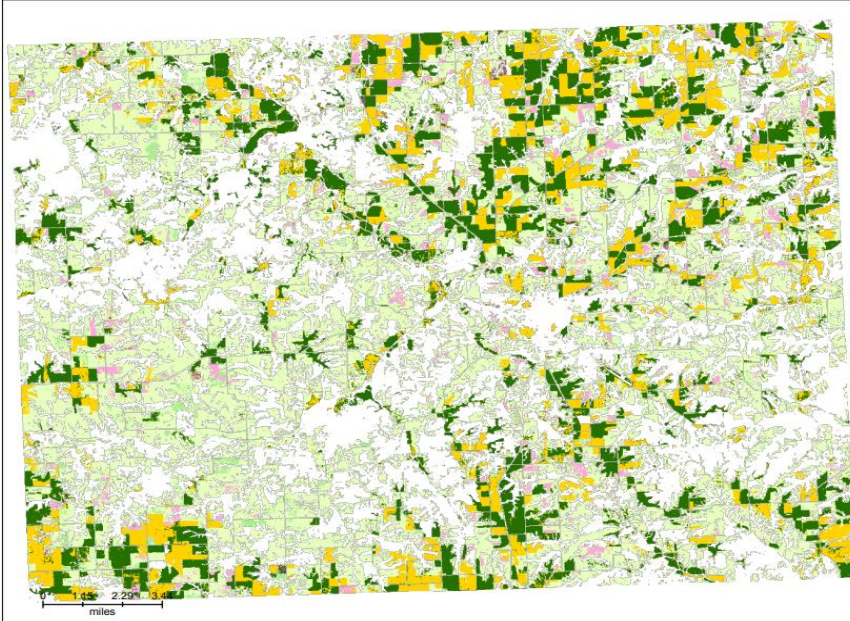
AGRICULTURE

- Grass/Pasture
- Soybeans
- Corn
- Alfalfa
- Other Hay/Non Alfalfa
- Oats
- Sorghum
- Sod/Grass Seed
- Clover/Wildflowers
- Fallow/Idle Cropland
- Dbl Crop Win/Whi/Corn
- Rye
- Peas
- Sweet Corn
- Winter Wheat

Produced by CropScape - <http://nassgeodata.gmu.edu/CropScape>



CDL2020 CDL, Monroe County, Iowa



Land Cover Categories
(by decreasing acreage)

AGRICULTURE

- Grass/Pasture
- Soybeans
- Corn
- Alfalfa
- Other Hay/Non Alfalfa
- Oats
- Sorghum
- Clover/Wildflowers
- Winter Wheat
- Fallow/Idle Cropland
- Millet
- Sod/Grass Seed
- Dbl Crop Win/Whi/Corn
- Rye

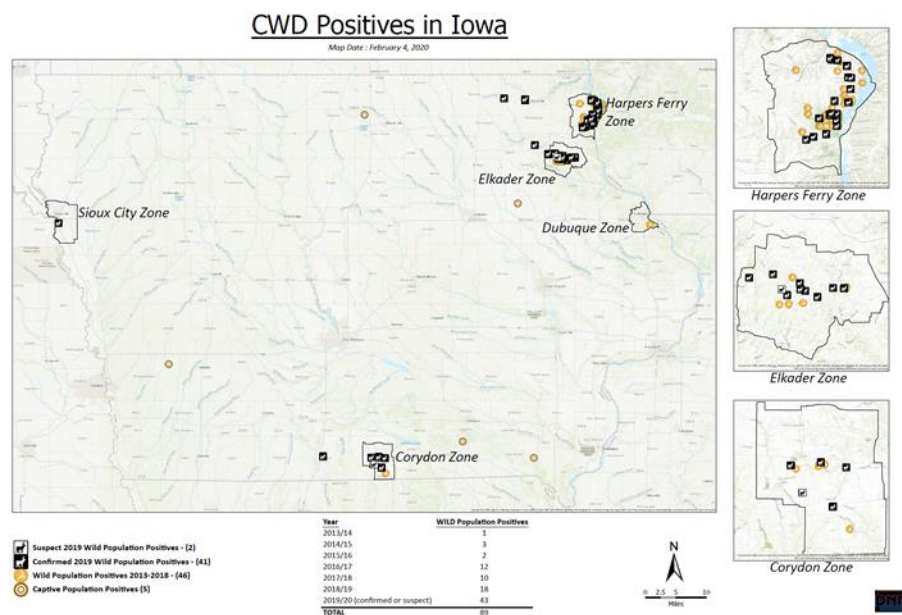
Historical Occurrences

In Iowa, there are several major reportable animal diseases, which include the Avian Flu, Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease), Chronic Wasting Disease, Exotic Newcastle Disease, Foot and Mouth Disease, Johne's Disease, Pseudorabies, Scrapies, and West Nile Virus. Reports from the Iowa

Department of Agriculture and Land Stewardship (IDALS) and the Center for Food Security and Public Health at Iowa State University indicate minimal or no recent cases of most reportable animal disease in Iowa. The IDALS website reports only three Animal Health Alert Network alerts since August 2012. The U.S. saw the largest ever outbreak of highly pathogenic avian influenza in 2014-2015. Iowa was among one of the hardest hit states in the nation. The H5N2 strain struck 70 premises of commercial or backyard flocks in Iowa and nationwide over 50 million commercial birds were lost to the virus or depopulation efforts meant to stop the spread of the disease. The outbreak led to an estimated \$1.6 billion in direct losses and \$3.3 billion impact in US economy. In Iowa, the most significantly affected area was in the northwestern part of the state.

The Scrapie disease primarily affects sheep and incidences have significantly decreased over the past decade. Four areas of Iowa have confirmed cases of Chronic Wasting Disease (CWD) in captive Whitetail deer. Those herds were depopulated. CWD has also been observed in wild deer populations in four Iowa counties. None of the reports were in the ADLM region, however, multiple documented cases were reported in Wayne County that is adjacent to Appanoose and Lucas Counties.

Exhibit 36: CWD Cases in Iowa



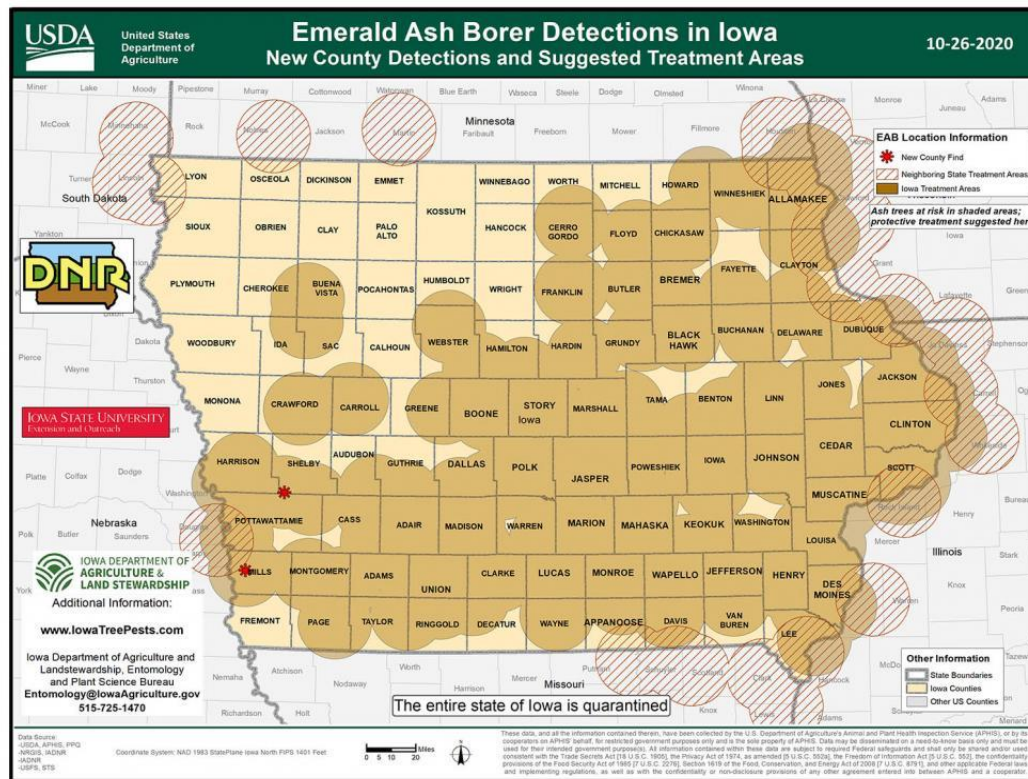
Iowa had 73 West Nile Virus cases in 2018, which was the second highest number since record keeping in 2003. The ADLM region documented one human case in Appanoose County in early 2020 and one horse infected in 2019.

There were 10 confirmed cases of rabies in Iowa in 2017, which was 48% lower than the previous year and 8 of those were observed in wild animals. There were no confirmed cases in the ADLM region.

Plant disease and infestation occur throughout Iowa, but most cases are relatively isolated and have not reached an outbreak level. For Iowa’s major crops, chemical and non-chemical methods are used to prevent and manage disease and infestations. Reports from Iowa State University Extension and Outreach have confirmed cases of historically uncommon crop disease like Physoderma, which is a fungus that can cause corn stalk to break, and Goss’s Wilt, a bacterium that can destroy a corn plant. Disease affecting seedlings in corn and soybean crops were reported in 2013, primarily in southeast Iowa. In addition, pest populations that are resistant to genetic modification and chemical management methods have been confirmed across Iowa.

A major concern for the Iowa landscape is the Emerald Ash Borer, which is a beetle that infests and kills ash trees in large numbers. Efforts to eradicate beetle populations have proven to be too great to effectively protect a large area. In early 2014, the presence of the borer was confirmed in southern Iowa. (See Exhibit 37) The presence of the beetle was confirmed in the ADLM region prior to 2018. A statewide quarantine is in place to prevent the spread of the insect to other states. Iowans are discouraged from transporting firewood to other counties in the state to prevent a statewide infestation.

Exhibit 37: Emerald Ash Borer in Iowa



Probability

Minimal historical occurrences indicate that an animal, plant, or crop disease will not likely become a major outbreak in the ADLM region. The Iowa Hazard Mitigation Plan 2018 only noted the Avian Influenza outbreak. Additionally, an Emerald Ash Borer outbreak is likely with the beetle confirmed in all the four counties in the region.

Magnitude and Severity

If a major outbreak of an animal, plant, or crop disease were to occur in the ADLM region, areas beyond the immediate location could potentially be impacted. If animals are affected, a major disease could significantly limit or eliminate the ability to move, slaughter, and export animals and animal products, which could result in a shutdown of facilities. A major disease outbreak could have widespread public health and economic impacts in Iowa, the nation and potentially the world. If crops and plants are affected there could be similar impacts to public health and industries associated with crops.

Warning Time

Animals and plants that are affected with a disease or pests can transmit the disease or pest before the issue is realized. Iowa would only have warning time if an event occurred in another state or region.

Duration

Response and recovery from a major disease or infestation is lengthy, with some producers potentially unable to sustain. Reoccurrence of diseases and infestations could cause repeated loss.

Exhibit 38: Jurisdictional Animal, Plant & Crop Disease Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	4	3	1	4	3.25	High
Centerville	2	1	1	4	1.75	Low
Centerville Community Schools	N/A	N/A	N/A	N/A	N/A	N/A
Cincinnati	1	1	4	4	1.75	Low
Exline	1	1	4	4	1.75	Low
Moravia	1	1	4	3	1.65	Low
Moravia Community School	N/A	N/A	N/A	N/A	N/A	N/A
Moulton	1	1	4	4	1.75	Low
Mystic	1	1	1	4	1.3	Low
Plano	3	1	1	4	2.3	Moderate
Rathbun	3	1	1	4	2.3	Moderate
Udell	3	1	1	4	2.3	Moderate
Unionville	2	1	2	4	1.9	Low
Moulton-Udell Community School	N/A	N/A	N/A	N/A	N/A	N/A
MercyOne Medical	N/A	N/A	N/A	N/A	N/A	N/A
Davis Unincorp Co	1	3	4	4	2.35	Moderate
Davis Co Community Schools	1	1	4	4	1.75	Low
Bloomfield	1	2	4	4	2.05	Moderate
Drakesville	1	2	4	4	2.05	Moderate
Floris	1	2	4	4	2.05	Moderate
Pulaksi	1	1	4	4	1.75	Low
Lucas Unincorp Co	2	2	1	4	2.05	Moderate
Chariton	3	4	1	4	3.1	High
Chariton Community Schools	2	2	4	1	2.2	Moderate
Derby	4	3	1	4	3.25	Moderate
Lucas	4	1	1	4	2.65	Moderate
Russell	2	2	1	4	2.05	Moderate
Williamson	1	2	1	4	1.6	Low
Lucas Co Health Center	2	1	1	4	1.75	Low
Monroe Unincorp Co	2	2	3	2	2.15	Moderate
Albia	1	1	1	1	1.0	Low
Albia Community Schools	1	1	1	4	1.3	Low
Eddyville	1	1	1	2	1.1	Low
Lovilia	1	1	1	4	1.3	Low
Melrose	1	1	3	4	1.6	Low
Monroe Co Hospital	2	2	2	3	2.1	Moderate

B.) Drought

Drought is a prolonged lack of precipitation that produces severe dry conditions. Four types of drought conditions are relevant in Iowa: meteorological drought, hydrological drought, agricultural drought, and socioeconomic drought. A meteorological drought is a lack of precipitation. A hydrological drought is a decline in surface and groundwater. An agricultural drought is a lack of moisture in soil, and socioeconomic drought is a shortage of water that affects people’s daily usage. See Exhibit 39.

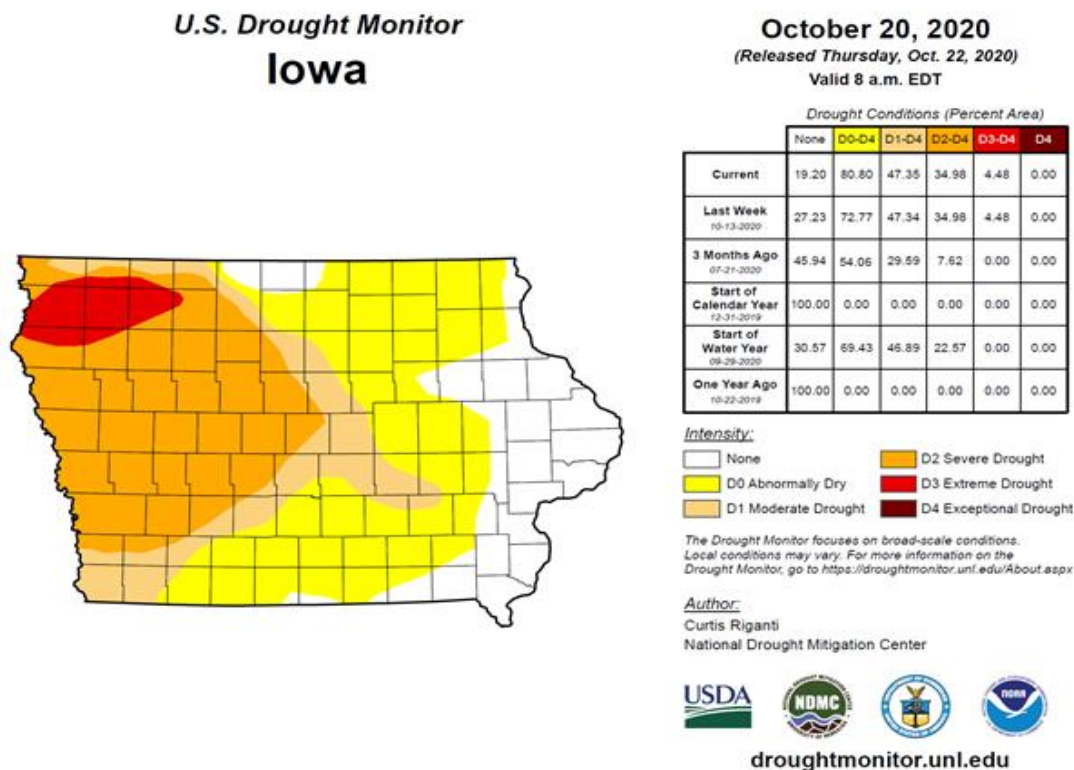
Potential Hazard Area

The potential hazard area for drought is across the ADLM region due to the widespread nature of this hazard. Typically, rural areas in Iowa are more severely impacted by this hazard.

Historical Occurrences

A detailed weekly record of drought across the entire country is provided by the U.S. Drought Monitor. The monitor shows the percent of a selected area that is in drought conditions across five categories of drought. The drought categories are shown in Exhibit 39. From abnormally dry through exceptional, the categories reflect more severe conditions and impacts. In addition to the percentage of the area covered by different categories of drought, each record also contains a figure for Drought Severity and Coverage Index (DSCI). This number approximates the severity of the drought in a region with weighted sum of the categories of drought for the selected areas, i.e., 1 point per percentage point of area categorized as abnormally dry, 2 points per percentage point of area categorized as moderate drought, etc. Weeks with a higher DSCI score tend to exhibit more severe conditions than weeks with lower scores.

Exhibit 39: Drought Monitor



The ADLM region was impacted by 17 regional droughts from 2000-2019. The region was fortunate not to experience any deaths or injuries. There was approximately \$12.65 Million in property damage and approximately \$97.65 Million in crop damage.

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	12.650M	97.650M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/20/1999	12:00	CST	Drought		0	0	0.00K	4.580M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/14/2000	00:00	CST	Drought		0	0	0.00K	4.690M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	09/01/2000	00:00	CST	Drought		0	0	0.00K	5.030M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2001	00:00	CST	Drought		0	0	0.00K	11.350M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2003	00:00	CST	Drought		0	0	12.650M	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/01/2012	00:00	CST-6	Drought		0	0	0.00K	45.000M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2012	00:00	CST-6	Drought		0	0	0.00K	6.000M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	09/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	10/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2013	00:00	CST-6	Drought		0	0	0.00K	21.000M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	09/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	06/12/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	08/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	09/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	10/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
Totals:								0	0	12.650M	97.650M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	12.650M	97.650M
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/20/1999	12:00	CST	Drought		0	0	0.00K	4.580M
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/14/2000	00:00	CST	Drought		0	0	0.00K	4.690M
DAVIS (ZONE)	DAVIS (ZONE)	IA	09/01/2000	00:00	CST	Drought		0	0	0.00K	5.030M
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2001	00:00	CST	Drought		0	0	0.00K	11.350M
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2003	00:00	CST	Drought		0	0	12.650M	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/01/2012	00:00	CST-6	Drought		0	0	0.00K	45.000M
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2012	00:00	CST-6	Drought		0	0	0.00K	6.000M
DAVIS (ZONE)	DAVIS (ZONE)	IA	09/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	10/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2013	00:00	CST-6	Drought		0	0	0.00K	21.000M
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	09/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	06/12/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	08/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	09/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	10/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
Totals:								0	0	12.650M	97.650M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	12.650M	97.650M
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/20/1999	12:00	CST	Drought		0	0	0.00K	4.580M
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/14/2000	00:00	CST	Drought		0	0	0.00K	4.690M
LUCAS (ZONE)	LUCAS (ZONE)	IA	09/01/2000	00:00	CST	Drought		0	0	0.00K	5.030M
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/01/2001	00:00	CST	Drought		0	0	0.00K	11.350M
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/01/2003	00:00	CST	Drought		0	0	12.650M	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/01/2012	00:00	CST-6	Drought		0	0	0.00K	45.000M
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/01/2012	00:00	CST-6	Drought		0	0	0.00K	6.000M
LUCAS (ZONE)	LUCAS (ZONE)	IA	09/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	10/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/01/2013	00:00	CST-6	Drought		0	0	0.00K	21.000M
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/25/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	09/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	10/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	08/21/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	09/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
Totals:								0	0	12.650M	97.650M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	12.650M	97.650M
MONROE (ZONE)	MONROE (ZONE)	IA	07/20/1999	12:00	CST	Drought		0	0	0.00K	4.580M
MONROE (ZONE)	MONROE (ZONE)	IA	08/14/2000	00:00	CST	Drought		0	0	0.00K	4.690M
MONROE (ZONE)	MONROE (ZONE)	IA	09/01/2000	00:00	CST	Drought		0	0	0.00K	5.030M
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2001	00:00	CST	Drought		0	0	0.00K	11.350M
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2003	00:00	CST	Drought		0	0	12.650M	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	07/01/2012	00:00	CST-6	Drought		0	0	0.00K	45.000M
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2012	00:00	CST-6	Drought		0	0	0.00K	6.000M
MONROE (ZONE)	MONROE (ZONE)	IA	09/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	10/01/2012	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2013	00:00	CST-6	Drought		0	0	0.00K	21.000M
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	09/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	10/01/2017	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	06/12/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	07/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	08/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	09/01/2018	00:00	CST-6	Drought		0	0	0.00K	0.00K
Totals:								0	0	12.650M	97.650M

([Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#))

Data from 2000-2019 was queried for any drought conditions where at least 20 percent of the county was in moderate or more severe drought. That threshold was set somewhat arbitrarily; it is meant to signify a level of drought that causes some damage and covers a large portion of the region. During that period, there were 17 drought events.

Probability

Based on the major periods of drought, the probability estimates for drought conditions occurring in the ADLM region is likely greater than 85% any given year. Multiple short-term drought conditions or long-term drought conditions could occur in the region, Iowa, and the Midwest of the United States. Overall, the probability estimate is based on historical occurrences, *the Iowa Hazard Mitigation Plan 2018*, and local knowledge.

Magnitude and Severity

Droughts are typically widespread, affecting a large area. If a drought occurs in ADLM region, it is likely that most of southern Iowa or even the entire Midwest of the United States. Local conditions can be varied in intensity throughout the duration of the drought. People are vulnerable during a drought if water supplies are significantly reduced, but typically there are secondary sources of water that can prevent negative health impacts due to the lack of water. Most often, people are affected by higher food prices during and after major periods of drought. Wildlife and livestock are more likely to be vulnerable during drought when there is a limited supply of water.

The agricultural sector of the economy in Iowa would be impacted if widespread and long-term drought conditions were to occur. Due to reliance on precipitation and water supply for irrigation, crops are extremely vulnerable. Most often, rural areas experience most negative impacts.

A long term, severe drought can decrease stream flow and water table levels, which can limit the amount of water available to residents. In certain circumstances, it may be necessary to place restrictions on industries that use larger amounts of water.

Fire suppression may be challenging during drought conditions due to dry vegetation and limited water supply. Most property loss would likely be livestock and crops. However, infrastructure can be affected due to drying soils and low water levels around dams.

In the ADLM region, widespread drought conditions could severely damage up to 25% of property, primarily crops. Although the potential magnitude and severity of drought conditions would be considered limited regionwide, the direct impacts on the rural area would be the most critical. If drought conditions were severe enough to significantly reduce water supply, populated areas in the ADLM region could be directly impacted.

Warning Time

Drought warning is related to the ability to predict conditions that produce drought, primarily precipitation and temperature. There are many variables, and it is difficult to predict a drought in advance. An area may already be in a drought before it is recognized. While drought warning may not come until the drought is already occurring, the secondary effects may be predicted weeks in advance.

Duration

Drought conditions are part of normal climate functions in the United States. According to Iowa and ADLM regions drought history, most drought events affect the state for a period of a few months or a few weeks; however, climate variability can cause drought conditions for a period of a year or more.

Exhibit 40: Jurisdictional Drought Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	3	2	1	4	2.5	Moderate
Centerville	4	1	1	3	2.55	Moderate
Centerville Community Schools	N/A	N/A	N/A	N/A	N/A	N/A
Cincinnati	2	1	1	3	1.05	Low
Exline	2	1	1	3	1.05	Low
Moravia	2	1	2	3	1.8	Low
Moravia Community School	N/A	N/A	N/A	N/A	N/A	N/A
Moulton	2	1	1	3	1.05	Low
Mystic	2	1	1	3	1.05	Low
Plano	2	1	1	4	1.75	Low
Rathbun	2	1	1	4	1.75	Low
Udell	2	1	1	4	1.75	Low
Unionville	2	2	1	3	1.95	Low
Moulton-Udell Community School	N/A	N/A	N/A	N/A	N/A	N/A
MercyOne Medical	N/A	N/A	N/A	N/A	N/A	N/A
Davis Unincorp Co	4	2	1	4	2.95	Moderate
Davis Co Community Schools	4	1	1	4	2.65	Moderate
Bloomfield	4	1	1	4	2.65	Moderate
Drakesville	4	1	1	4	2.65	Moderate
Floris	4	1	1	4	2.65	Moderate
Pulaksi	4	1	1	4	2.65	Moderate
Lucas Unincorp Co	2	3	1	4	2.35	Moderate
Chariton	4	4	1	4	3.55	High
Chariton Community Schools	2	1	2	1	1.6	Low
Derby	4	3	1	4	3.25	Moderate
Lucas	4	1	2	4	2.8	Moderate
Russell	2	2	1	4	2.05	Moderate
Williamson	1	2	1	4	1.6	Low
Lucas Co Health Center	2	1	1	2	1.55	Low
Monroe Unincorp Co	3	2	3	1	2.5	Moderate
Albia	2	2	1	4	2.05	Moderate
Albia Community Schools	3	2	1	4	1.6	Low
Eddyville	1	1	1	1	1.0	Low
Lovilia	1	1	1	4	1.3	Low
Melrose	2	1	1	4	1.75	Low
Monroe Co Hospital	2	2	1	4	2.05	Moderate

C.) Earthquake

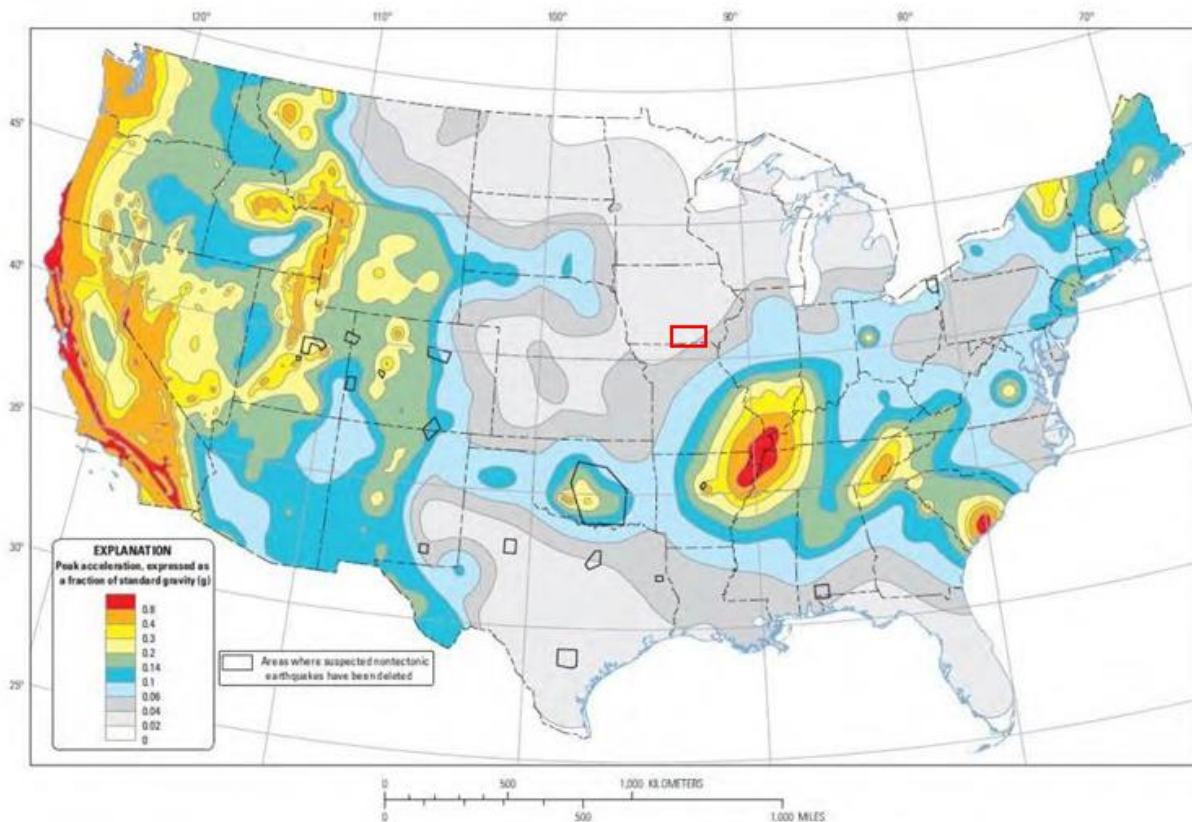
An earthquake is sudden shaking or vibration of the earth that may impose a direct threat to life and property. The shaking or vibration is caused by the breaking and shifting of rock beneath the earth's surface. The three general classes of earthquakes are tectonic, volcanic, and artificially produced.

The number of expect damaging earthquakes in Iowa is less than 2 in 10,000 years. Refer to the earthquake probabilistic map, as shown in Exhibit 41.

Potential Hazard Area

The potential hazard area for drought is across the ADLM region due to the widespread nature of this hazard. Typically, rural areas in Iowa are more severely impacted by this hazard.

Exhibit 41: 2% Probability of exceedance in 50 years map of peak ground acceleration



Source: United States Geological Survey, <https://earthquake.usgs.gov>

The possibility remains for Iowans to occasionally feel shaking from an earthquake; however, with the probability of damage occurring being so low.

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

Richter Magnitude Scale

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

Modified Mercalli Intensity Scale

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

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects experienced. The lower numbers of the intensity scale generally reflect the way the earthquake is felt by people. The higher the number of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

Historical Occurrences

Iowa has experienced minor effects from only a few earthquakes in the past 175 years. The epicenters of 13 earthquakes have been in the State with the majority along the Mississippi River. The strongest earthquake in Iowa occurred in Davenport in 1934. This earthquake resulted in only slight damage, according to the *State of Iowa Hazard Mitigation Plan, 2013*.

Exhibit 42: Historical Earthquakes in Iowa		
Date	Nearest Town	Mercalli Intensity
4/28/1867	Sidney, IA / Nebraska City, NE	IV
12/9/1875	Sidney, IA / Nebraska City, NE	III
4/13/1905	Wayland, MO / Keokuk, IA	IV-V
1/26/1925	Waterloo, IA	II
11/12/1934	Davenport, IA \ Rock Island, IL	VI
1/5/1935	Rock Island, IL / Davenport, IA	III
1/5/1935	Rock Island, IL / Davenport, IA	IV
2/26/1935	Burlington, IA	III
10/11/1938	Inwood, IA	V
11/8/1938	Dubuque, IA	II
11/24/1939	Davenport, IA / Rock Island, IL	II-III
4/20/1948	Oxford, IA	IV
7/16/2004	Shenandoah, IA	III

Probability

Exhibit 41; demonstrates the probabilistic ground motions with a 2 percent probability of exceedance. The red square shows the approximate regional boundary. As shown in this graphic, the probabilistic ground motions with a 2 percent probability of exceedance in the next 50 years is 0.04 peak acceleration, expressed as a fraction of standard gravity (g). The probability of a significant earthquake in any given year is “Unlikely”.

The 2014 U.S. Geological Survey (USGS) National Seismic Hazard Maps display earthquake ground motions for various probability levels across the United States and are applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. The updated maps represent an assessment of the best available science in earthquake hazards and incorporate new findings on earthquake ground shaking, faults, seismicity, and geodesy. The USGS National Seismic Hazard Mapping Project developed these maps by incorporating information on potential earthquakes and associated ground shaking obtained from interaction in science and engineering workshops involving hundreds of participants, review by several science organizations and State surveys, and advice from expert panels and a Steering Committee. The new probabilistic hazard maps represent an update of the seismic hazard maps; previous versions were developed by Petersen and others (2008) and Frankel and others (2002), using the methodology developed Frankel and others (1996). Algermissen and Perkins (1976) published the first probabilistic seismic hazard map of the United States which was updated in Algermissen and others (1990).

The National Seismic Hazard Maps are derived from seismic hazard curves calculated on a grid of sites across the United States that describe the annual frequency of exceeding a set of ground motions. Data and maps from the 2014 U.S. Geological Survey National Seismic Hazard Mapping Project are available for download. Maps for available periods (0.2 s, 1 s, PGA) and specified annual frequencies of exceedance can be calculated from the hazard curves. Figures depict probabilistic ground motions with a 2% probability of exceedance. Spectral accelerations are calculated for 5% damped linear elastic oscillators. All ground motions are calculated for site conditions with $V_{s30}=760$ m/s, corresponding to NEHRP B/X site class boundary.

The ADLM region is in an area where the probability of exceeding horizontal peak gravity acceleration by 1-2% is 10% over a period of 50 years. In other words, there is a 90% chance that any earthquake in the next 50 years affecting the region will not exceed an acceleration of 1-2% of the force of gravity. Based on recurrence intervals for small earthquakes, scientists estimate a 90% chance of a Richter magnitude 6.0 earthquake in the

New Madrid Fault Zone by 2040. A magnitude 6.5 in New Madrid would create a magnitude 4 effect in Iowa resulting in little or no damage.

Magnitude and Severity

Although a damaging event is unlikely, the potential impacts could be costly in the more urban areas of the County. Most structures in ADLM region is not built to withstand earthquake shaking, but because of the relatively low magnitude of a possible quake, property damage would likely be very minor.

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

Duration

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.

Exhibit 43: Earthquake Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	1	2	4	3	1.95	Low
Centerville	1	2	4	3	1.95	Low
Centerville Community Schools	1	2	4	3	1.95	Low
Cincinnati	1	2	4	3	1.95	Low
Exline	1	2	4	3	1.95	Low
Moravia	1	2	4	3	1.95	Low
Moravia Community School	1	2	4	3	1.95	Low
Moulton	1	2	4	3	1.95	Low
Mystic	1	2	4	3	1.95	Low
Plano	1	2	4	3	1.95	Low
Rathbun	1	2	4	3	1.95	Low
Udell	1	2	4	3	1.95	Low
Unionville	1	2	4	3	1.95	Low
Moulton-Udell Community School	1	2	4	3	1.95	Low
MercyOne Medical	1	2	4	3	1.95	Low
Davis Unincorp Co	1	2	4	3	1.95	Low
Davis Co Community Schools	1	2	4	3	1.95	Low
Bloomfield	1	2	4	3	1.95	Low
Drakesville	1	2	4	3	1.95	Low
Floris	1	2	4	3	1.95	Low
Pulaksi	1	2	4	3	1.95	Low
Lucas Unincorp Co	1	2	4	3	1.95	Low
Chariton	1	2	4	3	1.95	Low
Chariton Community Schools	1	2	4	3	1.95	Low
Derby	1	2	4	3	1.95	Low
Lucas	1	2	4	3	1.95	Low
Russell	1	2	4	3	1.95	Low
Williamson	1	2	4	3	1.95	Low
Lucas Co Health Center	1	2	4	3	1.95	Low
Monroe Unincorp Co	1	2	4	3	1.95	Low
Albia	1	2	4	3	1.95	Low
Albia Community Schools	1	2	4	3	1.95	Low
Eddyville	1	2	4	3	1.95	Low
Lovilia	1	2	4	3	1.95	Low
Melrose	1	2	4	3	1.95	Low
Monroe Co Hospital	1	2	4	3	1.95	Low

D.) Expansive Soils

Soils and soft rock that trend to swell or shrink excessively due to changes in moisture content are commonly known as expansive soils. 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.

The content of swelling clay soils is low in the ADLM region and there is lack of historical data for losses related to expansive soils statewide. The Iowa Hazard Mitigation Plan 2018 states, “At least, impact from this hazard has not attracted enough attention for anyone to keep track of losses due to the hazard. So, no comprehensive data is available to compare past losses across the state.” (3-32). In addition, the US Geological Survey (USGS) as having soil that consists of less than 50% clay having slight to moderate swelling potential or little to no swelling clay.

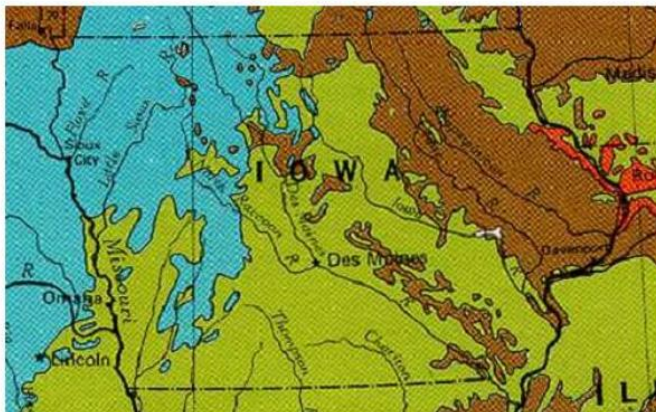
Potential Hazard Area

Exhibit 44 shows a map of the swelling potential of soils in Iowa. ADLM Region is in an area where generally less than 50 percent of the soil unit consists of clay having slight to moderate swelling potential, and a small area in the southeast of the region that has soil with no swelling clay potential.

Exhibit 44: U.S. Geological Map Survey

U.S. Geological Survey
Swelling Clays Map Of The Conterminous U.S.

Soil Map of Iowa



MAP LEGEND

- Unit contains abundant clay having high swelling potential
- Part of unit (generally less than 50%) consists of clay having high swelling potential
- Unit contains abundant clay having slight to moderate swelling potential
- Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
- Unit contains little or no swelling clay
- Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only)

Source: “Swelling Clays Map of the Conterminous United States” by W. Olive, A. Chleborad, C. Frahme, J. Shlocker, R. Schneider and R. Schuster, 1989.

Probability

The frequency of damage from expansive soils can be associated with the cycles of drought and heavy rainfall, which reflect changes in moisture content. However, in the ADLM region, expansive soil events are somewhat infrequent or occasional and minor; most events involve minor damage to building foundations and retaining walls. No major events have been reported in the region. Regarding minor events, affected property owners, local governments, and businesses generally make any necessary repairs.

Infrequent or occasional events will continue to cause minor damage to paved areas and foundations in the ADLM L region due to swelling soils, but it is unlikely that these damages will become greater in the future. New development should implement construction practices to lessen these impacts. The HMPC determined that damage to assets in the planning area is unlikely in any given year; the concern with this hazard is the cumulative effect of shrinking and swelling over many years.

Magnitude and Severity

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. As indicated previously, individual property owners, local governments, and businesses pay for repairs to minor damages caused by this hazard. Underground utility lines such as water and sewer pipes are also at risk to damages associated with expansive soils. While all jurisdictions remain at risk, the primary concern is event damages that occur gradually over time. That said, there is no data to support damages and costs associated with this hazard. This hazard does not impact human safety.

Additional future development in the planning area will also be vulnerable to this hazard. That said, it is possible to build successfully and safely on expansive soils if stable moisture content can be maintained, or if the building can be insulated from any soil volume change that might occur. The procedure for future development efforts to mitigate the risk to structures is as follows (source: <https://geology.com>):

- Testing to identify any problems.
- Design to minimize moisture content changes and insulate from soil volume changes.
- Build in a way that will not change the moisture conditions of the soil.
- Maintain a constant moisture environment after construction.

Warning Time

The warning time for expansive soils is consistent with other geologic hazards that occur slowly overtime.

Duration

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.

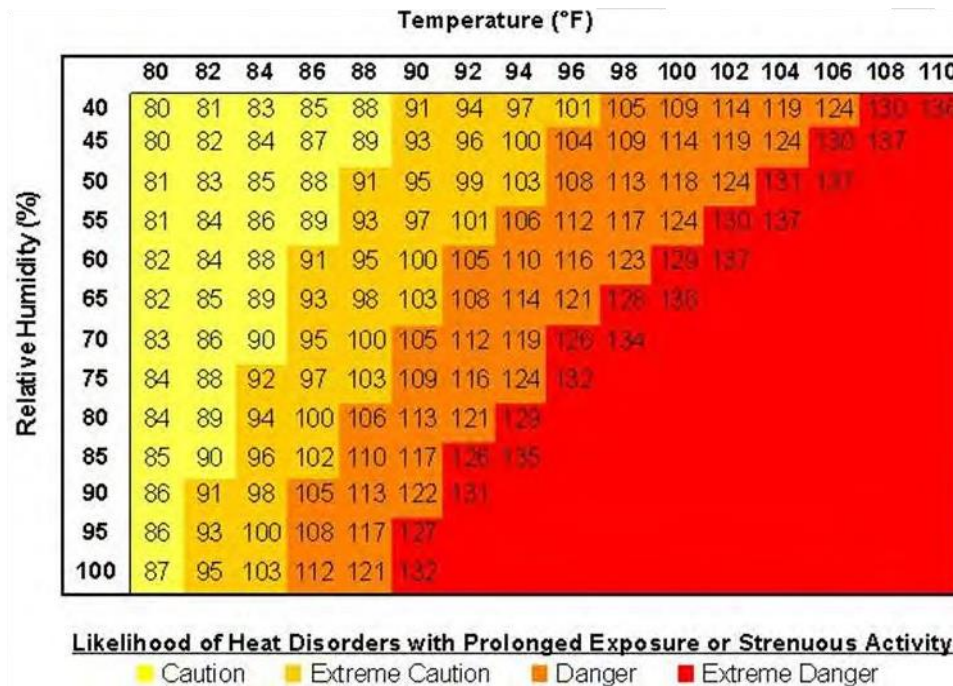
Exhibit 45: Expansive Soils Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	1	1	1	1.45	Low
Centerville	2	1	1	1	1.45	Low
Centerville Community Schools	2	1	1	1	1.45	Low
Cincinnati	3	1	1	1	1.9	Low
Exline	3	1	1	1	1.9	Low
Moravia	2	1	1	1	1.45	Low
Moravia Community School	2	1	1	1	1.45	Low
Moulton	2	1	1	1	1.45	Low
Mystic	3	1	1	1	1.9	Low
Plano	3	1	1	1	1.9	Low
Rathbun	3	1	1	1	1.9	Low
Udell	3	1	1	1	1.9	Low
Unionville	3	1	1	1	1.9	Low
Moulton-Udell Community School	2	1	1	1	1.45	Low
MercyOne Medical	2	1	1	1	1.45	Low
Davis Unincorp Co	3	1	1	1	1.9	Low
Davis Co Community Schools	2	1	1	1	1.45	Low
Bloomfield	2	1	1	1	1.45	Low
Drakesville	3	1	1	1	1.9	Low
Floris	3	1	1	1	1.9	Low
Pulaksi	3	1	1	1	1.9	Low
Lucas Unincorp Co	3	1	1	1	1.9	Low
Chariton	2	1	1	1	1.45	Low
Chariton Community Schools	2	1	1	1	1.45	Low
Derby	3	1	1	1	1.9	Low
Lucas	3	1	1	1	1.9	Low
Russell	3	1	1	1	1.9	Low
Williamson	3	1	1	1	1.9	Low
Lucas Co Health Center	2	1	1	1	1.45	Low
Monroe Unincorp Co	3	1	1	1	1.9	Low
Albia	2	1	1	1	1.45	Low
Albia Community Schools	2	1	1	1	1.45	Low
Eddyville	3	1	1	1	1.9	Low
Lovilia	3	1	1	1	1.9	Low
Melrose	3	1	1	1	1.9	Low
Monroe Co Hospital	2	1	1	1	1.45	Low

E.) Extreme Heat

Extreme heat is a temperature hotter or more humid than average for a location at that time of year. This includes three successive days of 90+ degrees Fahrenheit or one day with a temperature or heat index more than 100 degrees Fahrenheit.

Exhibit 46: Heat Index (HI) Chart



Source: National Weather Service (NWS) 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.

Potential Hazard Area

The potential hazard area for an extreme heat event in the ADLM region will cover all four counties. The table below summarizes the maximum population and building exposure to Extreme Heat. The health of the public and the economic impact on the agricultural community are the primary concerns with extreme heat. The segments of the public most at risk from extreme heat are the elderly, the young, and individuals living below the poverty line. The estimated number of affected people in Exhibit 47 is derived from the 2018 ACS. Those included in this calculation are residents over 65 years, children under 18 years, individuals living below the poverty line and people living with a diagnosed disability. Economic impact on the agricultural sector could result from the damage to animals and crops. Livestock is particularly vulnerable to the effects of the extreme heat and there are approximately 125,000 cattle and 200,000 hogs. Roads, bridges, and railroad tracks are also susceptible to damage from extreme heat. The HMGP committee believes that the major effect of an extreme heat will be on livestock and crops. Livestock is particularly vulnerable. The 2017 Agricultural Census reports that the estimated ag products sold regionally totals approximately \$91,317 by farm. Transportation facilities are also vulnerable to extreme heat. Most common type of damage is road buckles.

Exhibit 47: ADLM Region Vulnerable Population - Extreme Heat
2019 ACS

Jurisdictions	Population 65yrs & older	% Over 65yrs	Population 18 years & younger	% Under 18yrs	Population living below poverty guidelines	% In poverty	Residents living with a diagnosed disability	% With Disability
TOTAL APPANOOSE COUNTY	2884	23%	2788	22%	2200	18%	2375	19%
TOTAL DAVIS COUNTY	1555	17%	2621	29%	868	10%	1037	12%
TOTAL LUCAS COUNTY	1787	22%	2002	23%	1015	12%	1435	27%
TOTAL MONROE COUNTY	1533	20%	1840	24%	809	11%	962	13%
TOTAL REGIONAL	7759	21%	9251	25%	4892	13%	3671	18%

Historical Occurrences

From 2010-2019, ADLM region has experienced three heat events and one excessive heat event. The region was fortunate not to experience any deaths or injuries. There was approximately \$135,000 in property damage and no crop damage Refer to Exhibit 46. As defined by the NCEI, a heat event is whenever heat index values meet or exceed locally established advisory thresholds. A heat event does not fully meet the description of an extreme heat even in Iowa, but data from NCEI is included because it is for other natural hazards in the risk assessment and contains records of losses- although none were reported.

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	135.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/15/2011	18:00	CST-6	Excessive Heat		0	0	135.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/20/2016	13:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	07/18/2019	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
Totals:								0	0	135.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	135.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/15/2011	18:00	CST-6	Excessive Heat		0	0	135.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/20/2016	13:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	07/18/2019	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
Totals:								0	0	135.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	135.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/15/2011	18:00	CST-6	Excessive Heat		0	0	135.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/20/2016	13:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	07/18/2019	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
Totals:								0	0	135.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	135.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	07/15/2011	18:00	CST-6	Excessive Heat		0	0	135.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	07/20/2016	13:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	07/18/2019	12:00	CST-6	Excessive Heat		0	0	0.00K	0.00K
Totals:								0	0	135.00K	0.00K

Data from the National Oceanic and Atmospheric Administration's (NOAA) Surface Data Hourly Global (SDHG) data set contains hourly weather data that includes temperature and relative humidity. With this data, the circumstances for an extreme heat event described in the hazard definition were identified.

Probability

Historical occurrences indicate that extreme heat events are occasional in the ADLM region. Higher than normal temperatures due to climate change may increase the likelihood of an extreme heat event occurring in the state and ADLM region. The probability is likely, greater than 20% and up to 33% in any given year.

Magnitude and Severity

An extreme heat event typically affects a large geographic area, sometimes as large as an entire region in the United States. If an extreme heat event were to occur in the ADLM region, a greater geographic area. Humans, outdoor pets, and livestock are vulnerable during extreme heat events. Heatstroke, sunstroke, cramps, exhaustion, and fatigue can be caused by prolonged heat exposure and/or physical activity. Certain groups of people like the young, elderly, and outdoor workers are especially vulnerable to extreme heat events.

Rurals areas could see significant impact of livestock loss and reduced crop yields. Extreme heat events can damage buildings and infrastructure, which can result in shutdown of facilities for an extended period. Based on historical occurrences, the magnitude and severity of an extreme heat in the ADLM would likely be limited although the impacts could be more severe.

Warning Time

Extreme heat events are predictable within a few degrees approximately three days before the event may occur. Variations in local conditions can affect the actual temperature within a matter of hours or even minutes so warning time may be less. Win as much warning time as possible, the National Weather Service will initiate alert procedure when the heat index is expected to exceed 105 degrees for at least two consecutive days.

Duration

An extreme heat event is three consecutive days with 90+ degree Fahrenheit temperature or one day with a 100+ degree Fahrenheit temperature or heat index. Based on past extreme heat events in the state and ADLM region, an event can last a week or longer.

Exhibit 48: Jurisdictional Extreme Heat Hazard Scoring

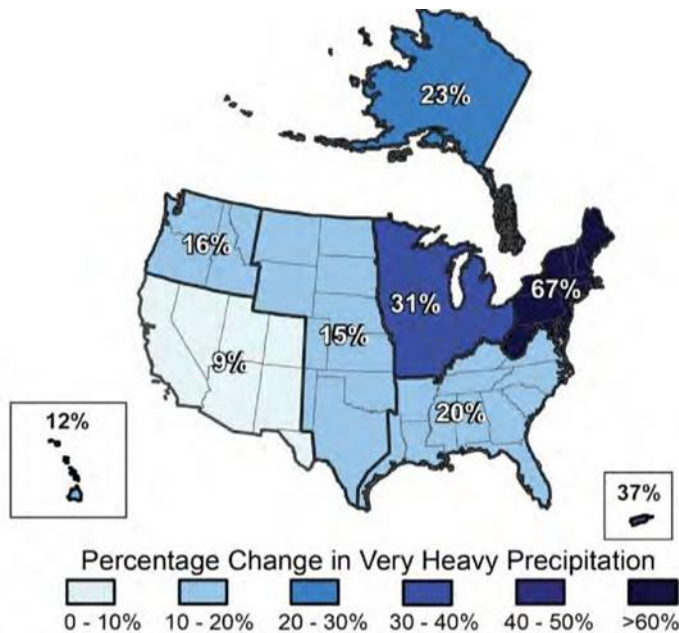
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	3	2	1	4	2.5	Moderate
Centerville	4	1	1	3	2.55	Moderate
Centerville Community Schools	3	2	1	3	2.5	Moderate
Cincinnati	2	2	1	3	1.95	Low
Exline	2	2	1	3	1.95	Low
Moravia	2	1	2	3	1.8	Low
Moravia Community School	3	2	1	3	2.5	Moderate
Moulton	2	1	2	3	1.8	Low
Mystic	3	1	1	3	2.1	Moderate
Plano	4	2	1	4	2.95	Moderate
Rathbun	4	2	1	4	2.95	Moderate
Udell	4	2	1	4	2.95	Moderate
Unionville	2	2	2	3	2.1	Moderate
Moulton-Udell Community School	3	2	1	3	2.5	Moderate
MercyOne Medical	4	1	1	3	2.55	Moderate
Davis Unincorp Co	4	2	1	4	2.95	Moderate
Davis Co Community Schools	4	2	1	4	2.95	Moderate
Bloomfield	4	2	1	4	2.95	Moderate
Drakesville	4	2	1	4	2.95	Moderate
Floris	4	2	1	4	2.95	Moderate
Pulaksi	4	2	1	4	2.95	Moderate
Lucas Unincorp Co	2	3	1	4	2.35	Moderate
Chariton	4	2	1	3	2.85	Moderate
Chariton Community Schools	2	1	3	1	1.6	
Derby	4	3	1	3	3.15	High
Lucas	4	1	3	3	2.85	Moderate
Russell	3	2	1	3	2.45	Moderate
Williamson	2	2	1	3	1.95	Low
Lucas Co Health Center	3	2	3	3	2.7	Moderate
Monroe Unincorp Co	4	1	1	4	2.65	Moderate
Albia	3	2	1	4	2.5	Moderate
Albia Community Schools	3	2	1	3	2.4	Moderate
Eddyville	2	2	2	2	2.0	Moderate
Lovilia	1	1	1	2	1.1	Low
Melrose	2	1	4	4	2.2	Moderate
Monroe Co Hospital	3	3	2	4	2.95	Moderate

F.) Flood (Flash & River)

In a flash flood event, water levels rise at an extremely fast rate with minimal to no warning. Common causes include heavy precipitation over a short period of time, rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces like pavement. Exhibit 49 displays a significant increase for occurrences of heavy precipitation events for the upper Midwest, including all of Iowa.

In a river flood event, water levels of a tributary or body of water exceed capacity and cover adjacent land that is not typically covered by water. In this plan, flooding of creeks and other water bodies is included in this hazard.

Exhibit 49: 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

Potential Hazard Area

The potential hazard areas for a flood are generally the areas designated as a floodplain by the Federal Emergency Management Agency. Refer to the risk assessment maps. The flood hazard layer is also shown in the critical facilities map for each jurisdiction. It should be noted that flooding is not limited to designated floodplains because uncommon climate conditions and changes in development patterns can affect what areas ultimately experience water inundation.

Vulnerable Locations/Buildings

Appanoose County:

In river flooding events, the flood plains and flood zones are at the most risk, but this is not necessarily the case for flash floods as detailed previously. Several unincorporated communities are located close to or in low-lying areas around rivers or streams. Because boundaries of the unincorporated communities are not readily available, approximate area of these communities is not given.

Exhibit 50: Appanoose County Vulnerable Flood Communities

Name	Approx. Area
Centerville	15-20%
Mystic	5%
Plano	1%
Rathbun	5%
Unionville	1%

Appanoose County- River Flooding

Centerville – River Flooding

The greatest River Flooding threat comes from Cooper Creek, Manson Branch, and Cathedral Creek that all extend into the city limits of Centerville. Cooper Creek wraps around the northern perimeter of the city and follows the western city limits. It enters agricultural regions with limited damage to residential or commercial buildings. Manson Branch would affect less than 10 residents and 1 business, Cathedral Creek would affect less than 100 residents.

Mystic –River Flooding

Walnut Creek intersects the southern half of the city limits. There are tributaries that extend up through the center of the city along South 1st Street, South 3rd Street, South 4th Street, South 6th Street, and along the east-west roads of Willow Lane, Low Road, Main Street, Cave Street, Bank Street, and East Lodwick Street.

Plano – River Flooding

The far northeast corner of the city limits has Little Walnut Creek passing through it. Although no structures are within the estimated range to be damage, the city's lagoon cells are on the edge of the possible hazard territory.

Rathbun – River Flooding

Walnut Creek and Little Walnut Creek are tributaries of the near-by Chariton River. Both creeks wrap around 75% of the city limits. The community's structures are primarily located on a hill. Most river damage would be to the roadways, bridges, and the railroad line.

Unionville –River Flooding

North Fox Creek is located at the base of a hill to the south of Unionville's residents. The creek does enter the community's city limit but does not place any structures at risk.

Davis County- River Flooding

Previous Flooding Occurrence Details by Jurisdiction

The following section provides previous major occurrences in the jurisdictions and unincorporated places within Davis County. First, major historical events for the county are described, followed by reported events for each city/location.

Davis County

Countywide there have been minor, medium, and large-size flooding events over the years. For example, there was one major event that started May 22 of 2004 as rainfall overflow, which ended up costing farmers across Iowa about \$15.2 million dollars. River flooding led to both inundation and oversaturation of crops, preventing planting, and ruining growing crops. This was Iowa's greatest flooding event since 1993, and, coupled with a tornado of scale F2, produced significant damage to many communities in the northern parts of the State (among others).

Bloomfield

In May of 1998, severe thunderstorms caused lowland flooding through various areas in Davis, particularly Bloomfield, causing nearly 3 inches of rain in under 3 hours. Crop damages accounted for about \$5,000 in losses.

Floris

During late April of 2007, a thunderstorm event turned into flash flooding that caused roads to be washed out and flooded. Losses were incurred in people's homes too. Rivers, as a result, were being flooded as well with this 2 to 7-inch flood. The estimated property damages added up to \$250,000, even though the event only lasted about 12 hours.

Pulaski

In mid-September of 2008 there was a heavy rainfall event that caused about 4 inches of water to be accumulated in the area, both causing flash floods and river flooding. Highways were closed due to safety concerns, and property damages totaled about \$50,000.

Unincorporated Areas

A major event affecting the western side of the State began mid-June of 2010. Heavy rainfall caused considerable crop losses across the state, totaling around \$1 billion in corn and soybean alone. While the crop losses were not directly tied to riverine flooding, flooding in general caused significant damages; Davis was one of the counties that signed a petition to have the President approve an official Disaster Declaration.

Exhibit 51: Davis County Vulnerable Flood Communities

Name	Approx. Area
Davis County	15%
Bloomfield	5%
Drakesville	0%
Floris	25%
Pulaski	0%

Lucas County- River Flooding

In River Flooding events, the flood plains and flood zones are at the most risk, but this is not necessarily the case for Flash Floods as detailed previously. Three communities (Chariton, Lucas, & Russell) in the county have flood plain maps and the flood zone boundaries on each are only approximate. See Exhibit 52. However, permanent rivers or streams only pass through two of these communities. The Chariton River passes through the south edge of Chariton and places few structures at risk. The Chariton Community School and Lucas County Health Center are not located near this area (and are on the opposite side of the city). White Breast Creek passes through the south edge of Lucas. The area of Lucas Bottoms, a low-lying wetland that White Breast Creek intersects and frequently floods. There are 2 businesses that are located on the edge of Lucas Bottoms. Additionally, several unincorporated communities are located close to or in low-lying areas around rivers or streams. Because boundaries of the unincorporated communities are not readily available, approximate area of these communities is not given. There are eight rivers and/or creeks that pass through the county that can create a situation of flooding.

Given the 1) rolling hill nature of Lucas County, 2) state highways pass through low-lying areas containing rivers or streams, and 3) the limited number of goods and services available in the county, severe flooding would impact most of the county. This was evidenced in the 2008 floods. Some of this impact is limited to traveling inconveniences.

FEMA has delineated the probable extent of the 100-year flood hazard areas in most areas. These flood insurance rate maps (FIRMS) show properties affected by the floods that have at least a 1% chance of occurring in any particular year. Generally, these areas are in the floodplain or adjacent areas. Much of these areas are parkland, agricultural, or conservation land. But residential and commercial areas are impacted by river flooding as well. Approximately 10 – 15% of the county is in low-lying areas where permanent rivers or streams pass through.

Exhibit 52: Lucas County Vulnerable Flood Communities

Name	Approx. Area
Chariton	1-3%
Lucas	5-7%
Russell	3%
Unincorporated Co	20%

Chariton River flows west to east along the southern half of Lucas County and often experiences flooding during periods of excessive moisture. There are 100 miles of roadways at 46 locations that have been affected by flooding in the past. Lucas county has now designed those roads to have a low spot that will wash out before any nearby bridge would suffer damage. This situation may not be ideal for handling flooding situations, but it is currently the most cost-effective approach at this time. The county has received FEMA disaster assistance to recover and rebuild the roadways.

Chariton- River Flooding- The Chariton River passes through the south edge of Chariton and White Breast Creek passes through the south edge of Lucas. The area of Lucas Bottoms, a low-lying wetland that White Breast Creek intersects and frequently floods. There are 2 businesses that are located on the edge of Lucas Bottoms.

Lucas – River Flooding -White Breast Creek passes through the very south edge of the community. There has been little flooding associated from this creek but there is the potential. This creek does pass through a wetland that is adjacent to State Highway 34. The Lucas Bottoms has had multiple flooding events.

Russell – River Flooding - Iowa DNR has released maps showing flood hazards in Russell (See Appendix A). There are two spurs of Honey Creek that enter the city limits from the east side. The southern spur runs along the edge of the residential structures for approximately ten city blocks or 90% the length of the community. The second spur is diagonal in the far southeast corner of the city limits. There are few structures near this creek.

Monroe County- River Flooding

Unincorporated County-River Flooding

Nearly all areas of concern are in the rural region of the county. The most vulnerable region of the unincorporated community is the northeast corner of the county that does include the Iowa Bioprocessing Center industries of Cargill, Ajinomoto Co., and Ajinomoto Heartland. The property is adjacent to the Des Moines River but is surrounded by a berm. The industries are very guarded in releasing any information regarding their facilities, risks, or procedures.

Exhibit 53: Monroe County Vulnerable Flood Communities	
Name	Approx. Area
Monroe County	5%
Albia	1%
Lovilia	0%
Melrose	45%

River flooding risk also includes Hiteman of greatest concern because it lies just on the outer edge of the 100-year flood plain. Also at risk are the seasonal residents that reside in the regions of Green Acres, Lazy Daz Ranch, and Lazy Daz Ranch Estates because of their location near the tributaries that lead into the adjacent tail waters of Lake Rathbun. See Exhibit 53. Past flooding events of 2008 and 2010 have primarily affected the roads and agricultural land. There are no

repetitive loss properties identified at this time. Cedar Creek commonly experiences flooding as it flows north to south and crosses approximately 75% the county’s length. This creek can solely affect 5 villages in the unincorporated region. There are structures in low lying areas along Cedar and White Creek. Cedar Creek extends from the west county line to near the middle of Monroe County, then northwest to the north county line. Along this path, potential flooding could affect 12 county bridges, 1 road area, and 1 state highway bridge. White Creek extends from the west county line to the northeast and joins Cedar Creek. There are approximately 8 county bridges that could be impacted and 2 possible road areas that could experience a slight potential.

Melrose – River Flooding

Cedar Creek enters the south quarter of city limits. See Appendix A. This prediction of 100 year and 500 year estimated flood plains near Cedar Creek to clearly show the potential for damage along the railroad line, both sides of Main Street, and the complete southern quarter of the community. No repetitive loss of properties.

Repetitive Loss Properties

There are certain areas of the region that have been damaged by flood events. Some properties have been damage by multiple flood events. These properties are considered “repetitive flood loss properties”. The technical definition for repetitive loss property as defined by the National Flood Insurance Program (NFIP), is a property that has received two or more claim payments through NFIP of more than \$1,000 within a ten-year period. As of November of 2020, there have been 0 repetitive loss properties in the ADLM region.

Exhibit 54: Federal Emergency Management Agency*CVPD Communities Participating in National Flood Program*

CID#	Community Name	County	Initial FIRM ID
190843	Appanoose Unincorp Co	Appanoose	2/16/2018
190009	Centerville	Appanoose	7/2/1987
195223	Cincinnati	Appanoose	2/16/2018
190010	Mystic	Appanoose	1/1/1987
195219	Rathbun	Appanoose	2/16/2018
190923	Unionville	Appanoose	7/1/1988
190861	Davis Unincorp Co	Davis	4/4/2018
190938	Bloomfield	Davis	4/4/2018
190080	Floris	Davis	4/4/2018
190885	Lucas Unincorp Co	Lucas	2/16/2018
190195	Chariton	Lucas	2/1/2018
190196	City of Lucas	Lucas	2/16/2018
190649	Russell	Lucas	5/1/1988
190894	Monroe Unincorp Co	Monroe	2/16/2018
190541	Albia	Monroe	2/16/2018
190465	Melrose	Monroe	7/2/1987

Historical Occurrences

The ADLM region had 108 river flooding events occurring between 2000-2019. There were no deaths or injuries associated with the flood events, but there was over \$9.6 million in property and crop damage. Refer to Exhibit 55. Significant property damage was recorded for the river flood events from 2008-2010.

Exhibit 55: Regional River Flooding Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	River Flooding	0	0	\$1.27M	\$20.78M
Davis County	2000-2019	River Flooding	0	0	\$792.5K	\$20.473M
Lucas County	2000-2019	River Flooding	0	0	\$2.373M	\$31.358M
Monroe County	2000-2019	River Flooding	0	0	\$2.268M	\$20.648M
REGIONAL TOTALS	2000-2019	River Flooding	0	0	\$6.7M	\$93.26M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	1.270M	20.778M
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/24/2001	12:00	CST	Flood		0	0	7.50K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	03/15/2001	15:00	CST	Flood		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	03/23/2001	18:00	CST	Flood		0	0	7.50K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	10/23/2001	03:00	CST	Flood		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	05/22/2004	18:00	CST	Flood		0	0	100.00K	298.04K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	05/13/2005	02:00	CST	Flood		0	0	30.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	04/26/2007	06:00	CST-6	Flood		0	0	250.00K	0.00K
MOULTON ARPT	APPANOOSE CO.	IA	08/24/2007	04:30	CST-6	Flood		0	0	25.00K	50.00K
MOULTON ARPT	APPANOOSE CO.	IA	06/13/2008	11:00	CST-6	Flood		0	0	10.00K	10.00K
MOULTON ARPT	APPANOOSE CO.	IA	07/08/2008	03:39	CST-6	Flood		0	0	5.00K	0.00K
MOULTON ARPT	APPANOOSE CO.	IA	07/28/2008	01:54	CST-6	Flood		0	0	10.00K	5.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	10/29/2009	22:00	CST-6	Flood		0	0	0.00K	25.00K
ICONIUM	APPANOOSE CO.	IA	06/12/2010	12:00	CST-6	Flood		0	0	0.00K	20.000M
MYSTIC	APPANOOSE CO.	IA	06/15/2010	14:10	CST-6	Flood		0	0	10.00K	0.00K
DARBYVILLE	APPANOOSE CO.	IA	06/15/2010	19:49	CST-6	Flood		0	0	10.00K	0.00K
MOULTON ARPT	APPANOOSE CO.	IA	07/05/2010	14:07	CST-6	Flood		0	0	25.00K	10.00K
MOULTON ARPT	APPANOOSE CO.	IA	07/20/2010	03:52	CST-6	Flood		0	0	10.00K	25.00K
MOULTON ARPT	APPANOOSE CO.	IA	08/13/2010	21:22	CST-6	Flood		0	0	5.00K	5.00K
MOULTON ARPT	APPANOOSE CO.	IA	06/27/2011	00:00	CST-6	Flood		0	0	5.00K	0.00K
LACONA	APPANOOSE CO.	IA	06/25/2015	04:22	CST-6	Flood		0	0	250.00K	250.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	06/25/2015	05:57	CST-6	Flood		0	0	100.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	05/28/2019	22:00	CST-6	Flood		0	0	250.00K	100.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	09/29/2019	15:30	CST-6	Flood		0	0	150.00K	0.00K
Totals:								0	0	1.270M	20.778M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	792.50K	20.473M
DAVIS (ZONE)	DAVIS (ZONE)	IA	06/24/2000	03:00	CST	Flood		0	0	50.00K	75.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	03/15/2001	15:00	CST	Flood		0	0	5.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	03/23/2001	18:00	CST	Flood		0	0	7.50K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	05/22/2004	18:00	CST	Flood		0	0	100.00K	298.04K
DAVIS (ZONE)	DAVIS (ZONE)	IA	05/13/2005	02:00	CST	Flood		0	0	30.00K	0.00K
FLORIS	DAVIS CO.	IA	04/26/2007	06:00	CST-6	Flood		0	0	250.00K	0.00K
PULASKI	DAVIS CO.	IA	09/13/2008	07:00	CST-6	Flood		0	0	50.00K	0.00K
ASH GROVE	DAVIS CO.	IA	06/12/2010	12:00	CST-6	Flood		0	0	0.00K	20.000M
ASH GROVE	DAVIS CO.	IA	05/28/2019	22:00	CST-6	Flood		0	0	300.00K	100.00K
Totals:								0	0	792.50K	20.473M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	2.373M	21.358M
LUCAS (ZONE)	LUCAS (ZONE)	IA	06/24/2000	03:00	CST	Flood		0	0	50.00K	75.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/24/2001	12:00	CST	Flood		0	0	7.50K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	03/15/2001	15:00	CST	Flood		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	03/23/2001	18:00	CST	Flood		0	0	7.50K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	04/07/2001	21:00	CST	Flood		0	0	150.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/11/2001	06:00	CST	Flood		0	0	25.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/31/2001	15:00	CST	Flood		0	0	2.50K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	06/05/2001	03:00	CST	Flood		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	06/12/2001	15:00	CST	Flood		0	0	25.00K	50.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	10/23/2001	03:00	CST	Flood		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/11/2002	06:00	CST	Flood		0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/04/2003	12:00	CST	Flood		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/09/2003	06:00	CST	Flood		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/22/2004	18:00	CST	Flood		0	0	100.00K	298.04K
LUCAS (ZONE)	LUCAS (ZONE)	IA	05/13/2005	02:00	CST	Flood		0	0	30.00K	0.00K
CHARITON	LUCAS CO.	IA	02/24/2007	23:00	CST-6	Flood		0	0	5.00K	0.00K
CHARITON	LUCAS CO.	IA	04/25/2007	07:45	CST-6	Flood		0	0	25.00K	0.00K
LUCAS	LUCAS CO.	IA	04/26/2007	06:00	CST-6	Flood		0	0	250.00K	0.00K
CHARITON	LUCAS CO.	IA	05/06/2007	14:15	CST-6	Flood		0	0	25.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	05/07/2007	04:59	CST-6	Flood		0	0	300.00K	0.00K
RUSSELL	LUCAS CO.	IA	08/24/2007	03:30	CST-6	Flood		0	0	25.00K	50.00K
RUSSELL	LUCAS CO.	IA	03/02/2008	13:15	CST-6	Flood		0	0	50.00K	0.00K
RUSSELL	LUCAS CO.	IA	03/03/2008	06:00	CST-6	Flood		0	0	50.00K	0.00K
RUSSELL	LUCAS CO.	IA	04/08/2008	19:00	CST-6	Flood		0	0	25.00K	0.00K

RUSSELL	LUCAS CO.	IA	04/18/2008	02:00	CST-6	Flood	0	0	25.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/11/2008	09:45	CST-6	Flood	0	0	0.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/24/2008	15:22	CST-6	Flood	0	0	0.00K	20.00K
RUSSELL	LUCAS CO.	IA	05/30/2008	20:00	CST-6	Flood	0	0	0.00K	10.00K
RUSSELL	LUCAS CO.	IA	06/05/2008	23:59	CST-6	Flood	0	0	10.00K	50.00K
RUSSELL	LUCAS CO.	IA	06/26/2008	10:53	CST-6	Flood	0	0	10.00K	50.00K
RUSSELL	LUCAS CO.	IA	07/18/2008	10:02	CST-6	Flood	0	0	10.00K	5.00K
RUSSELL	LUCAS CO.	IA	07/25/2008	05:33	CST-6	Flood	0	0	10.00K	100.00K
LUCAS	LUCAS CO.	IA	07/25/2008	07:35	CST-6	Flood	0	0	25.00K	25.00K
LUCAS	LUCAS CO.	IA	07/25/2008	13:13	CST-6	Flood	0	0	25.00K	50.00K
RUSSELL	LUCAS CO.	IA	08/01/2008	00:00	CST-6	Flood	0	0	0.00K	25.00K
RUSSELL	LUCAS CO.	IA	09/12/2008	22:27	CST-6	Flood	0	0	5.00K	25.00K
CHARITON	LUCAS CO.	IA	09/13/2008	07:00	CST-6	Flood	0	0	50.00K	0.00K
RUSSELL	LUCAS CO.	IA	11/07/2008	10:58	CST-6	Flood	0	0	0.00K	5.00K
RUSSELL	LUCAS CO.	IA	12/26/2008	21:13	CST-6	Flood	0	0	5.00K	0.00K
RUSSELL	LUCAS CO.	IA	03/08/2009	08:52	CST-6	Flood	0	0	25.00K	0.00K
RUSSELL	LUCAS CO.	IA	03/24/2009	07:03	CST-6	Flood	0	0	25.00K	0.00K
RUSSELL	LUCAS CO.	IA	04/27/2009	00:55	CST-6	Flood	0	0	10.00K	0.00K
LUCAS	LUCAS CO.	IA	04/27/2009	02:00	CST-6	Flood	0	0	20.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/15/2009	12:32	CST-6	Flood	0	0	10.00K	0.00K
RUSSELL	LUCAS CO.	IA	06/08/2009	09:12	CST-6	Flood	0	0	5.00K	10.00K
RUSSELL	LUCAS CO.	IA	07/04/2009	23:42	CST-6	Flood	0	0	10.00K	10.00K
RUSSELL	LUCAS CO.	IA	08/17/2009	14:28	CST-6	Flood	0	0	0.00K	0.00K
RUSSELL	LUCAS CO.	IA	08/27/2009	01:58	CST-6	Flood	0	0	50.00K	10.00K
RUSSELL	LUCAS CO.	IA	10/22/2009	18:05	CST-6	Flood	0	0	0.00K	25.00K
RUSSELL	LUCAS CO.	IA	10/29/2009	20:29	CST-6	Flood	0	0	0.00K	25.00K
RUSSELL	LUCAS CO.	IA	12/25/2009	02:25	CST-6	Flood	0	0	0.00K	0.00K
RUSSELL	LUCAS CO.	IA	03/11/2010	02:06	CST-6	Flood	0	0	10.00K	0.00K
RUSSELL	LUCAS CO.	IA	04/25/2010	02:38	CST-6	Flood	0	0	25.00K	0.00K
NORWOOD	LUCAS CO.	IA	04/25/2010	07:00	CST-6	Flood	0	0	50.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/13/2010	10:47	CST-6	Flood	0	0	5.00K	0.00K
NORWOOD	LUCAS CO.	IA	06/12/2010	12:00	CST-6	Flood	0	0	0.00K	20.000M
CHARITON	LUCAS CO.	IA	06/15/2010	10:00	CST-6	Flood	0	0	150.00K	0.00K
RUSSELL	LUCAS CO.	IA	07/20/2010	07:03	CST-6	Flood	0	0	10.00K	25.00K
RUSSELL	LUCAS CO.	IA	06/27/2011	17:27	CST-6	Flood	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	05/28/2013	21:00	CST-6	Flood	0	0	200.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/29/2013	06:30	CST-6	Flood	0	0	50.00K	0.00K
LUCAS	LUCAS CO.	IA	09/10/2014	05:21	CST-6	Flood	0	0	50.00K	15.00K
NORWOOD	LUCAS CO.	IA	06/25/2015	05:57	CST-6	Flood	0	0	75.00K	0.00K
CHARITON	LUCAS CO.	IA	06/25/2015	06:15	CST-6	Flood	0	0	100.00K	250.00K
DERBY	LUCAS CO.	IA	10/09/2018	12:06	CST-6	Flood	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	10/09/2018	14:45	CST-6	Flood	0	0	50.00K	100.00K
WILLIAMSON	LUCAS CO.	IA	05/28/2019	22:00	CST-6	Flood	0	0	80.00K	50.00K
Totals:							0	0	2.373M	21.358M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	2.268M	20.648M
MONROE (ZONE)	MONROE (ZONE)	IA	06/24/2000	03:00	CST	Flood		0	0	50.00K	75.00K
MONROE (ZONE)	MONROE (ZONE)	IA	03/15/2001	09:00	CST	Flood		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	03/15/2001	15:00	CST	Flood		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	03/23/2001	18:00	CST	Flood		0	0	7.50K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	04/07/2001	21:00	CST	Flood		0	0	150.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	05/11/2001	06:00	CST	Flood		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	06/12/2001	15:00	CST	Flood		0	0	25.00K	50.00K
MONROE (ZONE)	MONROE (ZONE)	IA	10/23/2001	03:00	CST	Flood		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	05/04/2003	12:00	CST	Flood		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	05/09/2003	06:00	CST	Flood		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	05/22/2004	18:00	CST	Flood		0	0	100.00K	298.04K
MONROE (ZONE)	MONROE (ZONE)	IA	05/13/2005	02:00	CST	Flood		0	0	30.00K	0.00K
ALBIA	MONROE CO.	IA	04/26/2007	06:00	CST-6	Flood		0	0	250.00K	0.00K
MELROSE	MONROE CO.	IA	07/28/2008	06:38	CST-6	Flood		0	0	25.00K	0.00K
AVERY	MONROE CO.	IA	03/08/2009	12:20	CST-6	Flood		0	0	10.00K	0.00K
SELECTION	MONROE CO.	IA	04/25/2010	09:00	CST-6	Flood		0	0	0.00K	0.00K
WELLER	MONROE CO.	IA	06/12/2010	12:00	CST-6	Flood		0	0	0.00K	20.000M
AVERY	MONROE CO.	IA	06/15/2010	14:10	CST-6	Flood		0	0	25.00K	0.00K
MELROSE	MONROE CO.	IA	05/28/2013	18:35	CST-6	Flood		0	0	250.00K	0.00K
WELLER	MONROE CO.	IA	09/10/2014	05:58	CST-6	Flood		0	0	100.00K	25.00K
ICONIUM	MONROE CO.	IA	06/25/2015	05:57	CST-6	Flood		0	0	1.030M	100.00K
MELROSE	MONROE CO.	IA	05/28/2019	22:00	CST-6	Flood		0	0	100.00K	100.00K
Totals:								0	0	2.268M	20.648M

Flash Flooding

Flash flooding can occur in any area of the ADLM region. Certain areas have a greater potential to be affected due to factors such as low elevation, nearby waterways, insufficient storm water management, intense urban or agricultural development, etc. All jurisdictions in the planning area have identified at least minor flash flood issues, but most have persistent issues due to insufficient storm water management.

Historical Occurrences

There have been 103 documented flash flood events from 2000-2019. Refer to Exhibit 56 for NCEI data that identifies the area where a flash flood even began and not necessarily the only area impacted by the event.

Exhibit 56: Regional Flash Flooding Data Storm Events Database National Centers for Environmental Information (noaa.gov)						
<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Flash Flooding	0	0	\$3.4M	\$390,000
Davis County	2000-2019	Flash Flooding	0	0	\$1.775M	\$400,000
Lucas County	2000-2019	Flash Flooding	0	0	\$2.545M	\$275,000
Monroe County	2000-2019	Flash Flooding	0	0	\$2.245M	\$200,000
REGIONAL TOTALS	2000-2019	Flash Flooding	0	0	\$9.965M	\$1.265M

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	3.400M	390.00K
COUNTYWIDE	APPANOOSE CO.	IA	06/25/2000	19:00	CST	Flash Flood		0	0	200.00K	50.00K
NORTH PORTION	APPANOOSE CO.	IA	08/03/2001	06:00	CST	Flash Flood		0	0	15.00K	15.00K
UDELL	APPANOOSE CO.	IA	08/23/2007	22:34	CST-6	Flash Flood		0	0	100.00K	50.00K
THIRTY	APPANOOSE CO.	IA	08/23/2007	22:36	CST-6	Flash Flood		0	0	250.00K	10.00K
RATHBUN	APPANOOSE CO.	IA	08/23/2007	23:45	CST-6	Flash Flood		0	0	500.00K	75.00K
STREEPY	APPANOOSE CO.	IA	08/24/2007	03:55	CST-6	Flash Flood		0	0	500.00K	100.00K
CLARKDALE	APPANOOSE CO.	IA	06/03/2008	05:00	CST-6	Flash Flood		0	0	50.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	06/12/2008	18:21	CST-6	Flash Flood		0	0	25.00K	0.00K
NUMA	APPANOOSE CO.	IA	06/13/2008	00:06	CST-6	Flash Flood		0	0	25.00K	0.00K
NUMA	APPANOOSE CO.	IA	07/06/2008	07:00	CST-6	Flash Flood		0	0	25.00K	25.00K
CENTERVILLE	APPANOOSE CO.	IA	07/07/2008	23:35	CST-6	Flash Flood		0	0	25.00K	0.00K
SHARON	APPANOOSE CO.	IA	07/08/2008	00:00	CST-6	Flash Flood		0	0	25.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	07/28/2008	00:20	CST-6	Flash Flood		0	0	25.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	07/04/2009	06:00	CST-6	Flash Flood		0	0	25.00K	10.00K
GARFIELD	APPANOOSE CO.	IA	06/15/2010	09:00	CST-6	Flash Flood		0	0	50.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	06/15/2010	09:15	CST-6	Flash Flood		0	0	100.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	06/15/2010	10:08	CST-6	Flash Flood		0	0	100.00K	0.00K
DARBYVILLE	APPANOOSE CO.	IA	07/04/2010	21:15	CST-6	Flash Flood		0	0	200.00K	0.00K
JEROME	APPANOOSE CO.	IA	07/20/2010	05:30	CST-6	Flash Flood		0	0	25.00K	0.00K
NUMA	APPANOOSE CO.	IA	07/20/2010	05:49	CST-6	Flash Flood		0	0	250.00K	0.00K
EXLINE	APPANOOSE CO.	IA	07/20/2010	05:50	CST-6	Flash Flood		0	0	25.00K	0.00K
DARBYVILLE	APPANOOSE CO.	IA	08/13/2010	17:25	CST-6	Flash Flood		0	0	25.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	09/13/2010	20:00	CST-6	Flash Flood		0	0	50.00K	5.00K
DEAN	APPANOOSE CO.	IA	06/26/2011	21:11	CST-6	Flash Flood		0	0	100.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	06/26/2011	21:30	CST-6	Flash Flood		0	0	500.00K	20.00K
JEROME	APPANOOSE CO.	IA	05/28/2013	20:29	CST-6	Flash Flood		0	0	25.00K	0.00K
MARK	APPANOOSE CO.	IA	09/10/2014	04:00	CST-6	Flash Flood		0	0	25.00K	25.00K
CLARKDALE	APPANOOSE CO.	IA	06/24/2015	21:58	CST-6	Flash Flood		0	0	0.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	06/24/2015	22:22	CST-6	Flash Flood		0	0	0.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/24/2015	22:23	CST-6	Flash Flood		0	0	0.00K	0.00K
ICONIUM	APPANOOSE CO.	IA	07/11/2015	09:45	CST-6	Flash Flood		0	0	100.00K	0.00K
SHARON	APPANOOSE CO.	IA	07/27/2015	15:31	CST-6	Flash Flood		0	0	10.00K	0.00K
EXLINE	APPANOOSE CO.	IA	05/28/2019	18:47	CST-6	Flash Flood		0	0	25.00K	0.00K
SHARON	APPANOOSE CO.	IA	05/28/2019	18:47	CST-6	Flash Flood		0	0	0.00K	0.00K
SHARON	APPANOOSE CO.	IA	09/29/2019	09:30	CST-6	Flash Flood		0	0	0.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	09/29/2019	09:30	CST-6	Flash Flood		0	0	0.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	09/29/2019	09:30	CST-6	Flash Flood		0	0	0.00K	0.00K
Totals:								0	0	3.400M	390.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	0	0	1.775M	400.00K
BLOOMFIELD	DAVIS CO.	IA	06/23/2000	18:15	CST	Flash Flood	0	0	0	150.00K	150.00K
COUNTYWIDE	DAVIS CO.	IA	06/25/2000	19:00	CST	Flash Flood	0	0	0	100.00K	25.00K
NORTHEAST PORTION	DAVIS CO.	IA	08/03/2001	04:00	CST	Flash Flood	0	0	0	50.00K	25.00K
COUNTYWIDE	DAVIS CO.	IA	08/27/2004	01:00	CST	Flash Flood	0	0	0	100.00K	25.00K
FLORIS	DAVIS CO.	IA	08/24/2007	01:30	CST-6	Flash Flood	0	0	0	200.00K	75.00K
PULASKI	DAVIS CO.	IA	08/24/2007	03:25	CST-6	Flash Flood	0	0	0	500.00K	75.00K
BLOOMFIELD	DAVIS CO.	IA	07/08/2008	02:00	CST-6	Flash Flood	0	0	0	75.00K	0.00K
STEBEN	DAVIS CO.	IA	07/08/2008	02:20	CST-6	Flash Flood	0	0	0	25.00K	0.00K
PULASKI	DAVIS CO.	IA	09/13/2008	04:00	CST-6	Flash Flood	0	0	0	50.00K	0.00K
CARBON	DAVIS CO.	IA	08/13/2010	15:00	CST-6	Flash Flood	0	0	0	25.00K	0.00K
BLOOMFIELD ARPT	DAVIS CO.	IA	06/26/2011	18:30	CST-6	Flash Flood	0	0	0	250.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/07/2014	11:53	CST-6	Flash Flood	0	0	0	25.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/07/2014	12:50	CST-6	Flash Flood	0	0	0	25.00K	0.00K
MARK	DAVIS CO.	IA	06/07/2014	14:29	CST-6	Flash Flood	0	0	0	50.00K	0.00K
ASH GROVE	DAVIS CO.	IA	09/10/2014	04:00	CST-6	Flash Flood	0	0	0	25.00K	25.00K
STEBEN	DAVIS CO.	IA	06/22/2015	19:00	CST-6	Flash Flood	0	0	0	25.00K	0.00K
ASH GROVE	DAVIS CO.	IA	05/28/2019	17:14	CST-6	Flash Flood	0	0	0	100.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	09/28/2019	20:20	CST-6	Flash Flood	0	0	0	0.00K	0.00K
Totals:							0	0	0	1.775M	400.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	0	0	2.545M	275.00K
COUNTYWIDE	LUCAS CO.	IA	06/25/2000	19:00	CST	Flash Flood	0	0	0	200.00K	50.00K
LUCAS	LUCAS CO.	IA	05/07/2007	01:45	CST-6	Flash Flood	0	0	0	75.00K	0.00K
CHARITON	LUCAS CO.	IA	07/28/2008	00:15	CST-6	Flash Flood	0	0	0	25.00K	0.00K
DERBY	LUCAS CO.	IA	09/12/2008	21:03	CST-6	Flash Flood	0	0	0	100.00K	0.00K
CHARITON	LUCAS CO.	IA	07/07/2010	17:20	CST-6	Flash Flood	0	0	0	50.00K	0.00K
CHARITON	LUCAS CO.	IA	07/07/2010	18:09	CST-6	Flash Flood	0	0	0	100.00K	0.00K
CHARITON	LUCAS CO.	IA	07/07/2010	18:33	CST-6	Flash Flood	0	0	0	250.00K	0.00K
CHARITON	LUCAS CO.	IA	07/07/2010	19:10	CST-6	Flash Flood	0	0	0	250.00K	0.00K
CHARITON	LUCAS CO.	IA	07/20/2010	02:34	CST-6	Flash Flood	0	0	0	1.000M	100.00K
RUSSELL	LUCAS CO.	IA	05/28/2013	18:11	CST-6	Flash Flood	0	0	0	50.00K	0.00K
RUSSELL	LUCAS CO.	IA	05/28/2013	21:00	CST-6	Flash Flood	0	0	0	50.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	05/28/2013	21:25	CST-6	Flash Flood	0	0	0	50.00K	0.00K
CHARITON	LUCAS CO.	IA	07/21/2013	12:40	CST-6	Flash Flood	0	0	0	250.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	08/23/2014	06:00	CST-6	Flash Flood	0	0	0	25.00K	0.00K
LUCAS	LUCAS CO.	IA	09/10/2014	04:00	CST-6	Flash Flood	0	0	0	50.00K	25.00K
RUSSELL	LUCAS CO.	IA	07/19/2016	14:10	CST-6	Flash Flood	0	0	0	20.00K	100.00K
Totals:							0	0	0	2.545M	275.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	2.245M	200.00K
ALBIA	MONROE CO.	IA	06/23/2000	16:45	CST	Flash Flood		0	0	100.00K	50.00K
COUNTYWIDE	MONROE CO.	IA	06/25/2000	19:00	CST	Flash Flood		0	0	200.00K	50.00K
COUNTYWIDE	MONROE CO.	IA	05/10/2001	20:30	CST	Flash Flood		0	0	150.00K	0.00K
SOUTH PORTION	MONROE CO.	IA	08/03/2001	06:00	CST	Flash Flood		0	0	15.00K	15.00K
AVERY	MONROE CO.	IA	06/13/2008	00:04	CST-6	Flash Flood		0	0	25.00K	0.00K
ALBIA MUNI ARPT	MONROE CO.	IA	06/26/2008	13:00	CST-6	Flash Flood		0	0	25.00K	0.00K
TYRONE	MONROE CO.	IA	06/26/2008	13:00	CST-6	Flash Flood		0	0	5.00K	0.00K
MELROSE	MONROE CO.	IA	06/26/2008	13:00	CST-6	Flash Flood		0	0	10.00K	0.00K
ALBIA	MONROE CO.	IA	07/08/2008	00:00	CST-6	Flash Flood		0	0	10.00K	0.00K
MELROSE	MONROE CO.	IA	07/08/2008	00:20	CST-6	Flash Flood		0	0	30.00K	0.00K
AVERY	MONROE CO.	IA	07/08/2008	01:00	CST-6	Flash Flood		0	0	25.00K	0.00K
SELECTION	MONROE CO.	IA	07/08/2008	02:00	CST-6	Flash Flood		0	0	50.00K	0.00K
ALBIA	MONROE CO.	IA	07/27/2008	23:20	CST-6	Flash Flood		0	0	25.00K	0.00K
HITEMAN	MONROE CO.	IA	07/28/2008	00:00	CST-6	Flash Flood		0	0	10.00K	5.00K
LOVILIA	MONROE CO.	IA	07/28/2008	00:00	CST-6	Flash Flood		0	0	5.00K	5.00K
ALBIA	MONROE CO.	IA	06/15/2010	08:54	CST-6	Flash Flood		0	0	100.00K	0.00K
AVERY	MONROE CO.	IA	06/15/2010	10:00	CST-6	Flash Flood		0	0	25.00K	0.00K
ALBIA	MONROE CO.	IA	06/15/2010	11:00	CST-6	Flash Flood		0	0	100.00K	0.00K
GEORGETOWN	MONROE CO.	IA	08/11/2010	03:26	CST-6	Flash Flood		0	0	10.00K	0.00K
AVERY	MONROE CO.	IA	04/17/2013	17:00	CST-6	Flash Flood		0	0	25.00K	0.00K
WELLER	MONROE CO.	IA	05/28/2013	16:15	CST-6	Flash Flood		0	0	100.00K	0.00K
LOVILIA	MONROE CO.	IA	05/28/2013	16:38	CST-6	Flash Flood		0	0	150.00K	0.00K
AVERY	MONROE CO.	IA	05/28/2013	18:10	CST-6	Flash Flood		0	0	200.00K	0.00K
LOVILIA	MONROE CO.	IA	05/28/2013	19:13	CST-6	Flash Flood		0	0	150.00K	0.00K
MELROSE	MONROE CO.	IA	05/28/2013	19:13	CST-6	Flash Flood		0	0	500.00K	0.00K
ALBIA	MONROE CO.	IA	09/10/2014	03:07	CST-6	Flash Flood		0	0	50.00K	25.00K
SELECTION	MONROE CO.	IA	06/22/2015	18:40	CST-6	Flash Flood		0	0	0.00K	0.00K
MELROSE	MONROE CO.	IA	06/25/2015	01:13	CST-6	Flash Flood		0	0	20.00K	0.00K
MELROSE	MONROE CO.	IA	07/19/2016	14:12	CST-6	Flash Flood		0	0	10.00K	50.00K
HITEMAN	MONROE CO.	IA	05/28/2019	16:57	CST-6	Flash Flood		0	0	10.00K	0.00K
HITEMAN	MONROE CO.	IA	05/28/2019	17:02	CST-6	Flash Flood		0	0	10.00K	0.00K
WELLER	MONROE CO.	IA	05/28/2019	17:14	CST-6	Flash Flood		0	0	100.00K	0.00K
Totals:								0	0	2.245M	200.00K

There were no deaths or injuries due to flash flood events but there was nearly \$10 million in property damage reported across the entire area affected by the hazard events. Of all property damage, \$200,700 occurred during one flash flood event from June to September 2010.

Aside from severe winter storms and thunderstorm, lightning, and hail, flooding is the most persistent hazard that causes substantial damage in the ADLM region. Unlike other weather-related hazards, the areas impacted, and the type of damage sustained is consistent.

Probability

Historical occurrences indicate that flash flood events can occur at least every other year, if not more in the ADLM region. Minor flood events, which are not always reflected in the data available, but occur frequently. The probability estimate is highly likely that a major flash flood event will occur in the ADLM region. This is 33% or greater probability in any given year. River flooding events have an estimated probability is also highly likely, which is 33% in any given year. The probability estimate for flood hazards is based on historical occurrences and local knowledge.

Magnitude and Severity

Flood hazard mapping and vulnerability of life and property to river flooding are well identified in the ADLM region. The Federal Emergency Management Agency (FEMA) has delineated the probable extent of the 100-year flood hazard areas. These maps are Flood Insurance Rate Maps (FIRMs), which show properties that have a 1% chance in any given year to be affected by floods. More information on designated floodplains can be found in the risk assessment maps.

In addition to current FIRMs, the Iowa Flood Center, Iowa Department of Natural Resources (IDNR) and FEMA partnered to develop the Iowa Flood Information System (IFIS). The IFIS is a web interface with interactive flood mapping and forecasting features that can be used to understand potential flood risk. More information can be found at www.iowafloodcenter.org. Flood inundation maps are another tool that has been implemented for Iowa communities and may be available for ADLM jurisdictions. In the future, more detailed flood risk information will be provided through the RiskMap program, which is a partnership between FEMA and IDNR to provide watershed-based information and solutions.

A flash flood event can impact areas far from a tributary or body of water. Streets can become swift moving rivers, and basements can trap residents because flash floods can fill them with water in minutes. Nearly half of all flash flood fatalities are auto related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current.

Buildings, infrastructure, and land can be eroded, extensively damaged, or destroyed in a flood event. Disruption or complete shutdown of essential facilities and services like major travel routes, water distribution and wastewater treatment facilities often occur during severe flood events. Depending on severity, overall disruption may occur just a few hours causing minor inconvenience or up to months causing major environmental and economic impacts in the county and state.

Potential impacts of flooding include injury and loss of life. River flooding does not have as high of risk to human as does flash flooding mostly because of the slow onset of river flooding. People in a flood zone, downstream from a dam or levee, or in low-lying areas are especially vulnerable in any type of flood event. In addition, people located in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be impacted in the event of significant rainfall.

Warning Time

Flash Floods are unpredictable, but there are factors that can indicate the likelihood of a flash flood event occurring in an area. Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure or a sudden release of water held by an ice jam. Weather surveillance radar is being used to improve monitoring capabilities of small rainfall. Knowledge of the watershed characteristics, modeling, monitoring, and warning systems increase the predictability of flash floods. Depending on the location in the watershed, warning times can be increased. The National Weather Service (NWS) forecasts the height of flood crests, the data, and the time the flow is expected to occur at a particular location.

Gauges along streams and rain gauges provide information for flood warnings. Warning is possible for river flood events because a flood usually develops over the course of several days. The NWS provides flood forecasts for Iowa and IFIS provides information and forecasts. Flood warnings are issued over mass notification systems and television stations. People in the path of river floods usually have time to take appropriate actions to limit harm to themselves and property.

Duration

Response to a flash flood event is usually shorter-term relative to a river flood event, requiring just days or weeks depending on the severity of the event. Response to a river flood event is usually extensive and requires days and even up to years to adequately recover.

Risk Assessment Maps

Exhibit 57: Appanoose County NW Quadrant Flood Risk

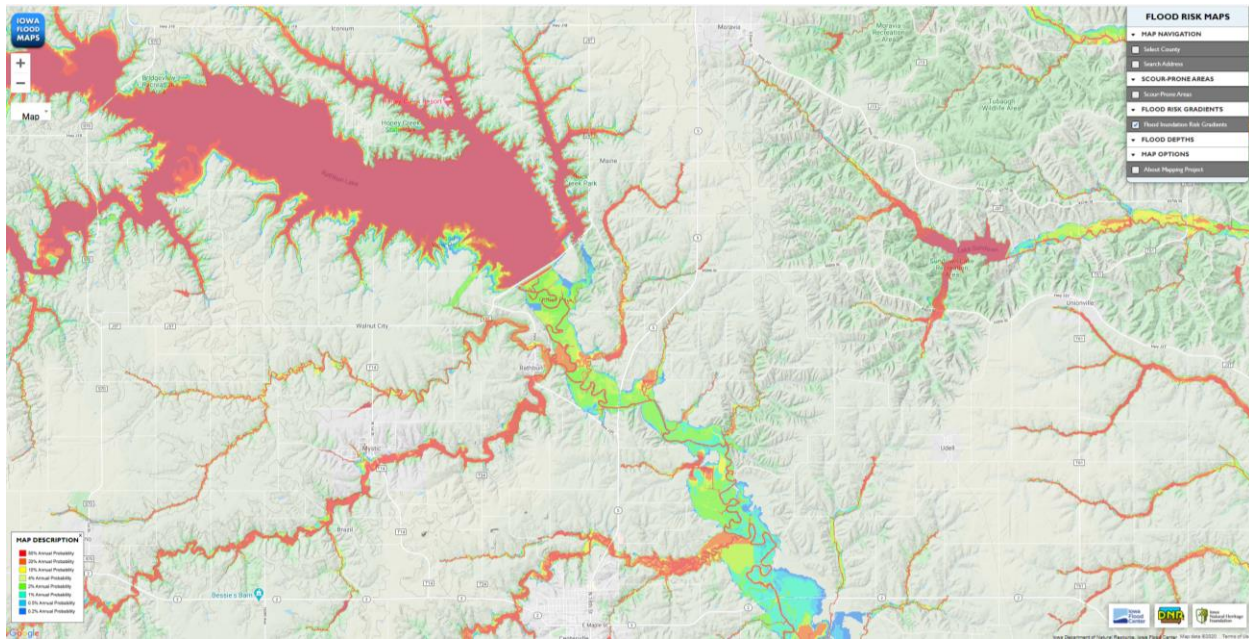


Exhibit 58: Appanoose County NE Quadrant Flood Risk

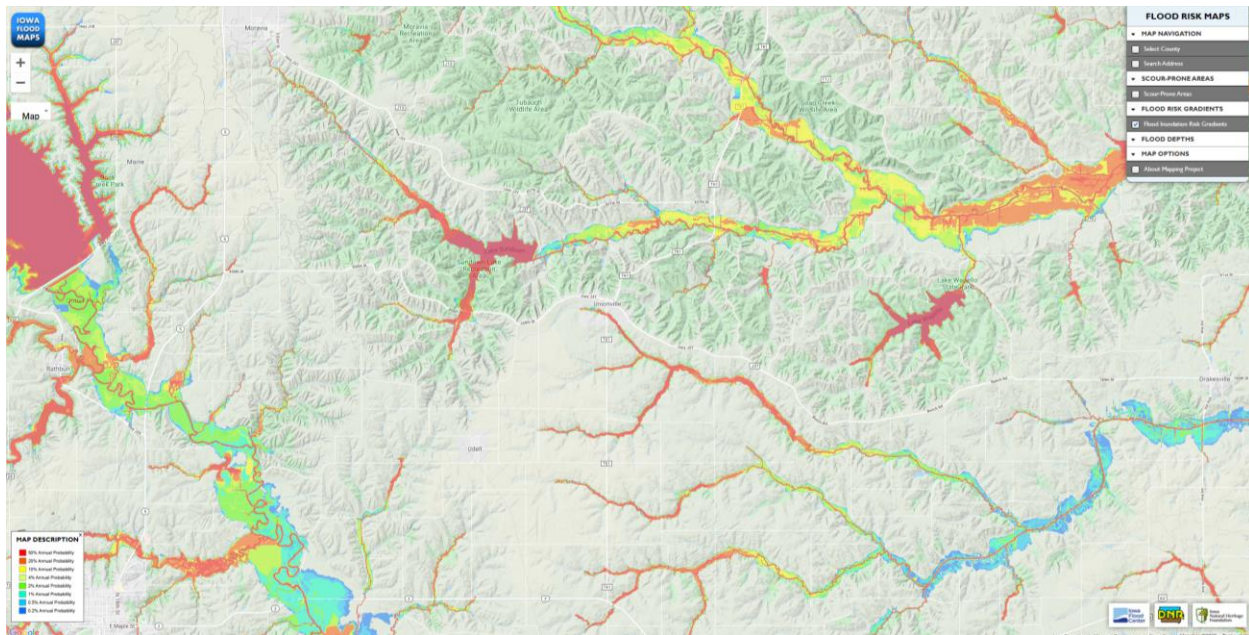


Exhibit 59: Appanoose County SE Quadrant Flood Risk

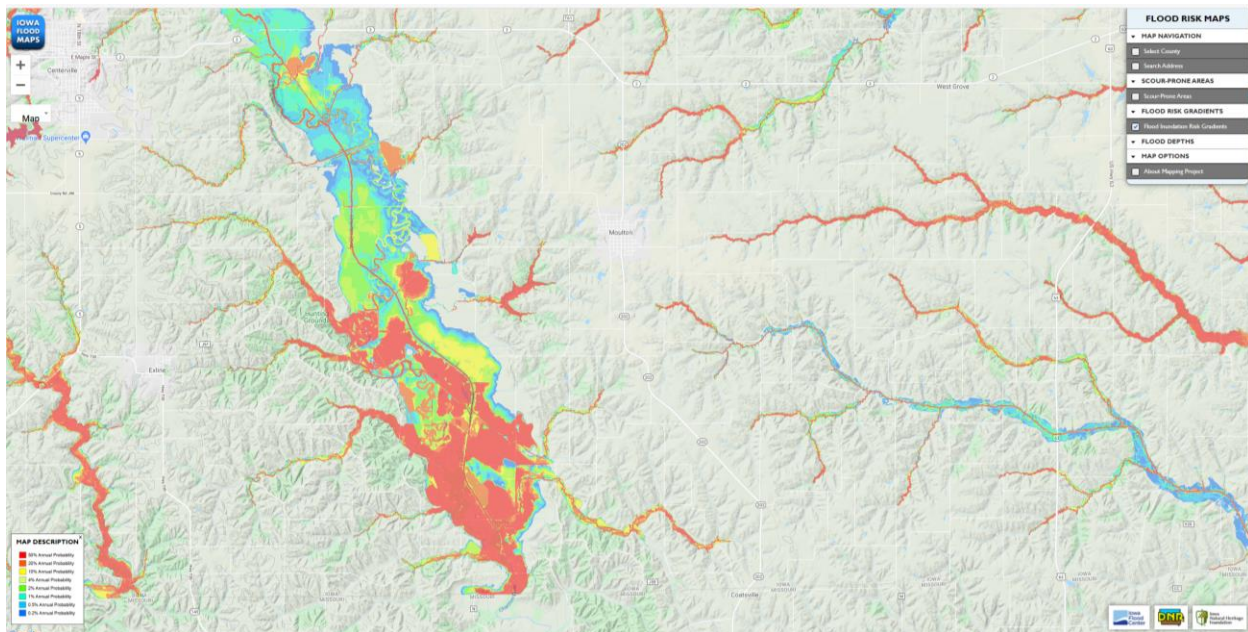
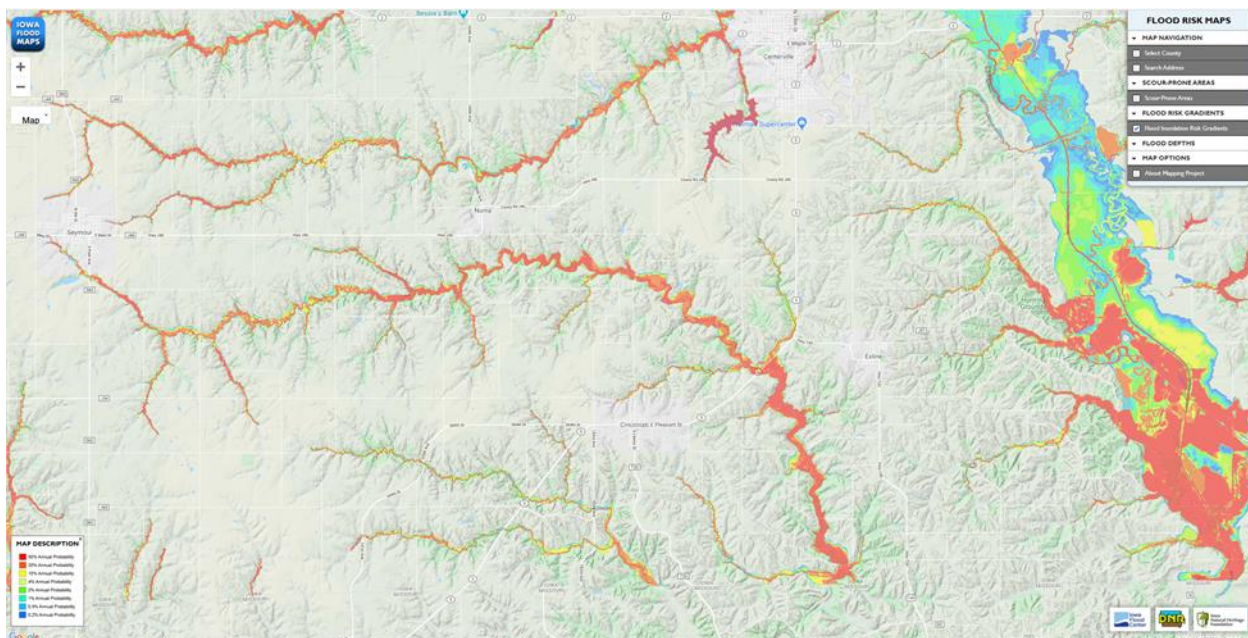


Exhibit 60: Appanoose County NW Quadrant Flood Risk

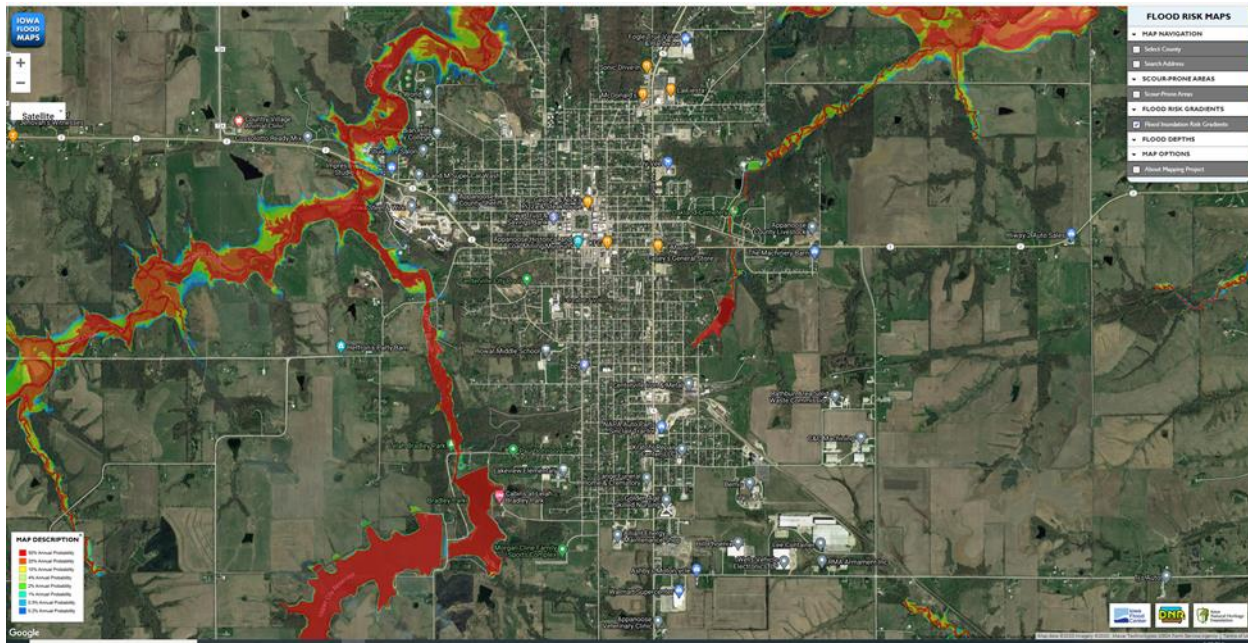


Given the 1) rolling hill nature of Appanoose County, 2) the fact that two railroad lines and each of the state highways pass through low-lying areas containing rivers or streams, and 3) the limited number of goods and services available in the county, severe flooding would impact most of the county. This was evidenced in the 2008 floods. Some of this impact is limited to traveling inconveniences.

Increasing wetlands on Rathbun Project has been a goal of local managers since Rathbun Lake reached its multipurpose pool in 1970. The original river bottom wetlands had been lost to Rathbun's lakebed and flood control operations.

The Goodwater, Hickory Hollow, and Woodpecker Marshes (approx. 160 acres) were constructed in the late 1970's thru the mid 1980's to supplement the existing Colyn and Brown's Slough wetlands (approx. 300 acres). The Coffey Marsh (approx. 230 acres) was completed in the Fall 1996. The S56 Marsh (200 acres) was completed in 2004, and Greenville Marsh (90 acres) was completed in 2005.

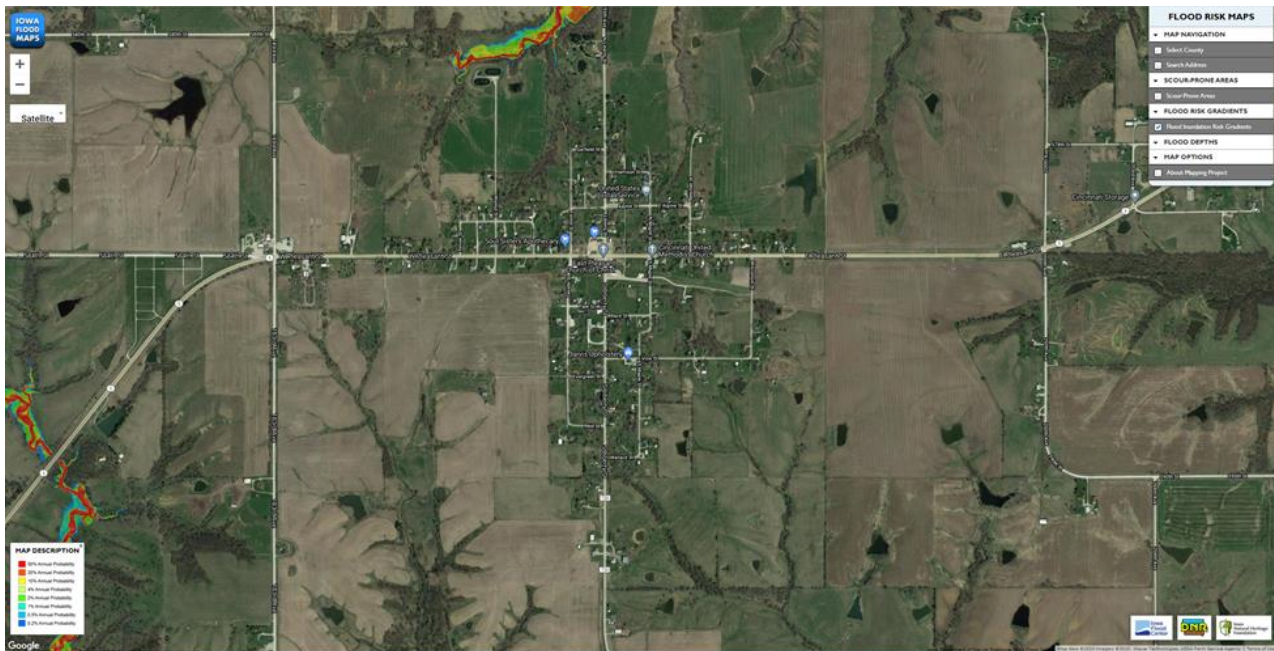
Exhibit 61: Centerville Floodplain Risk



Centerville – River Flooding

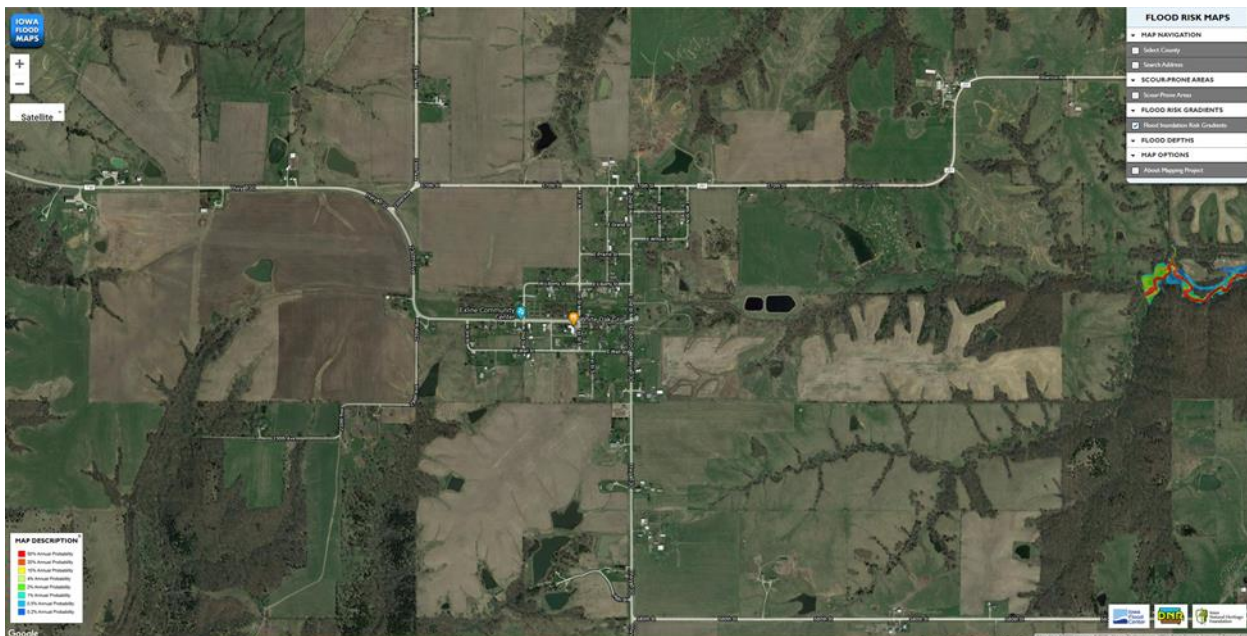
The greatest River Flooding threat comes from Cooper Creek, Manson Branch, and Cathedral Creek that all extend into the city limits of Centerville. Cooper Creek wraps around the northern perimeter of the city and follows the western city limits. It enters agricultural regions with limited damage to residential or commercial buildings. Manson Branch would affect less than 10 residents and 1 business, Cathedral Creek would affect less than 100 residents.

Exhibit 62: Cincinnati Floodplain Risk



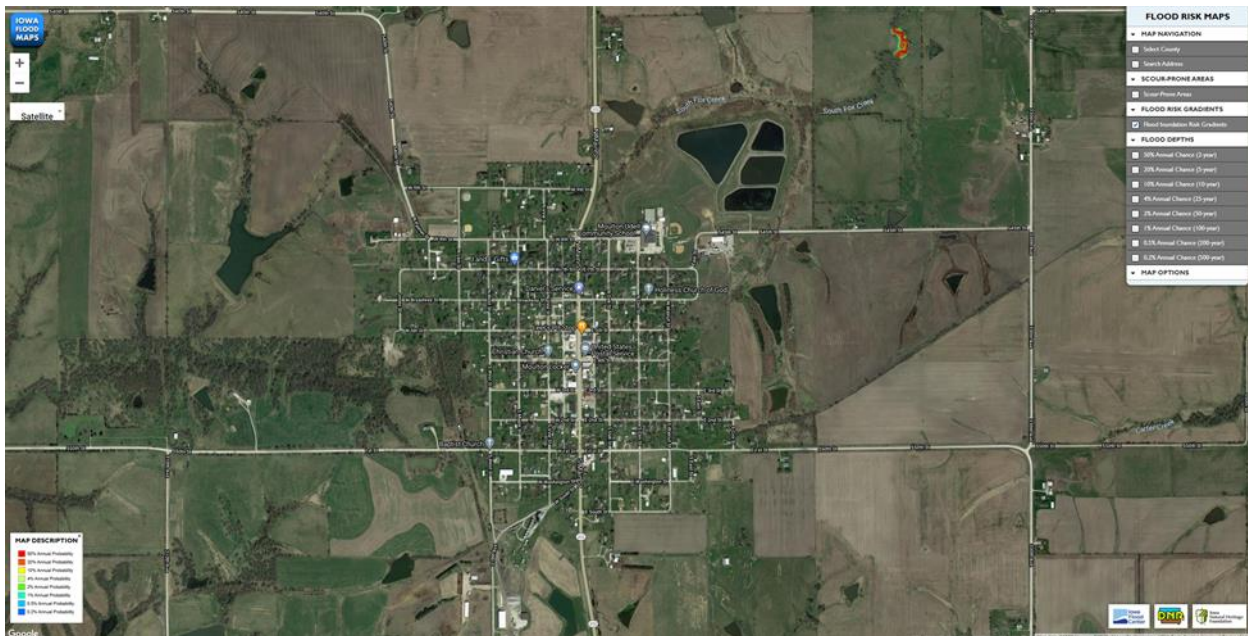
A small branch of Shoal Creek extends into the tip of the northwest corner of the Cincinnati city limits. There are no residential structures near this creek, however, it ends near the city's septic lagoons.

Exhibit 63: Exline Floodplain Risk



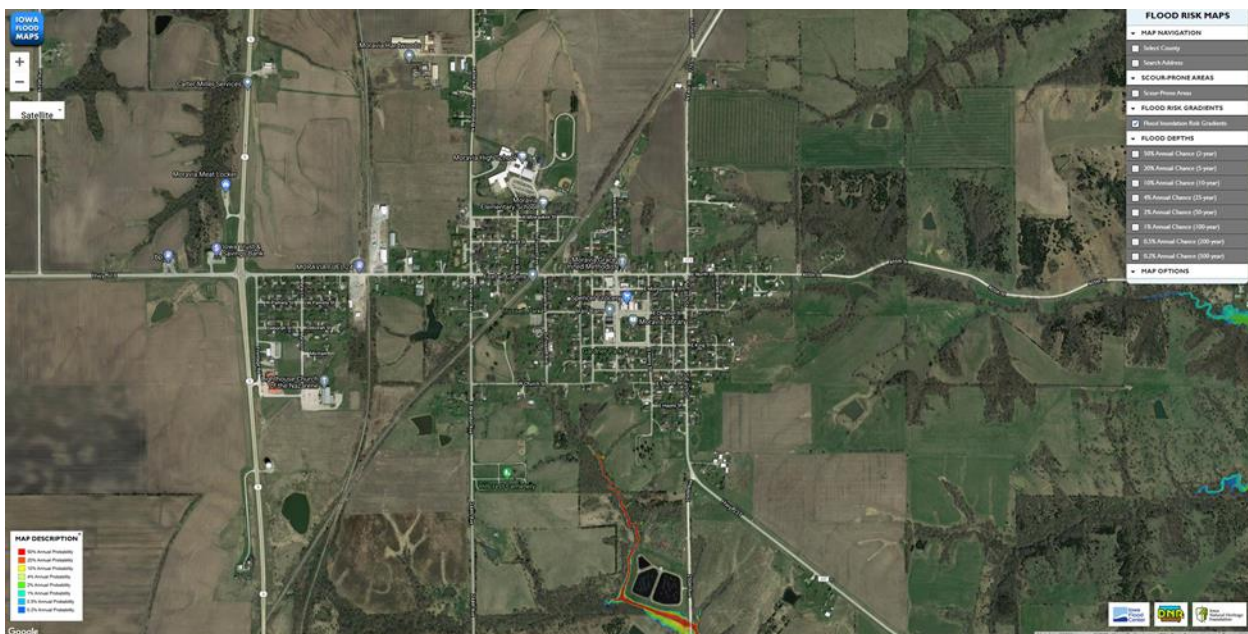
The City of Exline does not have a river in the city's boundaries.

Exhibit 64: Moulton Floodplain Risk



The City of Moulton does not have a river in the city’s boundaries.

Exhibit 65: Moravia Floodplain Risk



The City of Moravia does not have a river in the city’s boundaries.

Exhibit 66: Lake Sundown Floodplain Risk

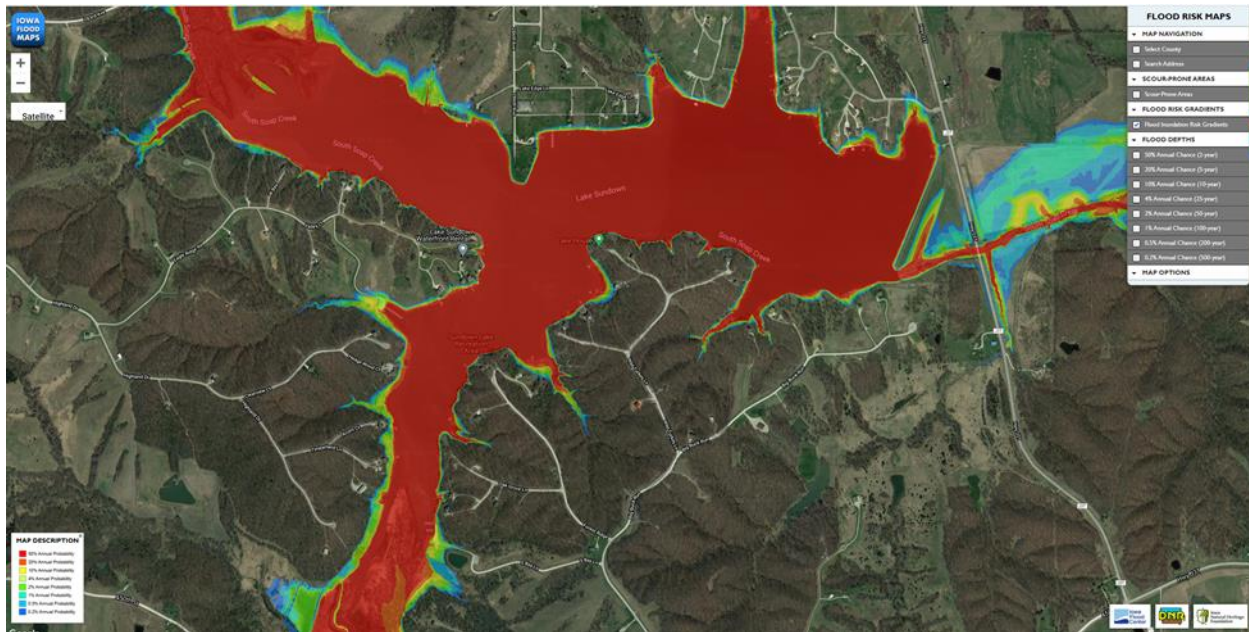


Exhibit 67: Plano Floodplain Risk



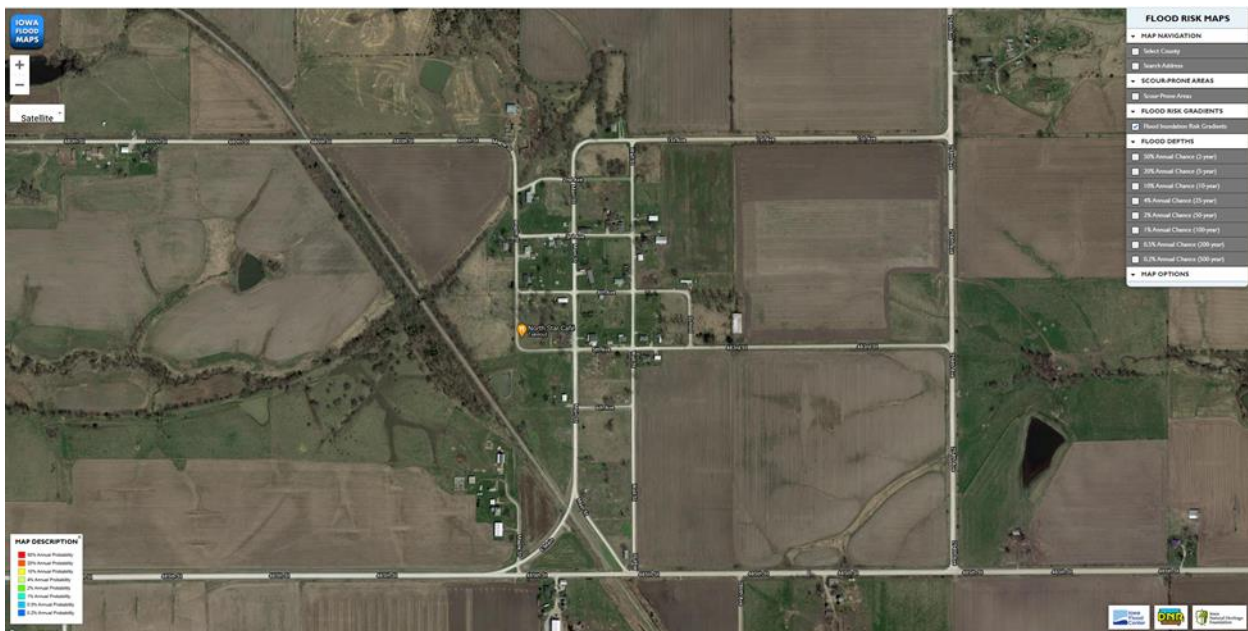
The far northeast corner of the city limits has Little Walnut Creek passing through it. Although no structures are within the estimated range to be damage, the city's lagoon cells are on the edge of the possible hazard territory.

Exhibit 68: Unionville Floodplain Risk



The nearest floodplain is not close to Unionville’s Corporate limits.

Exhibit 69: Udell Floodplain Risk



The City of Udell does not have a river in the city’s boundaries.

Exhibit 70: Lake Rathbun Floodplain Risk

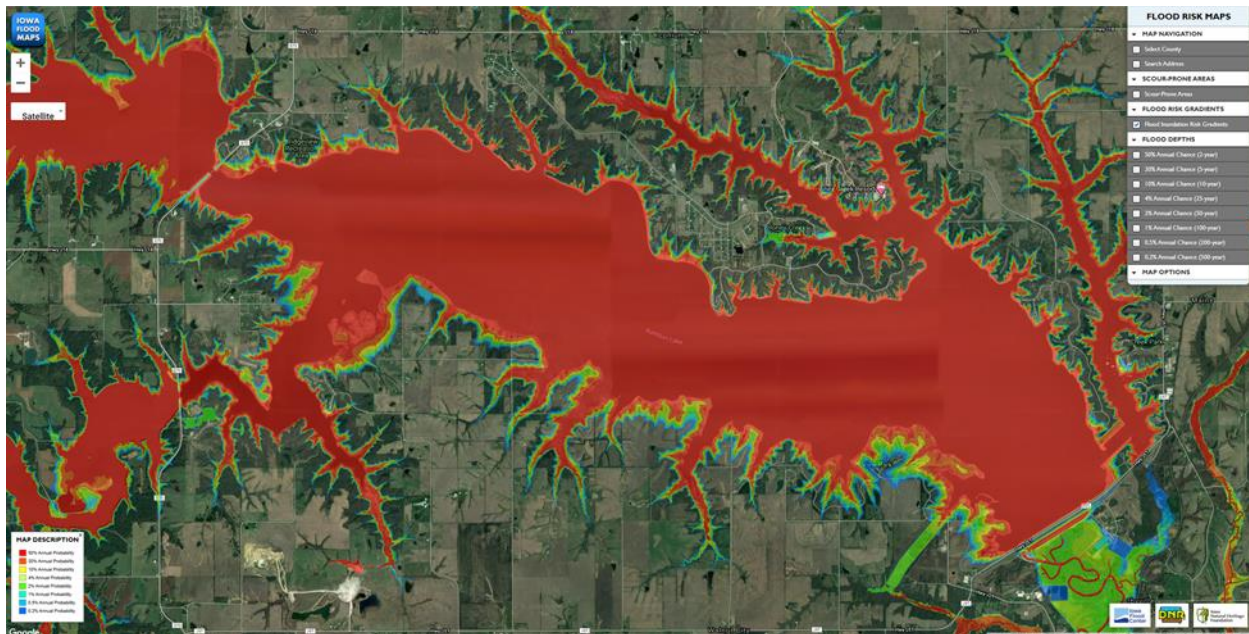
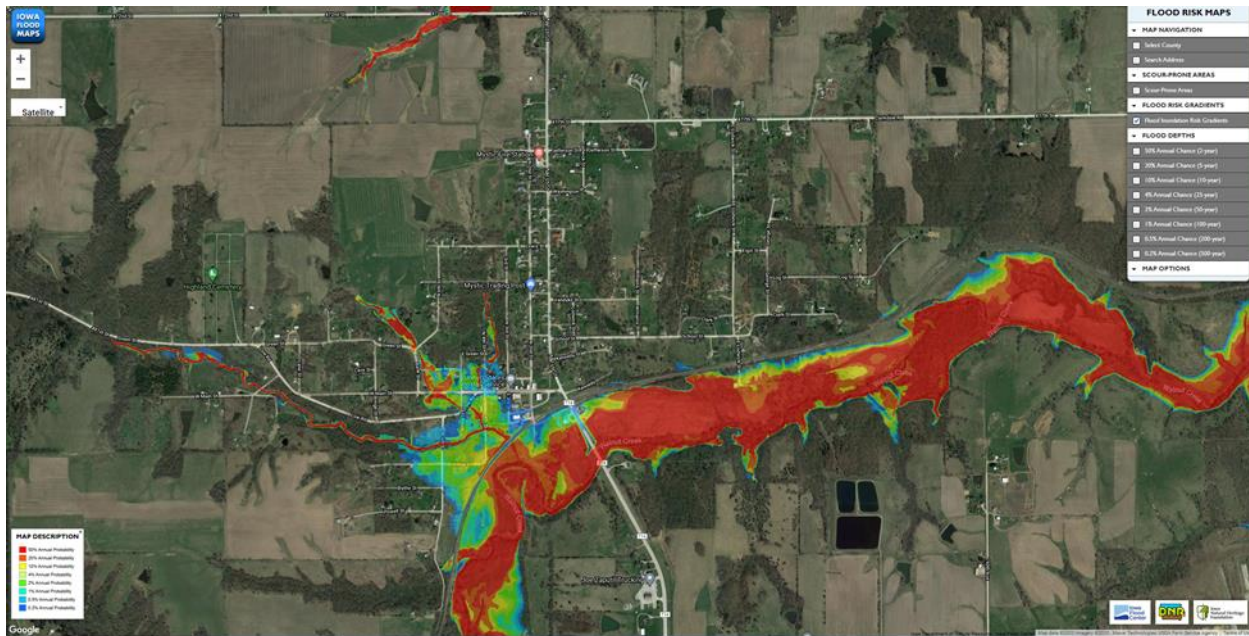


Exhibit 71: Rathbun Floodplain Risk



Walnut Creek and Little Walnut Creek are tributaries of the near-by Chariton River. Both creeks wrap around 75% of the city limits. The community's structures are primarily located on a hill. Most river damage would be to the roadways, bridges, and the railroad line.

Exhibit 72: Mystic Floodplain Risk



Walnut Creek intersects the southern half of the city limits. There are tributaries that extend up through the center of the city along South 1st Street, South 3rd Street, South 4th Street, South 6th Street, and along the east-west roads of Willow Lane, Low Road, Main Street, Cave Street, Bank Street, and East Lodwick Street.

Exhibit 73: Northwest Quarter of Davis County

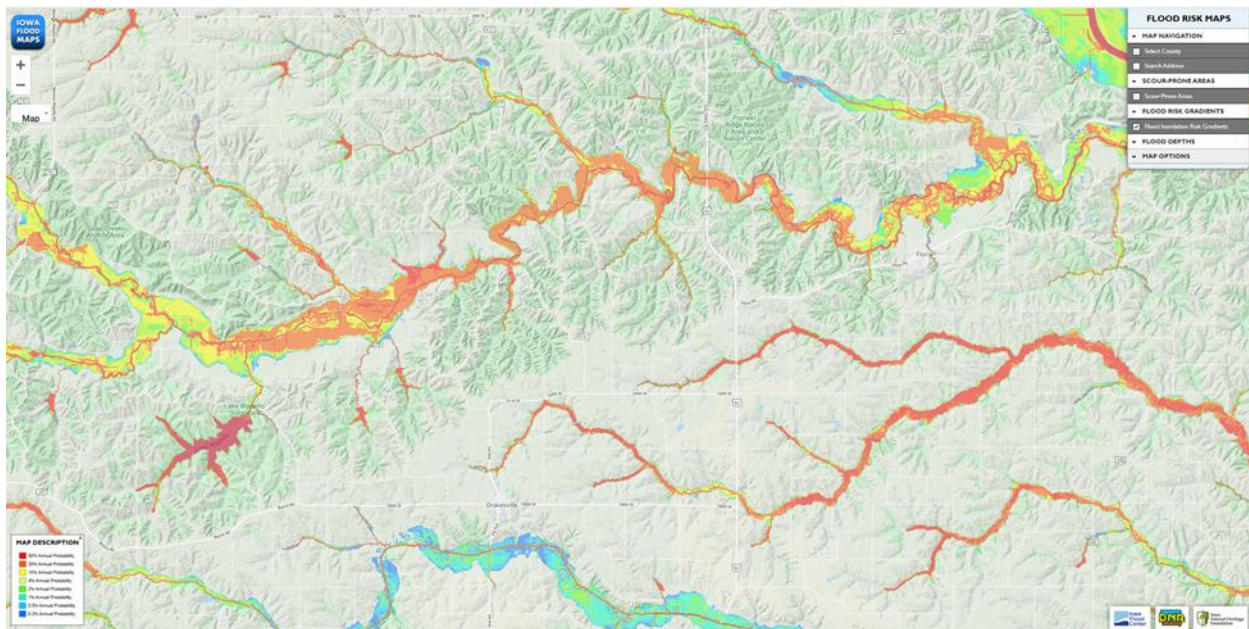


Exhibit 74: Northeast Quarter of Davis County

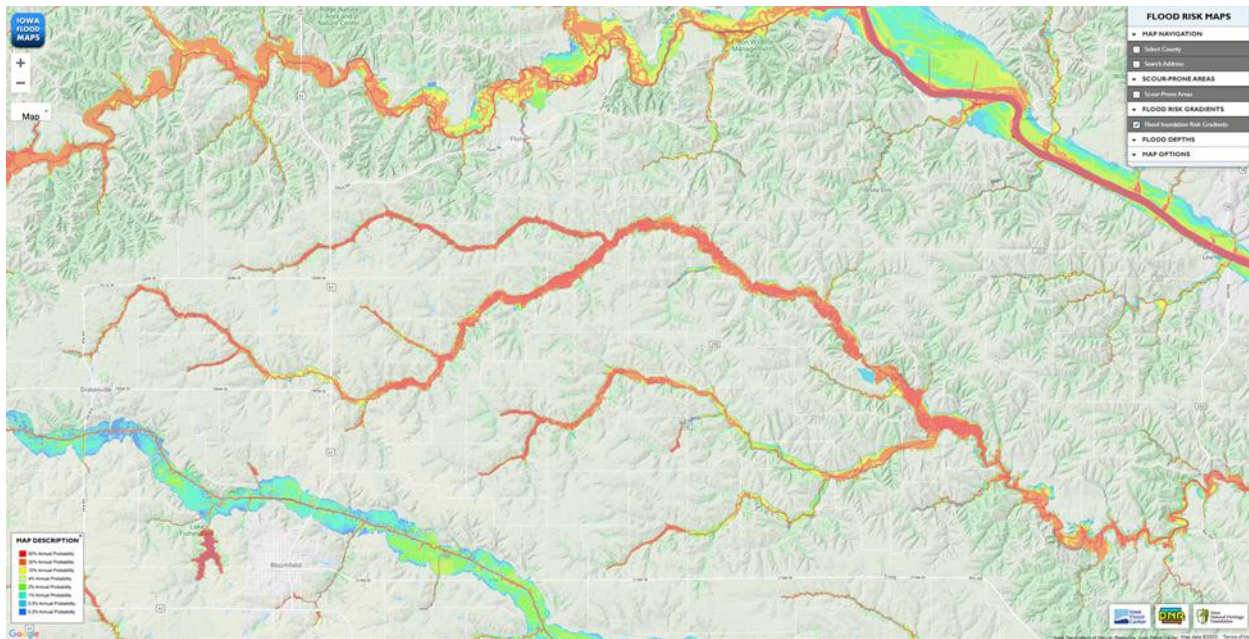


Exhibit 75: Southeast Quarter of Davis County

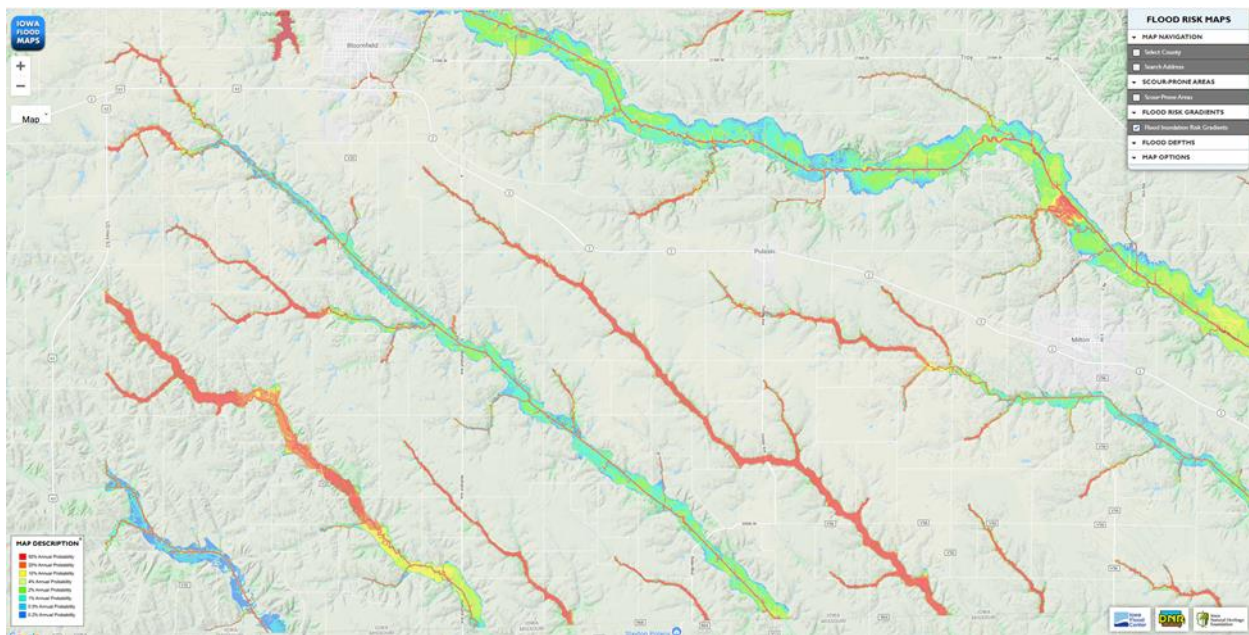


Exhibit 76: Southwest Quarter of Davis County

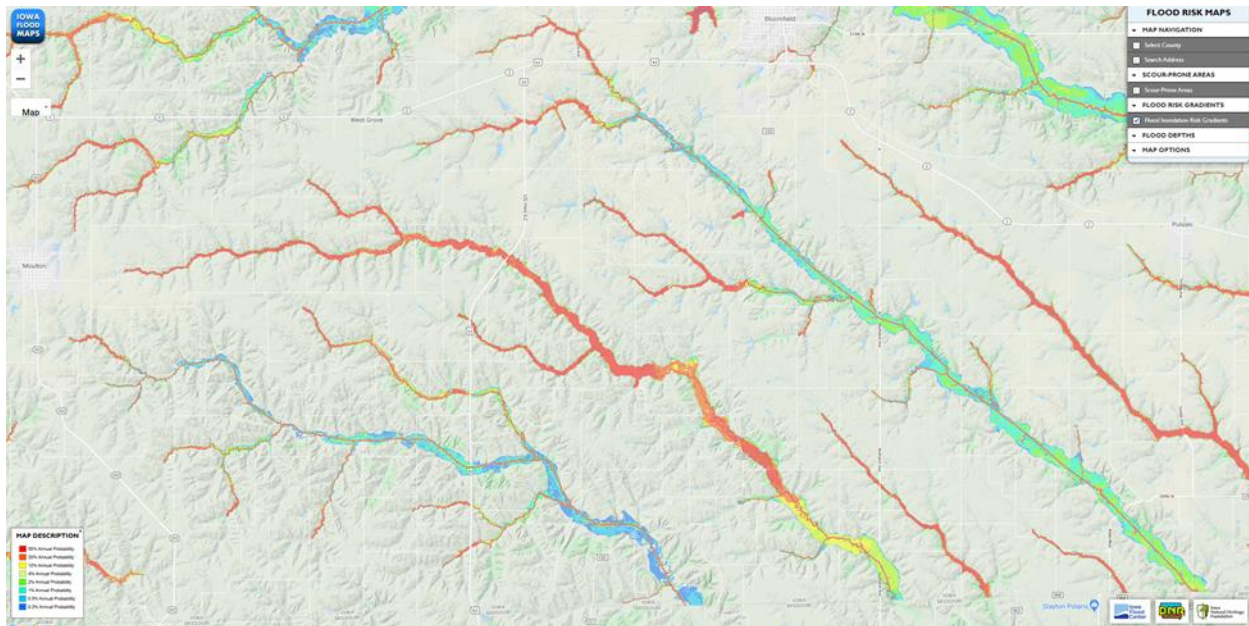
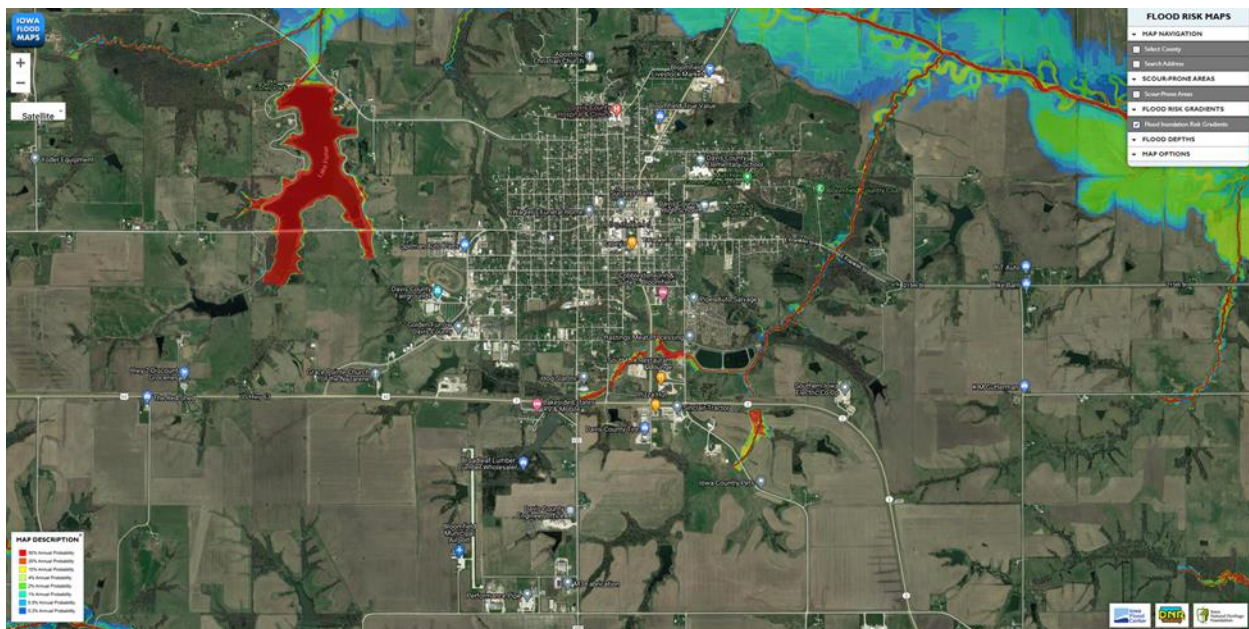


Exhibit 77: City of Bloomfield



The greatest risk in the corporate limits of Bloomfield follows a tributary off Fox River. The _____ Creek approaches from the northeast and enters the city in the southeast quadrant around the city lagoons affecting highway 63 and Highway 2. The low-lying areas affect two businesses with minor impacts.

Exhibit 78: City of Drakesville

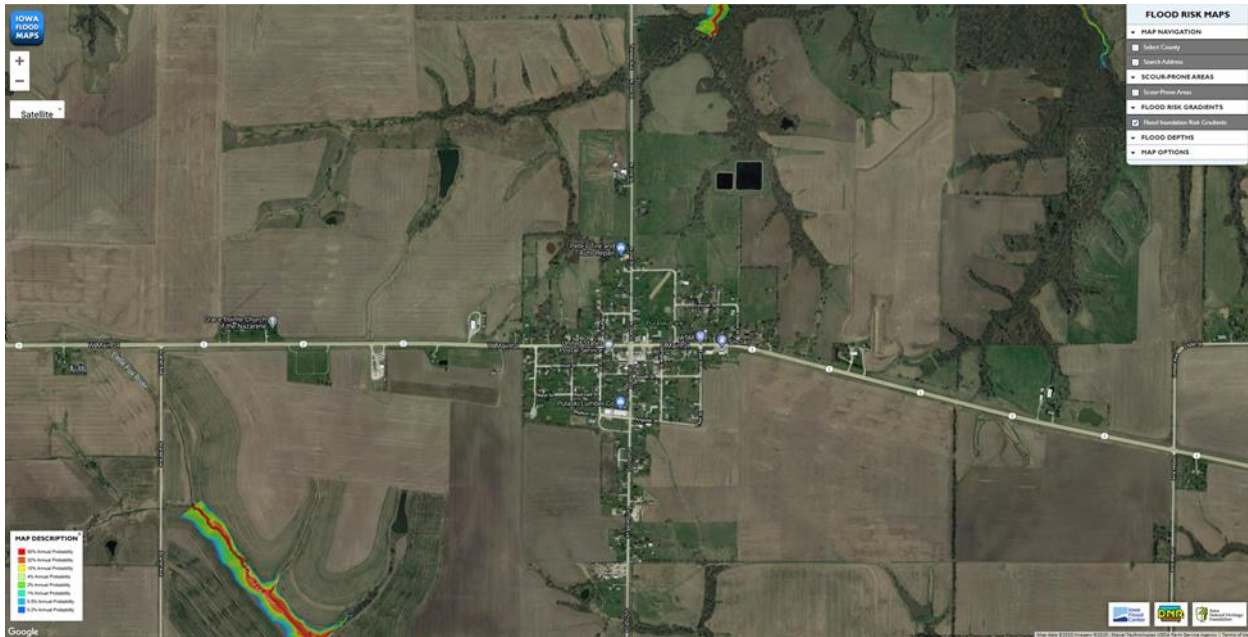


There is no risk of river flooding in Drakesville.

Exhibit 79: City of Floris



Exhibit 80: City of Pulaski



There is no risk of river flooding in Pulaski.

Exhibit 81: Lucas County NW Quadrant Floodplain Risk

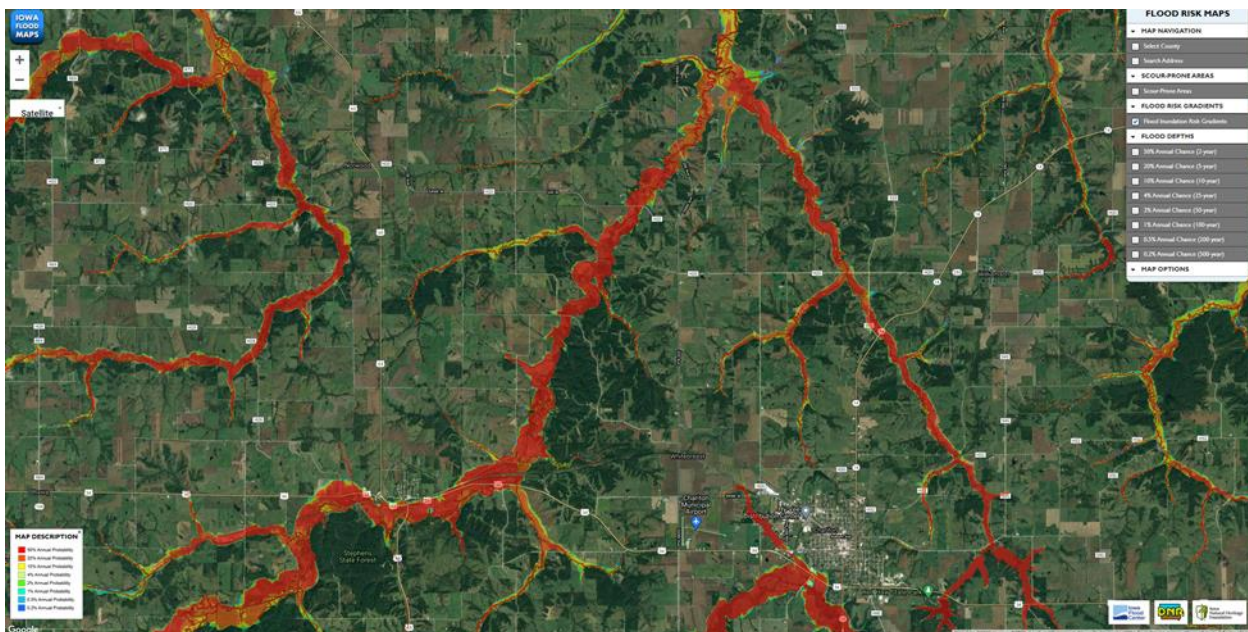


Exhibit 82: Lucas County NE Quadrant Floodplain Risk

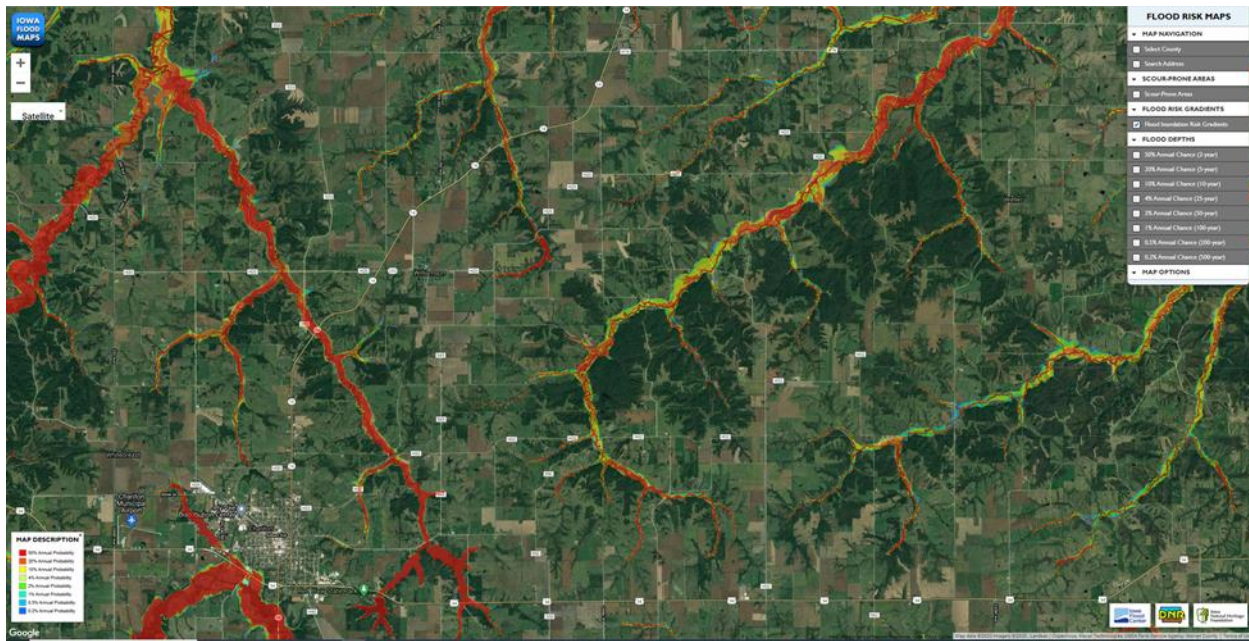


Exhibit 83: Lucas County SE Quadrant Floodplain Risk

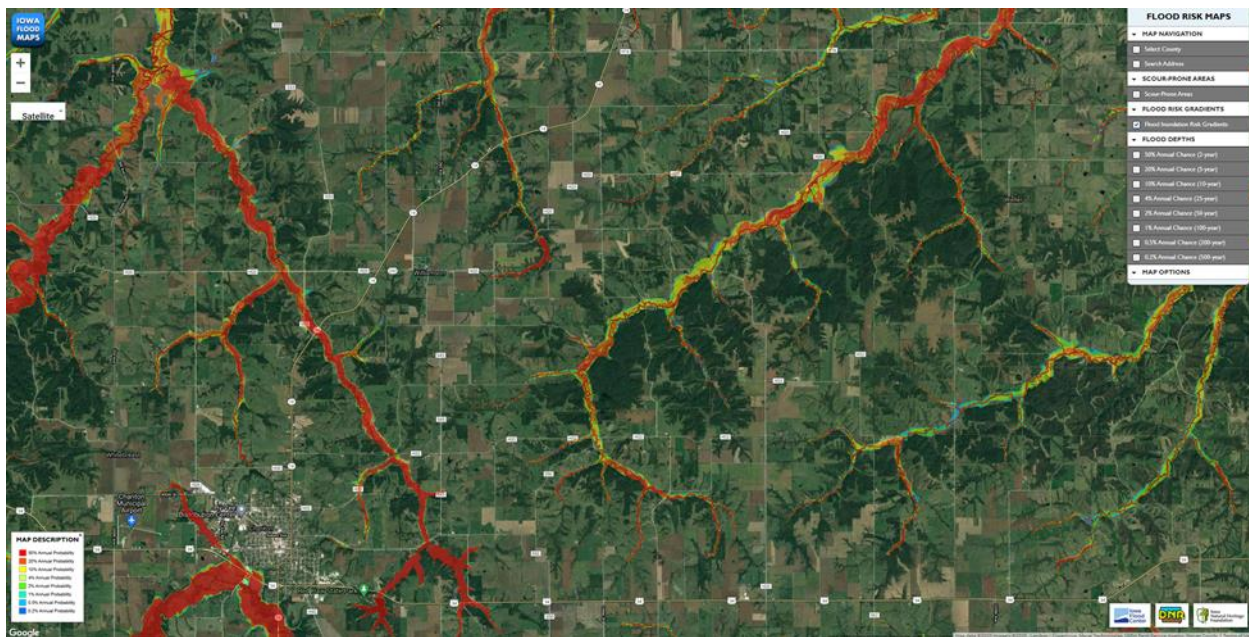


Exhibit 84: Lucas County SW Quadrant Floodplain Risk



Exhibit 85: Chariton Floodplain Risk

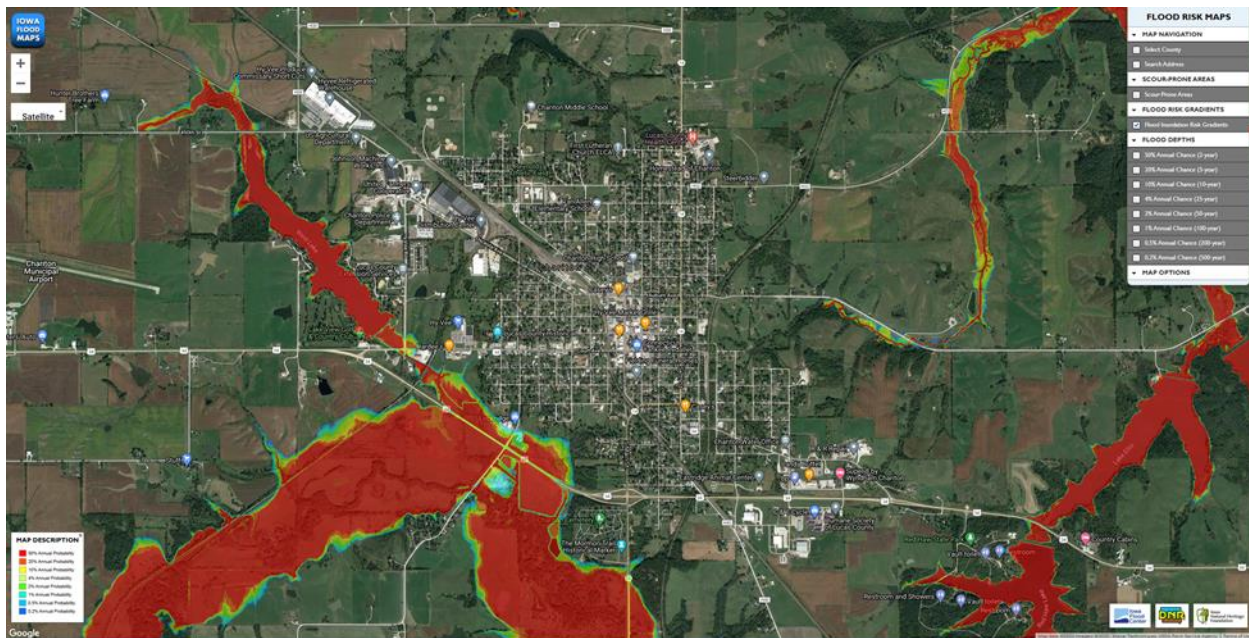
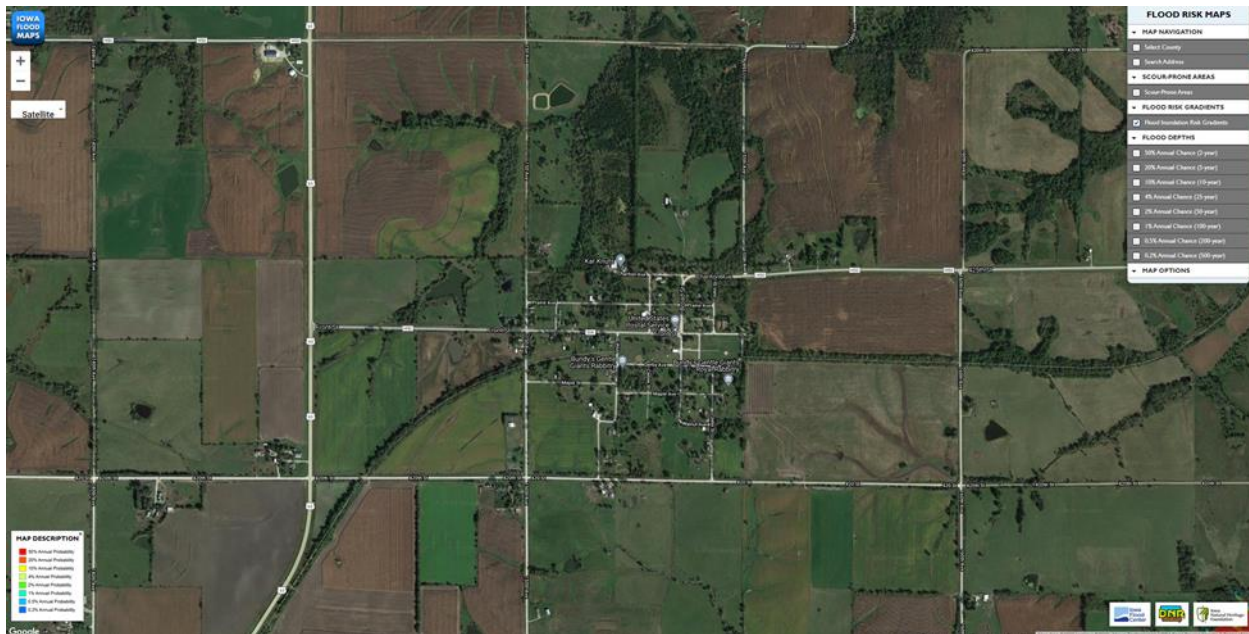
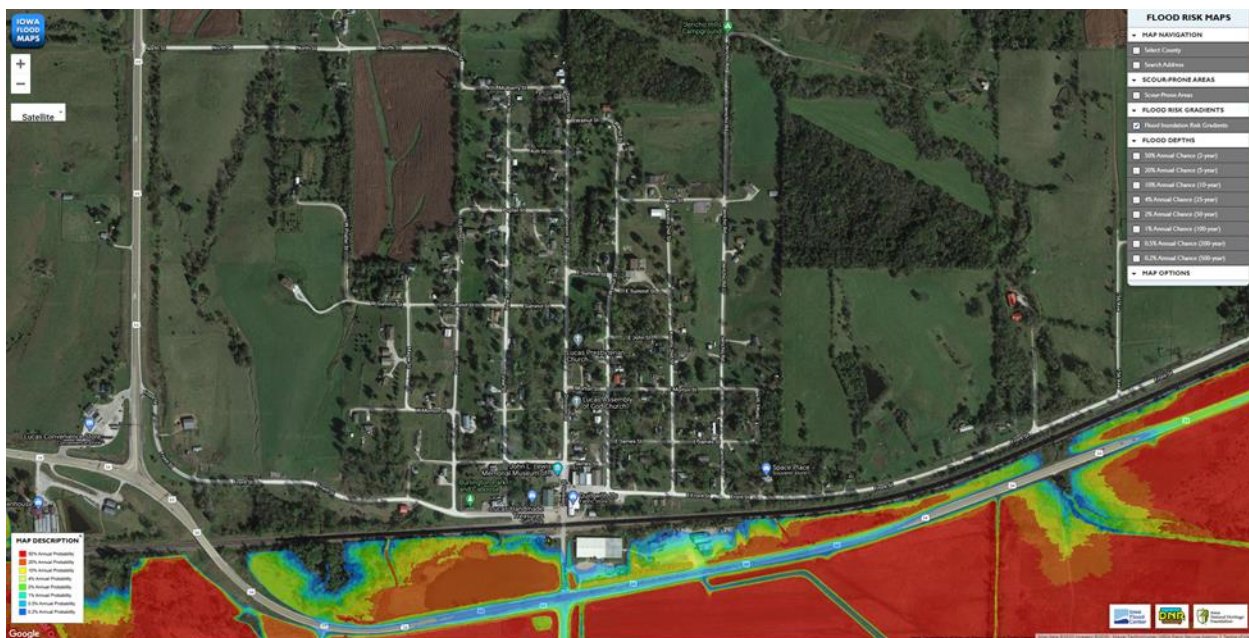


Exhibit 86: Derby Floodplain Risk



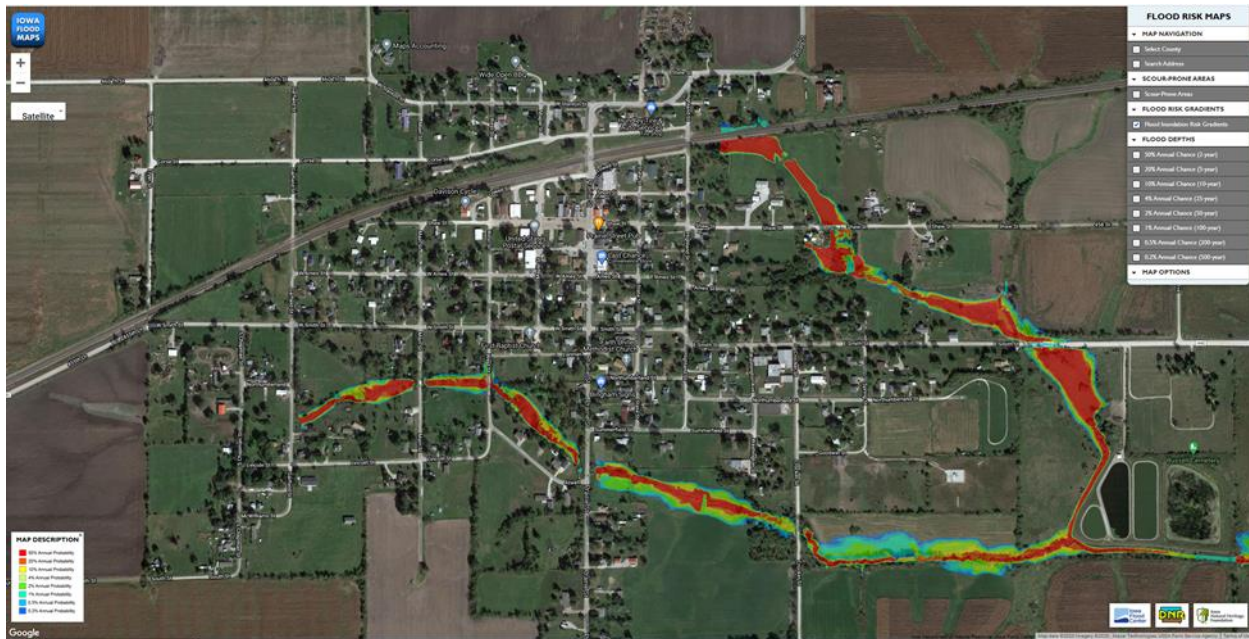
There is no risk of river flooding in Derby.

Exhibit 87: Lucas Floodplain Risk



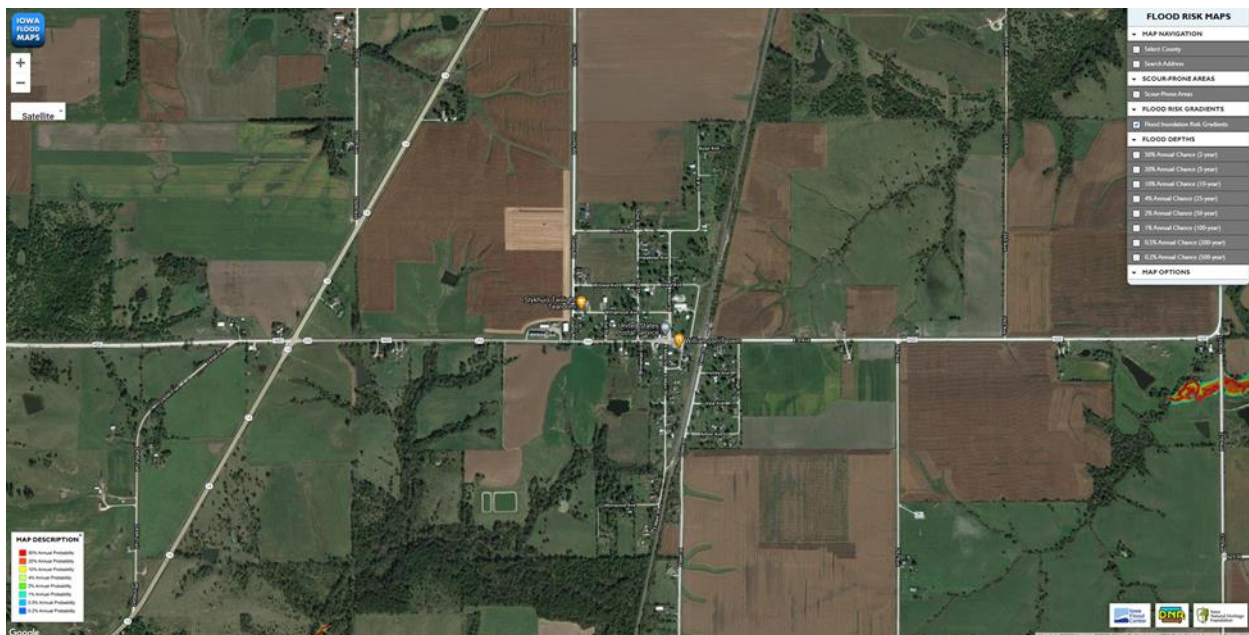
The City of Lucas has wetlands and river basin just south of the corporate limits. The city is primarily located on a hill so only one business is at risk of experiencing impacts.

Exhibit 88: Russell Floodplain Risk



Russell has two small tributaries that circles 75% of the perimeter from the north to the east and around to the southwest corner of the corporate limits. There are few structures at risk of experiencing an impact from river flooding.

Exhibit 89: Williamson Floodplain Risk



There is no risk of river flooding in Williamson.

Exhibit 90: Monroe County SW Quadrant Floodplain Risk

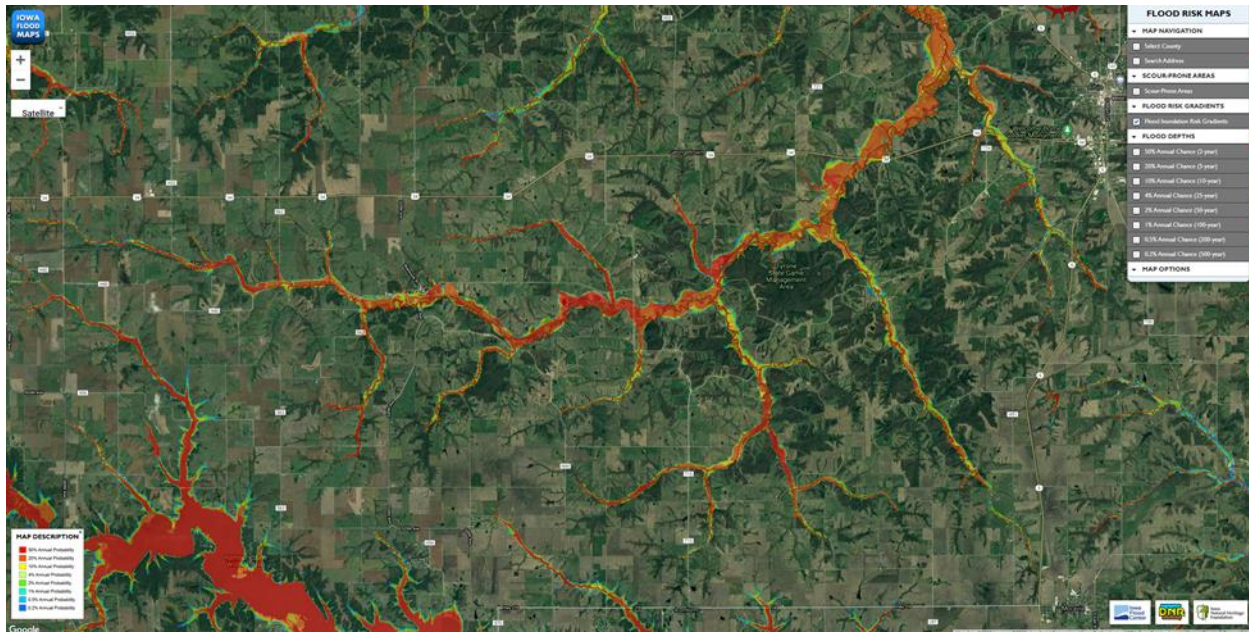


Exhibit 91: Monroe County NW Quadrant Floodplain Risk

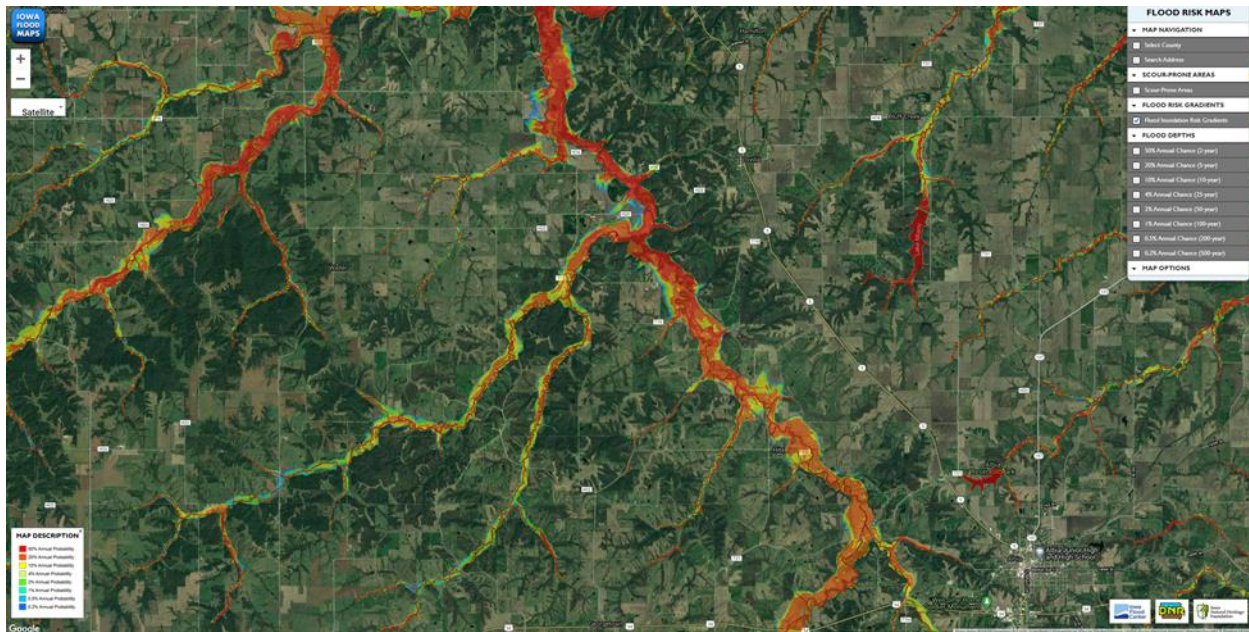


Exhibit 92: Monroe County NE Quadrant Floodplain Risk

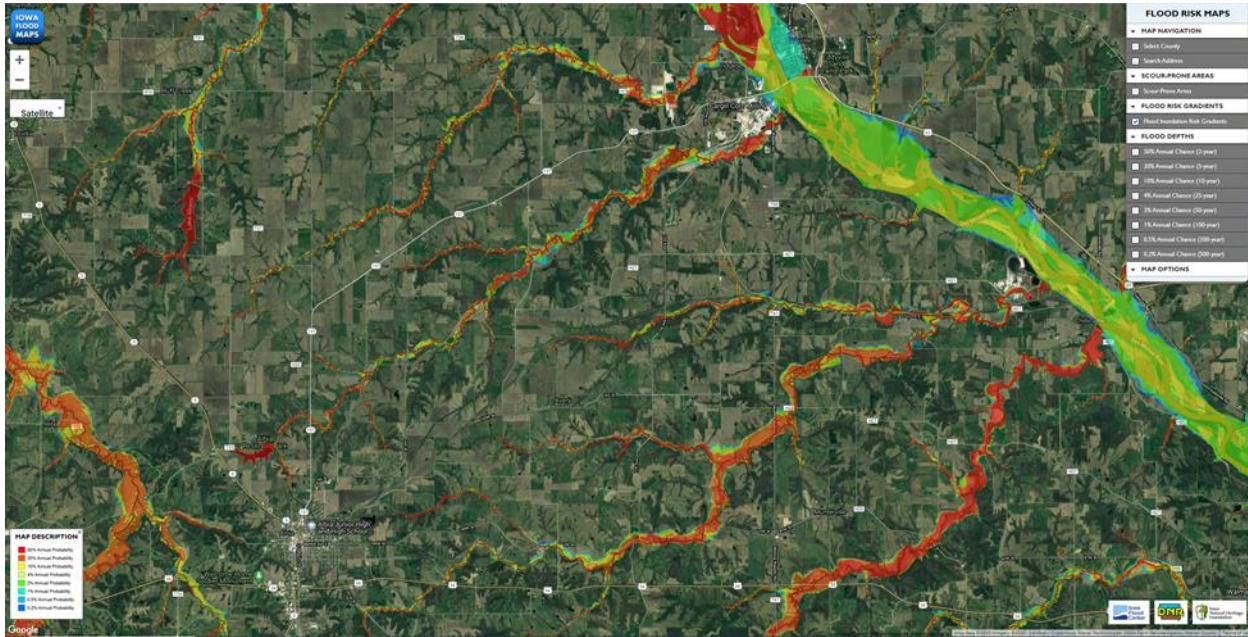


Exhibit 93: Monroe County SE Quadrant Floodplain Risk

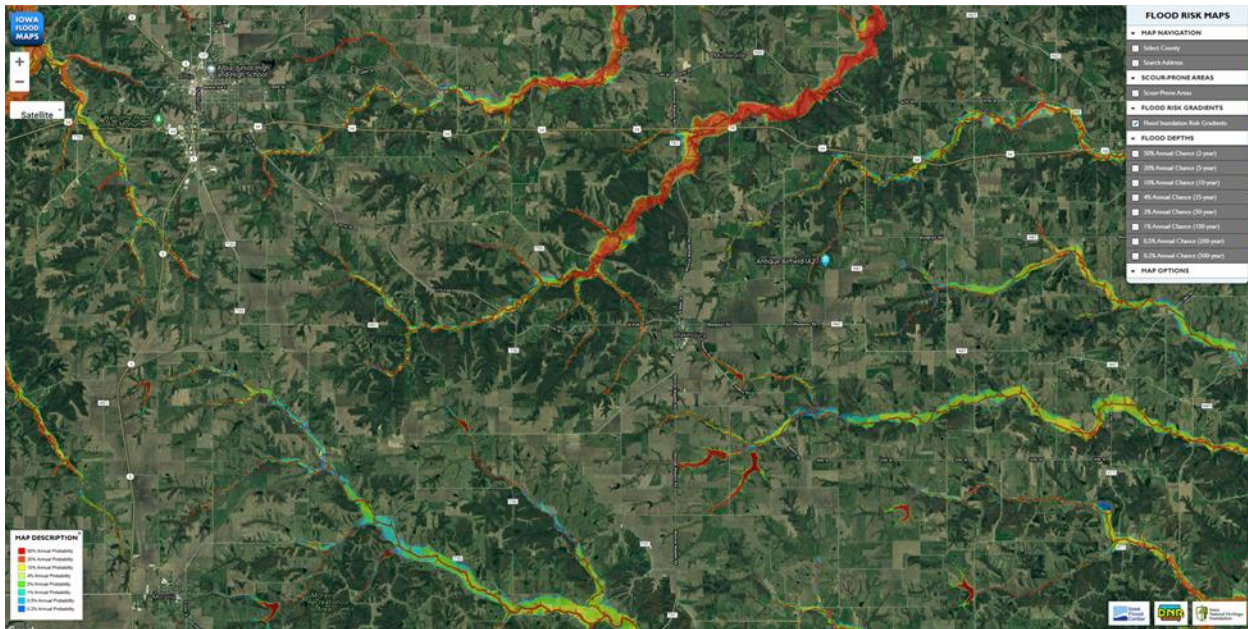
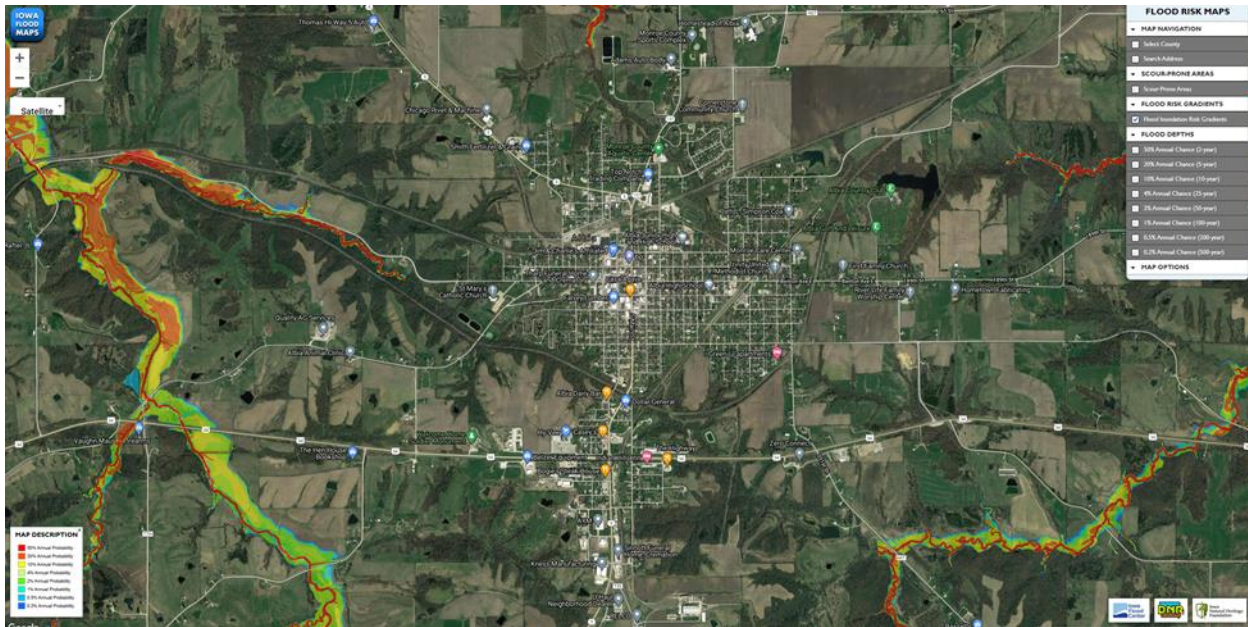
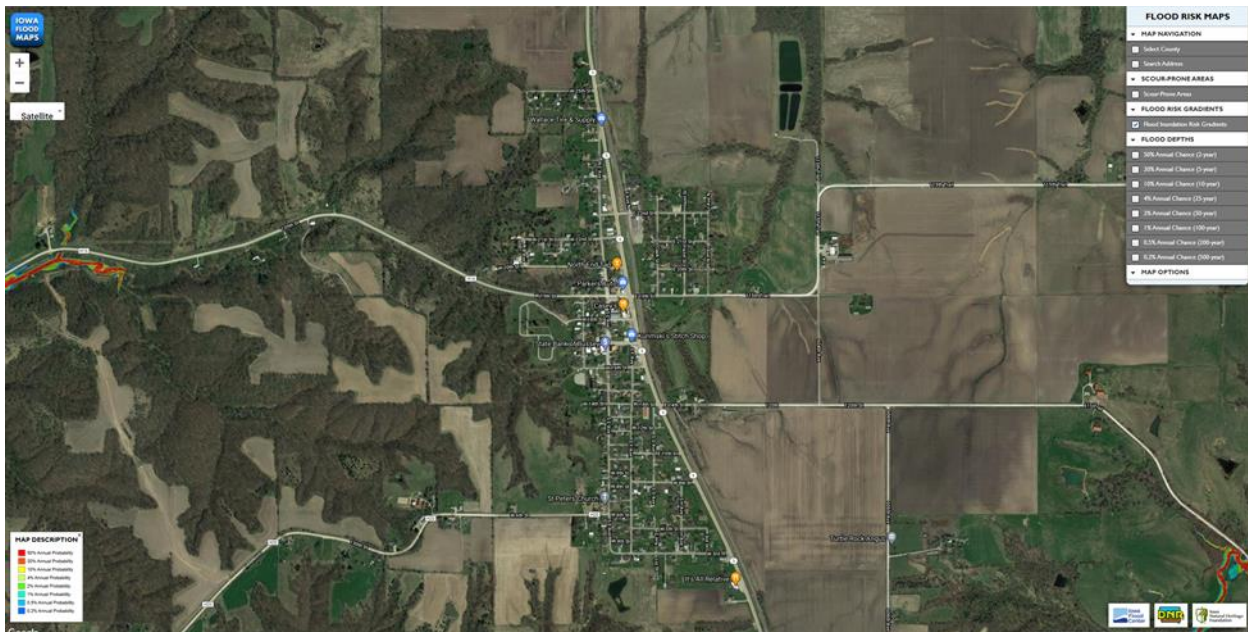


Exhibit 94: Albia Floodplain Risk



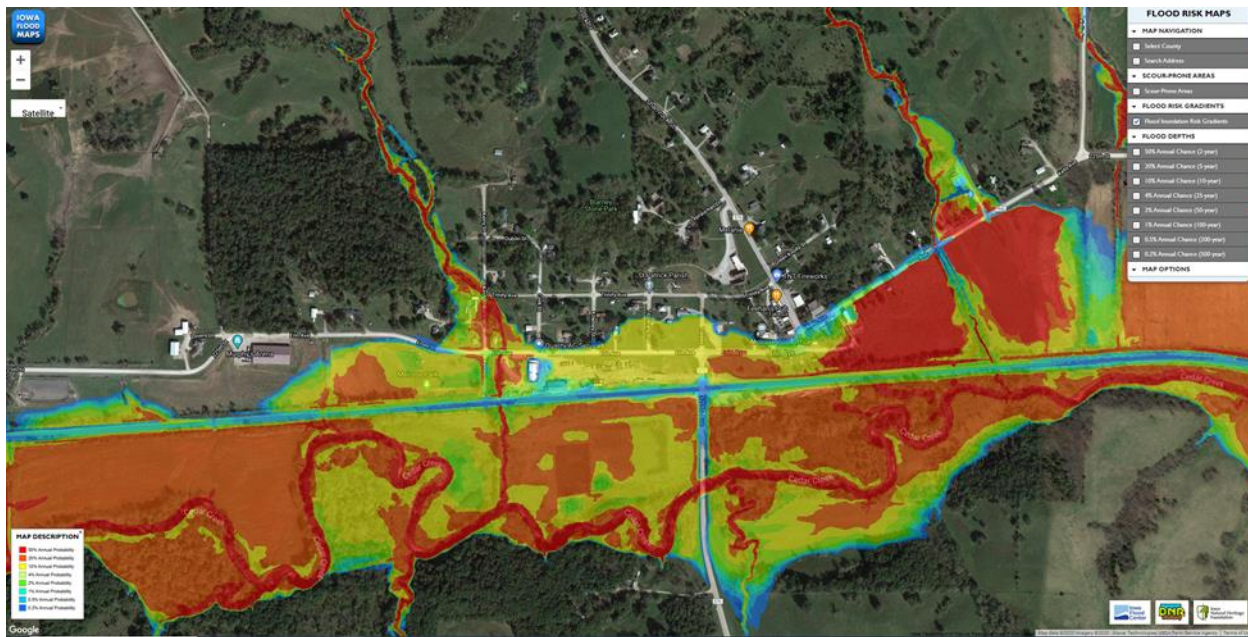
There are no rivers or tributaries that enter the corporate city limits of Albia.

Exhibit 95: Lovilia Floodplain Risk



There is no risk of river flooding in Lovilia.

Exhibit 96: Melrose Floodplain Risk



Cedar Creek runs parallel to the BNSF railroad line and the entire east-west boundary for the City of Melrose. This exposes multiple businesses and residential structures to be impacted by river flooding.

Exhibit 97: Albia Reservoir Floodplain Risk

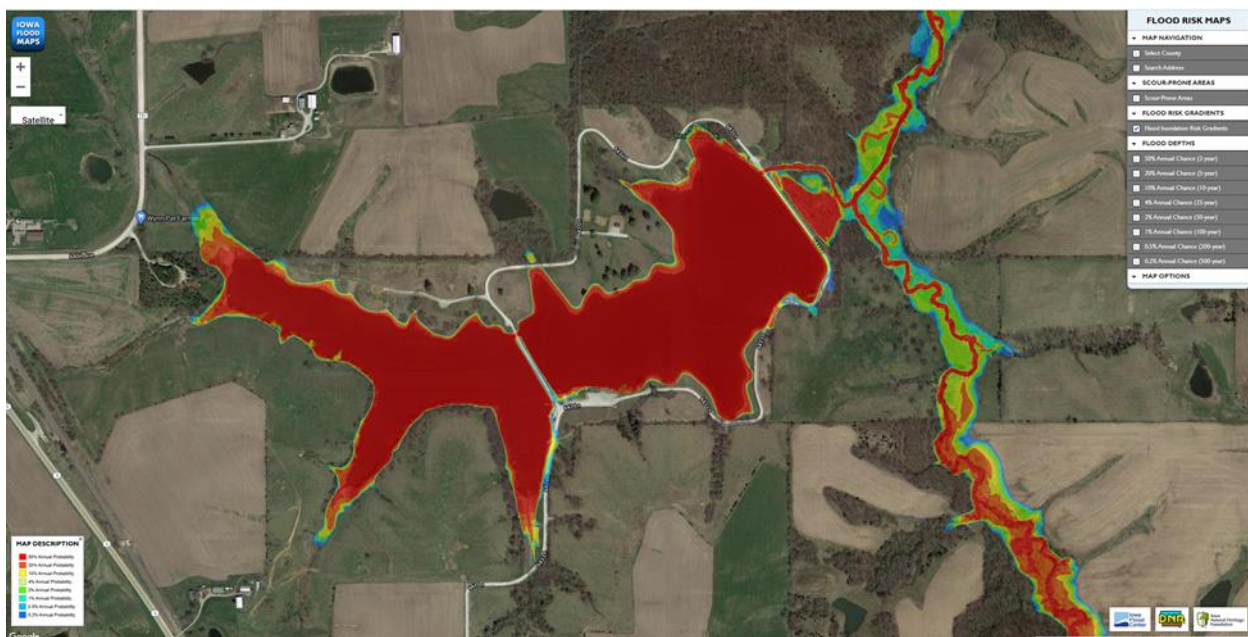


Exhibit 98: Lake Miami Floodplain Risk

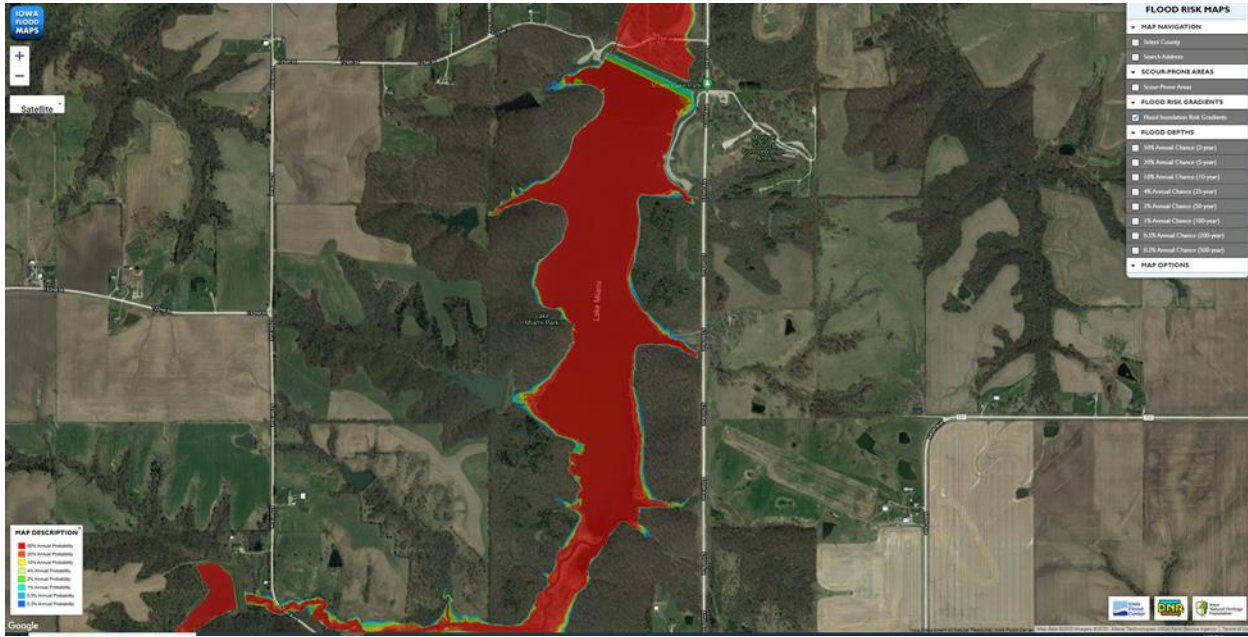


Exhibit 99: Jurisdictional Flood Hazard Scoring - Flash Flooding

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Apanoose Unincorp Co	3	2	4	2	2.75	Moderate
Centerville	1	1	4	1	1.45	Low
Centerville Community Schools	1	1	4	1	1.45	Low
Cincinnati	2	2	4	3	4.05	High
Exline	2	2	4	3	4.05	High
Moravia	1	1	2	3	1.35	Low
Moravia Community School	1	1	2	3	1.35	Low
Moulton	1	1	2	3	1.35	Low
Mystic	3	1	4	1	2.35	Moderate
Plano	2	2	4	3	4.05	High
Rathbun	2	2	4	3	4.05	High
Udell	2	2	4	3	4.05	High
Unionville	1	1	2	1	1.15	Low
Moulton-Udell Community School	1	1	2	3	1.35	Low
MercyOne Medical	1	1	4	1	1.45	Low
Davis Unincorp Co	4	2	3	1	2.95	Moderate
Davis Co Community Schools	1					
Bloomfield	4	2	3	1	2.95	Moderate
Drakesville	4	1	3	1	2.65	Moderate
Floris	4	1	3	1	2.65	Moderate
Pulaksi	4	1	3	1	2.65	Moderate
Lucas Unincorp Co	1	1	2	2	1.25	Low
Chariton	1	1	4	1	1.45	Low
Chariton Community Schools	2	2	4	4	2.5	Moderate
Derby	3	2	2	3	2.55	Moderate
Lucas	4	3	4	3	3.6	High
Russell	2	2	4	3	2.45	Moderate
Williamson	2	1	4	2	2.0	Moderate
Lucas Co Health Center	3	2	3	3	2.7	Moderate
Monroe Unincorp Co	4	1	1	4	2.65	Moderate
Albia	4	1	4	2	2.9	Moderate
Albia Community Schools	4	2	4	2	3.2	High
Eddyville	2	2	3	3	2.25	Moderate
Lovilia	1	1	1	3	1.2	Low
Melrose	2	2	3	3	2.25	Moderate
Monroe Co Hospital	3	3	4	2	3.05	High

Exhibit 100: Jurisdictional Flood Hazard Scoring – River Flooding						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	3	2	3	4	2.8	Moderate
Centerville	1	1	1	1	1.0	Low
Centerville Community Schools	N/A	N/A	N/A	N/A	N/A	N/A
Cincinnati	N/A	N/A	N/A	N/A	--	--
Exline	N/A	N/A	N/A	N/A	--	--
Moravia	1	1	2	3	1.35	Low
Moravia Community School	N/A	N/A	N/A	N/A	N/A	N/A
Moulton	N/A	N/A	N/A	N/A	--	--
Mystic	2	1	1	1	1.45	Low
Plano	N/A	N/A	N/A	N/A	--	--
Rathbun	N/A	N/A	N/A	N/A	--	--
Udell	N/A	N/A	N/A	N/A	--	--
Unionville	1	1	2	1	1.15	Low
Moulton-Udell Community School	N/A	N/A	N/A	N/A	N/A	N/A
MercyOne Medical	N/A	N/A	N/A	N/A	N/A	N/A
Davis Unincorp Co	4	2	1	4	2.95	Moderate
Davis Co Community Schools	3	1	1	4	2.20	Moderate
Bloomfield	3	1	1	4	2.20	Moderate
Drakesville	N/A	N/A	N/A	N/A	--	--
Floris	4	1	1	4	2.65	Moderate
Pulaksi	N/A	N/A	N/A	N/A	---	---
Lucas Unincorp Co	2	2	2	2	2.0	Moderate
Chariton	1	1	4	1	1.45	Low
Chariton Community Schools	1	1	2	2	1.25	Low
Derby	N/A	N/A	N/A	N/A	--	--
Lucas	4	3	3	3	3.45	High
Russell	1	2	2	3	1.65	Low
Williamson	1	1	1	2	1.0	Low
Lucas Co Health Center	3	2	3	3	2.7	Moderate
Monroe Unincorp Co	1	1	1	4	1.65	Low
Albia	4	1	4	1	2.8	Moderate
Albia Community Schools	4	2	4	2	3.2	High
Eddyville	3	2	3	3	2.7	Moderate
Lovilia	1	1	1	3	1.2	Low
Melrose	1	1	4	3	1.65	Low
Monroe Co Hospital	3	3	2	3	2.85	Moderate

G.) Grass and Wildland Fire

A grass or wildland fire is an uncontrolled fire that threatens life and property in a rural or wooded area. Grass and wildland fires can occur when conditions are favorable, such as periods of drought when natural vegetation would be drier and subject to combustibility.

According to the Iowa Hazard Mitigation Plan 2018, “A grass fire or wildland fire is not a cropland fire... Wild land or grass fires occur in natural, wild area.” The plan also references the wildfire hazard potential (WHP) map (refer to Exhibit 101), developed by the US Department of Agriculture (USDA) Forest Service’s Fire Modeling Institute. The map was designated to “depict the relative potential for wildfire that would be difficult for suppression resources to contain”.

Iowa’s urban/rural interface (area where development occurs within or immediately adjacent to wildland, near fire-prone trees, brush, and/or other vegetation) is growing, as cities expand into natural prairies and agricultural land that have permanent vegetative cover (such as CRP ground). The State has the largest number of CRP contracts in the nation and totaling over \$1.5 million acres.

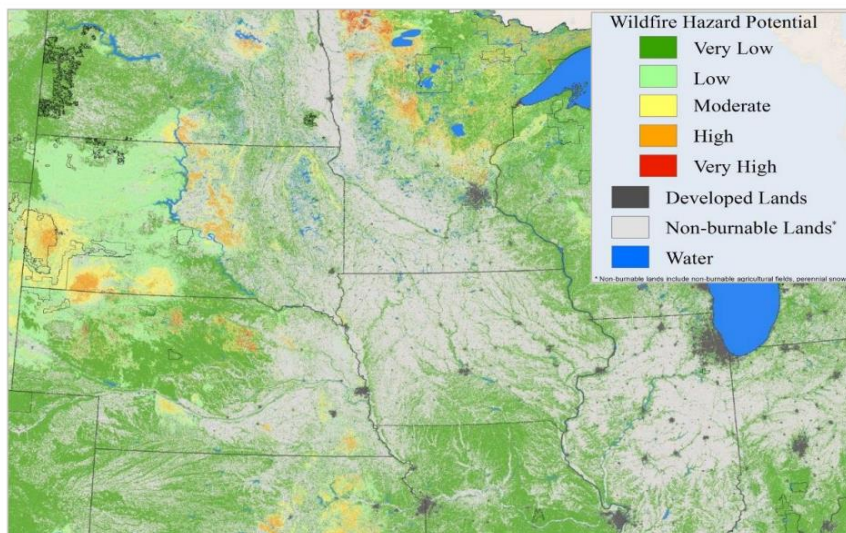
Wildfires are frequently associated with lightning and drought conditions, as dry conditions make vegetation more flammable, paired with the lack of moisture which exacerbates the situation. As new development encroaches into the wildland/urban interface, more and more structures and people are at risk. 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 Iowa. The National Weather Service monitors the conditions related to wildfires in the State daily so that wildfires can be predicted and tracked, if not prevented. The risk factors considered: high temperature, high wind speed, fuel moisture (greenness of vegetation), low humidity, little or no cloud cover.

Potential Hazard Area

The potential hazard area for a severe winter storm is the entire ADLM region. Concerns are for the Iowa DNR Wildlife Management Areas and Stephens State Forest (See Appendix A). There are thousands of acres of natural habitat to hundreds of plant and animal species in these regional assets.

Exhibit 101: Wildfire Potential



Historical Occurrences

Data was requested from the Iowa Department of Public Safety, and State Fire Marshall 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 report by participating fire departments. The State Fire Marshal's Division was unable to provide historical grass/wildland fire data currently. The Storm Events Database has no record of a wildfire occurring since 2000. Committee members spoke with their respective fire departments and discovered that many have heard stories of Grass fires long ago, but none are able to recall recent occurrences within the past 20 years nor find documentation to support it.

Probability

The State of Iowa indicates that there is nearly 100% chance that there will be a grass fire in each county in the state each year. Based on the anecdotal descriptions from the HMPC, grass/wildland fires occur annually, however, fires that cause significant damage occur less frequently. The Storm Events Database | National Centers for Environmental Information would indicate fires that resulted in notable damage and there are none. Despite the lack of significant damage, the committee believes that a grass fire is "likely" any given year.

Magnitude and Severity

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 at the same time 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, paired with the distance required for firefighting vehicles and personnel to travel to respond. Potential losses to crops and rangeland are additional concerns. However, given historical and local data as well as the HMPC's input, it is estimated that grassland and/or wildlife magnitude for the ADLM region would be minimal. Fires can spread very rapidly in buildings. Improvements in technology have enabled the development of affordable early warning systems such as smoke detectors, which have been installed in many homes and businesses. In addition, those responsible for providing fire, police, and ambulance service in the town participate in ongoing training to improve their response times and abilities.

Warning Time

Grass and Wildland fire incidents usually occur rapidly with minimal or no warning. Even if reported immediately, some people in the area have little time to react and /or evacuate. While there are advanced monitoring and prediction services surrounding wildfires (e.g., online wildfire tracking and prediction systems), these hazards often get out of control unexpectedly and therefore the warning times can be highly unpredictable. As such, a score of 4 (minimal or no warning time) has been generally assigned for the ADLM region.

Duration

Most grassfires occur without warning and travel at a moderate rate. This situation depends upon conditions at the time such as moisture, wind, and land cover. Most fires in the planning area do not last past 6 hours, as they can be managed rapidly once emergency responders get to the scene. A score of 1 (less than 6 hours of hazard exposure) has been assigned for the region.

Exhibit 102: Jurisdictional Grass & Wildland Fire Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	2	4	1	2.2	Moderate
Centerville	2	2	4	1	2.2	Moderate
Centerville Community Schools	2	2	4	1	2.2	Moderate
Cincinnati	3	2	4	1	2.65	Moderate
Exline	3	1	4	1	2.35	Moderate
Moravia	2	2	4	1	2.2	Moderate
Moravia Community School	3	2	4	1	2.65	Moderate
Moulton	3	1	4	1	2.35	Moderate
Mystic	3	2	4	1	2.65	Moderate
Plano	3	2	4	1	2.65	Moderate
Rathbun	2	2	4	1	2.2	Moderate
Udell	3	2	4	1	2.65	Moderate
Unionville	3	2	4	1	2.65	Moderate
Moulton-Udell Community School	3	1	4	1	2.35	Moderate
MercyOne Medical	2	2	4	1	2.2	Moderate
Davis Unincorp Co	3	3	4	1	2.95	Moderate
Davis Co Community Schools	3	1	4	1	2.35	Moderate
Bloomfield	3	1	4	1	2.35	Moderate
Drakesville	3	1	4	1	2.35	Moderate
Floris	3	2	4	1	2.65	Moderate
Pulaksi	3	1	4	1	2.35	Moderate
Lucas Unincorp Co	3	2	4	1	2.65	Moderate
Chariton	2	2	4	1	2.2	Moderate
Chariton Community Schools	2	2	4	1	2.2	Moderate
Derby	3	1	4	1	2.35	Moderate
Lucas	3	1	4	1	2.35	Moderate
Russell	3	1	4	1	2.35	Moderate
Williamson	3	1	4	1	2.35	Moderate
Lucas Co Health Center	3	2	4	1	2.65	Moderate
Monroe Unincorp Co	2	2	4	1	2.2	Moderate
Albia	2	2	4	1	2.2	Moderate
Albia Community Schools	2	2	4	1	2.2	Moderate
Eddyville	3	1	4	1	2.35	Moderate
Lovilia	2	2	4	1	2.2	Moderate
Melrose	2	2	4	1	2.2	Moderate
Monroe Co Hospital	3	2	4	1	2.65	Moderate

H.) Human Disease

A human disease event is a medical, health, or sanitation threat to the public such as contamination, epidemics, plagues, and insect infestations. A human disease event requires regular, frequent, and time information regarding individual cases to prevented and control spread of disease.

Potential Hazard Area

The potential hazard area for human disease events in the entire ADLM region. 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). Public health action to control infectious diseases in the 21st century is based on the 19th century discovery of microorganisms as the cause of many serious diseases (e.g., cholera and TB). Disease control resulted from improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs. A pandemic human disease is defined as a disease that has spread around the world to many people. The word, “pandemic”, means that a disease has caused illness in a person on nearly every continent. Many diseases throughout the history of the world have been pandemic. Examples are HIV/AIDS/Influenza. A pandemic will have widespread economic and societal implications for our state. Response and recovery to a pandemic will likely be lengthy. Considering that the manner that the diseases can spread so quickly, all residents can be considered at risk, however, the most vulnerable population considered are the elderly, youth, and disabled residents.

The individuals that travel internationally and have high exposure to potential vectors of disease are the most susceptible. See Exhibit 103. Greater than 20% of Iowa’s population is considered high risk. The elderly population of the ADLM region comprise up nearly 20% according to the 2018 ACS with a youth population (under age 19) of nearly 25%. About 45% of the ADLM region may be considered at high risk based on age alone.

Locations that are susceptible to such diseases would include assisted care facilities and school districts. There are approximately 20 retirement homes or residential care facilities throughout the ADLM Region. The thousands of children attending school throughout the four-county region.

Exhibit 103: ADLM Region Vulnerable Population								
2019 ACS								
Jurisdictions	Population 65yrs & older	% Over 65yrs	Population 18 years & younger	% Under 18yrs	Population living below poverty guidelines	% In poverty	Residents living with a diagnosed disability	% With Disability
TOTAL APPANOOSE COUNTY	2,884	23%	2,788	22%	2,200	18%	2,375	19%
TOTAL DAVIS COUNTY	1,555	17%	2,621	29%	868	10%	1,037	12%
TOTAL LUCAS COUNTY	1,787	22%	2,002	23%	1,015	12%	1,435	27%
TOTAL MONROE COUNTY	1,533	20%	1,840	24%	809	11%	962	13%
TOTAL REGIONAL	7,759	21%	9,251	25%	4,892	13%	3,671	18%

Historical Occurrences

There are 49 reportable communicable disease and infectious conditions in Iowa that hospitals and other health care providers must report to their county public health department. Iowa County Public Health investigates these diseases and maintains reports and are shared with the Iowa Department of Public Health (IDPH) and the Centers for Disease Control and Prevention (CDC). IDPH releases an annual report of notifiable and other diseases. See Exhibit 104.

Exhibit 104: Common Reportable Diseases in the ADLM Region						
Storm Events Database National Centers for Environmental Information (noaa.gov)						
<i>Communicable Disease/Infectious Disease</i>	<i>2009</i>	<i>2011</i>	<i>2013</i>	<i>2015</i>	<i>2017</i>	<i>2019</i>
Anaplasmosis/Ehrlichiosis					2	2
Campylobacteriosis	8	11	7	18	22	15
Chlamydia	42	78	86			
Cryptosporidiosis	6	7	20	5	12	16
E. Coli STEC	3	6	3	2	8	19
Ehrlichiosis/Anaplasmosis				1		
Giardiasis	3	4	1	2	1	4
Gonorrhea	2	4	6			
HUS					1	
Hep A				1	1	
Hep B, acute	1					1
Hep B, Chronic	1		2		2	
Lacrosse encephalitis					1	
Lyme	2		4	1		3
Pertussis	2		14	4	7	35
Q Fever, acute					1	
Rocky Mtn Spotted Fever		1			1	4
Salmonellosis	4	4	3	7	8	12
Syphilis		1	2			
Shigellosis				1		
West Nile Virus	1		1			

Source: Iowa Department of Public Health

The recent annual reports have dedicated a specific chapter to the surveillance of influenza. According to the 2016 annual report, the 2016-2017 flu season was worse in nearly every measure compared to the 2015-2016 season. The 2017 annual report stated that there were 270 influenza-related deaths in Iowa in the 2017-2018 flu season, more than the previous two flu seasons combined. It was also noted that 79% of those deaths were among person with a reported underlying health condition. IDPH reported “widespread” statewide influenza activity to the CDC for 10 consecutive weeks during that season. While the rate of infections from influenza increases and decreases seasonally in a predictable manner, many people will have some immunity from previous exposure and vaccinations and receiving an annual inoculation can help prevent the spread of hospitalizations due to influenza. In contrast, pandemic flu occurs when a new strain of influenza causes global outbreak. People have little to no immunity to these viruses because there is no past exposure to them or similar viruses. They can also occur any time of the year and not just in a “season”. According to *the 2013 Iowa Hazard Mitigation Plan*, there have been four influenza pandemics in Iowa since 1900, each occurring approximately 30 years apart. The H1N1 outbreak in 2009-2010 was the most recent event. This event killed fewer people in Iowa than the 2017-2018 seasonal flu.

The Coronavirus appeared in the United States in January of 2020. The highly contagious virus was declared a national public health emergency by the end of January. COVID-19 made its appearance in early March in Iowa and prompted the governor to issue a “partial activation” of state of emergency operations. The President of the United States declared a national emergency in March as well. Universities, colleges, and schools began to offer online classes or closed to prevent the spread of the disease. By the end of March, Iowa had declared a public health disaster and businesses were forced to shut down and created an economic hardship for many in the country. In the first year of the virus, Iowa experienced approximately 5,642 (1%) of the 534,000 deaths in the United States. The first vaccines were approved in December 2020 and citizens are still struggling to receive them at this time.

Probability

Historically, pandemics occur approximately every 30 years in Iowa. Influenza occurs every year all over the world. The virus spreads through a population for a few months and will disappear or move to another country due to travel. Influenza usually occurs in the fall and winter months in the U.S., but it is usually manageable at the local level. However, given the status of the coronavirus and the spread continuing, this ongoing event could continue to occur for several years.

Magnitude and Severity

When a human disease event was to occur, the area of effect, severity of symptoms or loss of human life would be determined by the communicability and virulence of the disease. The impacted area could vary from a neighborhood to a community to an entire county or more. Public health agencies work to reduce the spread of diseases and use community-based prevention, monitor current infectious disease trends, and provide early detection and treatment for infected persons.

Today’s society is so mobile, diseases can move rapidly across the state and nation within months, weeks and even days. Many diseases on the national notification list result in serious illness and even death. Some diseases are treatable but for many others only the symptoms are treatable.

Typically, the people who are especially vulnerable during a human disease event are the elderly, young, people with chronic medical conditions and people who engage in high-risk behaviors. People who travel internationally and have a higher exposure to potential vectors of the disease are the most susceptible. The population under eighteen in the ADLM region account for 25% and the elderly make up 21% of the total population. With such a high percentage of the population at risk, the magnitude and severity of a human disease event can reach a critical level.

Warning Time

Healthcare workers are usually the first to diagnose disease and become the first line of defense. ADLM Environmental Health, IDPH, and the U.S. CDC monitor reports submitted by health care providers, hospitals, and labs to identify patterns. Monitoring agencies are proactive in providing information to the health care community on medical concerns.

The public is reminded to prepare for typical human disease events like influenza before the common time of year this virus spreads throughout Iowa and the U.S. For other human disease events, the public is informed of initial outbreak, which are confirmed cases of a disease, so for most human disease events there is minimal to no warning.

A potential event exists for a human disease to occur from contamination of water supplies from infrastructure failure, flooding, or other hazards there is minimal to no warning for the public. The IDNR and local governments issue warning as soon as possible but the contamination is already present in water supplies.

Duration

A response to highly infectious disease occurs continuously but the direct effects of a human disease event such as a pandemic can occur for months at a time.

Exhibit 105: Jurisdictional Human Disease Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	4	4	4	4	4.0	High
Centerville	3	4	1	4	3.1	High
Centerville Community Schools	3	4	1	4	3.1	High
Cincinnati	4	2	2	4	3.1	Moderate
Exline	4	2	2	4	3.1	Moderate
Moravia	3	1	2	3	2.1	Moderate
Moravia Community School	3	4	2	4	3.1	High
Moulton	4	2	2	4	3.1	Moderate
Mystic	2	2	1	4	2.05	Moderate
Plano	4	2	2	4	3.1	Moderate
Rathbun	4	2	2	4	3.1	Moderate
Udell	4	2	2	4	3.1	Moderate
Unionville	1	3	1	4	1.9	Low
Moulton-Udell Community School	3	4	1	4	3.1	High
MercyOne Medical	3	4	1	4	3.1	High
Davis Unincorp Co	2	3	2	4	2.50	Moderate
Davis Co Community Schools	2	4	2	4	2.80	Moderate
Bloomfield	2	4	2	4	2.80	Moderate
Drakesville	2	3	2	4	2.50	Moderate
Floris	2	3	2	4	2.50	Moderate
Pulaksi	2	3	2	4	2.50	Moderate
Lucas Unincorp Co	1	4	4	4	2.65	Moderate
Chariton	2	4	4	4	3.1	High
Chariton Community Schools	2	2	4	2	2.3	Moderate
Derby	2	2	1	4	2.05	Moderate
Lucas	4	4	1	4	3.55	High
Russell	3	2	2	4	2.65	Moderate
Williamson	1	2	1	4	1.6	
Lucas Co Health Center	3	2	2	4	2.65	Moderate
Monroe Unincorp Co	3	2	4	4	2.75	Moderate
Albia	2	2	4	4	2.5	Moderate
Albia Community Schools	2	2	1	4	2.05	Moderate
Eddyville	1	1	1	1	1.0	Low
Lovilia	1	1	1	3	1.2	Low
Melrose	1	1	4	4	1.75	Low
Monroe Co Hospital	3	3	2	4	2.95	Moderate

Historical Occurrences

There have been no reported landslides in Iowa resulting in injury or death, according to the *Iowa Hazard Mitigation Plan 2018*. Furthermore, no State agency documents occurrences of landslide in Iowa. The United States Geological Survey landslide susceptibility map shows 95% of the ADLM region is at moderate susceptibility, low incidence.

Although no events have been reported, the HMPC estimates that slides have occurred, although are most likely are quite small affecting small and isolated tracks of land. No reported injuries or deaths have occurred because of this hazard.

Probability

The HMPC determined the probability of future occurrence of a significant landslide in the planning area to be Unlikely.

Magnitude and Severity

There will continue to be intense rainfall events that may cause minor landslides in the planning area. But the damages would be relatively minimal and isolated. The ADLM region has more “rolling hills” and lacks steep terrain, and therefore, most landslides would be small and affect an area about the size of a couple acres or less. Resulting damage from a landslide would likely be limited to minor property and infrastructure damage, and potentially limited interruption of essential facilities and services for a short period of time. HMPC members have not identified specific areas of development that are vulnerable to landslide, but the region is susceptible to these events.

Warning Time

Landslide events would be more likely to occur after a period of intense rainfall. Although that creates a window of time to increase the likelihood, a landslide could occur without warning.

Duration

The duration of the event would be a matter of seconds.

Exhibit 107: Jurisdictional Landslide Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	1	1	4	1	1.0	Low
Centerville	1	1	4	2	1.1	Low
Centerville Community Schools	1	1	4	2	1.1	Low
Cincinnati	1	1	4	1	1.0	Low
Exline						
Moravia	1	1	4	1	1.0	Low
Moravia Community School	1	1	4	1	1.0	Low
Moulton	1	1	4	2	1.1	Low
Mystic	1	1	4	1	1.0	Low
Plano	1	1	4	1	1.0	Low
Rathbun	1	1	4	2	1.1	Low
Udell	1	1	4	2	1.1	Low
Unionville	1	1	4	1	1.0	Low
Moulton-Udell Community School	1	1	4	2	1.1	Low
MercyOne Medical	1	1	4	2	1.1	Low
Davis Unincorp Co	1	1	4	1	1.0	Low
Davis Co Community Schools	1	1	4	2	1.1	Low
Bloomfield	1	1	4	2	1.1	Low
Drakesville	1	1	4	1	1.0	Low
Floris	1	1	4	1	1.0	Low
Pulaksi						
Lucas Unincorp Co	1	1	4	1	1.0	Low
Chariton	1	1	4	2	1.1	Low
Chariton Community Schools	1	1	4	2	1.1	Low
Derby	1	1	4	1	1.0	Low
Lucas	1	1	4	1	1.0	Low
Russell	1	1	4	2	1.1	Low
Williamson	1	1	4	1	1.0	Low
Lucas Co Health Center	1	1	4	2	1.1	Low
Monroe Unincorp Co	1	1	4	2	1.1	Low
Albia	1	1	4	2	1.1	Low
Albia Community Schools	1	1	4	2	1.1	Low
Eddyville	1	1	4	1	1.0	Low
Lovilia	1	1	4	2	1.1	Low
Melrose	1	1	4	1	1.0	Low
Monroe Co Hospital	1	1	4	2	1.1	Low

J.) Severe Winter Storm

Severe winter storm conditions that affect daily activities can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold.

Blizzard conditions are defined as winter storms lasting at least three hours with sustained winds of 35mph or more, reduced visibility of ¼ mile or less, and whiteout conditions.

Potential Hazard Area

The potential hazard area for a severe winter storm is the entire ADLM region.

Historical Occurrences

From 2000-2019, there have been 67 recorded winter storm events in the region. Generally, in most years there was one or more winter storm or other winter-related events, however there were no documented events during ten of the last 20 years. Winter storm events and pertinent data can be found in Exhibit 108.

Exhibit 108: Regional Winter Storm Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Winter Storm	0	0	\$439,900 zone	0
Davis County	2000-2019	Winter Storm	0	0	\$389,900	0
Lucas County	2000-2019	Winter Storm	0	0	\$189,900	0
Monroe County	2000-2019	Winter Storm	0	0	\$439,900 zone	0
REGIONAL TOTALS	2000-2019	Winter Storm	0	0	\$1.02M	0

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	439.90K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/10/2000	21:00	CST	Winter Storm		0	0	24.90K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/08/2001	23:00	CST	Winter Storm		0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/14/2003	11:00	CST	Winter Storm		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/12/2007	22:30	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/24/2007	03:00	CST-6	Winter Storm		0	0	250.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/22/2007	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/05/2008	11:00	CST-6	Winter Storm		0	0	10.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/06/2010	16:00	CST-6	Winter Storm		0	0	25.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/30/2013	00:00	CST-6	Winter Storm		0	0	25.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/04/2014	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/01/2015	00:00	CST-6	Winter Storm		0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/28/2015	04:00	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/11/2019	20:00	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/22/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	04/16/2020	01:00	CST-6	Winter Storm		0	0	0.00K	0.00K
Totals:								0	0	439.90K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	389.90K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/10/2000	21:00	CST	Winter Storm		0	0	24.90K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/08/2001	23:00	CST	Winter Storm		0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/14/2003	11:00	CST	Winter Storm		0	0	5.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/12/2007	22:30	CST-6	Winter Storm		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/24/2007	03:00	CST-6	Winter Storm		0	0	250.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/05/2008	11:00	CST-6	Winter Storm		0	0	10.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/04/2014	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/01/2015	00:00	CST-6	Winter Storm		0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/28/2015	04:00	CST-6	Winter Storm		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/11/2019	20:00	CST-6	Winter Storm		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/22/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	04/16/2020	01:00	CST-6	Winter Storm		0	0	0.00K	0.00K
Totals:								0	0	389.90K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	189.90K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/10/2000	21:00	CST	Winter Storm		0	0	24.90K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/08/2001	23:00	CST	Winter Storm		0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/14/2003	11:00	CST	Winter Storm		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/12/2007	22:30	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/22/2007	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/05/2008	11:00	CST-6	Winter Storm		0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/06/2010	13:00	CST-6	Winter Storm		0	0	25.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/29/2013	22:00	CST-6	Winter Storm		0	0	25.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/04/2014	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/01/2015	00:00	CST-6	Winter Storm		0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/28/2015	04:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/11/2019	20:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/18/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/22/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/11/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	04/16/2020	01:00	CST-6	Winter Storm		0	0	0.00K	0.00K
Totals:								0	0	189.90K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	439.90K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/10/2000	21:00	CST	Winter Storm		0	0	24.90K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/08/2001	23:00	CST	Winter Storm		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/14/2003	11:00	CST	Winter Storm		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/12/2007	22:30	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/24/2007	03:00	CST-6	Winter Storm		0	0	250.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/22/2007	12:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/05/2008	11:00	CST-6	Winter Storm		0	0	10.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/06/2010	16:00	CST-6	Winter Storm		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/30/2013	00:00	CST-6	Winter Storm		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/04/2014	16:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/01/2015	00:00	CST-6	Winter Storm		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/28/2015	04:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/11/2019	20:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/22/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/11/2019	15:00	CST-6	Winter Storm		0	0	0.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	04/16/2020	01:00	CST-6	Winter Storm		0	0	0.00K	0.00K
Totals:								0	0	439.90K	0.00K

In addition to winter storms, there have been nine blizzard events recorded in the ADLM region from 2000-2019. There were no deaths, injuries, or damage reported for the region. See Exhibit 109 for more data. However, the episode narrative described the blizzard of February 2011 as a tremendous blizzard, one of the worst in memory, impacted the region on February 1-2, 2011, as deep low pressure tracked from Texas to southern Indiana. Snowfall totals ranged from 10 to 20 inches with drifts as high as 7 feet. Blizzard conditions were widespread with visibilities near zero in heavy snow and winds gusting over 50-60mph.

Exhibit 109: Regional Blizzard Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Blizzard	0	0	\$75,000	0
Davis County	2000-2019	Blizzard	0	0	\$125,000	0
Lucas County	2000-2019	Blizzard	0	0	\$260,000	0
Monroe County	2000-2019	Blizzard	0	0	\$260,000	0
REGIONAL TOTALS	2000-2019	Blizzard	0	0	\$720,000	0

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>I.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
Totals:								0	0	75.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/09/2009	03:00	CST-6	Blizzard		0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/01/2011	17:00	CST-6	Blizzard		0	0	25.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	11/25/2018	12:00	CST-6	Blizzard		0	0	0.00K	0.00K
Totals:								0	0	75.00K	0.00K

Sort By: ▼

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>I.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
Totals:								0	0	25.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/01/2011	17:00	CST-6	Blizzard		0	0	25.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	11/25/2018	12:00	CST-6	Blizzard		0	0	0.00K	0.00K
Totals:								0	0	25.00K	0.00K

<u>Location</u>	<u>County/Zone</u>	<u>St.</u>	<u>Date</u>	<u>Time</u>	<u>I.Z.</u>	<u>Type</u>	<u>Mag</u>	<u>Dth</u>	<u>Inj</u>	<u>PrD</u>	<u>CrD</u>
Totals:								0	0	260.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/09/2009	01:00	CST-6	Blizzard		0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/25/2010	14:00	CST-6	Blizzard		0	0	75.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/01/2011	17:00	CST-6	Blizzard		0	0	25.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/20/2012	00:00	CST-6	Blizzard		0	0	100.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/16/2014	17:00	CST-6	Blizzard		0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	11/25/2018	08:00	CST-6	Blizzard		0	0	0.00K	0.00K
Totals:								0	0	260.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	260.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/09/2009	03:00	CST-6	Blizzard		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/25/2010	14:00	CST-6	Blizzard		0	0	75.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/01/2011	17:00	CST-6	Blizzard		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/20/2012	02:00	CST-6	Blizzard		0	0	100.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/16/2014	17:00	CST-6	Blizzard		0	0	10.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	11/25/2018	08:00	CST-6	Blizzard		0	0	0.00K	0.00K
Totals:								0	0	260.00K	0.00K

In Iowa, ice storm events typically cause the greatest human loss and property damage associated with severe winter weather. From 2000-2019, there were 15 ice storms in the ADLM region (see Exhibit 110). There were no deaths or injuries reported.

Exhibit 110: Regional Ice Storm Data Storm Events Database National Centers for Environmental Information (noaa.gov)						
Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Appanoose County	2000-2019	Ice Storm	0	0	\$465,000	0
Davis County	2000-2019	Ice Storm	0	0	\$475,000	0
Lucas County	2000-2019	Ice Storm	0	0	\$460,000	0
Monroe County	2000-2019	Ice Storm	0	0	\$415,000	0
REGIONAL TOTALS	2000-2019	Ice Storm	0	0	\$1.82M	0

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	465.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/17/2000	20:00	CST	Ice Storm		0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/08/2001	16:00	CST	Ice Storm		0	0	75.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/03/2005	01:00	CST	Ice Storm		0	0	25.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	11/29/2006	15:00	CST-6	Ice Storm		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/01/2007	06:00	CST-6	Ice Storm		0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/11/2007	00:00	CST-6	Ice Storm		0	0	150.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/18/2008	18:30	CST-6	Ice Storm		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	12/27/2008	08:00	CST-6	Ice Storm		0	0	5.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/20/2010	03:00	CST-6	Ice Storm		0	0	100.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	02/07/2019	00:00	CST-6	Ice Storm		0	0	0.00K	0.00K
Totals:								0	0	465.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	475.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/17/2000	20:00	CST	Ice Storm		0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/08/2001	16:00	CST	Ice Storm		0	0	75.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/03/2005	01:00	CST	Ice Storm		0	0	25.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	11/29/2006	15:00	CST-6	Ice Storm		0	0	5.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/01/2007	06:30	CST-6	Ice Storm		0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/11/2007	00:00	CST-6	Ice Storm		0	0	150.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/18/2008	18:30	CST-6	Ice Storm		0	0	15.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	12/27/2008	08:00	CST-6	Ice Storm		0	0	5.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/20/2010	03:00	CST-6	Ice Storm		0	0	100.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	02/07/2019	00:00	CST-6	Ice Storm		0	0	0.00K	0.00K
Totals:								0	0	475.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	460.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/17/2000	20:00	CST	Ice Storm		0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	02/08/2001	16:00	CST	Ice Storm		0	0	75.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/03/2005	01:00	CST	Ice Storm		0	0	25.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/01/2007	06:00	CST-6	Ice Storm		0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/10/2007	22:00	CST-6	Ice Storm		0	0	150.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/18/2008	18:30	CST-6	Ice Storm		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	12/27/2008	08:00	CST-6	Ice Storm		0	0	5.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/20/2010	03:00	CST-6	Ice Storm		0	0	100.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/15/2017	15:00	CST-6	Ice Storm		0	0	0.00K	0.00K
Totals:								0	0	460.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	415.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/17/2000	20:00	CST	Ice Storm		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	02/08/2001	16:00	CST	Ice Storm		0	0	75.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/03/2005	01:00	CST	Ice Storm		0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	11/29/2006	15:00	CST-6	Ice Storm		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/01/2007	06:00	CST-6	Ice Storm		0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/11/2007	00:00	CST-6	Ice Storm		0	0	100.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/18/2008	18:30	CST-6	Ice Storm		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	12/27/2008	08:00	CST-6	Ice Storm		0	0	5.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/20/2010	03:00	CST-6	Ice Storm		0	0	100.00K	0.00K
Totals:								0	0	415.00K	0.00K

Extreme cold and wind chill are also included in the severe winter storm definition because it is a dangerous component of Iowa’s winter season. There have not been any documented extreme cold/wind chill from 2000-2020.

Probability

Historical occurrences indicate that several winter storm events can occur annually in the ADLM region, so the probability is high likely, which is greater than 33% chance is any given year. The frequency of severe winter storm events depends on the overall severity of a particular winter season. As historical data indicates, the region can be affected by several severe winter storm events in one year, but there can also be a year with few or no severe winter storm events.

Magnitude and Severity

Winter storms usually impact several counties during a single event. Due to size and environmental changes as a storm travels across a region, there will be local variation in storm intensity and quantity precipitation. The presence of snow or ice, high winds, and low temperature can make a significant difference in how a severe winter storm event will impact a community.

During a winter storm event, people, pets, and livestock are susceptible to frostbite and hypothermia. The people primarily at risk are engaged in outdoor activity such as shoveling snow, digging out vehicles, or assisting stranded motorists. The elderly or young are also vulnerable during winter storm event. Businesses and schools often close during extreme cold or heavy snow conditions to protect the safety of patrons, workers, students, and bus drivers.

Heavy snow, blizzards, and ice storms can immobilize transportation systems, damage trees and power lines, and collapse buildings and communications towers. The potential for drifting snow is substantially high in open country than urban areas where buildings, trees, and other features obstruct the wind. Severe ice storms have caused total electric power outages over large areas of Iowa and rendered assistance unavailable to those in need due to impassable roads.

Jurisdiction	Number of Mobile Homes	Avg % of total mobile homes	Number of homes built prior to 1960	% Of homes built prior 1960
Total Appanoose County	590	9%	3,257	49%
Total Davis County	199	6%	1,699	47%
Total Lucas County	178	4%	1,891	45%
Total Monroe County	564	14%	1,511	38%
Total ADLM Region	1,531	8.25%	8,358	44.75%
<i>2019 ACS</i>				

Regarding the transportation system, the Iowa Department of Transportation (IDOT), county road departments, and local governments are responsible for snow removal of snow and treatment of snow streets and highways. Severe winter storms conditions can slow or stop the flow of vital supplies and disrupt emergency services. In addition, the emergency needs of remote isolated residents for food or fuel, as well as for feed, water, and shelter for livestock may be difficult to fulfill.

In the ADLM region, a severe winter storm can reach a critical level primarily due to the potential risk of human injury and death. It is possible a shutdown of services and facilities could last more than one week if the storm causes major power outages. This severity estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

Warning Time

The NWS has developed effective weather notifications that are promptly and widely distributed to the public. Notifications made by the NWS include winter storm watch, winter storm warning, blizzard warning, winter weather advisory and freeze advisory. Radio, television, weather alert radios, and even smart phone applications provide current weather information. For winter storm events accurate information is available up to a few days in advance.

Duration

Although a severe winter storm typically occurs over several hours, the event can have lasting impacts on a community beyond a week. Dangerous road conditions and/or electrical power outage can affect a community, especially rural areas, for an extended period. It is also possible that a severe winter storm event can last several days due to multiple storms events occurring in short time.

Exhibit 112: Jurisdictional Severe Winter Storm Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	2	4	1	2.2	Moderate
Centerville	4	2	1	3	2.85	Moderate
Centerville Community Schools	4	2	1	3	2.85	Moderate
Cincinnati	4	2	1	3	2.85	Moderate
Exline	4	2	1	3	2.85	Moderate
Moravia	3	1	2	2	2.15	Moderate
Moravia Community School	3	1	2	2	2.15	Moderate
Moulton	3	1	2	2	2.15	Moderate
Mystic	3	1	1	3	2.1	Moderate
Plano	4	2	1	3	2.85	Moderate
Rathbun	4	2	1	3	2.85	Moderate
Udell	4	2	1	3	2.85	Moderate
Unionville	3	2	2	3	2.55	Moderate
Moulton-Udell Community School	3	1	2	2	2.15	Moderate
MercyOne Medical	4	2	1	3	2.85	Moderate
Davis Unincorp Co	4	2	3	4	3.25	High
Davis Co Community Schools	4	2	3	4	3.25	High
Bloomfield	4	2	3	4	3.25	High
Drakesville	4	2	3	4	3.25	High
Floris	4	2	3	4	3.25	High
Pulaksi	4	2	3	4	3.25	High
Lucas Unincorp Co	2	2	1	3	1.95	Low
Chariton	4	1	2	2	2.6	Moderate
Chariton Community Schools	3	2	1	4	2.5	Moderate
Derby	3	2	3	1	2.5	Moderate
Lucas	4	1	4	3	3.0	High
Russell	3	3	1	3	2.7	Moderate
Williamson	3	2	1	3	2.4	Moderate
Lucas Co Health Center	4	2	4	2	3.2	High
Monroe Unincorp Co	3	1	4	3	2.55	Moderate
Albia	4	2	1	3	2.85	Moderate
Albia Community Schools	4	3	1	3	3.15	High
Eddyville	3	2	3	3	2.7	Moderate
Lovilia	1	1	1	2	1.1	Low
Melrose	2	2	3	2	1.1	Low
Monroe Co Hospital	4	3	2	4	3.4	High

K.) Sinkholes

A sinkhole is the loss of surface elevation due to the removal of subsurface support. Sinkholes range from broad, regional lowering of the land surface to localized collapse. The primary cause of most subsidence are human activities such as underground mining, ground water or petroleum withdraw, and drainage of organic soils. Sinkholes are also caused by erosion of limestone in subsurface areas.

Potential Hazard Area

Appanoose County

The Exhibit 113 below displays the maximum population and building exposure at risk with sink holes. In the late 1880's and the turn of the century there were as many as 188 coal mines operating throughout Appanoose County. Historical data collected gives estimated locations of such mines and recently Iowa DNR has created estimated mapping of locations so that communities can identify target areas. The following states approximate portions of communities that could be affected by a sink hole due to abandon mine failure.

Exhibit 113: Appanoose County Vulnerable Communities	
Name	Approx. Area
Streepyville (uninc.)	50% +
Thirty (uninc.)	50% +
Jerome (uninc.)	50% +
Sunshine (uninc.)	50% +
Darbyville (uninc.)	50% +
Centerville	50%
Cincinnati	10%
Exline	90%
Moravia	2%
Moulton	2%
Mystic	80%
Numa	5%
Plano	10%
Rathbun	10%
Udell	2%
Unionville	2%

Sinkholes, also known as subsidence, come in two primary forms in Iowa, Karst subsidence and Mine subsidence. Mine subsidence occurs when a mine or part of a mine collapses causing surface land to create a basin or hole. Karst subsidence occurs as water dissolves underlying rock creating a gap that ultimately collapses. Sinkholes have also resulted in the failure of farm and other types of ponds, roads, and one sewage-treatment lagoon. As sinkholes sometimes allow surface runoff to directly enter bedrock aquifers, their presence has a potential impact on groundwater quality.

Anywhere and anyone is vulnerable to sinkholes should they occur in a developed area. Buildings and infrastructure such as roads, underground pipes, and railroad lines face potentially severe damage from mine subsidence. The potential for damage from Karst subsidence is low given the soil composition of the area (i.e., a lack of Karst soils) throughout the county. Personal injury or even death is possible should a cave in happen suddenly; indirect injury or death is possible from building collapse or damage to infrastructure. The maximum threat of subsidence would be if one or more of the underlying mines were to collapse damaging homes, businesses, and infrastructure. The worst-case scenario is if subsidence or a full cave-in were to happen on any of the four countryside historic squares where a few old, and presumably unreinforced (due to age), brick buildings are located. One building could lead to structural damage to adjacent structures as many buildings are attached. Although the mapping may not be exact, the estimation provides residents of areas that could have a greater potential for experiencing a sinkhole. (See Appendix A)

Davis County

According to the Department of Natural Resources, there are no known sinkholes and limited potential karst areas in Davis County. See Exhibit 117 or Appendix A.

Lucas County

Current mapping of Lucas County does not place any communities at risk of sinkholes due to mines. All known locations are in the rural regions of the county. See Exhibit 114 or Appendix.

Monroe County

Albia – Exposure to Sink Holes

Abandon mines are located along the southern boundary of Albia near Iowa State Highway 5 and the Albia Industrial Park area. See Exhibit 125 or Appendix A.

Lovilia – exposure due to Sink Holes

At one point in history, there were 8 coal mining operations in or around Lovilia. Current mapping does not indicate there are mines located within the city limits of Lovilia. See Exhibit 126 or Appendix A.

Melrose – Exposure to Sink Holes

Current mapping does not indicate there are mines located within the city limits of Melrose.

Exhibit 114: Lucas County Coal Mine Locations

Primary locations are in the unincorporated county and more predominately in northeast section of the county surrounding Williamson and adjacent to Stephen's Forrest.

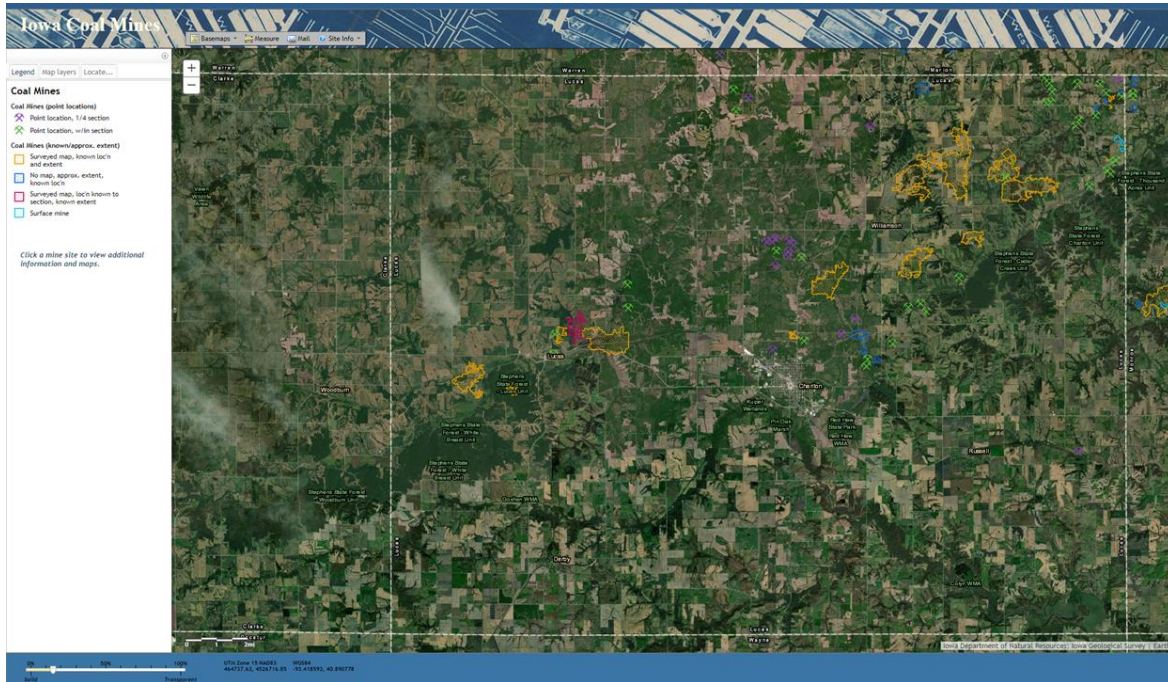


Exhibit 115: Monroe County Coal Mine Locations

Primary locations are in the northern half of the county. The types of mines ranged from surface mines to underground coal shafts.

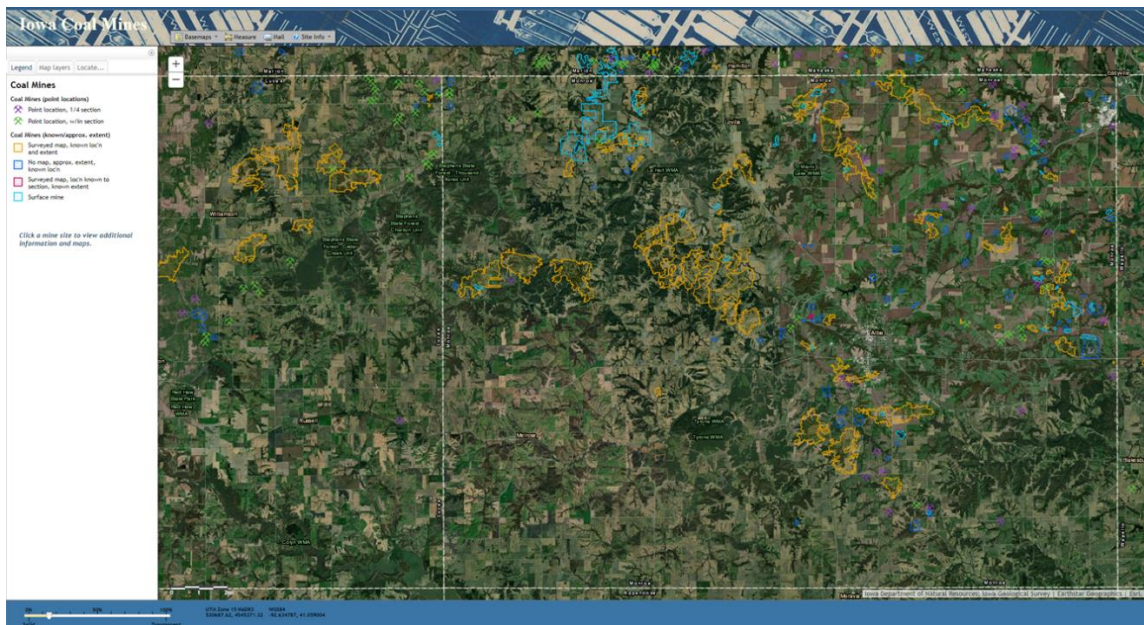


Exhibit 116: Appanoose County Coal Mine Locations

Appanoose County has a rich history of coal mining industries throughout the county. Many coal mine shafts, and strip mining are in and under now incorporated communities.

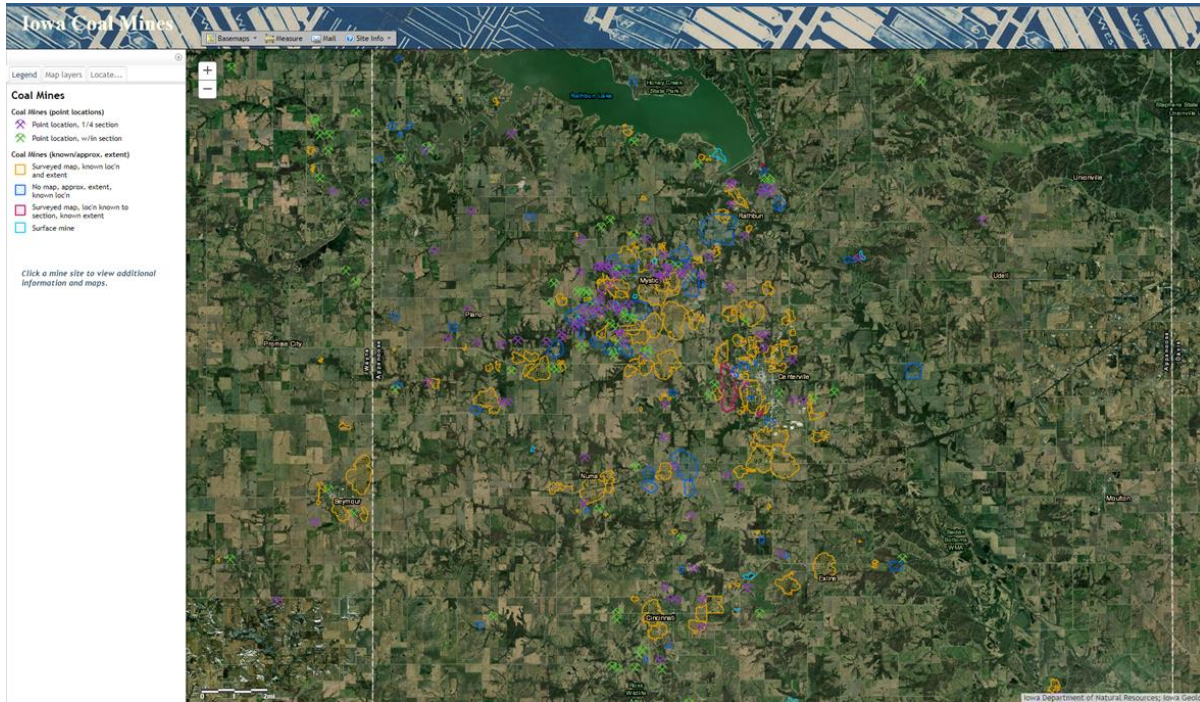


Exhibit 117: Davis County Coal Mine Locations

Little mining occurred in Davis County and what has been discovered is all surface strip mining.

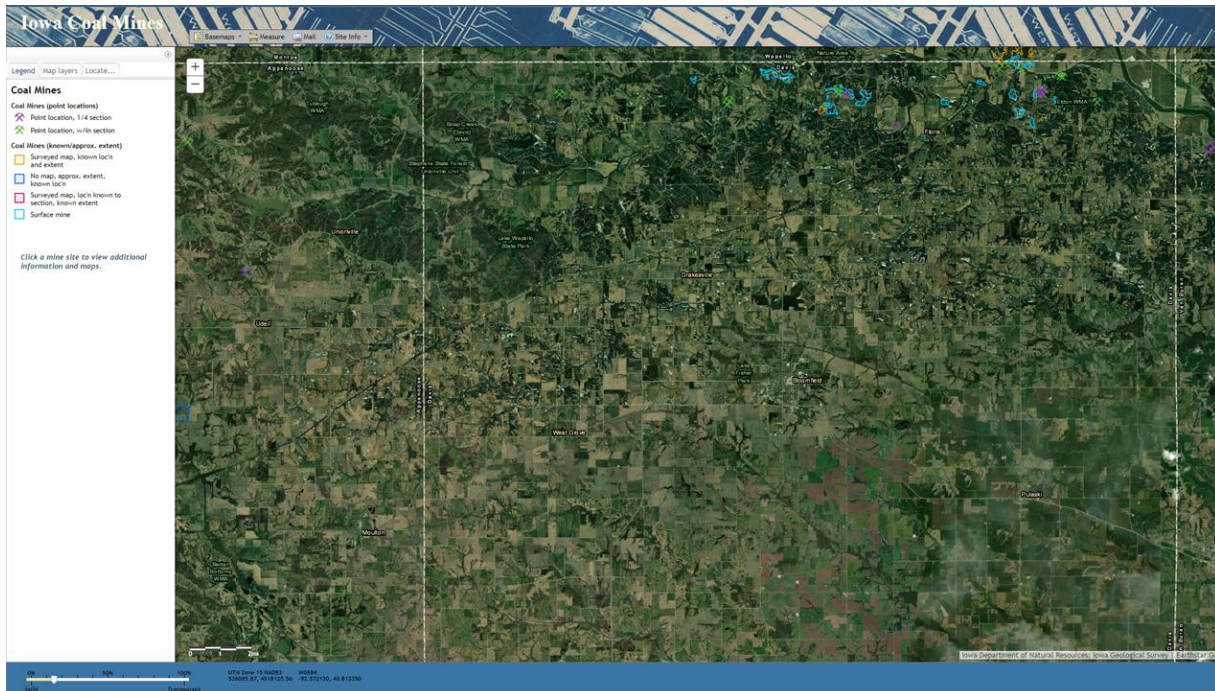


Exhibit 118: City of Centerville Coal Mine Locations

Vacated coal mines exist around the perimeter of Centerville's corporate limits. Residential and commercial structures have been developed on top of the abandon mines.

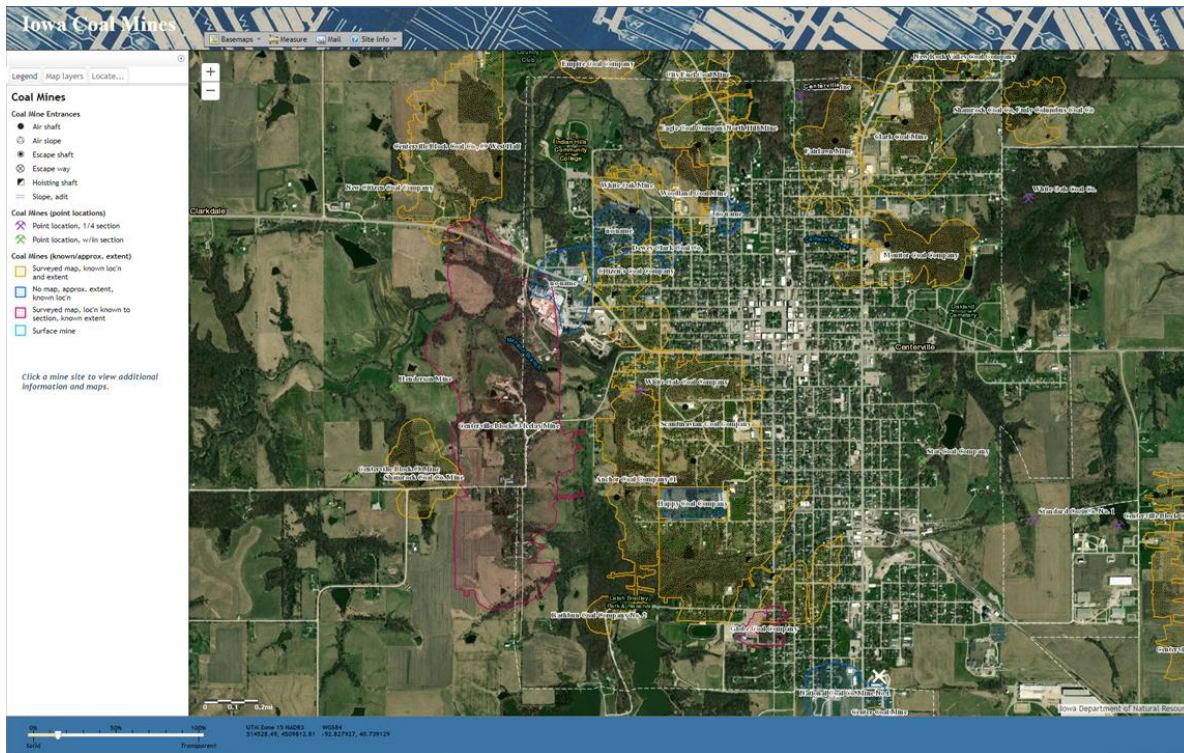


Exhibit 119: City of Mystic Coal Mine Locations

Nearly all of Mystic is located on top of old coal mines. This community was developed by workers of the mines.

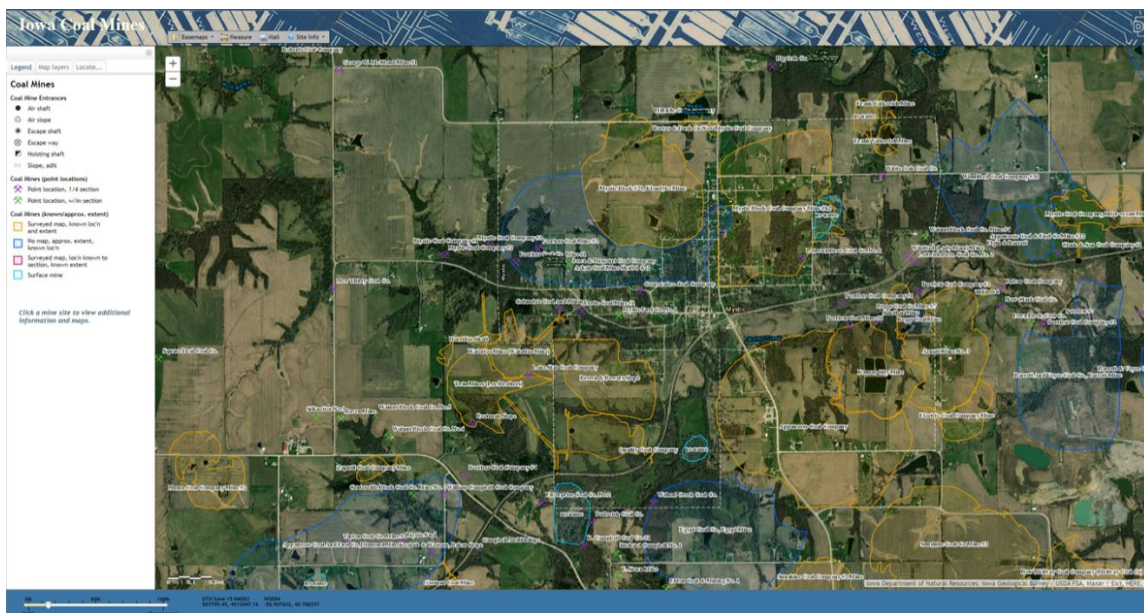


Exhibit 120: City of Rathbun Coal Mine Locations

The west side of Rathbun is situated on top of what is believed to be an old coal mine; however, formal mapping has not been created.

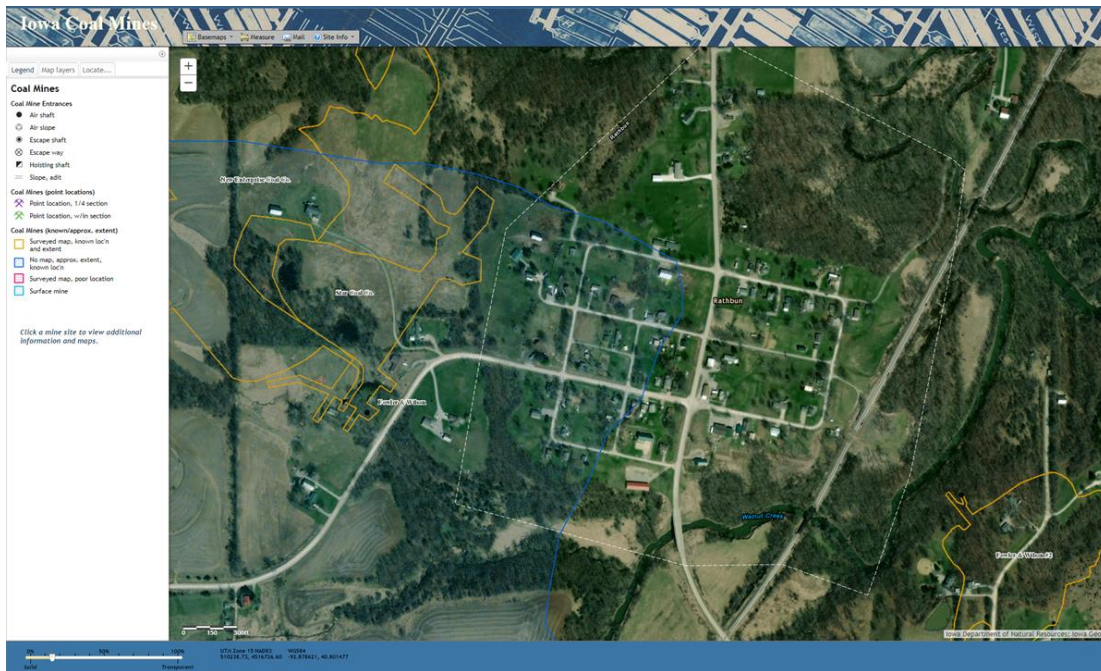


Exhibit 121: City of Exline Coal Mine Locations

Nearly all the residential homes and businesses in Exline are located on an old coal mine.



Exhibit 122: City of Cincinnati Coal Mine Locations

Cincinnati has large corporate boundaries that have open fields. The mines located within city limits are in the fields and not where residential structures are.

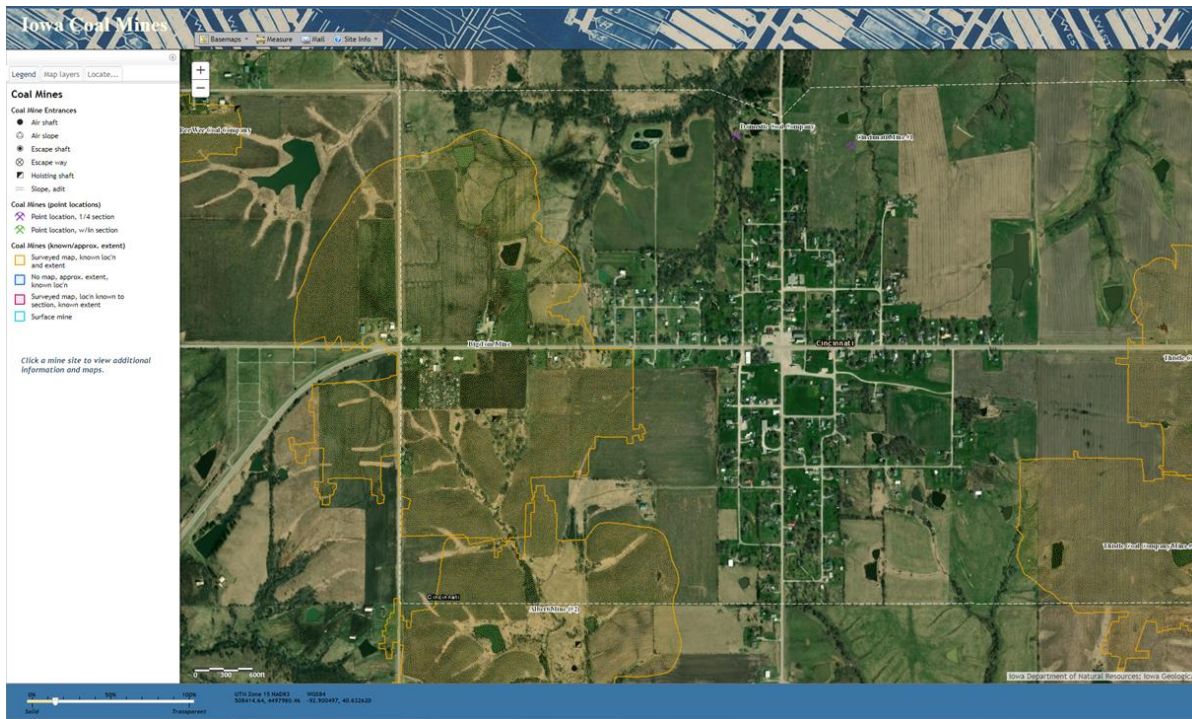


Exhibit 123: City of Numa Coal Mine Locations

Approximately 25% of Numa's incorporated land is located on abandon mines, however, they are in the open fields that have relatively few structures.

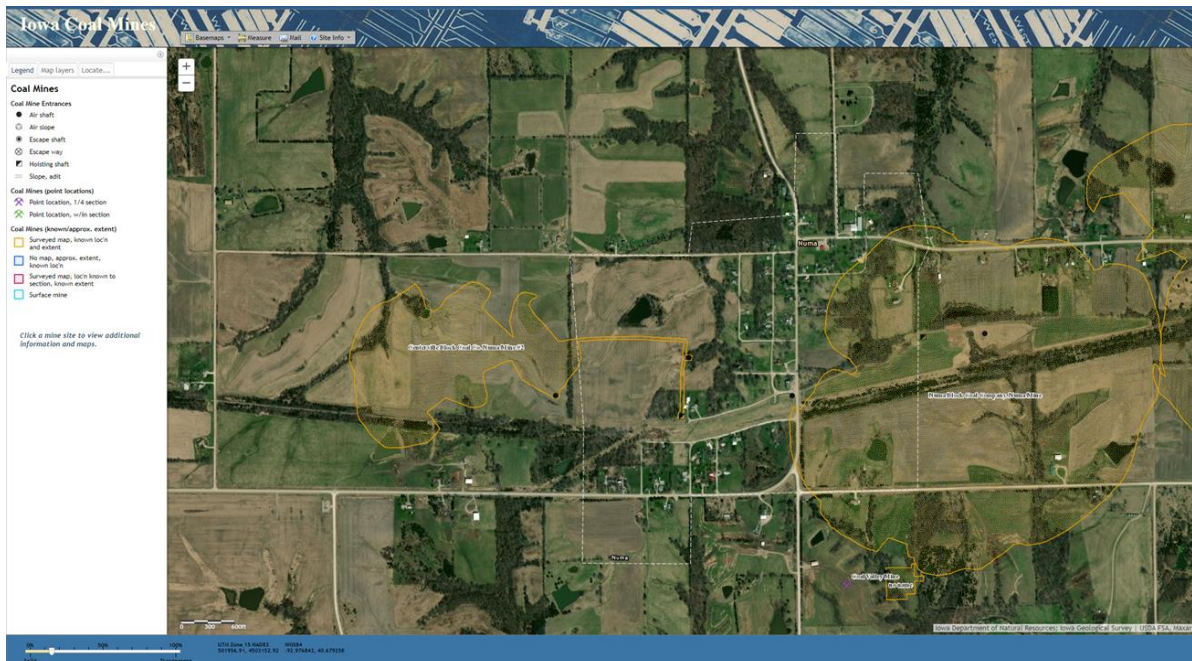


Exhibit 124: City of Plano Coal Mine Locations

History indicates one abandon mine located on the west end of residential housing and places several homes at risk.

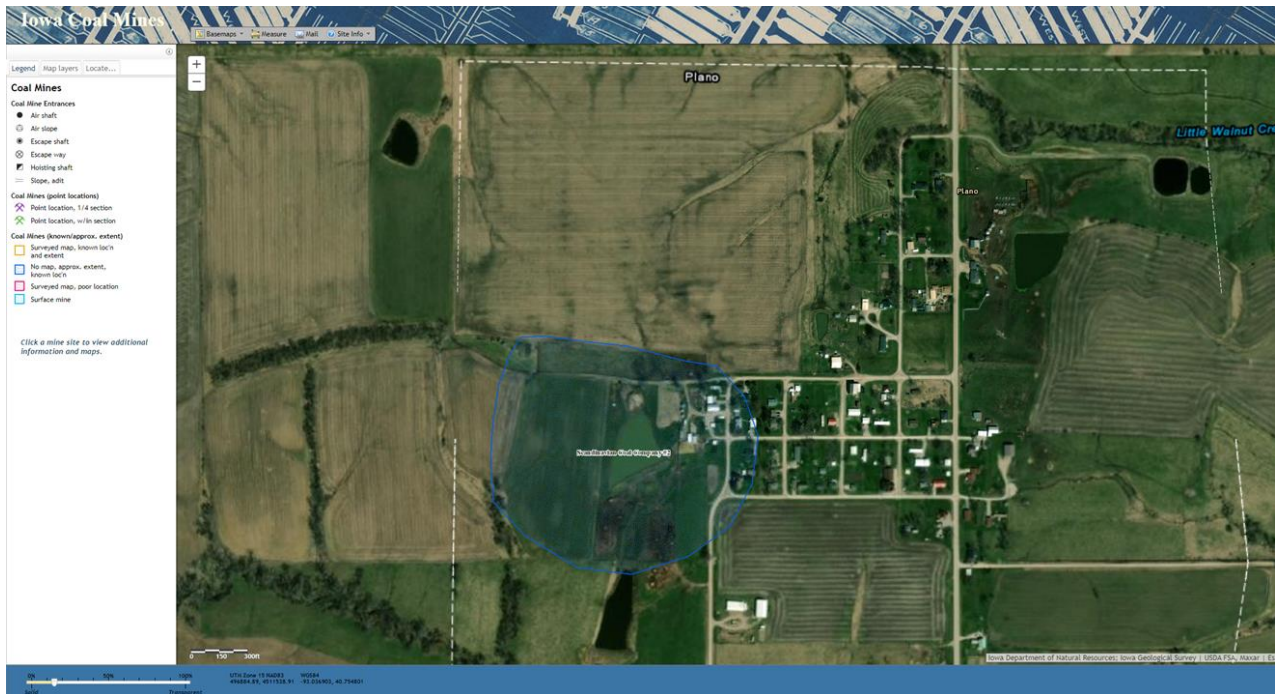


Exhibit 125: City of Albia Coal Mine Locations

Albia has a small portion of the Industrial Park placed on top of an abandon mine on the south boundary of the city.

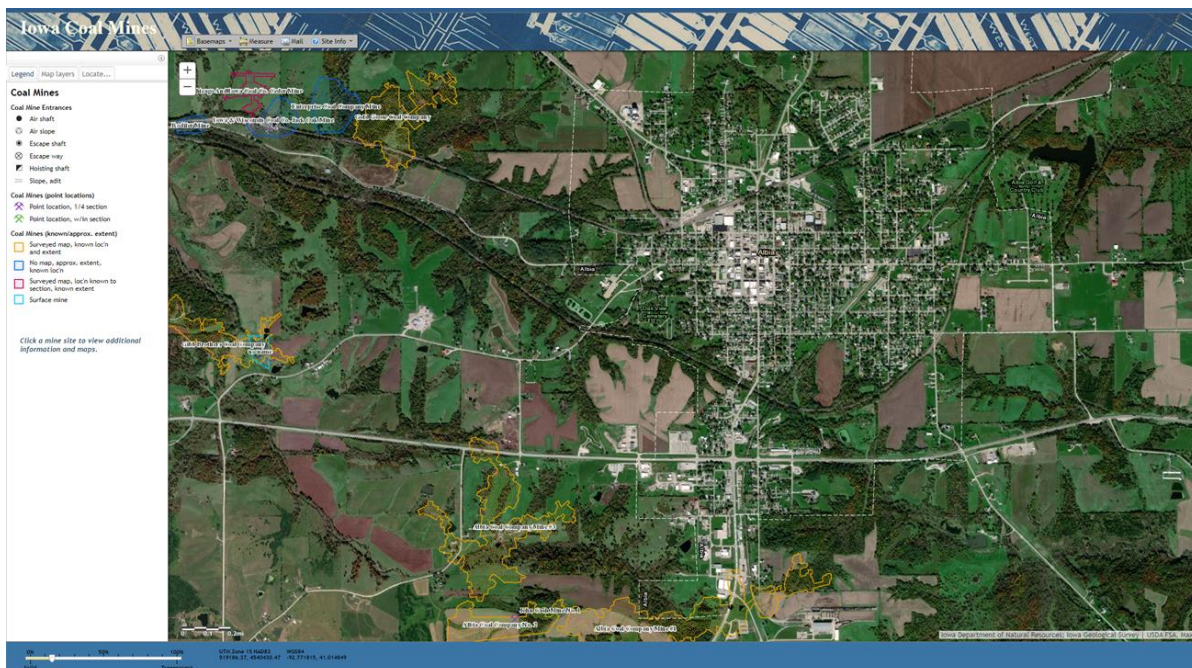
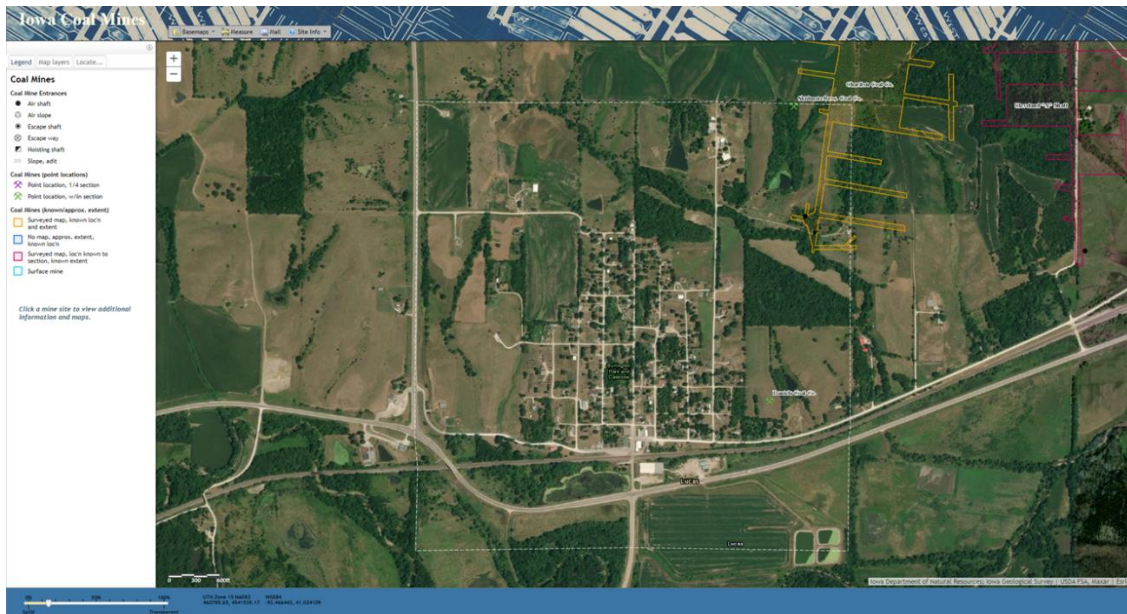


Exhibit 126: City of Lucas Coal Mine Locations

The City of Lucas has history coal mining in the far northeast corner of the city limits. The estimates place the old mines under open fields with no residential structures on it.



Historical Occurrences

While there are no recorded sinkholes in or immediately surrounding the incorporated cities, there is a possibility of subsidence occurring. The prevalence of mines under a large proportion of the communities provides the potential of large areas within the county being damaged by mine cave-ins. The Iowa Department of Natural Resources monitors and maps sinkholes and mines in Iowa. Not all the mines under Appanoose County are fully mapped; the extents of some mines are estimated. Based on these mapping limitations, the condition of at least some of the mines is presumably not fully known. There have been no recorded incidents of sinkholes opening in Appanoose County.

There have been no recorded incidents of sinkholes opening in Appanoose County. However, anecdotal evidence suggests that the railroads in the area have had some problems from sinkholes impacting their infrastructure. Other stories indicate that a home in Centerville collapsed into a mine and methane was released from the hole. The City of Cincinnati indicates that in 2015 an approximate 10-foot hole opened on the corner of the property that houses City Hall. It is uncertain why it occurred, but local officials believe it could be a sinkhole resulting from abandon mining. It was filled with dirt and no other problems have occurred.

The sinkhole inventory maintained by the Iowa Department of Natural Resources did not include any known previous sinkhole occurrences in Davis County. The *2018 Davis County Hazard Mitigation Plan* does not report any incidences of sinkholes or subsidence related to mines.

Probability

The prevalence of mines under a large proportion of the communities provides the potential of large areas within the county being damaged by mine cave ins. The Iowa Department of Natural Resources monitors and maps sinkholes and mines in Iowa. Not all the mines under Monroe County are fully mapped; the extents of some mines are estimated. Based on these mapping limitations, the condition of at least some of the mines is presumably not fully known. Historical documents state that there were mines surrounding or under many of the communities in the ADLM region. The local HMP committee believes there is a likelihood that a sinkhole due to mining could occur any given year.

Magnitude and Severity

Sinkholes, also known as subsidence, come in two primary forms in Iowa, Karst subsidence and Mine subsidence. Mines subsidence occurs when a mine or part of a mine collapses causing surface land to create a basin or hole. Karst subsidence occurs as water dissolves underlying rock creating a gap that ultimately collapses.

Most of Iowa's sinkholes occur in rural areas where their main impact is rendering some land unsuitable for row-crop agriculture. Sinkholes have also resulted in the failure of farm and other types of ponds, roads, and one sewage-treatment lagoon. As sinkholes sometimes allow surface runoff to directly enter bedrock aquifers, their presence has a potential impact on groundwater quality.

Damage consists primarily of direct structural damage and property loss and depreciation of land values, but also includes business and personal losses that accrue during periods of repair.

Generally, land subsidence possesses a greater risk to property than to life. Damage to property, facilities and infrastructure would only occur if the event undermined foundations.

Warning Time

Regional lowering occurs gradually over time, while the collapse of abandoned mines can occur suddenly. Collapse is one that can be properly mitigated if measures are taken structurally below the ground to compensate for the presents of mine caverns.

Duration

The response tied to sinkholes is related to securing the immediate threat to life and property including immediate reroute of traffic from the affected infrastructure and search and rescue in the case of structural collapse.

Exhibit 127: Jurisdictional Sinkhole Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	1	1	4	1.75	Low
Centerville	2	1	4	1	1.9	Low
Centerville Community Schools	2	1	4	1	1.9	Low
Cincinnati	1	1	4	3	2.85	Moderate
Exline	1	1	4	3	2.85	Moderate
Moravia	1	1	4	1	1.05	Low
Moravia Community School	1	1	4	1	1.05	Low
Moulton	1	1	4	1	1.05	Low
Mystic	2	1	4	1	1.9	Low
Plano	1	1	4	3	2.85	Moderate
Rathbun	1	1	4	3	2.85	Moderate
Udell	1	1	4	3	2.85	Moderate
Unionville	1	1	4	3	1.65	Low
Moulton-Udell Community School	1	1	4	1	1.05	Low
MercyOne Medical	2	1	4	1	1.9	Low
Davis Unincorp Co	1	1	2	1	1.15	Low
Davis Co Community Schools	1	1	2	1	1.15	Low
Bloomfield	1	1	2	1	1.15	Low
Drakesville	1	1	2	1	1.15	Low
Floris	1	1	2	1	1.15	Low
Pulaksi	1	1	2	1	1.15	Low
Lucas Unincorp Co	1	1	1	3	1.2	
Chariton	2	3	4	4	2.8	Moderate
Chariton Community Schools	1	3	4	1	2.05	Moderate
Derby	2	1	4	3	2.1	Moderate
Lucas	1	1	1	4	1.3	Low
Russell	3	2	4	4	2.65	Moderate
Williamson	1	1	4	3	1.65	Low
Lucas Co Health Center	2	1	4	4	2.2	Moderate
Monroe Unincorp Co	3	2	1	2	2.3	Moderate
Albia	3	2	4	4	2.95	Moderate
Albia Community Schools	1	1	4	4	1.75	Low
Eddyville	2	1	1	1	1.45	Low
Lovilia	1	1	1	2	1.1	Low
Melrose	2	1	4	1	1.9	Low
Monroe Co Hospital	2	2	4	3	2.4	Moderate

L.) Thunderstorm, Lightning, and Hail

A thunderstorm can occur singly, in clusters, or in lines resulting in heavy rains, winds reaching or exceeding 58mph, producing a tornado, or hail. Most thunderstorms produced only thunder, lightning, and rain.

Severe storms, however, can produce tornadoes, straight-line winds, microbursts above 58mph, lightning, hailstorms, and flooding. The National Weather Service considers a thunderstorm severe if it produces hail at least one inch in diameter, winds 58mph or higher, or tornadoes. See Exhibit 128.

Straight-line winds can often exceed 60mph, are common occurrences and are often mistaken for tornadoes. Several thunderstorms have caused other hazards such as flash flooding, river flooding, and tornadoes.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. The temperature of lightning can reach 50,000 degrees Fahrenheit in a split second. The rapid heating, expansion, and then cooling of air near the lightning creates thunder.

A hailstorm is an outgrowth of a severe thunderstorm in which pellets or irregularly shaped lumps of ice, otherwise known as hail, fall with rain. Hail can be smaller than a pea or large as a softball.

Exhibit 128: Tornado & 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

Potential Hazard Area

The potential hazard area for thunderstorm, lightning, and hail is the entire ADLM region.

Historical Occurrences

There have been 102 thunderstorm wind events recorded in the region from 2000-2019. Thunderstorms are the most frequently occurring natural hazard. There are several thunderstorms every year, and multiple storms often develop in an area within just a few days. The recorded thunderstorm events indicate there have been no deaths, zero reported injuries, and over \$756K in property damage, and \$4.3M in crop damage reported over the entire area impacted by the events (see Exhibit 129).

Exhibit 129: Regional Thunderstorm Wind Data [Storm Events Database](#) | [National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2020	Thunderstorm Wind	0	0	\$1.369M	\$549,000
Davis County	2000-2020	Thunderstorm Wind	0	0	\$2.0M	\$23,000
Lucas County	2000-2020	Thunderstorm Wind	0	0	\$842,000	\$79,000
Monroe County	2000-2020	Thunderstorm Wind	0	0	\$751,000	\$105,000
REGIONAL TOTALS	2000-2020	Thunderstorm Wind	0	0	\$5.01M	\$756,000

WALNUT CITY	APPANOOSE CO.	IA	07/24/2015	12:27	CST-6	Thunderstorm Wind	60 kts.	EG	0	0	25.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	07/24/2015	12:35	CST-6	Thunderstorm Wind	58 kts.	EG	0	0	50.00K	0.00K
MOULTON	APPANOOSE CO.	IA	07/24/2015	12:45	CST-6	Thunderstorm Wind	50 kts.	EG	0	0	5.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	07/28/2015	20:44	CST-6	Thunderstorm Wind	61 kts.	EG	0	0	100.00K	500.00K
CENTERVILLE	APPANOOSE CO.	IA	07/28/2015	21:00	CST-6	Thunderstorm Wind	56 kts.	EG	0	0	5.00K	0.00K
CENTERVILLE ARPT	APPANOOSE CO.	IA	07/28/2015	21:05	CST-6	Thunderstorm Wind	62 kts.	MG	0	0	20.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	07/28/2015	21:08	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	07/28/2015	21:13	CST-6	Thunderstorm Wind	65 kts.	EG	0	0	20.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	07/28/2015	21:15	CST-6	Thunderstorm Wind	54 kts.	EG	0	0	10.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	11/11/2015	15:35	CST-6	Thunderstorm Wind	56 kts.	EG	0	0	15.00K	0.00K
SHARON	APPANOOSE CO.	IA	11/11/2015	15:55	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	5.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	07/19/2016	13:43	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	07/19/2016	13:50	CST-6	Thunderstorm Wind	61 kts.	EG	0	0	5.00K	0.00K
DARBYVILLE	APPANOOSE CO.	IA	07/19/2016	14:05	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	10.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/17/2017	17:17	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	0.00K	0.00K
SHARON	APPANOOSE CO.	IA	06/25/2019	17:20	CST-6	Thunderstorm Wind	56 kts.	EG	0	0	10.00K	0.00K
MONROVIA	APPANOOSE CO.	IA	06/28/2019	10:06	CST-6	Thunderstorm Wind	61 kts.	EG	0	0	30.00K	0.00K
RATHBUN	APPANOOSE CO.	IA	06/28/2019	10:30	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	2.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/28/2019	10:51	CST-6	Thunderstorm Wind	52 kts.	EG	0	0	0.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/28/2019	11:03	CST-6	Thunderstorm Wind	56 kts.	EG	0	0	10.00K	0.00K
Totals:									0	2	1.396M	600.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	2	1.396M	600.00K
PLANO	APPANOOSE CO.	IA	06/04/2000	05:40	CST	Thunderstorm Wind	61 kts. E	0	0	40.00K	1.00K
PLANO	APPANOOSE CO.	IA	06/23/2000	13:45	CST	Thunderstorm Wind	56 kts. E	0	0	10.00K	1.00K
MOULTON	APPANOOSE CO.	IA	06/23/2000	13:50	CST	Thunderstorm Wind	56 kts. E	0	0	10.00K	0.00K
UNIONVILLE	APPANOOSE CO.	IA	06/23/2000	13:55	CST	Thunderstorm Wind	56 kts. E	0	0	10.00K	1.00K
MOULTON	APPANOOSE CO.	IA	06/14/2001	15:10	CST	Thunderstorm Wind	61 kts. E	0	0	10.00K	0.00K
NUMA	APPANOOSE CO.	IA	09/07/2001	21:40	CST	Thunderstorm Wind	78 kts. E	0	0	100.00K	20.00K
CENTERVILLE	APPANOOSE CO.	IA	09/07/2001	21:45	CST	Thunderstorm Wind	75 kts. E	0	1	100.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	09/20/2001	17:23	CST	Thunderstorm Wind	61 kts. E	0	0	5.00K	3.00K
UDELL	APPANOOSE CO.	IA	09/20/2001	17:49	CST	Thunderstorm Wind	70 kts. E	0	0	50.00K	10.00K
MOULTON	APPANOOSE CO.	IA	09/20/2001	17:56	CST	Thunderstorm Wind	52 kts. E	0	0	5.00K	0.00K
PLANO	APPANOOSE CO.	IA	03/09/2002	00:00	CST	Thunderstorm Wind	56 kts. E	0	0	5.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	04/24/2002	09:55	CST	Thunderstorm Wind	50 kts. E	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	08/27/2003	14:05	CST	Thunderstorm Wind	52 kts. EG	0	0	5.00K	1.00K
NUMA	APPANOOSE CO.	IA	05/24/2004	19:44	CST	Thunderstorm Wind	69 kts. EG	0	0	100.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	05/24/2004	19:45	CST	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	08/25/2004	13:08	CST	Thunderstorm Wind	52 kts. EG	0	0	15.00K	1.00K
MORAVIA	APPANOOSE CO.	IA	08/26/2004	22:25	CST	Thunderstorm Wind	57 kts. EG	0	0	15.00K	2.00K
CENTERVILLE	APPANOOSE CO.	IA	06/04/2005	20:40	CST	Thunderstorm Wind	57 kts. EG	0	0	10.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	09/17/2006	02:00	CST	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
NUMA	APPANOOSE CO.	IA	03/21/2007	23:53	CST-6	Thunderstorm Wind	70 kts. EG	0	0	25.00K	0.00K
NUMA	APPANOOSE CO.	IA	04/10/2008	15:53	CST-6	Thunderstorm Wind	65 kts. EG	0	0	10.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	05/25/2008	21:42	CST-6	Thunderstorm Wind	57 kts. EG	0	0	20.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	05/25/2008	21:44	CST-6	Thunderstorm Wind	52 kts. EG	0	0	15.00K	0.00K
EXLINE	APPANOOSE CO.	IA	06/08/2008	18:05	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	06/15/2008	10:52	CST-6	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/15/2008	11:12	CST-6	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
MONROVIA	APPANOOSE CO.	IA	07/27/2008	17:00	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	07/27/2008	17:00	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	07/27/2008	20:17	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	50.00K
GARFIELD	APPANOOSE CO.	IA	06/05/2010	18:35	CST-6	Thunderstorm Wind	69 kts. EG	0	0	50.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/05/2010	18:44	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/05/2010	18:45	CST-6	Thunderstorm Wind	57 kts. EG	0	0	10.00K	0.00K
EXLINE	APPANOOSE CO.	IA	06/05/2010	18:55	CST-6	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	06/18/2010	19:03	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
JEROME	APPANOOSE CO.	IA	06/18/2010	20:24	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	07/18/2010	03:48	CST-6	Thunderstorm Wind	65 kts. EG	0	0	50.00K	0.00K
RATHBUN	APPANOOSE CO.	IA	07/18/2010	03:54	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	07/18/2010	03:55	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
CLARKDALE	APPANOOSE CO.	IA	07/18/2010	04:00	CST-6	Thunderstorm Wind	63 kts. MG	0	0	25.00K	0.00K
JEROME	APPANOOSE CO.	IA	08/13/2010	12:45	CST-6	Thunderstorm Wind	57 kts. EG	0	0	3.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	08/13/2010	13:01	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	08/13/2010	19:07	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
MONROVIA	APPANOOSE CO.	IA	03/22/2011	20:45	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/26/2011	17:49	CST-6	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	07/23/2011	18:40	CST-6	Thunderstorm Wind	61 kts. EG	0	0	15.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	05/19/2013	20:05	CST-6	Thunderstorm Wind	55 kts. MG	0	0	1.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	05/19/2013	20:05	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CENTERVILLE ARPT	APPANOOSE CO.	IA	05/28/2013	19:35	CST-6	Thunderstorm Wind	56 kts. MG	0	0	10.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	04/27/2014	13:35	CST-6	Thunderstorm Wind	75 kts. EG	0	0	50.00K	0.00K
SHARON	APPANOOSE CO.	IA	04/27/2014	14:00	CST-6	Thunderstorm Wind	75 kts. EG	0	0	150.00K	0.00K
UDELL	APPANOOSE CO.	IA	04/27/2014	14:00	CST-6	Thunderstorm Wind	56 kts. EG	0	1	0.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/10/2015	18:45	CST-6	Thunderstorm Wind	65 kts. EG	0	0	25.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/11/2015	19:35	CST-6	Thunderstorm Wind	65 kts. EG	0	0	25.00K	0.00K
UDELL	APPANOOSE CO.	IA	06/22/2015	17:35	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K

Totals:								0	0	2.050M	43.00K
FLORIS	DAVIS CO.	IA	06/13/2000	19:35	CST	Thunderstorm Wind	61 kts. E	0	0	35.00K	5.00K
WEST GROVE	DAVIS CO.	IA	06/23/2000	13:55	CST	Thunderstorm Wind	56 kts. E	0	0	10.00K	1.00K
BLOOMFIELD	DAVIS CO.	IA	08/06/2000	14:55	CST	Thunderstorm Wind	52 kts. E	0	0	5.00K	1.00K
BLOOMFIELD	DAVIS CO.	IA	08/03/2001	06:15	CST	Thunderstorm Wind	54 kts. E	0	0	10.00K	3.00K
BLOOMFIELD	DAVIS CO.	IA	08/25/2003	19:30	CST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
BELKNAP	DAVIS CO.	IA	08/25/2003	20:00	CST	Thunderstorm Wind	52 kts. EG	0	0	1.00K	10.00K
FLORIS	DAVIS CO.	IA	08/25/2003	20:28	CST	Thunderstorm Wind	54 kts. EG	0	0	5.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	08/25/2003	20:30	CST	Thunderstorm Wind	57 kts. EG	0	0	15.00K	10.00K
BLOOMFIELD	DAVIS CO.	IA	08/25/2003	21:03	CST	Thunderstorm Wind	52 kts. EG	0	0	10.00K	2.00K
BLOOMFIELD	DAVIS CO.	IA	07/11/2004	10:15	CST	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/11/2004	10:25	CST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/11/2004	10:30	CST	Thunderstorm Wind	57 kts. EG	0	0	25.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	08/03/2004	05:42	CST	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/08/2005	10:33	CST	Thunderstorm Wind	57 kts. EG	0	0	10.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	03/12/2006	13:30	CST	Thunderstorm Wind	75 kts. EG	0	0	150.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/22/2006	02:45	CST	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
PULASKI	DAVIS CO.	IA	06/22/2006	02:56	CST	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	08/13/2006	18:14	CST	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
PULASKI	DAVIS CO.	IA	08/13/2006	18:20	CST	Thunderstorm Wind	61 kts. EG	0	0	15.00K	0.00K
BELKNAP	DAVIS CO.	IA	06/08/2008	18:25	CST-6	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
MARK	DAVIS CO.	IA	06/15/2008	11:10	CST-6	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
STILES	DAVIS CO.	IA	06/15/2008	11:28	CST-6	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/27/2008	17:27	CST-6	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/27/2008	17:30	CST-6	Thunderstorm Wind	57 kts. EG	0	0	25.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/27/2008	17:30	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/27/2008	17:33	CST-6	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
PULASKI	DAVIS CO.	IA	07/27/2008	17:40	CST-6	Thunderstorm Wind	65 kts. EG	0	0	100.00K	10.00K
BLOOMFIELD	DAVIS CO.	IA	06/07/2009	21:15	CST-6	Thunderstorm Wind	61 kts. EG	0	0	1.000M	0.00K
BLOOMFIELD ARPT	DAVIS CO.	IA	06/01/2010	21:45	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
MARK	DAVIS CO.	IA	06/18/2010	19:28	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
WEST GROVE	DAVIS CO.	IA	08/13/2010	13:25	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
FLORIS	DAVIS CO.	IA	08/13/2010	13:35	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
PULASKI	DAVIS CO.	IA	08/13/2010	13:47	CST-6	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
PULASKI	DAVIS CO.	IA	08/20/2010	15:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
PARIS	DAVIS CO.	IA	06/26/2011	18:29	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	0.00K
PULASKI	DAVIS CO.	IA	06/26/2011	18:40	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	0.00K
FLORIS	DAVIS CO.	IA	08/06/2011	23:35	CST-6	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
PULASKI	DAVIS CO.	IA	05/19/2013	20:38	CST-6	Thunderstorm Wind	55 kts. EG	0	0	10.00K	0.00K
FLORIS	DAVIS CO.	IA	05/19/2013	20:45	CST-6	Thunderstorm Wind	61 kts. EG	0	0	75.00K	0.00K
PULASKI	DAVIS CO.	IA	05/30/2013	13:55	CST-6	Thunderstorm Wind	61 kts. EG	0	0	100.00K	0.00K
PARIS	DAVIS CO.	IA	06/18/2013	14:59	CST-6	Thunderstorm Wind	52 kts. EG	0	0	15.00K	1.00K
WEST GROVE	DAVIS CO.	IA	04/27/2014	14:00	CST-6	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
BELKNAP	DAVIS CO.	IA	04/27/2014	14:16	CST-6	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/11/2015	19:35	CST-6	Thunderstorm Wind	70 kts. EG	0	0	25.00K	0.00K
FLORIS	DAVIS CO.	IA	06/20/2015	18:20	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/20/2015	18:30	CST-6	Thunderstorm Wind	75 kts. EG	0	0	100.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/22/2015	17:50	CST-6	Thunderstorm Wind	61 kts. MG	0	0	10.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/22/2015	18:18	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/22/2015	18:23	CST-6	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	07/24/2015	12:35	CST-6	Thunderstorm Wind	56 kts. EG	0	0	25.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	07/28/2015	21:20	CST-6	Thunderstorm Wind	60 kts. EG	0	0	100.00K	0.00K
FLORIS	DAVIS CO.	IA	11/11/2015	16:13	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	07/19/2016	14:30	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/25/2019	17:32	CST-6	Thunderstorm Wind	56 kts. EG	0	0	10.00K	0.00K
Totals:								0	0	2.050M	43.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	842.00K	586.00K
CHARITON	LUCAS CO.	IA	06/04/2000	05:05	CST	Thunderstorm Wind	61 kts. E	0	0	5.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	06/04/2000	05:15	CST	Thunderstorm Wind	65 kts. E	0	0	100.00K	2.00K
CHARITON	LUCAS CO.	IA	06/23/2000	13:00	CST	Thunderstorm Wind	61 kts. E	0	0	50.00K	5.00K
CHARITON	LUCAS CO.	IA	08/06/2000	13:45	CST	Thunderstorm Wind	52 kts. E	0	0	3.00K	1.00K
CHARITON	LUCAS CO.	IA	04/11/2001	14:00	CST	Thunderstorm Wind	61 kts. E	0	0	7.00K	0.00K
CHARITON	LUCAS CO.	IA	05/10/2001	19:30	CST	Thunderstorm Wind	50 kts. E	0	0	2.00K	0.00K
CHARITON	LUCAS CO.	IA	06/14/2001	14:51	CST	Thunderstorm Wind	52 kts. E	0	0	3.00K	0.00K
LUCAS	LUCAS CO.	IA	09/20/2001	16:32	CST	Thunderstorm Wind	65 kts. E	0	0	30.00K	10.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:01	CST	Thunderstorm Wind	52 kts. E	0	0	5.00K	0.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:06	CST	Thunderstorm Wind	52 kts. E	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	03/08/2002	23:30	CST	Thunderstorm Wind	61 kts. E	0	0	25.00K	0.00K
OAKLEY	LUCAS CO.	IA	09/18/2002	20:05	CST	Thunderstorm Wind	52 kts. E	0	0	5.00K	2.00K
CHARITON	LUCAS CO.	IA	08/20/2003	14:10	CST	Thunderstorm Wind	57 kts. EG	0	0	5.00K	5.00K
WILLIAMSON	LUCAS CO.	IA	08/03/2004	20:40	CST	Thunderstorm Wind	57 kts. EG	0	0	5.00K	1.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	06/04/2005	19:57	CST	Thunderstorm Wind	52 kts. MG	0	0	2.00K	0.00K
CHARITON	LUCAS CO.	IA	06/29/2005	22:55	CST	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
DERBY	LUCAS CO.	IA	07/13/2006	18:05	CST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
DERBY	LUCAS CO.	IA	08/23/2007	17:15	CST-6	Thunderstorm Wind	52 kts. EG	0	0	4.00K	0.00K
LUCAS	LUCAS CO.	IA	05/30/2008	03:45	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
OAKLEY	LUCAS CO.	IA	05/30/2008	03:51	CST-6	Thunderstorm Wind	61 kts. EG	0	0	15.00K	0.00K
NEWBERN	LUCAS CO.	IA	05/30/2008	04:00	CST-6	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
NEWBERN	LUCAS CO.	IA	05/30/2008	04:00	CST-6	Thunderstorm Wind	65 kts. EG	0	0	25.00K	0.00K
CHARITON	LUCAS CO.	IA	06/19/2008	11:58	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
DERBY	LUCAS CO.	IA	07/27/2008	16:50	CST-6	Thunderstorm Wind	61 kts. EG	0	0	20.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	04/26/2009	17:52	CST-6	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	04/26/2009	17:56	CST-6	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	04/26/2009	17:56	CST-6	Thunderstorm Wind	56 kts. EG	0	0	10.00K	0.00K
RUSSELL	LUCAS CO.	IA	06/01/2010	20:30	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	07/18/2010	03:07	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	06/19/2011	23:45	CST-6	Thunderstorm Wind	54 kts. MG	0	0	5.00K	0.00K
RUSSELL	LUCAS CO.	IA	06/19/2011	23:53	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	06/26/2011	17:04	CST-6	Thunderstorm Wind	57 kts. EG	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	07/23/2011	17:15	CST-6	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
RUSSELL	LUCAS CO.	IA	07/23/2011	17:25	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	50.00K
CHARITON	LUCAS CO.	IA	08/06/2011	22:30	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	10.00K
WILLIAMSON	LUCAS CO.	IA	08/06/2011	22:50	CST-6	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	04/12/2014	22:00	CST-6	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	06/17/2014	01:15	CST-6	Thunderstorm Wind	57 kts. MG	0	0	25.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	06/24/2015	20:30	CST-6	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	06/24/2015	20:33	CST-6	Thunderstorm Wind	61 kts. EG	0	0	50.00K	0.00K
CHARITON	LUCAS CO.	IA	06/24/2015	20:35	CST-6	Thunderstorm Wind	60 kts. EG	0	0	20.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	07/28/2015	20:07	CST-6	Thunderstorm Wind	52 kts. EG	0	0	50.00K	500.00K
RUSSELL	LUCAS CO.	IA	07/28/2015	20:17	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
CHARITON	LUCAS CO.	IA	08/02/2015	17:55	CST-6	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
CHARITON	LUCAS CO.	IA	08/02/2015	17:55	CST-6	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
LUCAS	LUCAS CO.	IA	08/02/2015	18:00	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
RUSSELL	LUCAS CO.	IA	07/19/2016	13:20	CST-6	Thunderstorm Wind	61 kts. EG	0	0	50.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	07/19/2016	13:20	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	0.00K
CHARITON	LUCAS CO.	IA	07/19/2016	13:20	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	07/19/2016	13:20	CST-6	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
CHARITON	LUCAS CO.	IA	09/19/2016	16:30	CST-6	Thunderstorm Wind	61 kts. EG	0	0	40.00K	0.00K
CHARITON	LUCAS CO.	IA	09/19/2016	16:33	CST-6	Thunderstorm Wind	56 kts. EG	0	0	10.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	05/17/2017	15:15	CST-6	Thunderstorm Wind	53 kts. MG	0	0	0.00K	0.00K

CHARITON MUNI ARPT	LUCAS CO.	IA	05/28/2019	08:59	CST-6	Thunderstorm Wind	62 kts. EG	0	0	25.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	07/20/2019	17:15	CST-6	Thunderstorm Wind	52 kts. MG	0	0	0.00K	0.00K
WILLIAMSON	LUCAS CO.	IA	08/20/2019	05:10	CST-6	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	08/20/2019	05:15	CST-6	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
Totals:								0	0	842.00K	586.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	751.00K	204.00K
LOVILIA	MONROE CO.	IA	02/25/2000	19:50	CST	Thunderstorm Wind	61 kts. E	0	0	40.00K	0.00K
GEORGETOWN	MONROE CO.	IA	06/23/2000	12:00	CST	Thunderstorm Wind	52 kts. E	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	06/25/2000	18:20	CST	Thunderstorm Wind	56 kts. E	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	07/05/2000	11:40	CST	Thunderstorm Wind	56 kts. E	0	0	5.00K	1.00K
MELROSE	MONROE CO.	IA	08/06/2000	14:20	CST	Thunderstorm Wind	52 kts. E	0	0	2.00K	1.00K
ALBIA	MONROE CO.	IA	08/06/2000	14:20	CST	Thunderstorm Wind	52 kts. E	0	0	10.00K	2.00K
ALBIA	MONROE CO.	IA	06/14/2001	15:01	CST	Thunderstorm Wind	56 kts. E	0	0	10.00K	0.00K
ALBIA	MONROE CO.	IA	06/14/2001	15:05	CST	Thunderstorm Wind	52 kts. E	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	04/24/2002	09:51	CST	Thunderstorm Wind	52 kts. E	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	04/24/2002	10:05	CST	Thunderstorm Wind	52 kts. E	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	05/17/2004	20:25	CST	Thunderstorm Wind	65 kts. EG	0	0	10.00K	5.00K
ALBIA	MONROE CO.	IA	08/25/2004	13:08	CST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
MELROSE	MONROE CO.	IA	08/26/2004	21:20	CST	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	08/26/2004	22:20	CST	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
LOVILIA	MONROE CO.	IA	09/08/2005	13:15	CST	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
AVERY	MONROE CO.	IA	04/10/2008	16:34	CST-6	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
AVERY	MONROE CO.	IA	04/10/2008	16:35	CST-6	Thunderstorm Wind	57 kts. EG	0	0	75.00K	0.00K
ALBIA	MONROE CO.	IA	07/27/2008	16:35	CST-6	Thunderstorm Wind	69 kts. EG	0	0	100.00K	10.00K
HITEMAN	MONROE CO.	IA	07/27/2008	16:53	CST-6	Thunderstorm Wind	61 kts. EG	0	0	3.00K	0.00K
HOCKING	MONROE CO.	IA	07/27/2008	17:00	CST-6	Thunderstorm Wind	69 kts. EG	0	0	35.00K	25.00K
AVERY	MONROE CO.	IA	06/01/2010	18:06	CST-6	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
ALBIA	MONROE CO.	IA	06/20/2011	00:15	CST-6	Thunderstorm Wind	57 kts. EG	0	0	75.00K	0.00K
ALBIA	MONROE CO.	IA	06/20/2011	00:17	CST-6	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
LOVILIA	MONROE CO.	IA	06/26/2011	21:52	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	08/06/2011	22:55	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	10.00K
ALBIA	MONROE CO.	IA	08/06/2011	23:04	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	05/19/2013	20:25	CST-6	Thunderstorm Wind	55 kts. EG	0	0	10.00K	0.00K
ALBIA	MONROE CO.	IA	04/12/2014	22:37	CST-6	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
LOVILIA	MONROE CO.	IA	04/27/2014	14:00	CST-6	Thunderstorm Wind	70 kts. EG	0	0	50.00K	0.00K
HITEMAN	MONROE CO.	IA	06/19/2014	18:05	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	0.00K
ALBIA	MONROE CO.	IA	04/09/2015	13:40	CST-6	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
LOVILIA	MONROE CO.	IA	06/22/2015	16:30	CST-6	Thunderstorm Wind	70 kts. EG	0	0	20.00K	0.00K
ALBIA	MONROE CO.	IA	06/22/2015	16:53	CST-6	Thunderstorm Wind	75 kts. EG	0	0	10.00K	0.00K
ALBIA	MONROE CO.	IA	06/22/2015	16:53	CST-6	Thunderstorm Wind	62 kts. EG	0	0	50.00K	0.00K
ALBIA	MONROE CO.	IA	06/22/2015	16:56	CST-6	Thunderstorm Wind	62 kts. EG	0	0	20.00K	0.00K
TRUAX	MONROE CO.	IA	07/28/2015	17:29	CST-6	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
MELROSE	MONROE CO.	IA	07/28/2015	20:31	CST-6	Thunderstorm Wind	57 kts. EG	0	0	10.00K	100.00K
MELROSE	MONROE CO.	IA	07/28/2015	20:31	CST-6	Thunderstorm Wind	61 kts. EG	0	0	15.00K	50.00K
HOCKING	MONROE CO.	IA	11/11/2015	15:44	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	11/11/2015	15:44	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
AVERY	MONROE CO.	IA	11/11/2015	15:50	CST-6	Thunderstorm Wind	61 kts. EG	0	0	25.00K	0.00K
MELROSE	MONROE CO.	IA	07/19/2016	13:35	CST-6	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	06/28/2018	12:00	CST-6	Thunderstorm Wind	64 kts. EG	0	0	15.00K	0.00K
ALBIA	MONROE CO.	IA	08/28/2018	16:20	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	06/28/2019	10:13	CST-6	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
ALBIA	MONROE CO.	IA	07/20/2019	17:54	CST-6	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
Totals:								0	0	751.00K	204.00K

The NCEI contains records of lightning events when lightning results in fatality, injury, and/or property or crop damage. From 1999- 2018, only nine lightning event is recorded. This data collection relies on community reporting and many residents do not report losses to property agencies.

Exhibit 130: Regional Lightning Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Lightning	0	1	\$170,000	0
Davis County	2000-2019	Lightning	0	0	\$60,000	0
Lucas County	2000-2019	Lightning	0	0	\$15,000	0
Monroe County	2000-2019	Lightning	0	0	0	0
REGIONAL TOTALS	2000-2019	Lightning	0	1	\$245,000	0

<i>Location</i>	<i>County/Zone</i>	<i>St.</i>	<i>Date</i>	<i>Time</i>	<i>I.Z.</i>	<i>Type</i>	<i>Mag</i>	<i>Dth</i>	<i>Inj</i>	<i>PrD</i>	<i>CrD</i>
Totals:								0	1	170.00K	0.00K
MOULTON	APPANOOSE CO.	IA	04/30/2003	20:10	CST	Lightning		0	0	75.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	08/22/2007	14:00	CST-6	Lightning		0	1	5.00K	0.00K
MOULTON	APPANOOSE CO.	IA	07/20/2010	05:00	CST-6	Lightning		0	0	40.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	10/03/2013	07:45	CST-6	Lightning		0	0	50.00K	0.00K
Totals:								0	1	170.00K	0.00K

<i>Location</i>	<i>County/Zone</i>	<i>St.</i>	<i>Date</i>	<i>Time</i>	<i>I.Z.</i>	<i>Type</i>	<i>Mag</i>	<i>Dth</i>	<i>Inj</i>	<i>PrD</i>	<i>CrD</i>
Totals:								0	0	60.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	08/13/2006	18:00	CST	Lightning		0	0	50.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	07/16/2007	04:00	CST-6	Lightning		0	0	10.00K	0.00K
Totals:								0	0	60.00K	0.00K

<i>Location</i>	<i>County/Zone</i>	<i>St.</i>	<i>Date</i>	<i>Time</i>	<i>I.Z.</i>	<i>Type</i>	<i>Mag</i>	<i>Dth</i>	<i>Inj</i>	<i>PrD</i>	<i>CrD</i>
Totals:								0	0	15.00K	0.00K
CHARITON	LUCAS CO.	IA	05/24/2011	14:10	CST-6	Lightning		0	0	15.00K	0.00K
Totals:								0	0	15.00K	0.00K

MONROE COUNTY - NONE

Hail events often accompany thunderstorms and frequently in the region. There were 138 recorded hail events in 2000-2019. It resulted in no deaths or injuries, but there was over \$4.1M in reported property and crop damage.

Exhibit 131: Regional Hail (greater than 1" in diameter) Data

[Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Hail greater than 1"	0	0	\$419,000	\$200,000
Davis County	2000-2019	Hail greater than 1"	0	0	\$265,000	\$2.439M
Lucas County	2000-2019	Hail greater than 1"	0	0	\$266,000	\$115,000
Monroe County	2000-2019	Hail greater than 1"	0	0	\$346,000	\$73,000
REGIONAL TOTALS	2000-2019	Hail greater than 1"	0	0	\$1.3M	\$2.827M

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	419.00K	230.00K
CENTERVILLE	APPANOOSE CO.	IA	06/16/2001	22:52	CST	Hail	0.88 in.	0	0	2.00K	5.00K
UDELL	APPANOOSE CO.	IA	09/20/2001	17:49	CST	Hail	1.75 in.	0	0	25.00K	5.00K
CINCINNATI	APPANOOSE CO.	IA	10/22/2001	16:05	CST	Hail	1.00 in.	0	0	5.00K	5.00K
MOULTON	APPANOOSE CO.	IA	04/30/2003	18:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
NUMA	APPANOOSE CO.	IA	04/30/2003	19:30	CST	Hail	1.75 in.	0	0	10.00K	0.00K
MOULTON	APPANOOSE CO.	IA	04/30/2003	20:08	CST	Hail	1.00 in.	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	05/08/2003	18:05	CST	Hail	2.75 in.	0	0	100.00K	0.00K
PLANO	APPANOOSE CO.	IA	05/08/2003	18:06	CST	Hail	1.75 in.	0	0	25.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	05/30/2004	01:15	CST	Hail	0.88 in.	0	0	2.00K	0.00K
MOULTON	APPANOOSE CO.	IA	05/30/2004	12:33	CST	Hail	0.75 in.	0	0	0.00K	5.00K
MORAVIA	APPANOOSE CO.	IA	05/30/2004	13:10	CST	Hail	0.75 in.	0	0	0.00K	5.00K
MORAVIA	APPANOOSE CO.	IA	06/08/2005	09:20	CST	Hail	0.75 in.	0	0	0.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	09/13/2005	18:52	CST	Hail	1.00 in.	0	0	5.00K	10.00K
PLANO	APPANOOSE CO.	IA	03/08/2006	18:00	CST	Hail	0.75 in.	0	0	0.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	03/12/2006	13:10	CST	Hail	1.00 in.	0	0	3.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	03/12/2006	13:13	CST	Hail	0.88 in.	0	0	1.00K	0.00K
MOULTON	APPANOOSE CO.	IA	03/12/2006	20:03	CST	Hail	1.00 in.	0	0	4.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	03/12/2006	20:25	CST	Hail	0.88 in.	0	0	3.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	04/02/2006	14:10	CST	Hail	0.75 in.	0	0	0.00K	0.00K
UNIONVILLE	APPANOOSE CO.	IA	04/06/2006	09:10	CST	Hail	0.75 in.	0	0	0.00K	0.00K
UNIONVILLE	APPANOOSE CO.	IA	05/03/2006	05:45	CST	Hail	1.75 in.	0	0	10.00K	0.00K
SUNSHINE	APPANOOSE CO.	IA	04/10/2008	17:24	CST-6	Hail	1.00 in.	0	0	1.00K	0.00K
RATHBUN	APPANOOSE CO.	IA	04/10/2008	17:34	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
ICONIUM	APPANOOSE CO.	IA	07/27/2008	19:15	CST-6	Hail	1.00 in.	0	0	2.00K	10.00K
DARBYVILLE	APPANOOSE CO.	IA	07/27/2008	19:24	CST-6	Hail	1.75 in.	0	0	15.00K	10.00K
FORBUSH	APPANOOSE CO.	IA	07/27/2008	19:30	CST-6	Hail	1.25 in.	0	0	5.00K	10.00K
MOULTON	APPANOOSE CO.	IA	07/27/2008	19:44	CST-6	Hail	1.75 in.	0	0	10.00K	10.00K
DEAN	APPANOOSE CO.	IA	02/26/2009	13:24	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	07/23/2009	05:00	CST-6	Hail	1.00 in.	0	0	5.00K	50.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	07/23/2009	05:08	CST-6	Hail	1.00 in.	0	0	1.00K	5.00K
DEAN	APPANOOSE CO.	IA	04/30/2010	10:45	CST-6	Hail	0.88 in.	0	0	1.00K	0.00K
MOULTON	APPANOOSE CO.	IA	04/30/2010	10:50	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
SEDAN	APPANOOSE CO.	IA	06/04/2010	20:22	CST-6	Hail	1.00 in.	0	0	3.00K	10.00K
MOULTON	APPANOOSE CO.	IA	06/04/2010	20:24	CST-6	Hail	1.75 in.	0	0	10.00K	10.00K
CENTERVILLE	APPANOOSE CO.	IA	10/23/2010	14:53	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
EXLINE	APPANOOSE CO.	IA	11/22/2010	03:22	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	06/04/2011	14:35	CST-6	Hail	1.00 in.	0	0	5.00K	10.00K
EXLINE	APPANOOSE CO.	IA	06/04/2011	14:44	CST-6	Hail	1.25 in.	0	0	2.00K	10.00K
CENTERVILLE	APPANOOSE CO.	IA	06/26/2011	17:21	CST-6	Hail	1.75 in.	0	0	50.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	06/26/2011	17:22	CST-6	Hail	1.00 in.	0	0	5.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	06/26/2011	17:23	CST-6	Hail	1.00 in.	0	0	3.00K	0.00K
UDELL	APPANOOSE CO.	IA	06/26/2011	18:07	CST-6	Hail	1.00 in.	0	0	1.00K	10.00K
CINCINNATI	APPANOOSE CO.	IA	06/26/2011	22:00	CST-6	Hail	2.00 in.	0	0	50.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	04/17/2013	06:44	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	04/17/2013	06:50	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
EXLINE	APPANOOSE CO.	IA	05/28/2013	19:38	CST-6	Hail	0.75 in.	0	0	0.00K	5.00K
CINCINNATI	APPANOOSE CO.	IA	05/28/2013	19:47	CST-6	Hail	0.88 in.	0	0	0.00K	5.00K
PLANO	APPANOOSE CO.	IA	04/12/2014	22:20	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
MORAVIA	APPANOOSE CO.	IA	05/11/2014	14:04	CST-6	Hail	2.00 in.	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	09/15/2014	06:53	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
UDELL	APPANOOSE CO.	IA	06/10/2015	19:00	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/21/2016	21:19	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K

FORBUSH	APPANOOSE CO.	IA	06/15/2017	21:57	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
GARFIELD	APPANOOSE CO.	IA	06/17/2017	16:59	CST-6	Hail	1.75 in.	0	0	2.00K	0.00K
MYSTIC	APPANOOSE CO.	IA	06/17/2017	17:00	CST-6	Hail	2.00 in.	0	0	0.00K	0.00K
PLANO	APPANOOSE CO.	IA	06/17/2017	17:00	CST-6	Hail	2.50 in.	0	0	10.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/17/2017	17:05	CST-6	Hail	3.00 in.	0	0	0.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/17/2017	17:05	CST-6	Hail	1.25 in.	0	0	0.00K	0.00K
THIRTY	APPANOOSE CO.	IA	06/17/2017	17:06	CST-6	Hail	3.00 in.	0	0	5.00K	0.00K
CENTERVILLE	APPANOOSE CO.	IA	06/17/2017	17:08	CST-6	Hail	2.00 in.	0	0	2.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	06/17/2017	17:08	CST-6	Hail	1.75 in.	0	0	2.00K	0.00K
MOULTON	APPANOOSE CO.	IA	06/17/2017	17:20	CST-6	Hail	1.25 in.	0	0	0.00K	0.00K
SEDAN	APPANOOSE CO.	IA	06/17/2017	17:22	CST-6	Hail	2.00 in.	0	0	2.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	06/25/2019	17:02	CST-6	Hail	1.75 in.	0	0	2.00K	10.00K
MAINE	APPANOOSE CO.	IA	06/25/2019	17:05	CST-6	Hail	1.00 in.	0	0	5.00K	10.00K
CENTERVILLE	APPANOOSE CO.	IA	06/25/2019	17:50	CST-6	Hail	1.75 in.	0	0	10.00K	0.00K
THIRTY	APPANOOSE CO.	IA	06/25/2019	17:52	CST-6	Hail	1.25 in.	0	0	5.00K	0.00K
Totals:								0	0	419.00K	230.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	265.00K	2.503M
FLORIS	DAVIS CO.	IA	09/22/2000	17:50	CST	Hail	0.88 in.	0	0	1.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	09/22/2000	18:30	CST	Hail	1.00 in.	0	0	2.00K	10.00K
FLORIS	DAVIS CO.	IA	05/13/2001	18:00	CST	Hail	0.88 in.	0	0	2.00K	2.00K
BLOOMFIELD	DAVIS CO.	IA	05/13/2001	18:19	CST	Hail	1.25 in.	0	0	7.00K	3.00K
BLOOMFIELD	DAVIS CO.	IA	05/13/2001	18:21	CST	Hail	1.75 in.	0	0	10.00K	3.00K
BLOOMFIELD	DAVIS CO.	IA	05/13/2001	18:24	CST	Hail	1.75 in.	0	0	10.00K	3.00K
BLOOMFIELD	DAVIS CO.	IA	05/13/2001	18:38	CST	Hail	1.75 in.	0	0	10.00K	3.00K
BLOOMFIELD	DAVIS CO.	IA	09/20/2001	17:48	CST	Hail	2.00 in.	0	0	25.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	09/20/2001	17:57	CST	Hail	1.00 in.	0	0	5.00K	2.00K
BLOOMFIELD	DAVIS CO.	IA	09/20/2001	18:00	CST	Hail	0.88 in.	0	0	2.00K	22.00K
PULASKI	DAVIS CO.	IA	09/20/2001	18:15	CST	Hail	1.00 in.	0	0	10.00K	15.00K
PULASKI	DAVIS CO.	IA	10/22/2001	16:45	CST	Hail	0.75 in.	0	0	0.00K	5.00K
FLORIS	DAVIS CO.	IA	05/31/2002	23:07	CST	Hail	1.00 in.	0	0	10.00K	5.00K
PARIS	DAVIS CO.	IA	05/10/2003	16:40	CST	Hail	1.00 in.	0	0	3.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	01/12/2005	11:40	CST	Hail	0.88 in.	0	0	0.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	03/12/2006	13:30	CST	Hail	1.75 in.	0	0	5.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	03/12/2006	13:35	CST	Hail	1.75 in.	0	0	5.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	03/12/2006	13:42	CST	Hail	1.00 in.	0	0	2.00K	0.00K
PULASKI	DAVIS CO.	IA	03/12/2006	13:50	CST	Hail	0.88 in.	0	0	2.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	03/12/2006	20:18	CST	Hail	1.00 in.	0	0	3.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	04/02/2006	15:00	CST	Hail	1.00 in.	0	0	2.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	04/06/2006	09:30	CST	Hail	0.75 in.	0	0	0.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	04/06/2006	10:15	CST	Hail	1.00 in.	0	0	2.00K	0.00K
FLORIS	DAVIS CO.	IA	04/15/2006	22:03	CST	Hail	0.88 in.	0	0	2.00K	0.00K
FLORIS	DAVIS CO.	IA	06/06/2006	15:55	CST	Hail	0.88 in.	0	0	2.00K	5.00K
FLORIS	DAVIS CO.	IA	06/06/2006	16:02	CST	Hail	1.75 in.	0	0	10.00K	5.00K
FLORIS	DAVIS CO.	IA	06/06/2006	16:15	CST	Hail	1.00 in.	0	0	2.00K	5.00K
PULASKI	DAVIS CO.	IA	06/06/2006	16:40	CST	Hail	0.88 in.	0	0	2.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	06/22/2006	02:45	CST	Hail	1.00 in.	0	0	3.00K	5.00K
DRAKESVILLE	DAVIS CO.	IA	07/02/2006	17:43	CST	Hail	1.00 in.	0	0	2.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	07/17/2006	18:43	CST	Hail	1.00 in.	0	0	3.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	07/17/2006	18:54	CST	Hail	1.00 in.	0	0	5.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	07/17/2006	19:15	CST	Hail	2.50 in.	0	0	25.00K	10.00K
PULASKI	DAVIS CO.	IA	08/13/2006	18:24	CST	Hail	1.75 in.	0	0	5.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	03/22/2007	00:55	CST-6	Hail	1.00 in.	0	0	5.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	03/31/2007	13:22	CST-6	Hail	1.00 in.	0	0	10.00K	0.00K
WEST GROVE	DAVIS CO.	IA	06/21/2007	18:39	CST-6	Hail	0.88 in.	0	0	2.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	06/21/2007	18:52	CST-6	Hail	1.00 in.	0	0	5.00K	5.00K
MARK	DAVIS CO.	IA	08/20/2007	23:00	CST-6	Hail	0.75 in.	0	0	0.00K	5.00K
BLOOMFIELD	DAVIS CO.	IA	06/07/2009	21:15	CST-6	Hail	1.75 in.	0	0	25.00K	750.00K
FLORIS	DAVIS CO.	IA	06/07/2009	21:23	CST-6	Hail	1.75 in.	0	0	5.00K	750.00K
FLORIS	DAVIS CO.	IA	06/07/2009	21:32	CST-6	Hail	1.50 in.	0	0	5.00K	750.00K
MARK	DAVIS CO.	IA	06/04/2010	20:35	CST-6	Hail	1.75 in.	0	0	10.00K	15.00K
PULASKI	DAVIS CO.	IA	06/04/2010	20:50	CST-6	Hail	1.00 in.	0	0	5.00K	10.00K
MARK	DAVIS CO.	IA	07/19/2010	06:58	CST-6	Hail	0.95 in.	0	0	0.00K	5.00K
WEST GROVE	DAVIS CO.	IA	05/22/2011	15:20	CST-6	Hail	1.00 in.	0	0	3.00K	5.00K
MARK	DAVIS CO.	IA	06/09/2011	15:50	CST-6	Hail	1.00 in.	0	0	3.00K	10.00K
PARIS	DAVIS CO.	IA	06/13/2011	13:34	CST-6	Hail	0.75 in.	0	0	0.00K	5.00K
WEST GROVE	DAVIS CO.	IA	06/16/2012	15:00	CST-6	Hail	1.00 in.	0	0	1.00K	5.00K
DRAKESVILLE	DAVIS CO.	IA	06/18/2013	15:11	CST-6	Hail	1.00 in.	0	0	0.00K	5.00K
WEST GROVE	DAVIS CO.	IA	09/10/2015	19:34	CST-6	Hail	1.75 in.	0	0	5.00K	20.00K
MARK	DAVIS CO.	IA	09/10/2015	19:43	CST-6	Hail	1.00 in.	0	0	2.00K	0.00K
PARIS	DAVIS CO.	IA	09/17/2015	18:26	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K

DRAKESVILLE	DAVIS CO.	IA	09/17/2015	18:38	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
FLORIS	DAVIS CO.	IA	04/07/2019	18:00	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/28/2019	10:50	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
MARK	DAVIS CO.	IA	08/29/2019	09:20	CST-6	Hail	1.50 in.	0	0	0.00K	20.00K
SAVANNAH	DAVIS CO.	IA	08/29/2019	09:25	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
SAVANNAH	DAVIS CO.	IA	08/29/2019	09:30	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
Totals:								0	0	265.00K	2.503M

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	266.00K	191.00K
LUCAS	LUCAS CO.	IA	06/13/2000	11:30	CST	Hail	0.88 in.	0	0	1.00K	5.00K
CHARITON	LUCAS CO.	IA	08/06/2000	14:00	CST	Hail	1.00 in.	0	0	5.00K	5.00K
LUCAS	LUCAS CO.	IA	10/22/2001	14:50	CST	Hail	1.00 in.	0	0	5.00K	5.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:00	CST	Hail	1.75 in.	0	0	25.00K	5.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:00	CST	Hail	0.88 in.	0	0	5.00K	5.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:01	CST	Hail	1.75 in.	0	0	25.00K	5.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:01	CST	Hail	2.50 in.	0	0	40.00K	15.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:01	CST	Hail	0.88 in.	0	0	3.00K	5.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:01	CST	Hail	0.75 in.	0	0	0.00K	5.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:02	CST	Hail	0.75 in.	0	0	0.00K	5.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:02	CST	Hail	0.75 in.	0	0	0.00K	5.00K
CHARITON	LUCAS CO.	IA	10/22/2001	15:04	CST	Hail	0.75 in.	0	0	0.00K	5.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:06	CST	Hail	1.75 in.	0	0	10.00K	5.00K
RUSSELL	LUCAS CO.	IA	10/22/2001	15:07	CST	Hail	1.75 in.	0	0	10.00K	5.00K
RUSSELL	LUCAS CO.	IA	05/08/2002	19:18	CST	Hail	0.88 in.	0	0	2.00K	1.00K
DERBY	LUCAS CO.	IA	06/01/2002	21:42	CST	Hail	1.00 in.	0	0	5.00K	5.00K
DERBY	LUCAS CO.	IA	06/01/2002	21:55	CST	Hail	1.00 in.	0	0	5.00K	5.00K
CHARITON	LUCAS CO.	IA	05/20/2004	17:38	CST	Hail	0.75 in.	0	0	0.00K	5.00K
WILLIAMSON	LUCAS CO.	IA	08/27/2004	18:30	CST	Hail	0.75 in.	0	0	0.00K	5.00K
LUCAS	LUCAS CO.	IA	03/30/2006	21:18	CST	Hail	1.50 in.	0	0	5.00K	0.00K
LUCAS	LUCAS CO.	IA	07/02/2006	19:10	CST	Hail	1.00 in.	0	0	2.00K	5.00K
CHARITON	LUCAS CO.	IA	06/19/2008	11:56	CST-6	Hail	1.00 in.	0	0	3.00K	10.00K
CHARITON	LUCAS CO.	IA	06/19/2008	11:57	CST-6	Hail	0.88 in.	0	0	1.00K	5.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	06/19/2008	11:58	CST-6	Hail	0.88 in.	0	0	1.00K	5.00K
CHARITON	LUCAS CO.	IA	06/19/2008	11:58	CST-6	Hail	1.00 in.	0	0	3.00K	5.00K
CHARITON	LUCAS CO.	IA	06/19/2008	11:59	CST-6	Hail	1.00 in.	0	0	3.00K	5.00K
LUCAS	LUCAS CO.	IA	07/27/2008	16:44	CST-6	Hail	0.88 in.	0	0	0.00K	10.00K
RUSSELL	LUCAS CO.	IA	07/27/2008	19:53	CST-6	Hail	1.00 in.	0	0	3.00K	10.00K
CHARITON	LUCAS CO.	IA	12/27/2008	03:03	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	06/18/2009	00:01	CST-6	Hail	1.00 in.	0	0	2.00K	5.00K
CHARITON	LUCAS CO.	IA	07/23/2009	04:22	CST-6	Hail	0.75 in.	0	0	0.00K	5.00K
LUCAS	LUCAS CO.	IA	04/03/2011	22:22	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	06/26/2011	16:25	CST-6	Hail	1.00 in.	0	0	1.00K	10.00K
DERBY	LUCAS CO.	IA	06/26/2011	17:04	CST-6	Hail	0.88 in.	0	0	0.00K	5.00K
LUCAS	LUCAS CO.	IA	04/14/2012	19:21	CST-6	Hail	1.75 in.	0	0	25.00K	0.00K
CHARITON	LUCAS CO.	IA	04/14/2012	19:29	CST-6	Hail	1.00 in.	0	0	50.00K	0.00K
CHARITON MUNI ARPT	LUCAS CO.	IA	05/28/2013	15:00	CST-6	Hail	0.75 in.	0	0	0.00K	5.00K
LUCAS	LUCAS CO.	IA	05/28/2013	15:00	CST-6	Hail	0.88 in.	0	0	0.00K	5.00K
LUCAS	LUCAS CO.	IA	04/12/2014	22:11	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
CHARITON	LUCAS CO.	IA	04/12/2014	22:13	CST-6	Hail	1.00 in.	0	0	1.00K	0.00K
RUSSELL	LUCAS CO.	IA	04/09/2015	13:10	CST-6	Hail	1.25 in.	0	0	25.00K	0.00K
LUCAS	LUCAS CO.	IA	08/02/2015	18:00	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
LUCAS	LUCAS CO.	IA	04/27/2016	17:54	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
OAKLEY	LUCAS CO.	IA	04/15/2017	18:54	CST-6	Hail	1.25 in.	0	0	0.00K	0.00K
RUSSELL	LUCAS CO.	IA	06/25/2019	17:15	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
LUCAS	LUCAS CO.	IA	04/11/2020	22:11	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
Totals:								0	0	266.00K	191.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	346.00K	103.00K
HITEMAN	MONROE CO.	IA	10/22/2001	15:25	CST	Hail	0.88 in.	0	0	3.00K	5.00K
HITEMAN	MONROE CO.	IA	10/22/2001	15:26	CST	Hail	1.75 in.	0	0	20.00K	10.00K
ALBIA	MONROE CO.	IA	10/22/2001	15:33	CST	Hail	1.00 in.	0	0	5.00K	5.00K
ALBIA	MONROE CO.	IA	10/22/2001	15:35	CST	Hail	1.00 in.	0	0	30.00K	5.00K
ALBIA	MONROE CO.	IA	10/22/2001	16:37	CST	Hail	1.00 in.	0	0	5.00K	3.00K
ALBIA	MONROE CO.	IA	12/22/2001	13:52	CST	Hail	0.88 in.	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	06/13/2002	00:22	CST	Hail	0.75 in.	0	0	0.00K	5.00K
ALBIA	MONROE CO.	IA	06/13/2002	00:30	CST	Hail	0.75 in.	0	0	0.00K	5.00K
ALBIA	MONROE CO.	IA	09/18/2002	19:41	CST	Hail	0.88 in.	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	04/30/2003	17:16	CST	Hail	1.75 in.	0	0	10.00K	0.00K
AVERY	MONROE CO.	IA	04/30/2003	17:25	CST	Hail	2.75 in.	0	0	50.00K	0.00K
ALBIA	MONROE CO.	IA	04/30/2003	17:30	CST	Hail	2.50 in.	0	0	50.00K	0.00K
MELROSE	MONROE CO.	IA	05/08/2003	18:00	CST	Hail	1.75 in.	0	0	10.00K	0.00K
LOVILIA	MONROE CO.	IA	05/08/2003	18:20	CST	Hail	1.75 in.	0	0	10.00K	0.00K
ALBIA MUNI ARPT	MONROE CO.	IA	08/31/2005	18:24	CST	Hail	0.75 in.	0	0	0.00K	5.00K
ALBIA MUNI ARPT	MONROE CO.	IA	08/31/2005	18:35	CST	Hail	0.75 in.	0	0	0.00K	5.00K
AVERY	MONROE CO.	IA	05/25/2008	22:02	CST-6	Hail	1.25 in.	0	0	3.00K	0.00K
ALBIA	MONROE CO.	IA	06/12/2008	16:00	CST-6	Hail	1.75 in.	0	0	75.00K	5.00K
AVERY	MONROE CO.	IA	06/12/2008	16:10	CST-6	Hail	1.75 in.	0	0	25.00K	5.00K
WELLER	MONROE CO.	IA	06/20/2008	16:01	CST-6	Hail	0.88 in.	0	0	1.00K	5.00K
MELROSE	MONROE CO.	IA	07/27/2008	19:00	CST-6	Hail	1.75 in.	0	0	10.00K	10.00K
ALBIA	MONROE CO.	IA	05/08/2009	17:33	CST-6	Hail	1.00 in.	0	0	1.00K	0.00K
WELLER	MONROE CO.	IA	04/30/2010	09:46	CST-6	Hail	0.88 in.	0	0	1.00K	0.00K
LOVILIA	MONROE CO.	IA	06/18/2010	17:46	CST-6	Hail	1.00 in.	0	0	2.00K	5.00K
ALBIA	MONROE CO.	IA	10/23/2010	16:23	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	10/23/2010	16:24	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
LOVILIA	MONROE CO.	IA	04/14/2012	19:55	CST-6	Hail	1.00 in.	0	0	5.00K	0.00K
AVERY	MONROE CO.	IA	04/14/2012	20:00	CST-6	Hail	2.50 in.	0	0	25.00K	0.00K
HITEMAN	MONROE CO.	IA	04/14/2012	20:02	CST-6	Hail	1.00 in.	0	0	2.00K	0.00K
MELROSE	MONROE CO.	IA	06/24/2012	00:50	CST-6	Hail	1.00 in.	0	0	0.00K	5.00K
AVERY	MONROE CO.	IA	05/28/2013	15:42	CST-6	Hail	1.00 in.	0	0	0.00K	10.00K
AVERY	MONROE CO.	IA	07/19/2013	16:57	CST-6	Hail	1.00 in.	0	0	0.00K	10.00K
AVERY	MONROE CO.	IA	11/28/2016	15:44	CST-6	Hail	0.75 in.	0	0	0.00K	0.00K
HOCKING	MONROE CO.	IA	05/17/2017	15:15	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
HOCKING	MONROE CO.	IA	05/17/2017	15:20	CST-6	Hail	0.88 in.	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	05/17/2017	15:29	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	06/14/2018	09:35	CST-6	Hail	1.50 in.	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	06/15/2019	18:01	CST-6	Hail	1.00 in.	0	0	0.00K	0.00K
Totals:								0	0	346.00K	103.00K

In combination, the thunderstorm, lightning, and hail hazard is the most frequently occurring natural hazard in the ADLM region. Every community has been affected, although not every community has reported injuries, deaths, or damage.

Probability

Iowa experiences on average between 30 and 50 thunderstorm days per year. Several of these thunderstorm days include the ADLM region each year. Because of the humid continental climate in Iowa, the conditions that create severe thunderstorms are typically present. To become severe, a storm needs moisture to form clouds and rain, relatively warm and unstable air that can rise rapidly, and weather front and convective systems that lift air masses.

In the ADLM region, it is highly likely a thunderstorm and lightning event will occur at least once each year, if not several times during a severe summer season. Thunderstorm and lightning events are the mostly frequently occurring hazard in the region. This probability estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

When considering historical occurrences for hail events, there is a high likelihood and probability of an event occurring at least once each year. Many years, Iowa has frequent severe weather and likely to experience several hail events in the spring and summer months.

Magnitude and Severity

Severe thunderstorms can be quite expansive with areas of localized severe conditions. Most severe thunderstorms cells are 5-25 miles wide with a larger area of heavy rain and strong winds around the main cell. Depending on the size, a thunderstorm can affect several or just one community in the region.

Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. Those in unprotected areas, mobile homes, or automobiles during a storm are at risk. Sudden strong winds often accompany a severe thunderstorm and may blow down trees across, power lines, homes, especially mobile homes, and businesses. High winds can also push vehicle off the road. Straight-line winds are typically responsible for most damage during a thunderstorm event.

Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year according to the *2010 Iowa Hazard Mitigation Plan*. Floods and flash floods are the number one cause of weather-related deaths in the United States. Livestock and people who are outdoors, especially under a tree or other natural lightning rods in or on water, or on or near hilltops are at risk from lightning. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignites fires, and cause electrical failures.

Thunderstorms can produce hail that can cause injury, damage homes and businesses, break glass, and destroy vehicles. Flash floods and tornadoes can develop during thunderstorms as well. People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile homes are vulnerable to the impacts of severe thunderstorms. One or more severe thunderstorms occurring over a short period, especially on saturated ground, can lead to flooding and cause extensive power and communication outages as well as agricultural damage.

In the ADLM region, when future thunderstorms event occurs, the magnitude and severity will likely be limited. Injuries will likely not result in permanent disability, although one thunderstorm has resulted in one death. Severe damage could affect 10% to 25% of the ADLM region and any facility shutdown could last a week or more.

The land area affected by a hail event is often the same size or smaller than the area affected by the storm that produces the hail. Typically, a hail event occurs within a 15 miles diameter around the center of the storm. Historically hail events in the region have been widespread overall due to the movement of storms moving through the community.

Hail events are rarely a direct cause of death but can cause injuries to humans, pets, and livestock that are outdoors during a storm. Hail can cause widespread damage to buildings, infrastructure, and vehicles. Damage to buildings is usually limited to windows, roofs, and exteriors.

Agricultural crops are extremely vulnerable because a hailstorm can strip leaves or destroy plants. The peak time for hail events to occur coincides with the agricultural growth season making damage a common risk. Factoring crop damage, hail events can cause millions in damage annually in Iowa. It is important to note that most of the financial impacts of hail damage are covered by insurance.

In future hail events for the ADLM region, the magnitude and severity of the event is likely to be limited based on historical occurrences. For property damage, 10%-25% could be severely damaged, and injuries would not likely result in permanent disability. There is a possibility that some facilities and services may shutdown, but the period would likely be short, lasting less than a week.

Warning Time

The National Weather Service issues severe thunderstorm watches and warnings as well as statements about severe weather and localized storms. These messages are broadcast over NOAA Weather Alert Radios and area television and radio stations. Weather forecasting and severe weather warnings issued by the National Weather Service usually provide residents and visitors adequate warning time of 12-24 hours. Problems arise when warnings are ignored and not understood.

Hail events can usually be predicted in conjunction with a severe storm that has conditions suitable for creating hail. The National Weather Service issues severe thunderstorm watches and warnings as well as statements about what type of severe weather might be produced during a storm. These messages are broadcast over NOAA Weather Alert Radios, television, and regular stations. Some hail events may occur without warning during periods of volatile severe weather, which are typically when conditions are ideal for a tornado.

Duration

Depending on the size and severity of a thunderstorm and lightning event, the negative impacts can affect a community for a relatively short period of time. Typically, thunderstorm and lightning events that occur in conjunction with other hazards like flash flood, flood, hail, tornado, etc. affect a community for an extended period due to damage and shutdown of facilities and services. A thunderstorm and lightning event independently will impact the region for less than a day. A hail event is typically short-term lasting not more than six hours. In most occurrences, hailstorm events are just a few minutes within a larger storm that can occur over several hours.

Exhibit 132: Jurisdictional Thunderstorm, Lightning & Hail Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	1	2	1	1.6	Low
Centerville	4	1	4	1	2.8	Moderate
Centerville Community Schools	4	1	4	1	2.8	Moderate
Cincinnati	4	2	3	2	3.05	High
Exline	4	2	3	2	3.05	High
Moravia	3	1	4	2	2.45	Moderate
Moravia Community School	3	1	4	2	2.45	Moderate
Moulton	4	1	4	1	2.8	Moderate
Mystic	3	1	4	1	2.35	Moderate
Plano	4	2	3	2	3.05	High
Rathbun	4	2	3	2	3.05	High
Udell	4	2	3	2	3.05	High
Unionville	4	2	4	2	3.2	High
Moulton-Udell Community School	4	1	4	1	2.8	Moderate
MercyOne Medical	4	1	4	1	2.8	Moderate
Davis Unincorp Co	4	2	2	2	2.90	Moderate
Davis Co Community Schools	4	2	2	2	2.90	Moderate
Bloomfield	4	2	2	2	2.90	Moderate
Drakesville	4	2	2	2	2.90	Moderate
Floris	4	2	2	2	2.90	Moderate
Pulaksi	4	2	2	2	2.90	Moderate
Lucas Unincorp Co	3	3	2	2	2.75	Moderate
Chariton	4	1	2	2	2.6	Moderate
Chariton Community Schools	3	2	1	1	2.5	Moderate
Derby	3	3	4	2	2.06	Moderate
Lucas	4	1	4	3	3.0	High
Russell	4	2	4	1	3.1	High
Williamson	4	2	4	2	3.2	High
Lucas Co Health Center	4	3	4	2	3.5	High
Monroe Unincorp Co	3	2	4	4	2.75	Moderate
Albia	2	2	4	1	2.2	Moderate
Albia Community Schools	4	3	1	2	3.05	High
Eddyville	4	4	4	3	3.9	High
Lovilia	2	1	2	2	1.7	Low
Melrose	3	2	3	1	2.5	Moderate
Monroe Co Hospital	4	2	2	2	2.9	Moderate

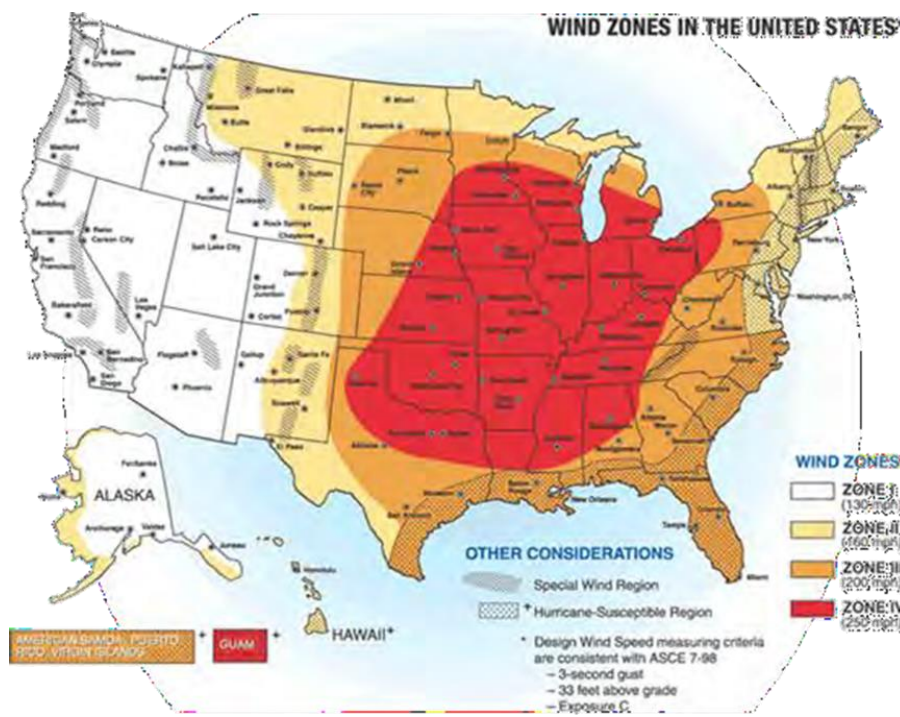
M.) Tornado and Windstorm

A tornado is a violent whirling wind with a rotating funnel shaped cloud extending down. Rotating wind speeds can exceed 300mph and travel across the ground at average speeds of 20-30mph. A tornado path can be a few yards to a mile wide, but an average tornado is a few hundred yards wide. A tornado can move over land for distances ranging from short hops to miles.

Before 2007, the Fujita Scale was used to rate the magnitude of a tornado. The scale is a range of values for wind speed, frequency, average damage path width, and potential damage. The current rating scale is the Enhanced Fujita Scale, which uses more accurate ranges for wind speed and more detailed analysis of damage.

A windstorm is the extreme wind associated with severe storms. Windstorms may have a destructive path up to tens of miles wide. These events can produce straight line winds more than 64 knots. The Beaufort Scale, which ranges 0-12, is typically used to determine the magnitude of a windstorm.

Exhibit 133: Wind Zones in the U.S.



Potential Hazard Area

The potential hazard area for a tornado and windstorm is the entire ADLM region. See Exhibit 133.

Historical Occurrences

There have been 27 tornadoes reported during 2000-2019. There have not been any deaths but almost \$1.855m in property and crop damage across the entire area impacted by the events (see Exhibit 134).

Exhibit 134: Regional Tornado Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Appanoose County	2000-2019	Tornado	0	0	\$1.77M	\$5K
Davis County	2000-2019	Tornado	0	0	\$25K	\$1K
Lucas County	2000-2019	Tornado	0	0	\$125K	\$12K
Monroe County	2000-2019	Tornado	0	0	\$484K	\$27K
REGIONAL TOTALS	2000-2019	Tornado	0	0	\$1.81M	\$45K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	1.177M	5.00K
UDELL	APPANOOSE CO.	IA	09/20/2001	17:09	CST	Tornado	F1	0	0	5.00K	5.00K
CENTERVILLE	APPANOOSE CO.	IA	05/24/2004	18:53	CST	Tornado	F0	0	0	2.00K	0.00K
PLANO	APPANOOSE CO.	IA	06/07/2007	13:35	CST-6	Tornado	EF0	0	0	0.00K	0.00K
JEROME	APPANOOSE CO.	IA	04/10/2008	15:57	CST-6	Tornado	EF1	0	0	75.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	04/10/2008	16:10	CST-6	Tornado	EF1	0	0	75.00K	0.00K
GRIFFINSVILLE	APPANOOSE CO.	IA	11/11/2015	15:22	CST-6	Tornado	EF2	0	0	200.00K	0.00K
JEROME	APPANOOSE CO.	IA	03/06/2017	20:22	CST-6	Tornado	EF1	0	0	20.00K	0.00K
CINCINNATI	APPANOOSE CO.	IA	03/06/2017	20:30	CST-6	Tornado	EF1	0	0	40.00K	0.00K
CENTERVILLE ARPT	APPANOOSE CO.	IA	03/06/2017	20:33	CST-6	Tornado	EF2	0	0	750.00K	0.00K
CENTERVILLE ARPT	APPANOOSE CO.	IA	10/09/2018	14:24	CST-6	Tornado	EF0	0	0	10.00K	0.00K
FORBUSH	APPANOOSE CO.	IA	10/09/2018	14:34	CST-6	Tornado	EF0	0	0	0.00K	0.00K
Totals:								0	0	1.177M	5.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	25.00K	1.00K
BLOOMFIELD	DAVIS CO.	IA	04/02/2006	14:47	CST	Tornado	F0	0	0	0.00K	0.00K
PULASKI	DAVIS CO.	IA	04/02/2006	14:57	CST	Tornado	F0	0	0	0.00K	0.00K
BLOOMFIELD	DAVIS CO.	IA	06/06/2006	16:12	CST	Tornado	F0	0	0	0.00K	1.00K
BELKNAP	DAVIS CO.	IA	04/25/2008	12:35	CST-6	Tornado	EF0	0	0	25.00K	0.00K
SAVANNAH	DAVIS CO.	IA	06/12/2008	15:55	CST-6	Tornado	EF0	0	0	0.00K	0.00K
DRAKESVILLE	DAVIS CO.	IA	05/09/2016	14:06	CST-6	Tornado	EF0	0	0	0.00K	0.00K
Totals:								0	0	25.00K	1.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	125.00K	12.00K
LUCAS	LUCAS CO.	IA	09/20/2001	16:30	CST	Tornado	F0	0	0	50.00K	5.00K
LUCAS	LUCAS CO.	IA	09/05/2004	19:48	CST	Tornado	F0	0	0	75.00K	5.00K
WILLIAMSON	LUCAS CO.	IA	06/22/2015	16:06	CST-6	Tornado	EF1	0	0	0.00K	2.00K
Totals:								0	0	125.00K	12.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	484.00K	27.00K
AVERY	MONROE CO.	IA	04/30/2003	17:30	CST	Tornado	F0	0	0	0.00K	0.00K
ALBIA	MONROE CO.	IA	11/12/2005	18:40	CST	Tornado	F1	0	0	50.00K	0.00K
AVERY	MONROE CO.	IA	06/20/2015	17:09	CST-6	Tornado	EF1	0	0	5.00K	1.00K
WELLER	MONROE CO.	IA	06/22/2015	16:10	CST-6	Tornado	EF3	0	0	150.00K	20.00K
ALBIA	MONROE CO.	IA	06/22/2015	16:50	CST-6	Tornado	EF2	0	0	125.00K	5.00K
MELROSE	MONROE CO.	IA	11/11/2015	15:28	CST-6	Tornado	EF2	0	0	150.00K	0.00K
MELROSE	MONROE CO.	IA	07/19/2016	13:34	CST-6	Tornado	EF0	0	0	4.00K	1.00K
Totals:								0	0	484.00K	27.00K

The highest magnitude tornado of F3 occurred in April 1999 impacted Lucas, Monroe, and Davis Counties.

Windstorms can potentially cause widespread damage, as well. While their wind speeds are lower than tornadoes, they effect a wider area and can persist for several hours. There have been 34 high wind events in the region from 2000-2019. A high wind event is a windstorm with measurable wind speed that is gale force and stronger. Among all windstorm events, there were no deaths or injuries reported. Approximately \$1.1 in property damage was recorded as shown in Exhibit 135.

Exhibit 135: Regional High Wind Data [Storm Events Database | National Centers for Environmental Information \(noaa.gov\)](#)

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Appanoose County	2000-2019	High Wind	0	0	\$155K zone	0
Davis County	2000-2019	High Wind	0	0	\$155K zone	0
Lucas County	2000-2019	High Wind	0	0	\$435.11K	\$25K
Monroe County	2000-2019	High Wind	0	0	\$350.11K	\$25K
REGIONAL TOTALS	2000-2019		0	0	\$1.1M	\$50K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	155.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	03/08/2000	11:00	CST	High Wind	50 kts. E	0	0	10.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	04/07/2001	04:00	CST	High Wind	50 kts. M	0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	03/09/2002	06:00	CST	High Wind	M	0	0	50.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/22/2005	00:15	CST	High Wind	35 kts. ES	0	0	10.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/24/2006	09:30	CST	High Wind	37 kts. MS	0	0	10.00K	0.00K
APPANOOSE (ZONE)	APPANOOSE (ZONE)	IA	01/26/2014	15:00	CST-6	High Wind	37 kts. ES	0	0	25.00K	0.00K
Totals:								0	0	155.00K	0.00K

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	155.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	03/08/2000	11:00	CST	High Wind	50 kts. E	0	0	10.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	04/07/2001	04:00	CST	High Wind	50 kts. M	0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	03/09/2002	06:00	CST	High Wind	M	0	0	50.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/22/2005	00:15	CST	High Wind	35 kts. ES	0	0	10.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/24/2006	09:30	CST	High Wind	37 kts. MS	0	0	10.00K	0.00K
DAVIS (ZONE)	DAVIS (ZONE)	IA	01/26/2014	15:00	CST-6	High Wind	52 kts. EG	0	0	25.00K	0.00K
Totals:								0	0	155.00K	0.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	435.11K	25.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	03/08/2000	11:00	CST	High Wind	50 kts. E	0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	04/07/2001	04:00	CST	High Wind	50 kts. M	0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	03/09/2002	06:00	CST	High Wind	M	0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	11/12/2003	09:00	CST	High Wind	50 kts. EG	0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	04/18/2004	15:10	CST	High Wind	35 kts. MS	0	0	80.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	04/27/2004	12:30	CST	High Wind	35 kts. MS	0	0	75.11K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/22/2005	00:15	CST	High Wind	35 kts. MS	0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	11/12/2005	18:00	CST	High Wind	35 kts. MS	0	0	50.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/24/2006	09:30	CST	High Wind	50 kts. MG	0	0	10.00K	0.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	10/26/2008	11:00	CST-6	High Wind	35 kts. ES	0	0	25.00K	25.00K
LUCAS (ZONE)	LUCAS (ZONE)	IA	01/26/2014	15:00	CST-6	High Wind	50 kts. EG	0	0	25.00K	0.00K
Totals:								0	0	435.11K	25.00K

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	350.11K	25.00K
MONROE (ZONE)	MONROE (ZONE)	IA	03/08/2000	11:00	CST	High Wind	50 kts. E	0	0	10.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	04/07/2001	04:00	CST	High Wind	50 kts. M	0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	03/09/2002	06:00	CST	High Wind	M	0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	11/12/2003	09:00	CST	High Wind	50 kts. EG	0	0	50.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	04/27/2004	12:30	CST	High Wind	35 kts. MS	0	0	75.11K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/22/2005	00:15	CST	High Wind	35 kts. ES	0	0	10.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	06/08/2005	09:00	CST	High Wind	50 kts. EG	0	0	20.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/24/2006	09:30	CST	High Wind	37 kts. MS	0	0	10.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	10/26/2008	11:00	CST-6	High Wind	35 kts. ES	0	0	25.00K	25.00K
MONROE (ZONE)	MONROE (ZONE)	IA	10/27/2010	09:00	CST-6	High Wind	54 kts. ES	0	0	25.00K	0.00K
MONROE (ZONE)	MONROE (ZONE)	IA	01/26/2014	15:00	CST-6	High Wind	50 kts. EG	0	0	25.00K	0.00K
Totals:								0	0	350.11K	25.00K

Probability






According to the Iowa Hazard Mitigation Plan 2018, Iowa averages 35 tornadoes per year. They are common across the state and 27 tornadoes have been documented in the ADLM region from 2000-2019. Funnel clouds, which are strong indicator of tornadoes, have been documented less often but have occurred several times. The average period between tornado and funnel cloud events is two years.

The entire United States is subject to various types of windstorm events. According to the Iowa Hazard Mitigation Plan 2018, Iowa experienced more than 1,500 windstorm events, including wind associated with thunderstorms, straight line wines and funnel clouds. Including the high wind events show in charts above. The ADLM region has experienced wind events every year.

Looking toward the future, it is highly likely a tornado or windstorm event will occur in the region within the next five years. The estimated probability of a tornado event is approximately once every three years. This probability is based on historical occurrences, parameters defined in the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

Magnitude and Severity

Exhibit 136: Enhanced Fujita Scale

EF Rating	Wind Speeds	Expected Damage
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled. 
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged. 
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed. 
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark. 
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse. 
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped. 

The Beaufort Wind Scale shown below identifies winds over 73 mph as hurricane-force winds with accompanying damage.

Exhibit 137: Beaufort Wind Scale Chart

Beaufort Number	Wind Speed (miles/hour)	Wind Speed (km/hour)	Wind Speed (knots)	Description	Wind Effects on Land
0	< 1	< 1	< 1	Calm	Calm. Smoke rises vertically.
1	1-3	1-5	1-3	Light Air	Wind motion visible in smoke.
2	4-7	6-11	4-6	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	12-19	7-12	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	13-18	20-28	11-16	Moderate Breeze	Dust and loose paper are raised. Small branches begin to move.
5	19-24	29-38	17-21	Fresh Breeze	Small trees begin to sway.
6	25-31	39-49	22-27	Strong Breeze	Large branches are in motion. Whistling is heard in overhead wires. Umbrella use is difficult.
7	32-38	50-61	28-33	Near Gale	Whole trees in motion. Some difficulty experienced walking into the wind.
8	39-46	62-74	34-40	Gale	Twigs and small branches break from trees. Cars veer on road.
9	47-54	75-88	41-47	Strong Gale	Larger branches break from trees. Light structural damage.
10	55-63	89-102	48-55	Storm	Trees broken and uprooted. Considerable structural damage.
11	64-72	103-117	56-63	Violent Storm	Widespread damage to structures and vegetation.
12	> 73	> 117	> 64	Hurricane	Considerable and widespread damage to structures and vegetation. Violence.

The most severe tornado events that occurred in the ADLM region was an EF3 rated, but the majority have been F1 or F0. Based on historical occurrences, the region will most likely be affected by a low rated tornado in the next five years although a higher magnitude tornado is possible.

Windstorms with gale force winds have also occurred in the region. Based on historical data, the region will most likely be affected by windstorm events rated 8 or higher on the Beaufort Scale, although hurricane force winds are possible.

During a tornado and windstorm event, everyone located in or near the path of the tornado is vulnerable. There are several groups of people who are especially vulnerable during tornado events. These people include mobile or manufactured home residents, outdoor recreation and campground visitors, outdoor workers, motorists, elderly, young, disabled individuals with limited mobility and residents or workers in buildings without basements.

Generally, the destructive path of a tornado is a few hundred feet in width, but stronger tornadoes can leave a path of devastation up to a mile wide. Large hail, strong straight-line winds, heavy rains, flash flooding and lightning are also associated with severe storms and may cause significant damage to a wider area. Tornado events rarely destroy entire neighborhoods or even communities.

Windstorms can have a destructive path that is several miles wide. Large hail, strong straight-line winds, heavy rains, flash flooding and lightning are also associated with windstorms and may cause significant damage to a wider area. It is often difficult to separate windstorms and tornado damage when wind speed exceeds 64 knots.

Damage from a tornado or windstorm can range from broken tree branches, shingle damage to roofs and broken windows all the way to complete destruction of well-constructed buildings, infrastructure, and large trees. Tornadoes can also impact critical services, especially electrical power. Buried services such as water and gas are less vulnerable but can be negatively affected by their system components located above ground.

For Iowa and the ADLM region, it is important to note varying degrees of crop damage can occur during a tornado or windstorm event. Wind can flatten fields, break plant stalks, or twist plants. Windstorm events can destroy a crop or cause limited damage that can reduce crop yields. Both circumstances can cause economic hardship for the agricultural sectors of Iowa and ADLM's economy.

People living in mobile homes, homes that are built prior to building codes and homes in deteriorating conditions are particularly vulnerable to high winds. People in automobiles and campground are also at a greater risk. Generally, an injury is minor and seldom is death associated with a windstorm.

Committee members discussed the most vulnerable locations as campgrounds at Lake Rathbun, Sundown Lake, Lake Miami, Lake Wapello, Red Haw Lake, and the mobile homes located throughout the region. Also, of critical concern is the aged (and possibly weak) housing structure in the area. See Exhibit 138.

Exhibit 138: Vulnerable Structures				
Jurisdiction	Number of Mobile Homes	Avg % of total mobile homes	Number of homes built prior to 1960	% Of homes built prior 1960
Total Appanoose County	590	9%	3,257	49%
Total Davis County	199	6%	1,699	47%
Total Lucas County	178	4%	1,891	45%
Total Monroe County	564	14%	1,511	38%
Total ADLM Region	1,531	8.25%	8,358	44.75%
<i>2019 ACS</i>				

If a tornado or windstorm were to occur in the ADLM region, the magnitude and severity would likely be limited. A future tornado event may result in injuries that do not result in permanent disability, 10%-25% of a jurisdiction's property severely damaged, and shutdown of facilities and services for approximately a week. This magnitude and severity estimated is based on historical occurrences, parameters defined in the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

Warning Time

Advancement in weather forecasting has allowed tornado watches to be issued hours in advance of a tornado event. The best lead time is approximately 30 minutes. A tornado can change paths very rapidly limiting the amount of warning time for the people located in its path. Outside of weather forecasting, there may not be visible indicators of a tornado on the ground due to blowing dust or driving rain and hail that often is included in the storm and limits visibility.

A future tornado event in the ADLM region will likely have minimal damage, less than six hours, or no warning time. The National Weather Service has developed a windstorm warning system that issues windstorm watches 12-24 hours in advance. Advisories are issued when existing or imminent windstorms could impact an area. Like tornado warnings, the typical warning time for a windstorm is 30 minutes. It is important to note that jurisdictions in the ADLM region activate outdoor warning system for storm events that are predicted to have a wind speed of 70mph or greater, which are rated 11 and greater on the Beaufort scale. This warning time estimate is based on historical occurrences and local knowledge.

Duration

Normally a tornado will stay on the ground for no more than 20 minutes. However, a tornado can touch ground several times in different areas. Typically, local response during a tornado event is the immediate threat to life and property. After a tornado event, local response is for the individuals, services, and structures that are negatively impacted by the tornado.

Based on historical occurrences in the region, a series of tornadoes can develop in a few hours prolonging the amount of time jurisdictions can be impacted by a tornado event but the event lasts less than six hours. In the ADLM region, a windstorm event can last several hours but usually not more than an entire day. This duration estimate is based on historical occurrences, parameters defined in the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

Exhibit 139: Jurisdictional Tornado & Windstorm Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	1	4	1	1.9	Low
Centerville	3	1	4	1	2.8	Moderate
Centerville Community Schools	3	1	4	1	2.8	Moderate
Cincinnati	4	4	3	2	3.25	High
Exline	3	2	4	1	2.65	Moderate
Moravia	3	1	4	2	2.45	Moderate
Moravia Community School	3	1	4	2	2.45	Moderate
Moulton	4	4	3	2	3.25	High
Mystic	3	1	4	1	2.35	Moderate
Plano	3	3	3	4	3.1	Moderate
Rathbun	3	3	3	4	3.1	High
Udell	3	3	3	4	3.1	High
Unionville	3	3	4	1	2.95	Moderate
Moulton-Udell Community School	4	4	3	2	3.25	High
MercyOne Medical	3	1	4	1	2.8	Moderate
Davis Unincorp Co	4	4	4	1	3.70	High
Davis Co Community Schools	4	4	4	1	3.70	High
Bloomfield	4	4	4	1	3.70	High
Drakesville	4	4	4	1	3.70	High
Floris	4	4	4	1	3.70	High
Pulaksi	4	4	4	1	3.70	High
Lucas Unincorp Co	2	3	3	1	2.35	Moderate
Chariton	4	3	2	4	3.4	High
Chariton Community Schools	2	3	3	1	1.65	Low
Derby	3	3	4	2	2.0	Moderate
Lucas	4	4	4	4	4.0	High
Russell	3	3	4	3	3.15	High
Williamson	2	2	4	1	2.2	Moderate
Lucas Co Health Center	4	3	4	2	3.5	High
Monroe Unincorp Co	3	2	3	1	2.5	Moderate
Albia	2	2	4	2	2.3	Moderate
Albia Community Schools	3	3	4	1	2.95	Moderate
Eddyville	4	4	4	3	3.9	High
Lovilia	2	1	2	2	1.7	Low
Melrose	3	2	4	3	2.85	Moderate
Monroe Co Hospital	4	4	3	4	3.85	High

Technological Hazards

A.) Hazardous Materials Incident

Generally, a hazardous materials incident includes the accidental release of flammable, explosive, toxic, noxious, corrosive, oxidizing, or radioactive substances, irritants, or mixtures that can pose a risk to life, health or property possibly requiring evacuation. A hazardous materials event includes fixed hazardous materials, transportation of hazardous materials, and pipeline transportation.

A fixed hazardous materials incident is the accidental release of hazardous materials during handling, storage, or production at a facility. Fixed incidents generally affect a localized area.

A transportation hazardous materials incident involves the accidental release of hazardous materials during the transport of the materials. Transportation incidents generally affect the area where the incident occurs.

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of 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.

Potential Hazard Area

The potential hazard area for a hazardous materials event is conditionally identified as the entire region. Areas surrounding facilities using hazardous materials, which are required to report materials through a Tier II form or along transportation infrastructure are immediate potential hazard areas. Appendix A, as well as Exhibits 145 through 148, provide Risk Assessment maps for the locations of these facilities. There are 190 miles of gas/hazardous liquid lines in the region with 102 located in Appanoose County, Davis County has 48 miles, 30 in Lucas County, and 10 in Monroe County. The maps in Exhibits 145 through 148 show the approximate locations of pipelines and the locations of pipeline spills since 2002. If materials are released in the air or water, the potential hazard area may be expanded downwind or downstream of the incident. LP Gas for heating fuel. Liquid petroleum is not by nature toxic but can cause asphyxiation through oxygen deprivation. LP Gas is heavier than air so it will sink to the lowest places possible and is flammable. Stores of anhydrous ammonia in the county pose health and safety threats to potentially large areas of the county and are potential targets for meth producers as a source of raw materials.

Exhibit 140: Fixed Hazardous Materials Potential Locations			
	% Of homes using LP Gas, tanks, bottles	Underground Storage Tanks (open/closed)	Above Ground Storage Tanks
Centerville	1%	8/27	19
Cincinnati	4%	1 /2	0
Exline	43%	1/1	0
Moravia	0%	2/8	2
Moulton	6%	0/8	5
Mystic	57%	0/4	0
Numa	39%	0/0	0
Plano	78%	0/0	1
Rathbun	71%	0/0	0
Udell	96%	0/0	0
Unionville	68%	0/1	0
Unincorporated Co	--	20/74	--
TOTAL APPANOOSE CO	22%	32/125	27
Bloomfield	.7%	1/3	8
Drakesville	67%	0/0	0
Floris	69%	1/0	0
Pulaski	82%	0/2	10
Unincorporated Co	--	4/14	--
TOTAL DAVIS COUNTY	34%	6/19	18
Chariton	2%	1/3	20
Derby	50%	0/1	0
Lucas	53%	0/0	1
Russell	60%	0/3	0
Williamson	0%	0/2	0
Unincorporated Co	--	9/26	--
TOTAL LUCAS COUNTY	26%	10/34	21
Albia	1%	7/8	3
Lovilia	1%	2/4	0
Melrose	80%	0/4	0
Unincorporated Co	--	0/1	--
TOTAL MONROE COUNTY	27%	9/17	24
REGIONAL AVERAGE/TOTAL	27%	57/195	90
	2019 ACS	UST Finder (arcgis.com)	Tanks (iowadnr.gov)

Appanoose County

Exhibit 141: Tier II Facilities in Appanoose County

FACILITY	SECTION 302 EHS CHEMICAL NAME	CONTAINERS	CAMEO SCREENING WORST CASE	LEPC Planning Concentric Circle	School, Day Care Centers, Preschools, Care Facilities Within LEPC Planning Concentric
Agriland FS, Inc 801 W North St Moravia, IA 52571	Anhydrous ammonia	Tank	> 10 miles	2 miles	6,7
Bemis Company, Inc 1400 E O'Neal St Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
C & C Machining, Inc 22233 230 th Avenue Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 mile	.10 miles	NONE
Delaware North at Honey Creek Resort 12633 Resort Dr Moravia, IA 52571	Chlorine Sulfuric Acid	Tank Lead Acid Batteries	.5 miles	.5 miles	NONE
Inhance Technologies 2800 Industrial Park Rd Centerville, IA 52544	Hydrogen Fluoride	Cylinders	.10 miles	.10 miles	NONE
Iowa Steel & Wire Co. 1500 Van Buren St Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
ITC Midwest – Appanoose 32768 535 Street Moulton, IA 52572	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
L & W Quarries, Walnut City #5 14593 Highway J5T Mystic, IA 52574	Sulfuric Acid	Lead Acid Batteries	.10 mile	.10 mile	NONE
L & W Quarries Inc - Clarkdale #8 19037 200th Street Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
L&W Quarries, Shop 12020 455th Street Plano, IA 52581	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
Rathbun Fish Hatchery 15053 Hatchery Place Moravia, IA 52571	Formaldehyde (Solution)	drum	.5 miles	.5 miles	NONE
Smith Fertilizer & Grain 1605 S 24 th Street Centerville, IA 52544	Anhydrous ammonia	Tank	>10 miles	2 miles	1,2,3,5,9,13,14,15,16,17,19,20,21,22,25,28,29,30,32,36,37,38,40,41
Wells Vehicle Electronics Distribution Center 2700 Dewey Road Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
Windstream - Iowa Telecom 236 W Maple St Centerville, IA 52544	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	10

Centerville – Fixed Hazardous Materials

The fixed hazardous materials locations place all the public-school structures at an increased risk, three preschool buildings, three senior living centers, and twelve of the private in-home daycare facilities. Emergency Management has identified locations in the ESF10 and provided a map showing the specific locations can be seen in Appendix 141.

Cincinnati – Fixed Hazardous Materials

There are also two above ground fuel tanks (500 gallon) that are located at the Fire Hall.

Moravia – Fixed Hazardous Materials

There are two agriculture business that place one daycare and the Moravia school at a potential risk.

Davis County

According to the Iowa Department of Natural Resources, there are 10 sites in Davis 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. There are 8 Tier II facilities in Bloomfield and 2 in Pulaski. See Exhibit 142.

Exhibit 142: Tier II Facilities in Davis County.

FACILITY	SECTION 302 EHS CHEMICAL NAME	CONTAINERS	CAMEO SCREENING WORST CASE	LEPC Planning Concentric Circle	School, Day Care Centers, Preschools, Care Facilities Within LEPC Planning Concentric
Agriland FS, Inc 22686 Highway 2 Bloomfield, IA 52537	Anhydrous ammonia	Tank	> 10 miles	2 miles	15, 21
Citizens Mutual Telephone Co 114 W Jefferson St Bloomfield, IA 52537	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
Nutrien Ag Solutions 1339 906 Karr Avenue Bloomfield, IA 52537	Anhydrous Ammonia *Parazone 3SL	Tank Plastic Jugs	>10 miles	2 miles	1,2,3,4,5,6,8,9,10,11,14,18, 19,22,34,36,38,40,41
Troy Elevator, Inc 30919 215 th St Bloomfield, IA 52537	Anhydrous Ammonia	Tank	>10 miles	2 miles	NONE
Troy Elevator, Inc 32730 215 th Street Bloomfield, IA 52537	Gramaxone Max	Plastic bottles or jugs	.10 mile	.10 mile	NONE

Lucas County

Fixed Hazardous Materials – Anecdotal evidence suggests that meth use and production is not uncommon in Lucas County. Chemical spills can occur anytime there is a traffic accident as oil, gasoline, and other fluids used in vehicles are released. Dumping of household cleaners, paints, and old oil can happen at any time and are more likely in areas where people do not understand hazardous materials laws. See Exhibit 143.

Exhibit 143: Tier II Facilities in Lucas County.

FACILITY	SECTION 302 EHS CHEMICAL NAME	CONTAINERS	CAMEO SCREENING WORST CASE	LEPC Planning Concentric Circle	School, Day Care Centers, Preschools, Care Facilities Within LEPC Planning Concentric
Windstream Iowa Telecom 220 N Grand Street Chariton, IA 50049	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
ITC Midwest – Lucas County 50415 State Hwy 14 Chariton, IA 50049	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
United Farmers' Cooperative 49297 215th Street Chariton, IA 50049	Anhydrous Ammonia	Tank	>10 miles	2 miles	1,2,3,4,5,6,7,8,9,13,20,23
HyVee Perishable Distribution Center 21591 490 th Street Chariton, IA 50049	Anhydrous Ammonia *Sulfuric Acid	Tank Batteries	>10 miles	2 miles	1,2,3,4,5,6,7,8,9,12,13,19,20,23
HyVee Grocery Distribution Center 1801 Osceola Avenue Chariton, IA 50049	Sulfuric Acid	Lead acid batteries	.10 miles	.10 miles	NONE
HyVee HBC Distribution Center 1802 Osceola Avenue Chariton, IA 50049	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
HyVee Distribution Fuel Center 2110 Osceola Avenue Chariton, IA 50049	Hydrofluoric Acid	Plastic Drum	.10 miles	.10 miles	1,2,3,4,5,6,7,8,9,12,13,19,20,23
ITC Midwest – Court 501 Court Ave Chariton, IA 50049	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
US Cellular – Russell 901 Auction 600 East Goodwin St. Russell, IA 50238	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	
US Cellular 24410 482 nd St Chariton, IA 50049	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	
US Cellular – Lucas 49794 US Hwy 65 Lucas, IA 50151	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	

Chariton- Fixed Hazardous Materials

Fixed hazardous materials could potentially affect three in-home daycare facility, one preschool, and Chariton Public Middle School. Appendix ____ contains maps that will show specific locations.

Russell – Fixed Hazardous Materials

There is one gas station located within Russell and multiple private mechanical/construction businesses that could experience a fixed hazardous incident.

Monroe County

Two large industries are in the far Northeast corner of Monroe County. The physical addresses place near the City of Eddyville but on right on the edge of the Monroe County line. The Cargill plant offers employment to more than 550 residents from a large area. The Cargill plant is a processing plant that produces pet food and various other products for human consumption. Ajinomoto Heartland is global leaders of feed-grade amino acid manufacturing. Representing Ajinomoto Animal Nutrition in North America, Ajinomoto Heartland LLC manufactures and distributes cost effective feed-grade amino acids and is the frontrunner in amino acid nutritional research and technical expertise. This industry employs approximately 75 employees. Ajinomoto Food Ingredients produces supplemental food ingredients for human consumption. This division employs about 100 individuals. Each of these sites has a personnel member that has HAZMAT training and certification. Each site offers a safety protocol and evacuation plan for its employees. The emergency procedures are held confidential at each location, and both were reluctant to give any information. Local emergency personnel have been working to build a relationship with the site managers so that they could better support the facility in the event of an emergency. This has been a lengthy and difficult process but there are discussions of hosting a joint meeting with intentions of establishing a better support system for each location.

Exhibit 144 summarizes the maximum threat to residents and structures that can be affected by fixed hazardous materials. The manufacturing plants, automobile repair, gas stations, and farmyards are potential sites for hazardous materials incidents in Monroe County. There are nine gas and farm stores located in Albia, two in Lovilia, and one in Melrose that are at a higher rate for possible incident.

Chemical spills can occur anytime there is a traffic accident as oil, gasoline, and other fluids used in vehicles are released. Dumping of household cleaners, paints, and old oil can happen at any time and are more likely in areas where people do not understand hazardous materials laws.

The manufacturing plants, automobile repair, and gas stations are potential sites for hazardous materials incidents in Monroe County. There are approximately 9 locations in Albia that contain fixed hazardous materials available for purchase. This does include gas stations and farm supply businesses that are scattered throughout the community. Albia hosts an industrial site that is home to such businesses as RELCO, A.Y.M, Chicago Rivet & Machine, Superior Machine, Quiktron, L & S Tools, Iowa Aluminum, Hawkeye Molding, Walker Chemical Corp, and Kness Manufacturing. These industries combined employment to 550 individuals in this area.

See Appendix ___ to view the vulnerable zone around the fixed hazardous locations in the county. Specific locations of concerns include private in-home daycares, who would have the vulnerable population of young children. One agri-business facility places two private, in-home daycare at a greater potential risk. The industries in the Iowa Bioprocessing Center does not affect any vulnerable populations.

Exhibit 144: Tier II Facilities in Monroe County

FACILITY	SECTION 302 EHS CHEMICAL NAME	CONTAINERS	CAMEO SCREENING WORST CASE	LEPC Planning Concentric Circle	School, Day Care Centers, Preschools, Care Facilities Within LEPC Planning Concentric
Agriland FS, Inc 6281 160 th St Albia, IA 52531	Anhydrous Ammonia	Tank	>10 miles	2 miles	18, 25
Ajinomoto Health & Nutrition North America, Inc 1 Ajinomoto Drive Eddyville, IA 52553	Anhydrous Ammonia	Tank	>10 miles	2 miles	NONE
Ajinomoto Animal Nutrition North America, Inc 1116 Hwy 137 Eddyville, IA 52553	Anhydrous Ammonia *Sulfuric Acid	Tank	>10 miles	2 miles	NONE
Cargill Incorporated 1 Cargill Drive Eddyville, IA 52553	Sulfuric Acid Formaldehyde & Water Hydrogen Chloride	Batteries Tank Cylinder	.5 miles	.5 miles	NONE
ITC Midwest Eddyville Industrial Complex & Bridgeport North 1 Cargill Drive Eddyville, IA 52553	Sulfuric Acid	Lead Acid Batteries	.10 miles	.10 miles	NONE
Nutrien Ag Solutions 1334 2774 Hwy 5 PO Box 282 Moravia, IA 52571	Anhydrous Ammonia	Tank	>10 miles	2 miles	Moravia Elementary, Middle, & High Schools in Appanoose County
Wacker Chemical Corporation 1 Wacker Drive Eddyville, IA 52553	Sulfuric Acid 10% Sulfuric Acid Solution	Batteries Tank, Tote Bins	.10 miles	.10 miles	NONE

Lovilia – exposure due to Fixed Hazardous Materials

There are two fuel stations along State Highway 5 that are in the center of the community. An additional site that may contain hazardous materials would be a farm supply and grain store on the north edge of the community along Highway 5.

Melrose – exposure due to Fixed Hazardous Materials

A particular area of concern in Melrose is the land that is owned by Farm Services. The business stores numerous tanks of hazardous farm chemicals next to the railroad property and rail line.

1.) PIPELINE INCIDENT

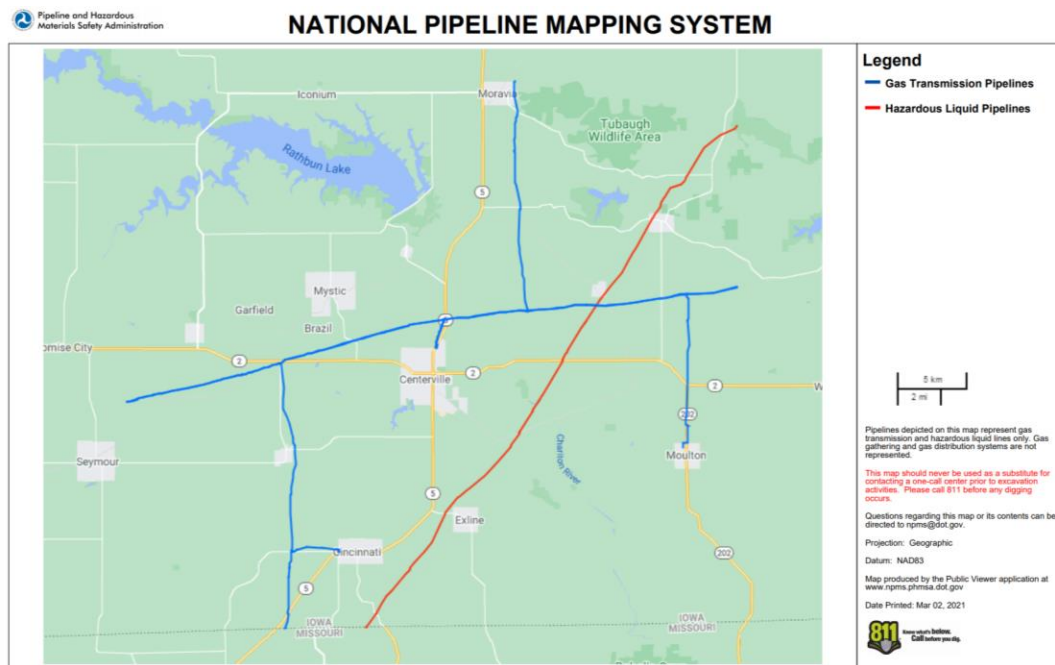
A Pipeline Incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range 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 to the pipelines.

About 5 interstate pipelines operate in the state under federal pipeline jurisdiction. There are many high-pressure gas mains throughout the state which supply residential and industrial users. People and property with pipelines on their land or nearby are the most at risk. People excavating earth near a pipeline are also at risk. Whether the greater hazard is posed to those upwind or downwind from a site depends on the product spilled, for example - natural gas is lighter than air. Private homes and business served by natural gas have smaller diameter pipelines connected to their structure.

Appanoose County

The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident. One natural gas pipeline runs near Mystic about 1 ½ miles to the south and east of town. There are several intersecting Natural gas lines throughout Appanoose County. One main line crosses the center of the county from west to east and by not through a specific community. A spur of that line goes south through the community Numa with an additional line feeding east into the community of Cincinnati. There are additional lines that also connect off the main line north to Moravia and south Moulton. There is a crude oil/petroleum line that runs from Mendota to the edge of Exline and between Udell and Unionville. The Unincorporated County just outside of the edge of Udell lies in a particularly vulnerable area because of the intersection of the crude oil/petroleum line and the Natural gas line. See Exhibit 145 or Appendix A.

Exhibit 145: Pipelines in Appanoose County (Source: Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, <https://pvpnms.phmsa.dot.gov/PublicViewer/>)



Centerville – Pipeline Incident

The underground pipelines cross public streets, roads, and highways as well as streams. Iowa’s natural environment is also vulnerable to contamination from an underground pipeline incident. There are several intersecting Natural gas lines throughout Appanoose County. One line enters the north edge of Centerville’s city limits.

Cincinnati – Pipeline Incident

There are several intersecting Natural gas lines throughout Appanoose County. (See Appendix ____.) One main line crosses the center of the county from west to east and by not through a specific community. A spur of that line goes south through the community Numa with an additional line feeding east into the community of Cincinnati. There are additional lines that also connect off the main line north to Moravia and south Moulton.

Numa – Pipeline Incident

A spur of a natural pipeline goes south through the community Numa with an additional line feeding east into the community of Cincinnati.

Mystic, Plano, & Rathbun – Pipeline Incident

There are no identified pipelines in the Cities of Mystic, Plano, and Rathbun.

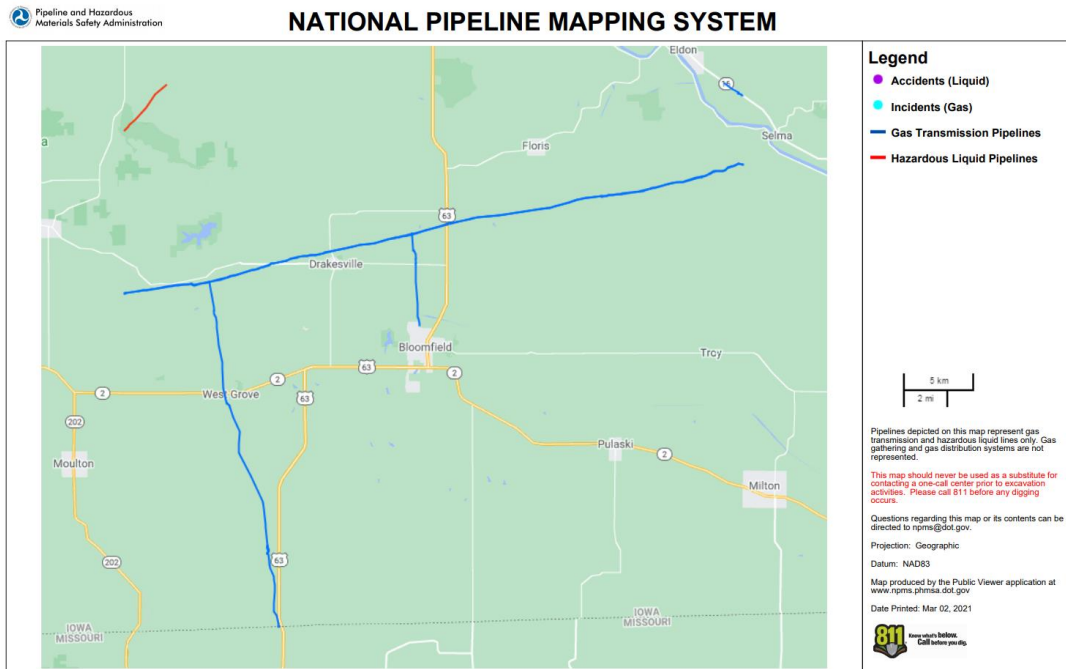
Udell– Pipeline Incident

There is a crude oil/petroleum line that runs from Mendota to the edge of Exline and between Udell and Unionville. The Unincorporated County just outside of the edge of Udell lies in a particularly vulnerable area because of the intersection of the crude oil/petroleum line and the Natural gas line.

Davis County

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. See Exhibit 146 or Appendix A.

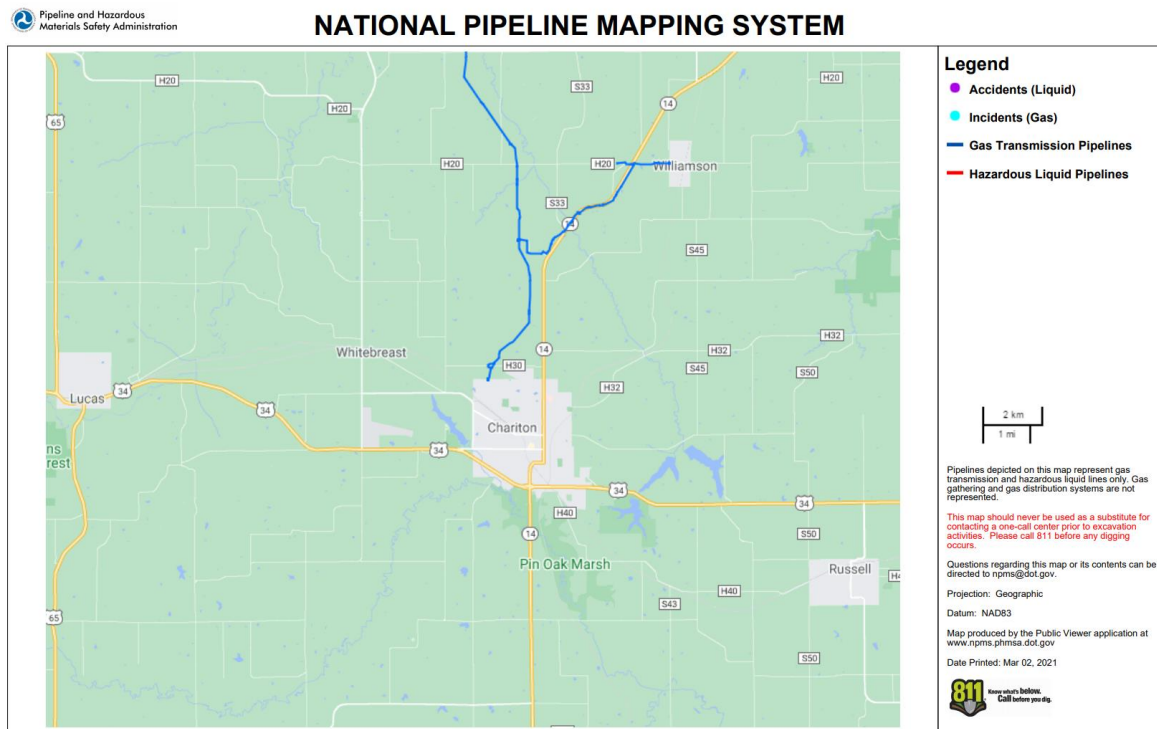
Exhibit 146: Pipelines in Davis County (Source: Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, <https://pvpnms.phmsa.dot.gov/PublicViewer/>)



Lucas County

The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident. A natural gas pipeline exists through the rural district from the north central county line to the northwest corner of Chariton. A spur line off this offers service to Williamson. This pipeline is approximately 40 miles in length and provides an opportunity for a Pipeline Incident to occur. See Exhibit 147 or Appendix A.

Exhibit 147: Pipelines in Lucas County (Source: Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, <https://pypnms.phmsa.dot.gov/PublicViewer/>)



Derby, Lucas & Russell Pipeline Incident

No pipeline has been identified.

Chariton – Pipeline Incident

A natural gas pipeline exists through the rural district from the north central county line to the northwest corner of Chariton. A spur line off this offers service to Williamson. This pipeline is approximately 40 miles in length and provides an opportunity for a Pipeline Incident to occur.

Williamson – Pipeline Incident

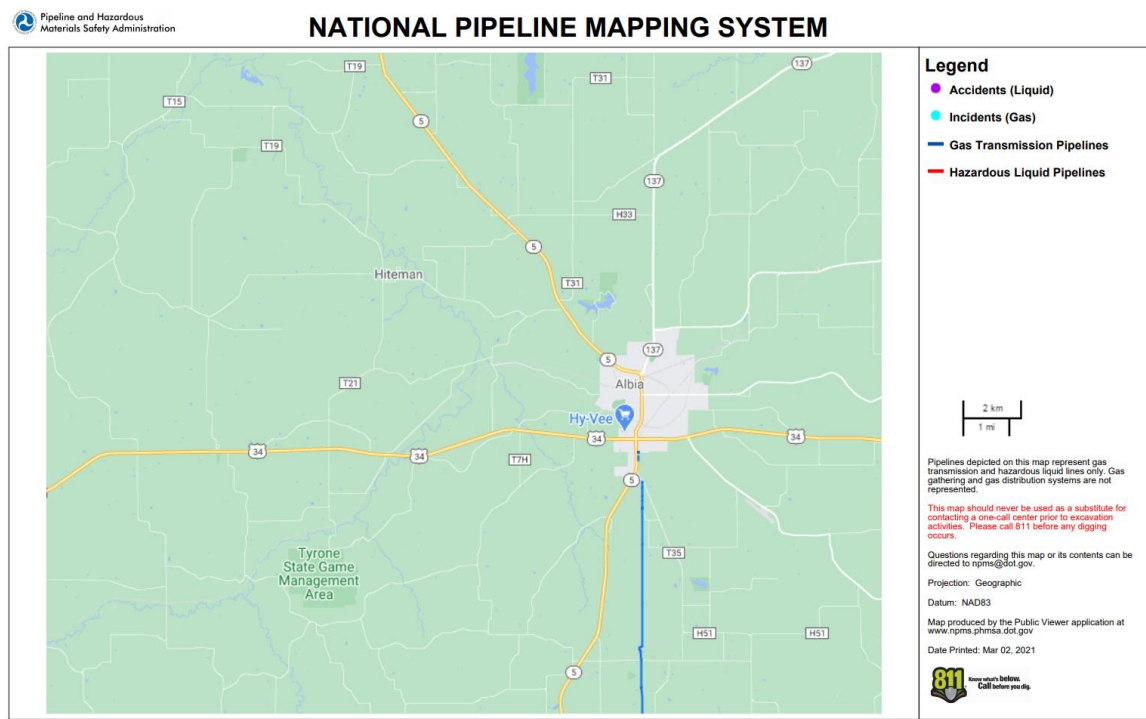
A natural gas pipeline exists through the rural district from the north central county line to the northwest corner of Chariton. A spur line off this offers service to Williamson. This pipeline is approximately 40 miles in length and provides an opportunity for a Pipeline Incident to occur.

Monroe County

Unincorporated Lucas County – exposure due to Pipeline Incident

The underground pipelines cross public streets, roads, and highways as well as streams. Iowa’s natural environment is also vulnerable to contamination from an underground pipeline incident. One natural gas pipeline runs parallel to Highway 5 and enters the south edge of the City of Albia. This line extends approximately 10 miles from the south edge of the county into Albia. Another natural gas line enters the county from the north (adjacent to Highway 5) for 2 miles to provide service to the city of Lovilia. See Exhibit 148 or Appendix A.

Exhibit 148: Pipelines in Monroe County (Source: Pipeline and Hazardous Materials Safety Administration, National Pipeline Mapping System, <https://pvnpmis.phmsa.dot.gov/PublicViewer/>)



Albia – exposure due to Pipeline Incident

About 5 interstate pipelines operate in the state under federal pipeline jurisdiction. There are many high-pressure gas mains throughout the state which supply residential and industrial users. People and property with pipelines on their land or nearby are the most at risk. People excavating earth near a pipeline are also at risk. Whether the greater hazard is posed to those upwind or downwind from a site depends on the product spilled, for example - natural gas is lighter than air. Private homes and business served by natural gas have smaller diameter pipelines connected to their structure.

The underground pipelines cross public streets, roads, and highways as well as streams. Iowa’s natural environment is also vulnerable to contamination from an underground pipeline incident. One natural gas pipeline runs parallel to Highway 5 and enters the south edge of the City of Albia. This line extends approximately 10 miles from the south edge of the county into Albia. Another natural gas line enters the county from the north (adjacent to Highway 5) for 2 miles to provide service to the city of Lovilia.

Lovilia – exposure due to Pipeline Incident

About 5 interstate pipelines operate in the state under federal pipeline jurisdiction. There are many high-pressure gas mains throughout the state which supply residential and industrial users. People and property with pipelines on their land or nearby are the most at risk. People excavating earth near a pipeline are also at risk. Whether the greater hazard is posed to those upwind or downwind from a site depends on the product spilled, for example - natural gas is lighter than air. Private homes and business served by natural gas have smaller diameter pipelines connected to their structure. The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident. A natural gas line enters the county from the north (adjacent to Highway 5) for 2 miles to provide service to the city of Lovilia.

2.) TRANSPORTATION OF HAZARDOUS MATERIALS

Appanoose County

Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. Additionally, there are risks along each railroad line in the county. Multiple rail lines extend approximately 40 miles in the Unincorporated County of Appanoose County place many at risk in the event of a rail transportation incident and the maximum population and building exposures are show in the table below.

Centerville –Transportation of Hazardous Materials

Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident. Both highways intersect the city and cross at a major intersection in the city. Semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. Appanoose County (APNC) railroad begin their line within the city limits of Centerville. The rail line is utilized for the transportation of products manufactured locally in the industrial park area. It is estimated that 15% of the homes in the community could potentially be affected in the event of a potential incident of Transportation of Hazardous Materials. Potentially, twelve commercial businesses and 3 industries would be affected.

Cincinnati –Transportation of Hazardous Materials

Iowa State Highway 5 offers an increased potential for a transportation of Hazardous materials incident. The highway intersects the city from north to south.

Exline –Transportation of Hazardous Materials

Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks.

Moravia –Transportation of Hazardous Materials

Iowa State Highways 5, local highways J18 and J3T offer an increased potential for a transportation of Hazardous materials incident. The Southern Iowa Railroad rail line intersects the city limits of Moravia. The rail extends parallel to highway 5 and continues through the west edge of the community from the north to the south. The MRL rail line also crosses the city from the southwest corner to the northeast corner of the city. With both lines intersecting the city approximately 168 residential structures, a large church, the public school and 2 businesses would lie within 500 feet of the line.

Moulton –Transportation of Hazardous Materials

The table below that depicts the maximum threat to the population and building exposures. Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident. Highway 202 intersects Moulton and is also “Main Street” of the community.

Mystic –Transportation of Hazardous Materials

The table below that depicts the maximum threat to the population and building exposures. Highways T14 intersects the city from north to south and offers an increased potential for a transportation of Hazardous materials incident. The Dakota Minnesota Eastern railway passes through the city and can transport hazardous materials as well.

Numa –Transportation of Hazardous Materials

The table below that depicts the maximum threat to the population and building exposures. Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident.

Plano –Transportation of Hazardous Materials

Plano is located one half mile from Highway 2 and can be used as an alternate emergency route. Local highway S70 passes directly through Plano.

Rathbun –Transportation of Hazardous Materials

The table below that depicts the maximum threat to the population and building exposures. County highway J29 passes through the community of Rathbun and provides access to Lake Rathbun’s dam and campgrounds. Rathbun is brushed by the MRL tracks on the very east edge of the community. An incident would likely affect 5% or 6 homes in this community.

Udell –Transportation of Hazardous Materials

The table below that depicts the maximum threat to the population and building exposures. Iowa State Highways 5 and 2 offers an increased potential for a transportation of Hazardous materials incident. A small, local highway T4J provides access into Udell. Southern Iowa Railroad offers transport from Centerville to Albia and intersects the city of Udell.

Unionville – Transportation of Hazardous Materials

County Highways JT3, T4J and T61 all intersect in the community of Unionville.

Davis County

The transport of hazardous materials in Davis County occurs via trucks on the highways/roads and airplanes carrying hazardous cargo. Hazardous materials can be transported on any of the roads in Davis County. Main conduits of transport include U.S. Highway 63 and Iowa Highway 2. Agriculture is important to the economy of Davis County. As a result, chemicals utilized in agriculture are frequently transported along county and local roadways.

Numerous major US and state highways run through Davis County. U.S. Highway 63 runs north-south through Bloomfield in the middle of the county, while Iowa Highway 2 runs east-west through Bloomfield and Pulaski. Numerous paved county roads connect all the incorporated cities and unincorporated towns throughout the county.

Lucas County

Unincorporated County- Transportation Hazardous Material

This creates the potential of an incident of hazardous materials in transportation on any state highway or gravel road. The largest risk occurs along the Burlington Northern Santa Fe Railroad which transports Nuclear Waste through Lucas County.

Chariton - Transportation Hazardous Material

U.S. Highways 65 and 34 offers an increased potential for a Transportation of Hazardous Materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. The Transportation of Hazardous Materials is common in a rural area due to critical farming chemicals. This creates the potential of an incident of hazardous materials in transportation on any state highway or gravel road. A Particular area of concern is State Highway 14 which extends the entire length of the city from north to south for 3 miles. This highway is also the only access route to the local hospital, multiple gas stations and has frequent transporters of hazardous materials. Highway 34 dusts the southern edge of Chariton's city limits. There are multiple exit/entrance ramps from the 4-lane highway that increase the potential for accidents. The largest risk occurs along the Burlington Northern Santa Fe Railroad which transports Nuclear Waste through Lucas County, including the City of Russell. See Appendix A.

Derby- Transportation Hazardous Material

Iowa State Highways 14, 65 and 34 offers an increased potential for a Transportation of Hazardous Materials incident. Locally, highway H50 provides a connection to highway 14 to highway 65 and goes through the heart of Derby.

Lucas - Transportation Hazardous Material

This creates the potential of an incident of hazardous materials in transportation on any state highway or gravel road. A Particular area of concern is State Highway 34 intersects Lucas County from west to east. The route of the highway passes on the southern edge of the City of Lucas. This is the only highway access provided to the city that could provide opportunity for highway accidents. The rail lines pass through the community of Lucas and can transport hazardous materials. Burlington Northern Santa Fe is the rail line that crosses the southern half of Lucas from east to west. The largest risk occurs along the railroad which transports Nuclear Waste through Lucas County, including the City of Lucas. The community was built around the rail line/coal mining and, therefore, has several homes within 50 yards of the track line. See Appendix A.

Russell - Transportation Hazardous Material

This creates the potential of an incident of hazardous materials in transportation on any state highway or gravel road. A Particular area of concern is the spur highway S56 stemming off State Highway 34. This provides critical access to the community by emergency personnel. The largest risk occurs along the Burlington Northern Santa Fe Railroad which transports Nuclear Waste through Lucas County, including the City of Russell. See Appendix A.

Williamson - Transportation Hazardous Material

This creates the potential of an incident of hazardous materials in transportation on any state highway or gravel road. A Particular area of concern is the 2-mile spur highway that connects the jurisdiction to State Highway 14. This is the access of emergency vehicles to the community. The Union Pacific rail line

intersects the center of the city of Williamson from north to south and places many houses that are with 50 yards at risk.

Monroe County

Albia - Transportation Hazardous Material – summarized in the table below that depicts the maximum threat to the population and building exposures. Iowa State Highway 5 and US Highway 34 offers an increased potential for a transportation of Hazardous materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. Iowa State Highway 5 and US Highway 34 pass through (and intersect) in Albia's City limits to offer an increased potential for a transportation of Hazardous materials incident. Semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. State Highway 5 intersects the City of Albia from north to south and is adjacent to Grant Elementary near the heart of the City of Albia.

There are three railroad companies that operate lines in Monroe County: BNSF, Southern Iowa Railroad, and IMRL. SIR's rail line enters the county from the south and runs parallel to highway 5 into the City of Albia. BNSF hosts the highest miles of rail line throughout Monroe County. There are 5 rail lines that exit the RELCO rail yard in Albia. One BNSF line parallels highway 5 to the northern boundary of the Monroe County line through the communities of Lovilia and Hagerty. The remaining BNSF rail line directs west from Albia to the south edge of Melrose and exits parallel to highway 34 at the west limit of Monroe/Lucas County line. The BNSF line that operates east and west (and passes through Albia) is a designated route for the transport of Biodiesel Ethanol fuel. The unincorporated communities Halpin, Tower Station, and Tyrone are also affected by this line. There are numerous crossings present the opportunity for train-vehicle or pedestrian accidents. Derailments are also possible, while major derailments are less likely.

See Appendix ___ to view the vulnerable zone around the fixed hazardous locations in the county. The transport of such materials to the facilities also places these childcare locations at risk. Specific locations of concerns include private in-home daycares, who would have the vulnerable population of young children. One agri-business facility places two private, in-home daycare at a greater potential risk. The industries in the Iowa Bioprocessing Center does not affect any vulnerable populations.

Lovilia - Transportation Hazardous Material – Iowa State Highways 5 and 34 offers an increased potential for a transportation of Hazardous materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks.

Melrose - Transportation Hazardous Material- summarized in the table below that depicts the maximum threat to the population and building exposures. Iowa State Highway 5 and US Highway 34 offers an increased potential for a transportation of Hazardous materials incident. As well as semis frequently transport along this roadway in addition to local farmers that commonly transport Anhydrous Ammonia tanks. In Melrose, a potential could occur along county highway S70 that passes through town or along the BNSF railroad line in the southern third of the community.

Historical Occurrences

Since 2010, there have been 82 hazardous materials incidents in the ADLM region that involved 500 or more pounds or gallons of hazardous materials. Most incidents in the region involve a relatively small number of materials are well contained. Data for all hazardous materials incidents are available through the Hazardous Substance Incident Tracking Database maintained by the Iowa Department of Natural Resources. Refer to Exhibit 149 for hazardous materials incidents.

Since 2012, there has been one pipeline incident in the ADLM region according to the National Pipeline Mapping System (NPMS). The system only displays “significant incident” which are defined as those that caused either a death or serious injury, cost more than \$50,000, released more than 50 barrels of liquid or caused a fire or explosion. The only incident occurred September 6, 2010, in Centerville. The fire caused three injuries and approximately \$86,535 in property damage.

Appanoose County

According to the Iowa Utilities Board (IUB) and the United States Department of Transportation Pipeline and Hazardous Materials Safety Administration, 43 pipeline accidents, incidents, or service outages were reported from 2000-2009 resulting in a total of six (6) injuries. Most incidents that occur are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging. With development occurring at an unprecedented rate and the ground becoming more and more congested with utilities, the probability of an underground pipeline incident is significant. Petroleum and natural gas pipeline accidents occur with some regularity, but they usually have a limited impact and are quickly and adequately handled by pipeline company emergency crews and local and state responders. Pipeline operators are required to coordinate all safety preparedness and response activities with the communities. Continuing to plan, train, and exercise emergency procedures help to limit the occurrence and severity of incidents.

Eighty-two hazardous materials releases on file with the DNR between 2010 and August 2015 in the ADLM region. The manufacturing plants, automobile repair, and gas stations are potential sites for hazardous materials incidents in the region. See Exhibits 149 through 152.

Exhibit 149: Appanoose County Hazardous Material Releases

Spill Number	Reported Date	City	Incident County
060319-BJB-0856	6/3/2019	Centerville	Appanoose
041818-JAG-1647	4/18/2018	Mystic	Appanoose
030717-TJB-1052	3/7/2017	Mystic	Appanoose
080315-BJB-2013	8/3/2015	Centerville	Appanoose
052415-TJB-0955	5/24/2015	Rathbun	Appanoose
122214-WDG-1242	12/22/2014	Centerville	Appanoose
102314-WDG-1047	10/23/2014		Appanoose
092614-JAG-2104	9/26/2014	Centerville	Appanoose
042714-TWA-2256	4/27/2014	Centerville	Appanoose
083113-JAG-1115	8/31/2013	Centerville	Appanoose
052013-JAT-0403	5/20/2013	Centerville	Appanoose
040413-RLT-1516	4/4/2013	Centerville	Appanoose
032113-DLP-1623	3/21/2013	Cincinnati	Appanoose
081812-JAT-1730	8/18/2012	Moravia	Appanoose
071911-AHB-1626	7/19/2011		Appanoose
040511-AHB-0933	4/5/2011	Cincinnati	Appanoose
012611-RLT-0830	1/26/2011	Centerville	Appanoose
011111-JAT-2204	1/11/2011	Centerville	Appanoose
092310-RLT-0748	9/23/2010	Moravia	Appanoose
042110-KAL-1218	4/21/2010	Centerville	Appanoose

Exhibit 150: Davis County Hazardous Material Releases

Spill Number	Reported Date	City	Incident County
032918-WDG-0120	3/29/2018	Bloomfield	Davis
090716-WDG-0611	9/7/2016	Floris	Davis
070116-TJJ-1037	7/1/2016	Floris	Davis
051915-JPR-1549	5/19/2015	Drakesville	Davis
051515-JPR-2138	5/15/2015	Bloomfield	Davis
022814-JLK-1430	2/28/2014	Bloomfield	Davis
120413-TJJ-1348	12/4/2013		Davis
061213-AHB-0940	6/12/2013	Floris	Davis
073012-AHB-0855	7/30/2012	Bloomfield	Davis
091411-AHB-1242	9/14/2011	Drakesville	Davis
080111-RLT-1440	8/1/2011	Bloomfield	Davis
022310-AHB-0939	2/23/2010	Bloomfield	Davis
120109-RLT-1236	12/1/2009	Bloomfield	Davis

Exhibit 151: Lucas County Hazardous Material Releases

Spill Number	Reported Date	City	Incident County
070619-ACH-0616	7/6/2019	Chariton	Lucas
050919-B1L-0734	5/9/2019	Williamson	Lucas
102518-TJB-0655	10/25/2018	Chariton	Lucas
102616-TAP-1500	10/26/2016	Chariton	Lucas
043014-TWA-1737	4/30/2014	Chariton	Lucas
041214-DJA-1340	4/12/2014	Lucas	Lucas
040714-WDG-1220	4/7/2014	Chariton	Lucas
062613-WCG-1030	6/26/2013	Chariton	Lucas
011613-AHB-1511	1/16/2013	Chariton	Lucas
060512-AHB-1547	6/5/2012	Melcher-Dallas	Lucas
022312-AHB-1005	2/23/2012	Chariton	Lucas
080711-JAT-0327	8/7/2011	Lucas	Lucas
072011-RLT-1422	7/20/2011	Chariton	Lucas
021711-JAT-1830	2/17/2011	Lucas	Lucas
110910-RLT-0810	11/9/2010	Chariton	Lucas
102510-AHB-1040	10/25/2010	Russell	Lucas
072010-RLT-1517	7/20/2010	Russell	Lucas
050310-WCG-1900	5/3/2010	Chariton	Lucas

Exhibit 152: Monroe County Hazardous Material Releases

Approximately 30 spills of hazardous materials releases on file with the DNR between 2010 and December 2019. Nineteen incidents were documented in Eddyville.

Spill Number	Reported Date	City	Incident County
032210-KAL-1138	3/22/2010	Albia	Appanoose

Spill Number	Reported Date	City	Incident County
122519-TJB-1300	12/25/2019	Eddyville	Monroe
062819-DJT-1100	6/28/2019	Oskaloosa	Monroe
121018-WCG-0850	12/10/2018	Eddyville	Monroe
011218-WDG-1545	1/12/2018	Albia	Monroe
021617-JAG-1015	2/16/2017	Eddyville	Monroe
122016-DLP-1025	12/20/2016	Lovilia	Monroe
101216-DLP-1452	10/12/2016	Melrose	Monroe
100516-TJB-1405	10/5/2016	Lovilia	Monroe
091716-RAR-1027	9/17/2016	Eddyville	Monroe
091416-JFP-2115	9/14/2016	Eddyville	Monroe
071316-TJJ-0438	7/13/2016	Eddyville	Monroe
042116-AJP-0340	4/21/2016	Eddyville	Monroe
022816-CSG-0821	2/28/2016	Albia	Monroe
012416-WCG-0945	1/24/2016	Eddyville	Monroe
122815-JAG-1524	12/28/2015	Eddyville	Monroe
121715-JFP-1930	12/17/2015	Eddyville	Monroe
121515-WCG-1610	12/15/2015	Eddyville	Monroe
072315-TJB-1020	7/23/2015	Eddyville	Monroe
061815-TJB-1032	6/18/2015	Eddyville	Monroe
021215-BDJ-1634	2/12/2015	Batavia	Monroe

Spill Number	Reported Date	City	Incident County
082814-TEM-1742	8/28/2014	Eddyville	Monroe
072314-WCG-1556	7/23/2014	Eddyville	Monroe
041614-DJA-1555	4/16/2014	Lovilia	Monroe
060311-TAP-1118	6/3/2011		Monroe
051811-RLT-1452	5/18/2011	Albia	Monroe
030311-WCG-0555	3/3/2011	Eddyville	Monroe
022211-TAP-1530	2/22/2011	Eddyville	Monroe
101410-AHB-0803	10/14/2010	Albia	Monroe
073010-AHB-1302	7/30/2010	Eddyville	Monroe
031910-TAP-1700	3/19/2010	Eddyville	Monroe

Probability

Minor hazardous materials incidents occur fairly frequently in the region. Most incidents are not a major threat due to small quantities or immediate containment. Any of the frequent incidents could become a major event if materials are released in a densely populated or environmentally sensitive area and/or involves a large amount of material. The probability estimates of a major hazardous materials incident occurring in the ADLM region is likely, which is a probability greater than 19% and up to 33% in any given year. This probability is based primarily on local knowledge.

Magnitude and Severity

People, pets, livestock, and vegetation near facilities producing, storing, or transporting hazardous substances are at risk. Some hazardous materials may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful or damaging burns to skin if they come in direct contact with your body.

Population downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.

Most hazardous materials incidents are localized and are quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristic of 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 material contaminates a source of water.

Facilities are required to have an off-site consequence plan that addresses the population of the surrounding area. Responding personnel are required to be trained to HAZMAT Operations Level to respond to the scene, and those personnel that come into direct contact with the substances released are required to have HAZMAT Technician level training.

Throughout the ADLM region, there are fixed facilities with hazardous materials- farm cooperatives, manufacturers, water, and wastewater treatment facilities, etc. In addition, the region has several highway travels routes, railroad lines, and pipelines. Refer to the risk of assessment maps for transportation incident.

Hazardous material incidents can be widespread and severe, but historical occurrences in the region had negligible impact. It is most likely that hazardous materials incidents will continue to have negligible impacts, although it is possible an incident can be severe.

Warning Time

Hazardous materials incidents usually occur rapidly with minimal or no warning. Even if reported immediately, people in the area have little time to react and/or evacuate. During some events, sheltering in-place is the best alternative to evacuation because there is no time to evacuate safely. Mass notification systems, television, radio, and weather radios disseminate emergency messages about incidents.

Duration

A hazardous materials incident can affect a community for a short period of time if the amount of material is relatively small and well-contained. On the other hand, a hazardous materials incident can be widespread, extremely dangerous and require long-term remediation and recovery. Response to a hazardous release is generally limited to the immediate effects, but response is expanded for environmental emergencies.

Exhibit 153: Jurisdictional Hazardous Materials Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	1	4	3	2.1	Moderate
Centerville	2	1	4	1	1.9	Low
Centerville Community Schools	2	1	4	1	1.9	Low
Cincinnati	2	1	4	3	3.3	Moderate
Exline	2	1	4	3	3.3	Moderate
Moravia	2	1	4	1	1.45	Low
Moravia Community School	2	1	4	1	1.45	Low
Moulton	2	1	4	3	3.3	Moderate
Mystic	1	1	4	1	1.45	Low
Plano	2	1	4	3	3.3	Moderate
Rathbun	2	1	4	3	3.3	Moderate
Udell	2	1	4	3	3.3	Moderate
Unionville	2	1	4	3	3.3	Moderate
Moulton-Udell Community School	2	1	4	3	3.3	Moderate
MercyOne Medical	2	1	4	1	1.9	Low
Davis Unincorp Co	2	1	4	1	1.45	Low
Davis Co Community Schools	2	1	4	1	1.45	Low
Bloomfield	4	1	4	1	2.80	Moderate
Drakesville	2	1	4	1	1.90	Low
Floris	2	1	4	1	1.90	Moderate
Pulaksi	2	1	4	1	1.90	Moderate
Lucas Unincorp Co	1	1	4	2	1.55	Low
Chariton	2	2	4	3	2.4	Moderate
Chariton Community Schools	2	2	2	1	2.2	Moderate
Derby	2	1	4	2	2.0	Moderate
Lucas	2	2	4	3	2.4	Moderate
Russell	2	4	4	4	3.1	High
Williamson	1	1	4	1	1.45	Low
Lucas Co Health Center	3	2	3	3	2.7	Moderate
Monroe Unincorp Co	3	2	3	1	2.5	Moderate
Albia	4	1	4	2	2.9	Moderate
Albia Community Schools	1	1	4	2	1.55	Low
Eddyville	4	4	4	3	3.9	High
Lovilia	2	1	4	3	2.1	Moderate
Melrose	1	1	4	1	1.45	Low
Monroe Co Hospital	1	3	3	3	2.1	Moderate

B.) Infrastructure Failure

This hazard encompasses communication failure, energy failure, structural failure, and structural fire. This includes an extended interruption, widespread breakdown, or collapse (part or all) of any public or private infrastructure that threatens life and property.

Potential Hazard Area

The potential hazard area for infrastructure failure is the entire ADLM region but would be likely to concentrate in and around cities.

Historical Occurrences

COMMUNICATION FAILURE - No widespread communication failures have occurred in Iowa. Local incidents: due to weather conditions, equipment failure, excavation incidents, or traffic accidents have been reported, the outages were usually resolved in a timely manner. Widespread communication losses are unlikely due to backup systems and redundant system designs. Local communication failures are likely to affect small areas of a country. Communications failures have presumably occurred in the region; however, documentation is not readily available.

ENERGY FAILURE- The energy crisis of the 1970's had significant impact on many consumers in Iowa. High inflation and unemployment were associated with the excessive dependence on foreign oil during the early and mid-1970's. An energy shortage of that magnitude has not affected Iowa in recent years. Only when free market forces cease to provide for the health, welfare, and safety of the citizens governments can take appropriate actions to limit the effects of an energy shortage. Energy Failure in Lucas County can and has involved real or perceived gasoline shortages and downed power lines. The most recent occurrence was in 2007 when a severe ice storm crippled this area. Essentially most of the region experienced Energy Failure or disruption for 3-5 days.

STRUCTURAL FAILURE - There have been several sporadic structural failures across the state. They have included homes, commercial structures, and communication towers. There is no central collection point for this information. There has been anecdotal information identifying structural failure has occurred in three commercial buildings in Albia, two commercial buildings in Chariton, and Davis County. There have been multiple structures with failing integrity that were mitigated by owners and/or local jurisdictions.

STRUCTURAL FIRE - Structural fires are almost a daily occurrence in some communities. Nearly all are quickly extinguished by on-site personnel or local fire departments. There have been 450 deaths in Iowa from fires between the years 2010-2020. Twelve of those deaths occurred in the ADLM region six occurring in Centerville. From 2019-2020, there were 86 statewide recorded fire fatalities. There have been several fires that have occurred within the region; however, nearly all these fires there have been individual house fires or small fires. Many of the home fires were accidental home fires caused by children playing with matches, homeowners' negligence, lightning strikes, or rodents chewing electrical wiring. The structural fires that have occurred in region 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.

Most major and minor infrastructure failure, such as roads, bridges, or water infrastructure, is due to natural hazards that occur in the area. The persistent infrastructure failure that occurs is stormwater and wastewater back up due to insufficient capacity during heavy rains or infiltration due to cracks in sewer lines.

Degrading transportation infrastructure is a consistent issue in the ADLM region, like all counties throughout Iowa. Bridges are especially challenging due the high cost of repair and replacement to meet modern safety standards.

Structural fires occur frequently occur in the older buildings throughout the region. Typically, local capabilities are sufficient to respond and control fire.

Probability

No widespread communications failure has occurred in Iowa or the ADLM region. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner. Widespread and long-term communications losses are unlikely are unlikely due to backup systems and redundant system designs.

An extended interruption of electric, petroleum, or natural gas service, which by an actual or impending acute shortage of usable energy, could create a potential health problem for the population and possibly even mass panic. International events could potentially affect supplies of energy producing products while local conditions could affect distribution of electricity, petroleum, or natural gas. The magnitude and frequency of energy shortages are associated with international markets.

Local and state events such as severe winter storms can disrupt power distribution systems. If disruptions are long lasting, public shelters may need to be opened to provide shelter from extreme cold or extreme heat. Stockpiles of energy products like power generators and fuel can eliminate short disruptions.

In the ADLM region, there have been structural failures, primarily structural damage from severe weather events. Throughout the region, local jurisdictions inspect and maintain structures or enforce local regulations to prevent failures that can cause injury, death, or property damage. Most often, structures are closed or decommissioned before a major failure event can occur, but there is still a likely probability of a failure occurring in the region.

Structural fires are a common occurrence in some communities, but nearly all are quickly extinguished by on-site personnel or local fire departments. In the ADLM region, there have been structural fires requiring emergency responses and recovery efforts, but local capabilities have been sufficient. Despite comprehensive fire prevention and education in public, commercial, and residential structures, there is a likely probability for a major structural fire to occur in the ADLM region.

Magnitude and Severity

Most critical communication systems have backup and redundant designs to provide continuity of service. It should be mentioned that Appanoose, Davis, Lucas, and Monroe Counties have E911 communication centers based in each of their county seats. If a communications failure were to affect a main communication center, that entire county would be affected and at risk, especially if the failure event occurred during a hazard event. Energy failure, or power outages, can be widespread and last for several hours or a few days. Depending on the time of year, an extend period without power can be dangerous in extreme cold or heat conditions. In addition, power outages can limit the use of pumps or other necessary equipment to protect structures during other hazards like flash flooding, that may affect an area during the outage.

Any structure in the ADLM region could become hazardous in the event of flooding, earthquake, fire, high winds, or other natural events. All structures are vulnerable due to normal deterioration and natural elements. Increases in traffic volume and weight will likely increase vulnerability of transportation facilities in Iowa and the ADLM region.

The impacts of failed structures would likely be contained to the immediate area and adjacent properties. The area could be as small as the house and yard of a fallen chimney, or the area could be relatively extensive if a failure structure is a multi-story building or tall communication tower. Dam and levee failures would affect a much larger area and are discussed in a separate section.

Occupants of older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Structures with combustible materials are more vulnerable than steel or concrete structures. In addition, structures without early detection systems are more likely to be destroyed before containment by response agencies. ADLM Emergency Management indicates that very few buildings around any of the county seat squares are equipped with such systems.

Structures in areas served by older, smaller, or otherwise inadequate water distribution infrastructure are also at significant risk. The fire death risk for elderly and children under five years of age are more than two times than the average population.

With modern equipment, training, fire detection devices, and building regulations and inspections, most fires can be quickly contained and limited to the immediate structure involved. Certain circumstances, such as the involvement of highly combustible materials or high winds, can threaten a larger area. The density of a neighborhood can also make occupants and structures more vulnerable due to the potential of fire spreading.

Communication Failure

Communication Failure is the widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities, long-term interruption of electronic broadcast services, 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 communication systems to effectively protect citizens. Business and industry rely heavily on various communication media as well. Mechanical failure, traffic accidents, power failure, line severance, and weather can affect communication systems and disrupt service.

Potentially the entire county could be vulnerable to a communications failure, especially if the local telephone system and radio system should fail. The cellular phones could be used as a back-up, however, that system could also fail due to the large number of calls going through or if the cell towers are damaged.

Energy Failure

An extended interruption of service electric, petroleum, or natural gas, which by an actual or impending acute shortage of usable energy could create a potential health problem for the population and possibly mass panic. International events could potentially affect supplies of energy producing products while local conditions could affect distribution of electricity, petroleum, or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems; if disruptions are long lasting, public shelters may need to be activated to provide shelter from extreme cold or extreme heat. Stockpiles of energy products eliminate short disruptions but can increase the level of risk to the safety of people and property near the storage site. The effects of an energy shortage would be felt throughout the state. Because the distribution systems are very well developed, local shortages can quickly be covered. Storm-related Energy Failures may impact a few homes or the entire community and surrounding areas.

Response to such disruptions depends on the severity of the damage and the availability of staff to repair the system. During the holiday season, staff availability may be limited. Due to the rural population and the relative isolation of jurisdictions in the region in relation to more urbanized parts of Iowa, regional residents may face longer periods without energy. Much like the storms in the winter of 2007, most all the jurisdictions profiled experienced a widespread Energy Failure due to a Severe Winter Storm. The area experienced this energy crisis for 2-3 days in the jurisdictions and 5-6 days in the un-incorporated regions. The hospital operated off generators, one shelter site had a generator and residents took shelter with each other.

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 to 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. Electric service provider maps are displayed in Exhibits 154 through 157. Generally, the 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.

Exhibit 154: Appanoose County Electrical Service Map

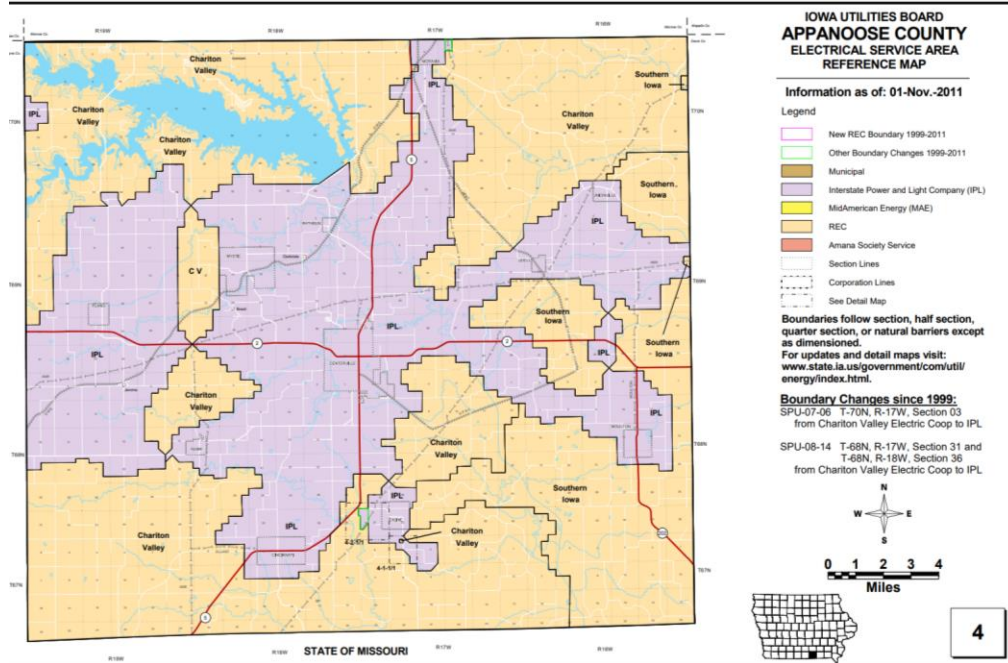


Exhibit 155: Davis County Electrical Service Map

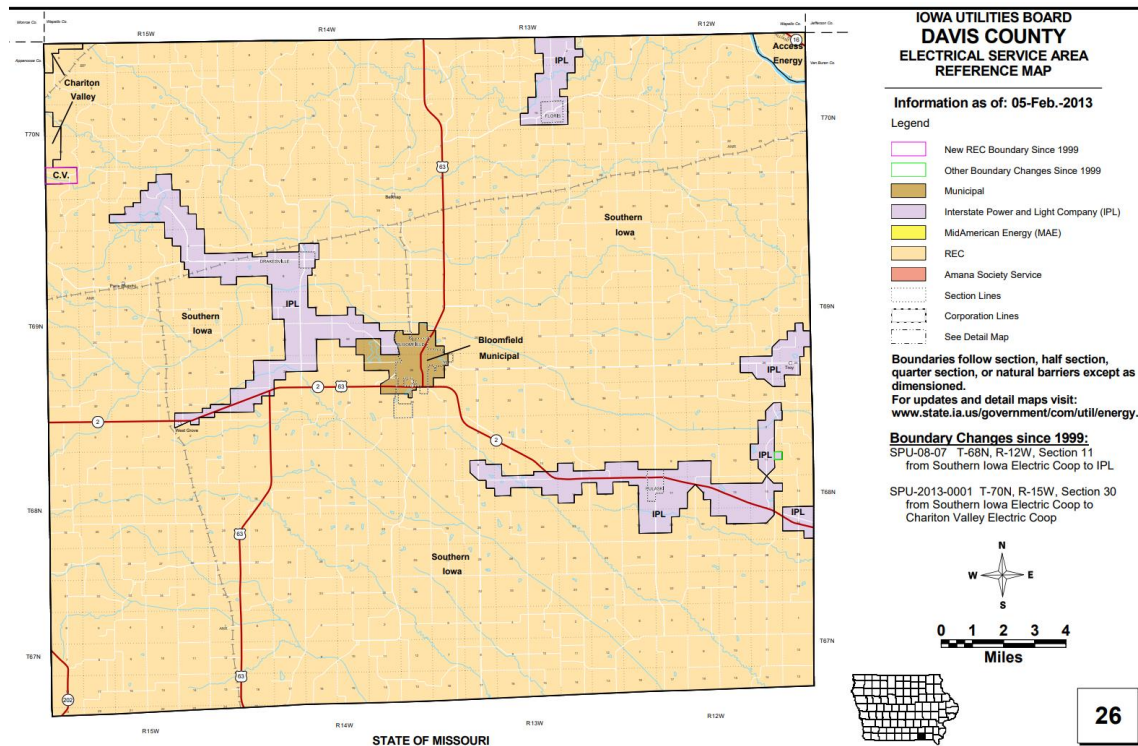


Exhibit 156: Lucas County Electrical Service Map

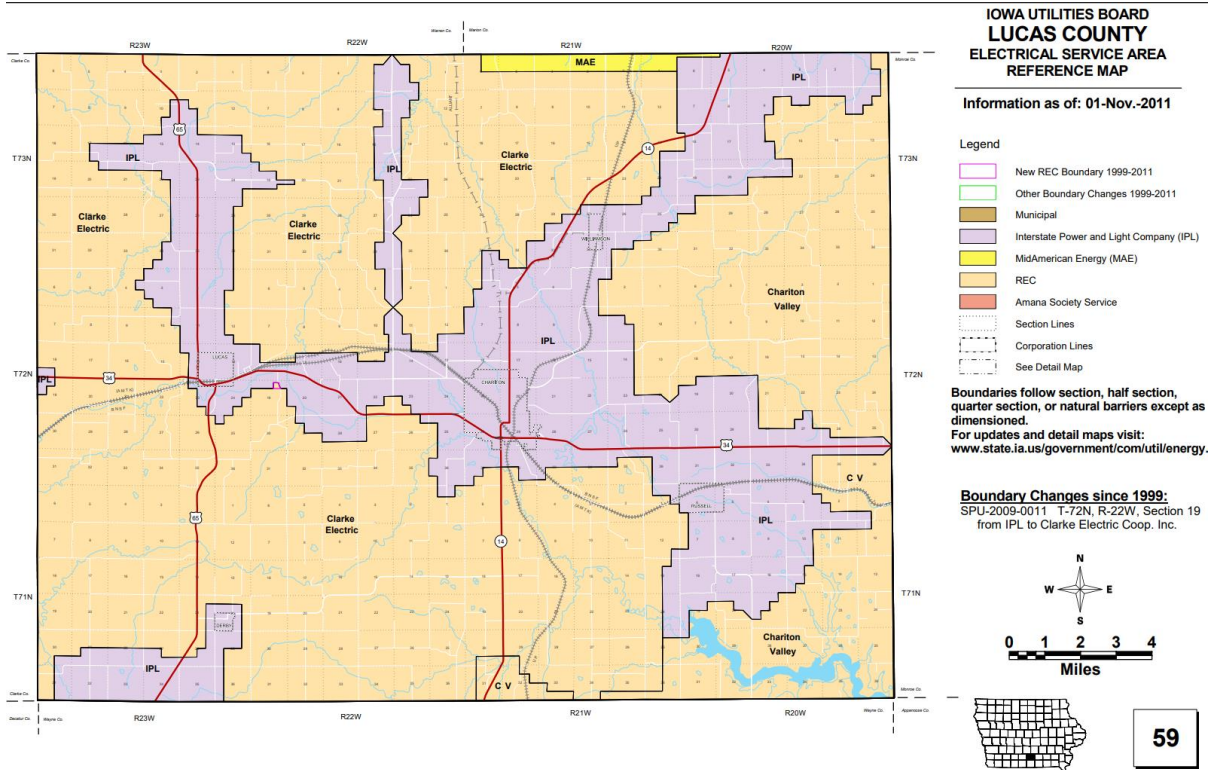
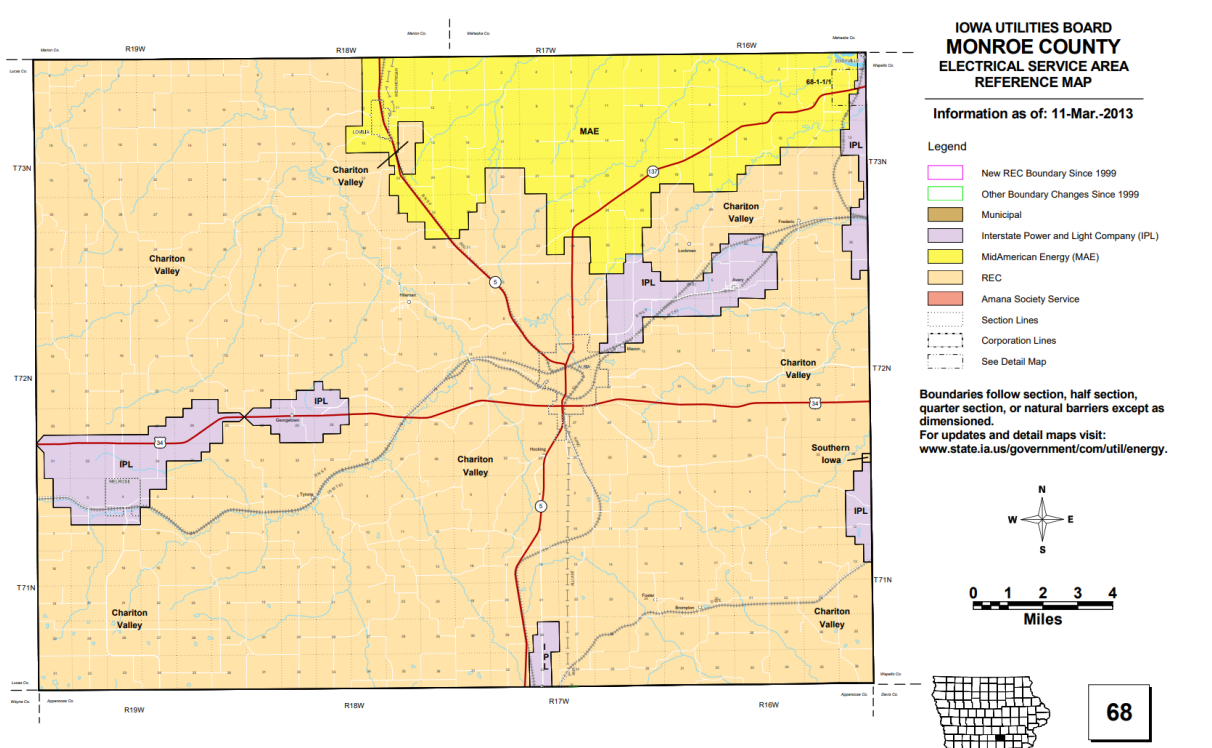


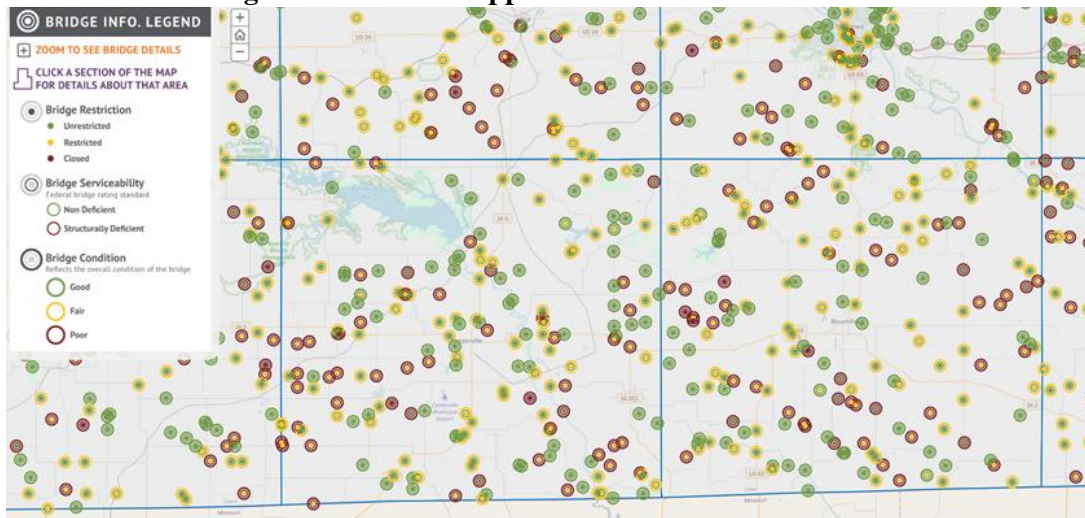
Exhibit 157: Monroe County Electrical Service Map



Structural Failure – Given the age of homes throughout the unincorporated regions, the risk of Structural Failures may be relatively high. Additionally, many of the commercial buildings were constructed in the late 1800’s and early 1900’s prior to the advent of building codes in the United States. There are other concerns of the aging infrastructure in the communities throughout the region. All participating jurisdictions used vitrified clay tile to construct wastewater and storm sewer drains when the communities were developed in the mid to late 1800’s. Many of these drainage systems in this area are deteriorating and crumbling and leaving communities in desperation. Several jurisdictions have received funding to replace portions of storm drainage or water line systems.

Iowa DOT provide bridge condition mapping for the state. The four county ADLM Region has 685 bridges that are in various functional states. Approximately 17% (118) of the bridges are declared structurally deficient. Nearly 32% (221) have restricted weight limits and 18 are completely closed. Exhibits 158 and 159 provide mapping locations of the bridges.

Exhibit 158: Bridge Conditions in Appanoose & Davis Counties



Appanoose County

Total Number of Structures: 185

Bridge Condition

Good	Fair	Poor
68	68	49

Structurally Deficient

Not Deficient	Deficient
136	49

Weight Restrictions

Unrestricted	Restricted	Closed
119	62	4

Total Daily Traffic: 63,983

Total Daily Truck Traffic: 170,991

Total Bridge Deck Area (sq ft): 399,814.00

Davis County

Total Number of Structures: 169

Bridge Condition

Good	Fair	Poor
53	67	49

Structurally Deficient

Not Deficient	Deficient
120	49

Weight Restrictions

Unrestricted	Restricted	Closed
104	61	4

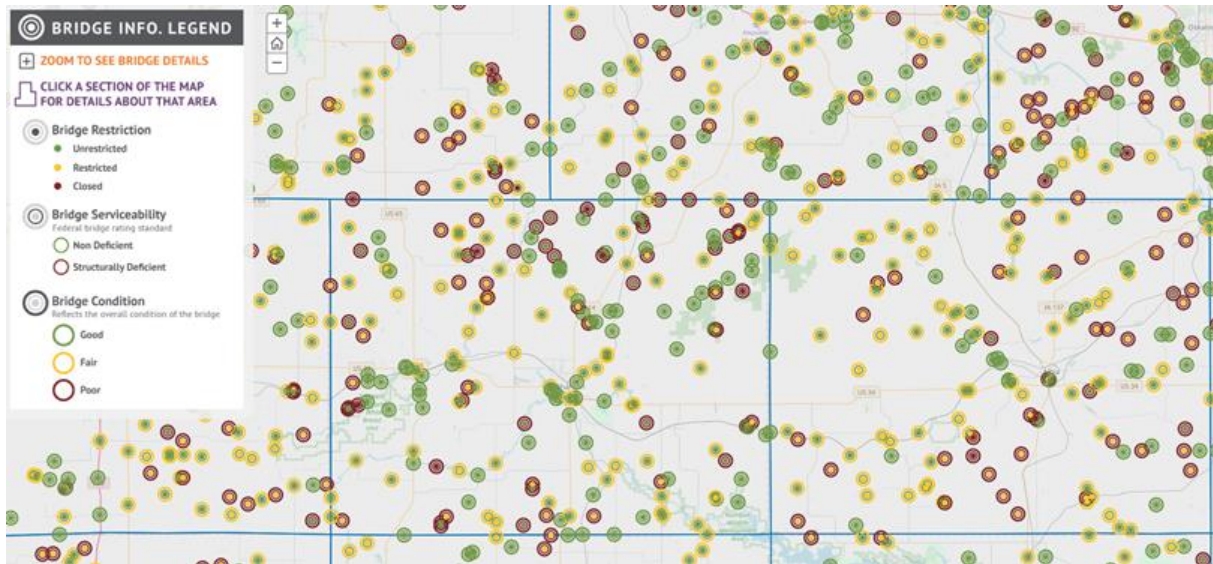
Total Daily Traffic: 53,735

Total Daily Truck

Traffic: 218,275

Total Bridge Deck Area (sq ft): 355,677.00

Exhibit 159: Bridge Conditions in Lucas & Monroe Counties



Lucas County

Total Number of Structures: 193

Bridge Condition

Good	Fair	Poor
69	65	59

Structurally Deficient

Not Deficient	Deficient
134	59

Weight Restrictions

Unrestricted	Restricted	Closed
144	42	7

Total Daily Traffic: 62,690

Total Daily Truck Traffic: 236,576

Total Bridge Deck Area (sq ft): 437,479.00

Monroe County

Total Number of Structures: 138

Bridge Condition

Good	Fair	Poor
31	68	39

Structurally Deficient

Not Deficient	Deficient
99	39

Weight Restrictions

Unrestricted	Restricted	Closed
79	56	3

Total Daily traffic: 44,640

Total Daily Truck traffic: 200,863

Total Bridge Deck Area (sq ft): 312,264.00

Structural Fire - Structural Fire is a great concern in this area and is summarized in the table below. Monroe County unincorporated area is relatively old indicating two things, 1) the wood and building materials used in its structures may be more flammable due to age and 2) structures may not meet more recent building and fire codes. Similarly, the absence of a zoning ordinance means that hazardous and flammable materials may be stored and used anywhere in town elevating the potential threat of fire spreading to homes that may not be otherwise subject to substantial fires.

Exhibit 160: FEMA Standard Values for Loss of Service	
Power Loss	Cost of Complete Loss of Service
Loss of Electric Power	
Total Economic Impact	\$126 per person per day
Loss of Potable Water Service	
Total Economic Impact	\$93 per person per day
Loss of Wastewater Service	
Total Economic Impact	\$41 per person per day
Loss of Road/Bridge 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	

Warning Time

A communications failure would likely occur with little or no warning. It is usually impossible to predict a communications failure. Some communications may be shut down for a short period of time for improvements or maintenance. These disruptions are usually made during periods of low demand and the people who rely on the m are given notice that the system will be out of service.

A typical, more frequent type of energy failure occurs because of severe weather and does not have a warning. During such events, the warnings of severe weather could be considered a warning for potential energy failure, however, it is difficult to predict when or if utilities will be impacted. Overall, this type of energy failure cannot be predicted.

The failure of a structure would likely occur suddenly with little or no warning. Inspection and maintenance of public structures and enforcement of local regulation usually prevents failure or removes people who are vulnerable. Casual hazards can include fire, explosion, overloading of ice and snow, earthquakes, flooding, high wind, erosion, chemical corrosion, subsidence, and lack of general upkeep. While fires usually start with little or no warning time, alert devices can allow time for responders to contain the fire and allow occupants to evacuate.

Duration

Communication failure and energy failure are usually widespread in nature and may require outside resources to assist the region in emergency response. In contrast, structural failure and fires can usually be handled by local response personnel.

Exhibit 161: Jurisdictional Infrastructure Failure Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	2	1	4	2.05	Moderate
Centerville	3	2	3	2	2.6	Moderate
Centerville Community Schools	3	2	3	2	2.6	Moderate
Cincinnati	2	2	4	4	3.7	High
Exline	2	2	4	4	3.7	High
Moravia	1	1	4	1	1.05	Low
Moravia Community School	1	1	4	1	1.05	Low
Moulton	3	2	3	2	2.6	Moderate
Mystic	1	1	3	2	1.40	Low
Plano	2	2	4	4	3.7	High
Rathbun	2	2	4	4	3.7	High
Udell	2	2	4	4	3.7	High
Unionville	2	1	4	2	2.0	Moderate
Moulton-Udell Community School	3	2	3	2	2.6	Moderate
MercyOne Medical	2	2	1	4	2.05	Moderate
Davis Unincorp Co	4	2	4	3	3.30	High
Davis Co Community Schools	4	2	4	3	3.30	High
Bloomfield	4	2	4	3	3.30	High
Drakesville	4	2	4	3	3.30	High
Floris	4	2	4	3	3.30	High
Pulaksi	4	2	4	3	3.30	High
Lucas Unincorp Co	2	2	4	4	2.5	Moderate
Chariton	3	4	4	4	3.55	High
Chariton Community Schools	2	1	4	3	2.4	Moderate
Derby	2	1	3	1	1.75	Low
Lucas	2	1	4	4	2.2	Moderate
Russell	2	2	4	2	2.3	Moderate
Williamson	1	1	4	1	1.45	
Lucas Co Health Center	3	2	4	3	2.85	Moderate
Monroe Unincorp Co	2	3	3	4	2.65	Moderate
Albia	1	1	4	3	1.65	Low
Albia Community Schools	1	1	4	4	1.75	Low
Eddyville	3	2	3	3	2.7	Moderate
Lovilia	1	1	1	4	1.65	Low
Melrose	1	1	4	1	1.45	Low
Monroe Co Hospital	3	3	3	4	3.1	High

C.) Levee and Dam Failure

Levee failure can be attributed to the loss of structural integrity of a flood wall or berm by erosions, piping, saturation, or under seepage causing water to inundate normally dry areas.

Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, which can affect life and property. Dams are constructed for a variety of uses including flood control, erosion control, water supply impoundment, hydroelectric power generation and recreation.

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 more than 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.*

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 as high, moderate, or low hazard to indicate the potential impacts of failure. The classifications, which do not signify the likelihood of failure, are:

- High Hazard – Failure may result in loss of life and extensive damage.
- Moderate Hazard – Failure may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads, interrupt major utility services; and there is no substantial risk of loss of life. Or the dam and its impoundment are of public importance, such as a water supply, public recreation, or a feature in a private development complex.
- Low Hazard – Failure would be limited to loss of the dam, livestock, farm outbuildings, agricultural lands and lesser used roads, and loss of life is unlikely.

Potential Hazard Area

Levees are built to reduce the risk of flooding. The mission of FEMA and all public safety partners involves helping levee owners, flood control districts, community officials, floodplain managers, the media, and other stakeholders understand and communicate the risks that come with living and working in levee-impacted areas. FEMA does not design, build, maintain, inspect or certify levees. The best available data comes from Flood Insurance Rate Maps (FIRMs).



The National Levee Database indicates the only levee in the ADLM region is in the far northeast corner of Monroe County. It is identified as an ‘active’ and ‘accredited levee system’ protecting the community of Eddyville. The levee protects 404 structures with approximate values of \$171M from Muchakinock Creek. Most of the structure is along the county lines of Monroe, Mahaska, and Wapello. The levee’s total length is 1.97 miles and wraps around the northwest, west and southwest corner of Eddyville.

Approximately 1,640 feet of the middle section enters Monroe County.

[National Levee Database \(army.mil\)](http://www.army.mil). See National Levee Database Mapping in Appendix A.

There are 382 dams located throughout the ADLM region. The potential hazard area for dam failure is generally the areas surrounding and downstream from the dam. Overall dam classification determines the potential risk if failure were to occur. Approximately 368 dams are considered low hazard dams and 12 are classified as a significant hazard dam. There are two high hazard dams include Rathbun Lake dam and Red Haw. Rathbun Dam’s potential hazard areas include the immediate surrounding area, the City of Mystic,

and structures located along the Chariton River. The dam lies south of Highway 34 and in the event of failure would release into the rural regions of southeastern corner of the county but cause more damage downstream.

Dams are classified into three (3) categories based on the potential risk to people and property should a failure occur. The classification may change over time because of development downstream from the dam since its construction. Older dams may not have been built to the standards of its new classification. Below are the hazard classifications defined by Iowa Department of Natural Resources (DNR):

- High Hazard – 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.
 - Local High Hazard dams – Appanoose 1 (Lake Rathbun Dam), Lucas 1 (Red Haw Lake dam)
 - Federal dams identified in State Major Dam Inventory – Lake Rathbun in Appanoose County.
- Moderate (Significant) Hazard – A structure shall be classified as moderate hazard if located in an area where failure may damage isolated home or cabins, industrial or commercial buildings, moderately traveled roads or railroads, interrupted 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.

- Local Significant Hazard dams – Appanoose 3, Davis 3, Lucas 3, and Monroe 3 (see profile below).
- Low Hazard – A structure shall be classified as a low hazard dam 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 considerably unlikely.
 - There are approximately 368 low hazard dams across the ADLM region.

Dam Profiles

Appanoose County

Rathbun Dam is considered a “high hazard” dam according to Iowa DNR GIS data and does have an emergency action plan (<http://rathbun.uslakes.info/DamInfo.asp?DamID=100199>). Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Significant hazard potential are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss. Dams assigned the low hazard potential classification are those where failure or mis-operations results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner’s property. This hazard potential classification does not indicate the condition of the dam. Four unincorporated communities are located along the low-lying area containing the Chariton River where the greatest impact from a failure of Rathbun Dam would be seen. A significant critical facilities impact from the failure of the Rathbun Dam would be the potential county and surrounding regions in Iowa and Missouri through Rathbun Regional Water.

People and property along streams are most vulnerable. Facilities and lives considerable distances from the actual impoundment are not immune from the hazard. Depending on the size and volume of the impoundment as well as the channel characteristics, a flash flood from a dam failure can travel a significant distance.

Lake Sundown Dam is located approximately 6 miles to the west of the City of Moulton. Lake Sundown is in the eastern portion of Appanoose County and there are no communities downstream from that dam.

The dam is identified as a “Significant Risk Dam” in the National Inventory of Dams. The dam faces to the southeast and releases into a valley region of agriculture land. If it were to fail, agriculture land would suffer primary damage and possibly a few residential structures would be impacted. The Inventory also states that the Lower Centerville Reservoir Dam and the Upper Centerville Reservoir Dam are both considered “Significant Hazard Dams”. See Exhibit 162.

There are 54 low hazard dams identified throughout the county, but primary damage would occur to the Unincorporated County of the county. A Low Hazard dam is defined if it is 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. Maximum risk would be to the roadways and bridges throughout the county.

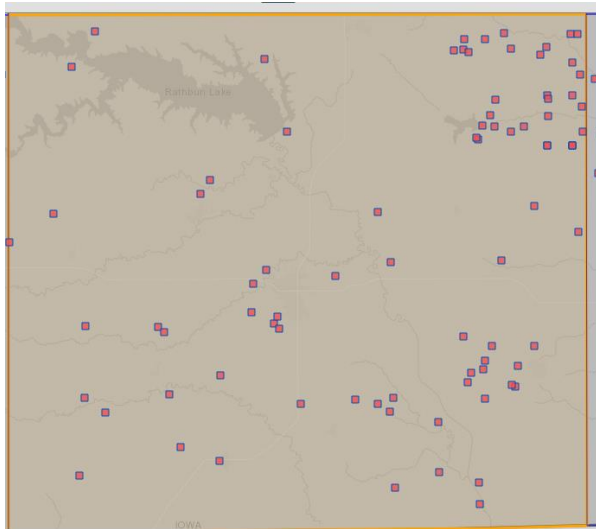
Exhibit 162: Appanoose County Significant Hazard Dams

<https://nid.sec.usace.army.mil>

Dam Name	NID #	Hazard Class	Dam Ht. (ft.)	Max Storage (acre-ft.)	River	Owner
Rathbun Reservoir Dam	IA00016	High	100	552,000	Chariton River	Federal
Lower Centerville Reservoir Dam	IA01334	Significant	39	575	TR-Cooper Creek	Local Government
Upper Centerville Reservoir Dam	IA01335	Significant	48	2620	Centerville Reservoir	Local Government
Lake Sundown Dam	IA00098	Significant	51	12640	South Soap Creek	Private

There are approximately 54 low hazard dams, 3 significant, and one high hazard dam in Appanoose County. The High-hazard dam Lake Rathbun directly releases into the Chariton River, which extends to the tributaries of Cooper Creek, Walnut Creek, and little Walnut Creek. These would carry volumes of water to the communities of Mystic and Centerville in the event of a dam failure. Mystic is approximately 8 miles from Rathbun Lake; the two nearest creeks (one running through Mystic) flow northwesterly. Chariton River which flows out of Rathbun Lake flows southeasterly. The most direct impact of a dam failure on Mystic would be one or both creeks flowing backward due to the influx of water into the Chariton River. The topography of the area between Mystic and the lake would likely preclude water flowing overland into town other than through these two creeks. As with the flooding hazard, the floodplain amounts to about 25-35% of the town, though a catastrophic dam failure would likely flood more areas than are identified in the new Iowa DNR flood hazard mapping (See Appendix A.) Estimates from local city officials place approximately 60% of the city being affected. The City of Rathbun is also located near the dam, about 1.5 miles to the south. Because of the proximity to the dam much of the community would be placed at risk of significant damage should the dam fail. This would include 128 residential structures, 3 commercial buildings, one church and all critical facilities. The dam directly releases into the Chariton River, which extends to the tributaries of Cooper Creek, Walnut Creek, and little Walnut Creek.

Exhibit 163: Appanoose County Dam Locations



Davis County

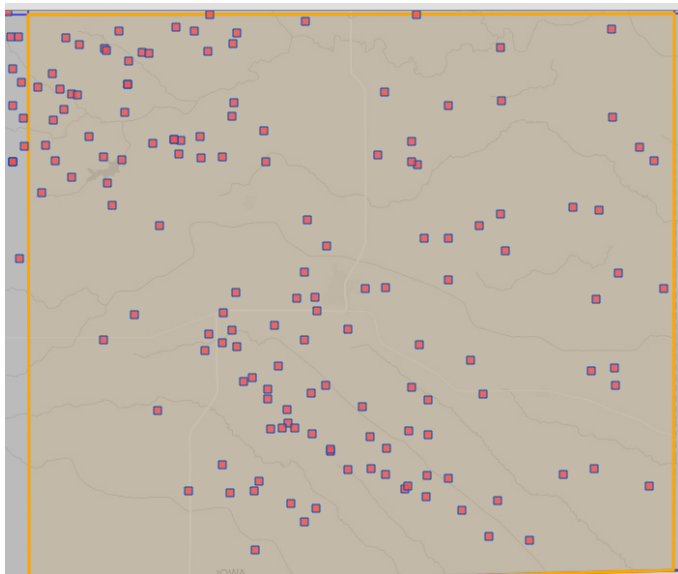
Exhibit 164: Davis County Significant Hazard Dams
<https://nid.sec.usace.army.mil>

Dam Name	NID #	Hazard Class	Dam Ht. (ft.)	Max Storage (acre-ft.)	Normal Storage (acre-ft.)	River	Nearest Downstream City/Distance (miles)
Lake Wapello Dam	IA00301	S	57	7,610	3,790	Pee Dee Creek	Floris (16)
Lake Fisher Dam	IA01339	S	43	2,166	1,128	Tr- Fox River	Bloomfield (1)
Kincart Farms Dam	IA01523	S	25	67	29	Tr- North Fork- Wyaconda	Bloomfield (N/A)

For this plan, The National Inventory of Dams (NID) was consulted. Davis County has approximately 145 low hazard dams in the county and three significant hazard dams. Lake Wapello Dam was evaluated and received a “satisfactory” rating and no potential dam deficiencies were recognized. One small crack was noted in the floor of the spillway chute and will need repair in the next five years. Lake Wapello dam is upstream from local DNR offices and maintenance buildings, highway 273, a gravel road and a few state park roads. Lake Fisher Dam also was reported as satisfactory in 2017. It is not upstream from any settlements, but the lake does serve as the backup water supply for the City of Bloomfield. Kincart Farms dam failure greatest impact would be the washout of Highway 2/63.

Lake Sundown is in adjacent Appanoose County. This dam is an upstream dam that would impact Davis County in the event of failure. The most significant impact would be to the county’s transportation system, including Highway 2.

Exhibit 165: Davis County Dam Locations



Lucas County

Exhibit 166: Lucas County Significant Hazard Dams
<https://nid.sec.usace.army.mil>

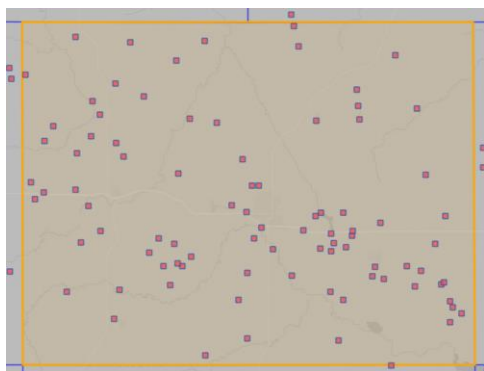
Dam Name	NID #	Hazard Class	Dam Ht. (ft.)	Max Storage (acre-ft.)	River	Owner
Red Haw Dam	IA01357	High	43	2200	TR-Little Whitebreast Creek	State
Lake Ellis Dam	IA01358	Significant	38	1463	TR-Little Whitebreast Creek	Local Government
Lake Morris Dam	IA01359	Significant	39	3440	Little Whitebreast Creek	Local Government
Crystal Lake Dam	IA01697	Significant	27	1500	TR-Chariton River	Private

No incorporated communities are located along the low-lying area containing the Chariton River where the greatest impact from a failure of Morris Dam and Ellis dam would be seen. Both are recognized by the Iowa State Plan as “Significant Hazard Dam”. This rating indicates that this dam is in an area where it is failure would cause damage to few homes (less than 6), industrial buildings, moderately traveled roads or rail lines, interrupt major utility services but without substantial risk to the loss of life. There could be extensive damage to highway 34, possibly highway 5 and countless gravel roads that lie to the south and east of the dam. The two lakes are the sole water source for the City of Chariton. Crystal Lake is located on the west edge of Chariton, just outside the city limits. This lake is also deemed a “Significant Hazard Dam” would release into a marsh land below and eventually enter the Chariton River West Court Street of Chariton, and possibly a city sewage lift station.

The Iowa State Mitigation plan has identified one “High Hazard Dam” in Lucas County as Red Haw Lake. The dam lies south of Highway 34 and in the event of failure would release into the rural regions of southeastern corner of the county but cause more damage downstream. Most of the water would enter Lake Ellis or continue to flow north and reach Lake Red Rock through many tributaries.

No incorporated communities are located along the low-lying area containing the Chariton River where the greatest impact from a failure of Morris Dam and Ellis dam would be seen. Both are recognized by the Iowa State Plan as “Significant Hazard Dam”. This rating indicates that this dam is in an area where it is failure would cause damage to few homes (less than 6), industrial buildings, moderately traveled roads or rail lines, interrupt major utility services but without substantial risk to the loss of life. There could be extensive damage to highway 34, possibly highway 5 and countless gravel roads that lie to the south and east of the dam.

Exhibit 167: Lucas Dam Locations



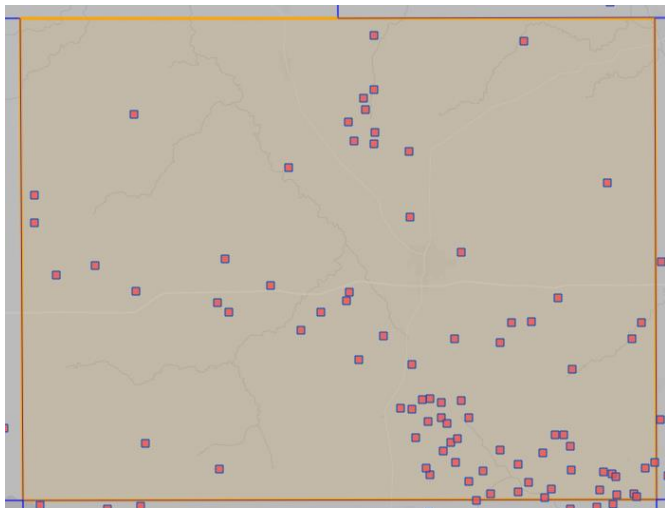
Monroe County

Exhibit 168: Monroe County Significant Hazard Dams
<https://nid.sec.usace.army.mil>

Dam Name	NID #	Hazard Class	Dam Ht. (ft.)	Max Storage (acre-ft.)	River	Owner
Lake Miami Dam	IA00807	Significant	32	2300	Tri-Bluff Creek	State
Chad Leffler Dam	IA04265	Significant	28.6	248	--	private
Albia Reservoir	IA01365	Significant	40	1100	Tr-Miller Creek	Local government

There are 86 low hazard dams identified throughout the county, but primary damage would occur to the unincorporated region of the county. A Low Hazard dam is defined if it is 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. Maximum risk would be to the roadways and bridges throughout the county. For example, a breach of Albia Reservoir dam would release water to a rural region of the county. A larger concern would be the impact that could occur to highway 34 and a few rural homes. Monroe county LEPC specifically sites the locations of Middle Avery Creek along “Smokey Hollow”; White Creek Valley; and Cedar Creek Valley in the rural regions of the county are particularly vulnerable to flash flooding. Primary damage along these valleys results in roadway and agriculture damage. Also, Cedar Creek commonly experiences flash flooding as it flows north to south and crosses approximately 75% the county’s length. This creek can solely affect 5 villages in the unincorporated region. There are 3 significant hazard dams in unincorporated Monroe County. See Exhibit 168.

Exhibit 169: Monroe Dam Locations



Historical Occurrences

There have been no major dam or levee failures in the ADLM region.

Probability

The IDNR inspects major dams and levee structures regularly. Major dams are all high hazard dams plus moderate hazard dams that have a permanent storage volume exceeding 100-acre-feet or a total water storage volume to the top of the dam exceeding 250 acre-feet. Low hazard dams with a product storage of 30,000 acre-feet and height.

Due to regular IDNR inspections, it is unlikely a major dam failure would occur. In addition, historical occurrences, the estimate in the *Iowa Hazard Mitigation Plan 2018*, and local knowledge also indicate dam failure is unlikely.

Magnitude and Severity

Most of the dams in the ADLM region is considered low hazard dams and would result in flooding of the surrounding area and downstream floodplains. For the high hazard dams, there is a risk of loss of life and severe property damage due to the large amounts of water that would be released.

Overall, the estimated magnitude and severity of this hazard is catastrophic due to the potential damage to a large area of property and shutdown of area wide critical facilities that could result from a major dam failure. Communities of that would receive significant damage is Rathbun and Mystic.

Warning Time

There is little to no warning if structures are not monitored, which are likely to be small private dams. Because major structures are monitored, if the levee or dam were to fail, there would likely be several hours for the vulnerable areas downstream to evacuate. Due to the potential impacts, a minimal warning time is the preferred estimate.

Duration

Response to a dam or levee failure would be extensive and require wide ranging recovery efforts for reconstruction of the original flood control structures and any damaged property.

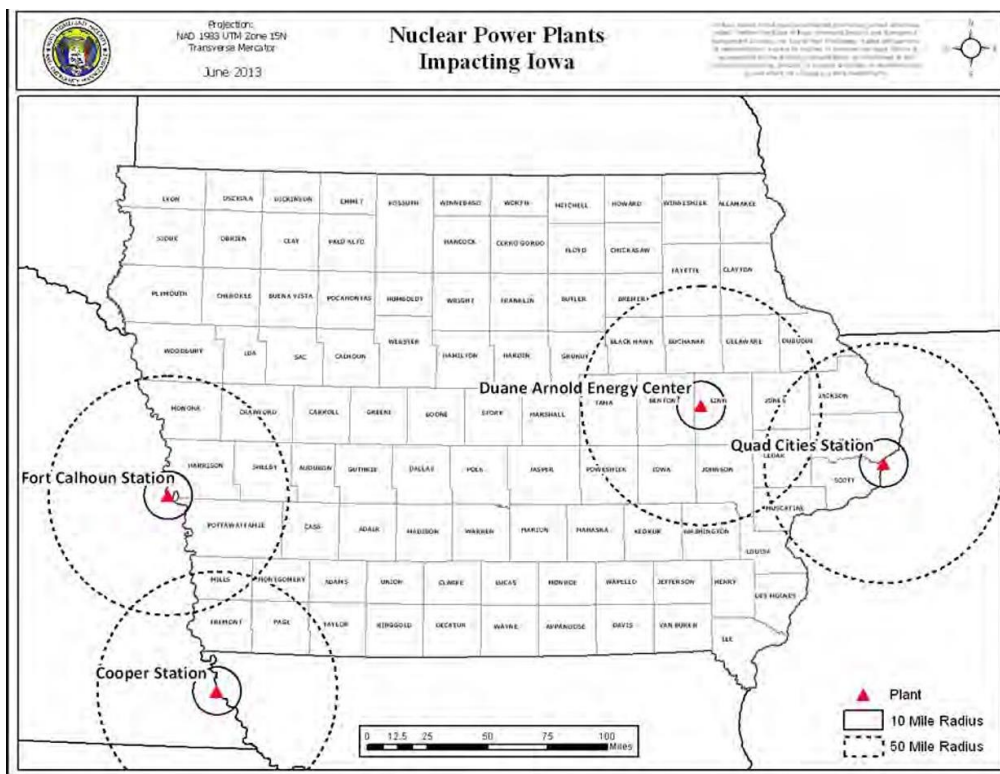
Exhibit 170: Jurisdictional Levee & Dam Failure Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	1	1	4	4	1.75	Low
Centerville	2	1	1	4	1.75	Low
Centerville Community Schools	N/A	N/A	N/A	N/A	N/A	N/A
Cincinnati	N/A	N/A	N/A	N/A	N/A	N/A
Exline	N/A	N/A	N/A	N/A	N/A	N/A
Moravia	1	1	4	1	1.05	Low
Moravia Community School	N/A	N/A	N/A	N/A	N/A	N/A
Moulton	N/A	N/A	N/A	N/A	N/A	N/A
Mystic	1	1	1	4	1.3	Low
Plano	N/A	N/A	N/A	N/A	N/A	N/A
Rathbun	1	4	4	4	3.85	High
Udell	N/A	N/A	N/A	N/A	N/A	N/A
Unionville	1	1	1	1	1.0	Low
Moulton-Udell Community School	N/A	N/A	N/A	N/A	N/A	N/A
MercyOne Medical	N/A	N/A	N/A	N/A	N/A	N/A
Davis Unincorp Co	1	2	4	4	2.05	Moderate
Davis Co Community Schools	1	2	4	4	2.05	Moderate
Bloomfield	1	2	4	4	2.05	Moderate
Drakesville	1	1	4	4	N/A	N/A
Floris	1	2	4	4	2.05	Moderate
Pulaksi	1	1	4	4	N/A	N/A
Lucas Unincorp Co	1	1	4	4	1.75	Low
Chariton	1	1	4	4	1.75	
Chariton Community Schools	2	1	4	4	2.2	Moderate
Derby	N/A	N/A	N/A	N/A	N/A	N/A
Lucas	N/A	N/A	N/A	N/A	N/A	N/A
Russell	N/A	N/A	N/A	N/A	N/A	N/A
Williamson	1	1	4	1	1.45	Low
Lucas Co Health Center	2	1	4	3	2.1	Moderate
Monroe Unincorp Co	3	2	1	2	2.3	Moderate
Albia	N/A	N/A	N/A	N/A	N/A	N/A
Albia Community Schools	1	1	4	4	1.75	Low
Eddyville	2	3	3	3	2.55	Moderate
Lovilia	1	1	1	1	1.0	Low
Melrose	1	1	4	3	1.65	Low
Monroe Co Hospital	2	3	3	3	2.1	Moderate

D.) Radiological Incident

This hazard encompasses fixed radiological incidents and transportation radiological incident, which involves an incident resulting in a release of radiological material in transport or at a fixed facility to include power plants, hospitals, laboratories, and other facilities with radioactive material. Primary focus on nuclear power plants. There are three nuclear facilities in adjacent states and the buffer zones reach into Iowa. The only nuclear power plant in Iowa is in Linn County. None of the four facilities are near the ADLM region.

Hospitals and some Industrial facilities are other types of fixed facilities that may house radioactive materials. Sources of radioactive materials may include medical products, radioactive waste from hospitals or laboratories, and industrial products. Small amounts of products exist in a few locations and all within buildings. Trained people use the equipment, and it is properly handled and stored.

Exhibit 171: Nuclear Power Plants in Iowa



Potential Hazard Area

The potential hazard area for a radiological incident is the entire ADLM region but particularly vulnerable areas are the transportation routes.

Appanoose County

FIXED RADIOLOGICAL INCIDENT

There are no fixed radiological facilities in Appanoose County.

TRANSPORTATION RADIOLOGICAL INCIDENT

The county has three state highways that are identified in the county. Highway 5 transports traffic north and south across the county and Highway 2 extends east and west through Appanoose County.

Additional risks of transportation of radiological material can occur along the rail lines in Appanoose

County. There are two railroad companies that operate lines in Appanoose County: APNC, and IMRL. There are approximately 80 miles of railroad line throughout the county.

Davis County

FIXED RADIOLOGICAL INCIDENT

There are no fixed radiological facilities in Davis County.

TRANSPORTATION RADIOLOGICAL INCIDENT

Primary risk of a transportation radiological incident would occur on the roadway systems throughout the county. The greatest likelihood would be along Highways 2 and 63.

Lucas County

FIXED RADIOLOGICAL INCIDENT

There are no fixed radiological facilities located in Lucas County.

TRANSPORTATION RADIOLOGICAL INCIDENT

The county areas of vulnerability would be those located near the rail system. The communities of Russell, Chariton, and Lucas all have the Burlington Northern Santa Fe railroad passing through within each jurisdiction's city limits. Highway 14 transports traffic north and south across the county, as well as highway 65 operating 9 miles west of highway 14 in Lucas County. Highway 34 extends east and west through Lucas County and passes through Chariton on the very south edge of Chariton's city limits as a 4-lane highway for approximately 3 miles. It also extends to bypass the city of Lucas. Highway 14 passes through the heart of Chariton's residential area and near Williamson on the north edge of the county. Additional risks of transportation of radiological material can occur along the rail lines in Lucas County.

Radiological materials could be transported by rail line or state highways in Lucas County. There are two rail lines that intersect Lucas County. The rails are owned by Burlington Northern and Union Pacific. Burlington Northern cross-sections the county from East to West. Union Pacific operates tracks that cross the county from north to south. Derailments are also possible, while major derailments are less likely. There are three State Highways acknowledged in Lucas County. Highways 65 and 14 offer transportations north to south through the county. Highway 65 extends 47 miles and passes near the communities of Lucas and Derby but does not enter either city limit. State highway 14 is approximately 40 miles in length from the south edge of the county, through the City of Chariton, and near the city of Williamson. Iowa State Highway 34 passes through the county from west boarder to east county line border. Highway 34 passes near Russell and Lucas but doe enter the city limits of Chariton on its 46 miles of transportation.

Monroe County

FIXED RADIOLOGICAL INCIDENT

There are no fixed radiological facilities in Monroe County.

TRANSPORTATION RADIOLOGICAL INCIDENT

The county has three state highways that are identified in the county. Highway 5 transports traffic north and south across the county and Highway 34 extends east and west through Monroe County. State Highway 137 branches off highway 5 on the north edge of Albia and continues northeasterly to the city of Eddyville.

Additional risks of transportation of radiological material can occur along the rail lines in Monroe County. There are three railroad companies that operate lines in Monroe County: BNSF, APNC, and IMRL. They total approximately 90 miles of rail line throughout the county. Industries located in the Northeast region of the county have potential exposure due to State Highway 137 that is adjacent each property. It is estimated that only the north half of each location (that closest the roadway) would be affected.

The community of Albia is at a greater risk of experiencing an incident related to Radiological Materials due to the number of rail lines that intersect the city. There are five sets of tracks that travel through the city limits of Albia. Along the miles of those rail lines lie numerous houses and a few businesses. This places approximately 35% of residential structures at risk and 10% of businesses.

Iowa State Highways 5 and 34 passes through (and intersect) in Albia's City limits to offer an increased potential for a transportation of radiological materials incident. State Highway 5 intersects the City of Albia from north to south and is adjacent to Grant Elementary near the heart of the city of Albia. There are also five sets of tracks that travel through the city limits of Albia. One rail line is within two city blocks of Kendall Elementary and the Jr. High section of the Jr/Sr High School building that could potentially create a radiological incident affecting the school system.

Lovilia also has a rail line that extends through the community from north to south. It runs parallel to State Highway 5 and within 30 yards of it. This places approximately 40% of businesses and 45% of homes at risk if there were to be Radiological Material on board. An additional risk could be any Radiological materials that are transported on State Highway 5. This highway and rail line both dissect the city the entire length north to south.

The maximum population and building exposure to transportation of radiological materials is shown in the chart below. Melrose has highway S70 that intersects the city; however, it is primarily traveled by residents. The most likely radiological incident could take place on a rail line passes through the southern part of the community and could potential be transporting Radiological Materials. This places approximately 10% of commercial properties and 15% of residential structures.

Historical Occurrences

There are no radiological incidents in Iowa's history.

Probability

Historically there have been no significant releases of radiation from fixed facilities in Iowa or even the United States. Iowa has one nuclear power plant located within its borders. Duane Arnold Energy Center is located near Palo in Linn County, which is approximately 125 miles away from the nearest ADLM county (Monroe). The ADLM region is well beyond the 50-mile radius from the facility is considered the ingestion pathway that is monitored for radioactive contamination of food and water resources. Three other nuclear facilities border Iowa, none near this region.

There have also been no occurrences of radiological incidents in Iowa. Transportation accidents are the most common type of incidents involving radioactive materials because of the high frequency of radioactive shipments. Radioactive materials are transported through the United States and Iowa regularly.

Operators of facilities with radioactive materials and transporters of radioactive waste are trained in the packaging and handling. In addition, the shipment of radioactive waste is tightly regulated. The likelihood of an incident is unlikely but possible.

Magnitude and Severity

Sources of radioactive materials include medical products, industrial products, nuclear power plant fuel, nuclear weapons, and radioactive waste from hospitals, laboratories, nuclear reactors, and military facilities.

In over 50 years of nuclear power production in the U.S., no deaths or injuries from radiation have been recorded among the public. Each of the nuclear facilities in the country identifies a 10-mile radius Emergency Planning Zone and a 50-mile radius Ingestion Pathway Zone.

Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the public exposed to the toxic materials. Proper training and equipment greatly reduce the risk to response personnel. A few to a few dozen people may be impacted by an immediate release with a small amount of contamination.

If the land and facilities cannot be used for weeks, months or even years, the loss of production would be devastating. Economic impacts would be multi-sector and long-lasting in the surrounding area.

Warning Time

A radiological release in Iowa could result from an incident in handling or transporting radioactive materials. This accident could occur with little to no warning. Ionizing radiation cannot be detected with human senses. Detection instruments are needed to indicate the existence of radiation. Distance from the incident would dictate the amount of time needed to avoid exposure from damaging radiation.

Duration

Responding to the effects of radiological releases in Iowa is extensive and will require resources and assistance from several Federal agencies to determine and evaluate the threat to life and the environment in the affected areas.

Exhibit 172: Jurisdiction Radiological Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	1	1	4	1	1.45	Low
Centerville	1	3	4	1	2.05	Moderate
Centerville Community Schools	1	3	4	1	2.05	Moderate
Cincinnati	1	1	4	3	2.85	Moderate
Exline	1	1	4	3	2.85	Moderate
Moravia	1	1	4	1	1.05	Low
Moravia Community School	1	1	4	1	1.05	Low
Moulton	1	1	4	3	2.85	Moderate
Mystic	1	1	4	1	1.45	Low
Plano	1	1	4	3	2.85	Moderate
Rathbun	1	1	4	3	2.85	Moderate
Udell	1	1	4	3	2.85	Moderate
Unionville	1	2	1	3	1.5	Low
Moulton-Udell Community School	1	1	4	3	2.85	Moderate
MercyOne Medical	1	1	4	1	1.45	Low
Davis Unincorp Co	1	1	4	4	1.75	Low
Davis Co Community Schools	1	1	4	4	1.75	Low
Bloomfield	1	1	4	4	1.75	Low
Drakesville	1	1	4	4	1.75	Low
Floris	1	1	4	4	1.75	Low
Pulaksi	1	1	4	4	1.75	Low
Lucas Unincorp Co	1	3	4	4	2.35	Moderate
Chariton	1	4	4	3	1.55	Low
Chariton Community Schools	1	1	4	4	1.75	Low
Derby	1	1	1	1	1.0	Low
Lucas	1	3	4	4	2.35	Moderate
Russell	2	4	4	4	3.1	High
Williamson	1	1	4	3	1.65	Low
Lucas Co Health Center	2	1	4	3	2.1	Moderate
Monroe Unincorp Co	2	2	2	4	2.2	Moderate
Albia	1	1	4	4	1.75	Low
Albia Community Schools	1	1	4	3	1.65	Low
Eddyville	1	1	1	2	1.1	Low
Lovilia	1	1	1	1	1.0	Low
Melrose	1	1	4	3	1.65	Low
Monroe Co Hospital	1	3	3	3	2.1	Moderate

E.) Transportation Incident

A transportation incident is generally an accident involving any mode of transportation that directly threatens life and results in a combination of death, injury, property damage, or adverse impacts to community's capabilities to provide emergency services.

An air transportation incident may involve a military, commercial or private aircraft. Air transportation incidents can occur in the air or on the ground. In addition, incidents can occur at or near an airport, in remote unpopulated areas, residential areas or dense urban areas.

A highway transportation incident can be a single or multi-vehicle incident requiring response exceeding normal daily capabilities.

A railway transportation incident may include derailment, collision, and at-grade highway crossing accidents. Train incidents can result from a variety of causes including human error, mechanical failure, faulty signal, or problems with the track. Results of an incident can range from minor "track hops" to catastrophic hazardous materials incidents and even human or animal casualties.

A waterway incident involves any incident with a water vessel. In addition, waterway incidents may include events in which a person or object fall through the ice on partially frozen bodies of water.

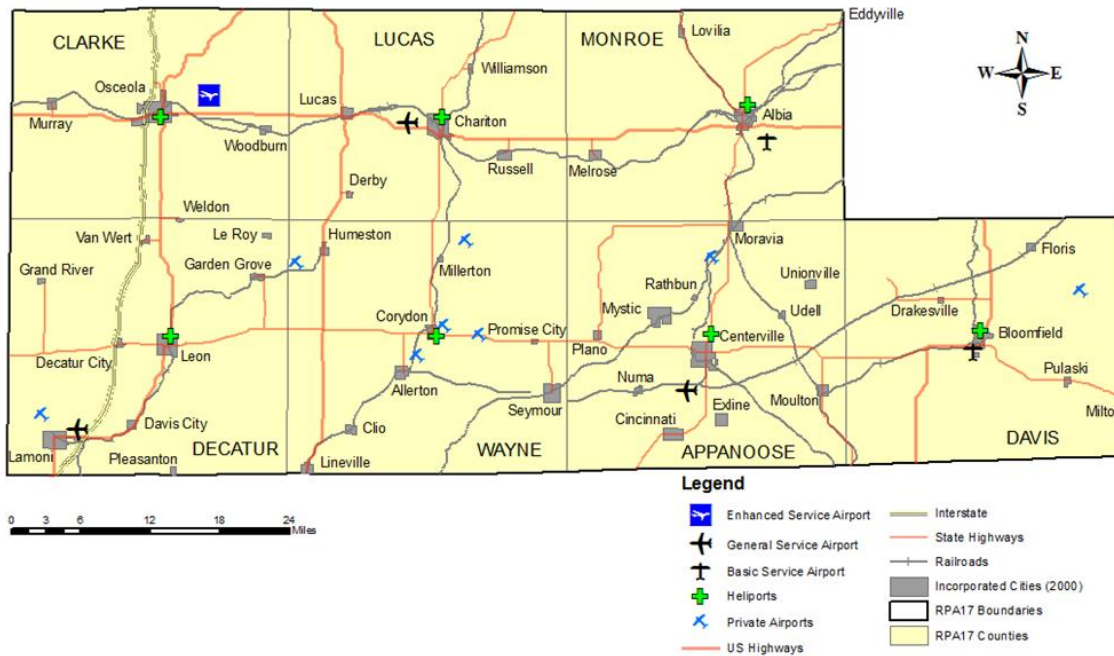
Potential Hazard Area

The potential hazard area for a transportation incident is the entire ADLM region but transportation infrastructure and surrounding areas are the primary potential hazard areas. For an air transportation incident, any area below a flight path in the ADLM region could be affected. A waterway incident, any body of water and the surrounding areas could be affected.

1.) Air Transportation Incident

An air transportation incident may involve a military, commercial, or private aircraft. Air transportation is playing a more prominent role in transportation as a whole; airplanes, helicopters, and other modes of air transportation are used to transport passengers for business and recreation as well as thousands of tons of cargo. A variety of circumstances can result in an air transportation incident; mechanical failure, pilot error, enemy attack, terrorism, weather conditions, and on-board fire can all lead to an incident at or near the airport. Air transportation incidents can occur in remote unpopulated areas, residential areas, or downtown business districts. Incidents involving military, commercial, or private aircraft can also occur while the aircraft is on the ground.

Exhibit 173: ADLM Region Airport Facilities



Centerville Municipal Airport is owned and operated by the City of Centerville. It is described as a “Basic Service Airport” by the National Plan of Integrated Airport System (NPIAS). It is in the unincorporated area just south of Centerville. Mercy Medical Helipad is located at the hospital, approximately one-third of a mile from the north edge of Centerville. This location does could potentially impact the hospital, a retirement community/assisted living center and several private homes.

The Chariton Municipal Airport is in the unincorporated county area west of Chariton. A heliport is located at the Lucas County Hospital on the north side of Chariton. It is described as a “Basic Service Airport” by the National Plan of Integrated Airport System (NPIAS).

Albia’s municipal airport is located approximately five miles southeast of Albia in the unincorporated region of the county. An event is unlikely, but due to local of the airport the southeast section of Albia may be at a slightly larger risk than the rest of the community.

The Southeast Iowa Regional Airport in Des Moines County is the primary commercial airport that services Davis County. Within Davis County, the Bloomfield Municipal Airport, located approximately 2 miles southwest of Bloomfield’s business district is owned by the City of Bloomfield. Local access to the Bloomfield airport is provided from County Road V20 via 230th Street. The Iowa Aviation System Plan identifies the Bloomfield Municipal Airport as a Basic Service airport. Basic Service airports have runways 3,000 feet or greater in length with facilities and services customized to meet local aviation needs.

Historical Occurrence- Air Transportation Incident

From 1964-2018, there have been 26 airway incidents documented in the ADLM region (see Exhibit 174). However, there has been a significant reduction since 2000 with only two events occurring in the region. Since 1960, there have been 1,948 air transportation incidents/accidents in Iowa (Iowa National Transportation Safety Board). This figure does include the 111 fatalities in the crash of United Flight 232 in Sioux City, Iowa in 1989. According to the National Transportation Safety Board (NTSB), there have been no aviation accidents or

incidents in the region in the last ten years. Only a few major accidents have impacted Iowa since 1935 but numerous less severe accidents have occurred around the state in both large and small cities.

Exhibit 174: Airway Incidents in ADLM Region				
Event Date	Location	Make/Model	NTSB #	Event Severity
3/28/2005	Bloomfield, IA	Mooney	CHI05LA083	Nonfatal
11/30/2003	Bloomfield, IA	Piper	CHI04LA035	Nonfatal
12/21/1993	Centerville, IA	Cessna 182	CHI94LA057	Nonfatal
2/25/1989	Unionville, IA	Cessna 1728	MKC89LA064	Nonfatal
2/14/1984	Chariton, IA	Cessna 172	MKC84LA076	Nonfatal
4/20/1984	Bloomfield, IA	Beech	MKC84LA127	Nonfatal
9/4/1983	Bloomfield, IA	Mooney	MKC83LA211	Nonfatal
10/2/1982	Centerville, IA	Beech C24R	MKC83LA002	Nonfatal
7/22/1980	Centerville, IA	Pitts s1	MKC80FA047	Fatal
4/18/1981	Mystic, IA	Taylorcraft BC12-D	MKC81DCD16	Nonfatal
10/13/1977	Moulton, IA	Ryan Navion	MKC78FCD03	Nonfatal
6/27/1977	Moulton, IA	Bellanca 7GCAA	MKC77DCD24	Nonfatal
8/23/1975	Centerville, IA	Cessna 170A	MKC76FCD05	Nonfatal
6/18/1974	Unionville, IA	Piper PA-25	MKC74FCD40	Nonfatal
5/5/1974	Chariton, IA	Cessna 140	MKC74DCD30	Nonfatal
6/18/1974	Unionville, IA	Piper PA-25	MCK74FCD40	Nonfatal
8/13/1971	Albia, IA	Grumman G-164	MKC72DCD21	Nonfatal
6/11/1971	Centerville, IA	Beech 35-C33	MKC71DCD87	Nonfatal
2/9/1969	Chariton, IA	Piper PA-32	MKC69F0344	Nonfatal
3/23/1968	Chariton, IA	Cessna 172	MKC68D0518	Nonfatal
12/31/1968	Floris, IA	Cessna	---	Nonfatal
9/25/1967	Chariton, IA	Piper PA-28	MKC68D0235	Nonfatal
9/21/1967	Chariton, IA	Piper PA-28	MKC68D0221	Nonfatal
12/30/1965	Centerville, IA	Cessna 182	MKC66D0364	Nonfatal
2/20/1965	Centerville, IA	Piper PA-16	MKC65F0054	Nonfatal
10/17/1964	Floris, IA	Aeronca 7AC	--	Nonfatal

Source: http://www.nts.gov/_layouts/ntsb.aviation/index.aspx.

2.) Railroad Incident

Railroad Appanoose County

Multiple rail lines extend approximately 40 miles in the Unincorporated County of Appanoose County place many at risk in the event of a rail transportation incident and the maximum population and building exposures are show in the table below.

Centerville – Railroad Transportation Incident

Iowa Southern Railroad (ISR) begin their line within the city limits of Centerville. The rail line is utilized for the transportation of products manufactured locally in the industrial park area. It is estimated that 15% of the homes in the community could potentially be affected in the event of a disaster. Potentially, twelve commercial businesses and 3 industries would be affected.

Moravia- Railroad Incident

ISR line intersects the city limits of Moravia. The rail extends parallel to highway 5 and continues through the west edge of the community from the north to the south. The MRL rail line also crosses the city from the southwest corner to the northeast corner of the city. With both lines intersecting the city

approximately 168 residential structures, a large church, the public school and 2 businesses would lie within 500 feet of the line.

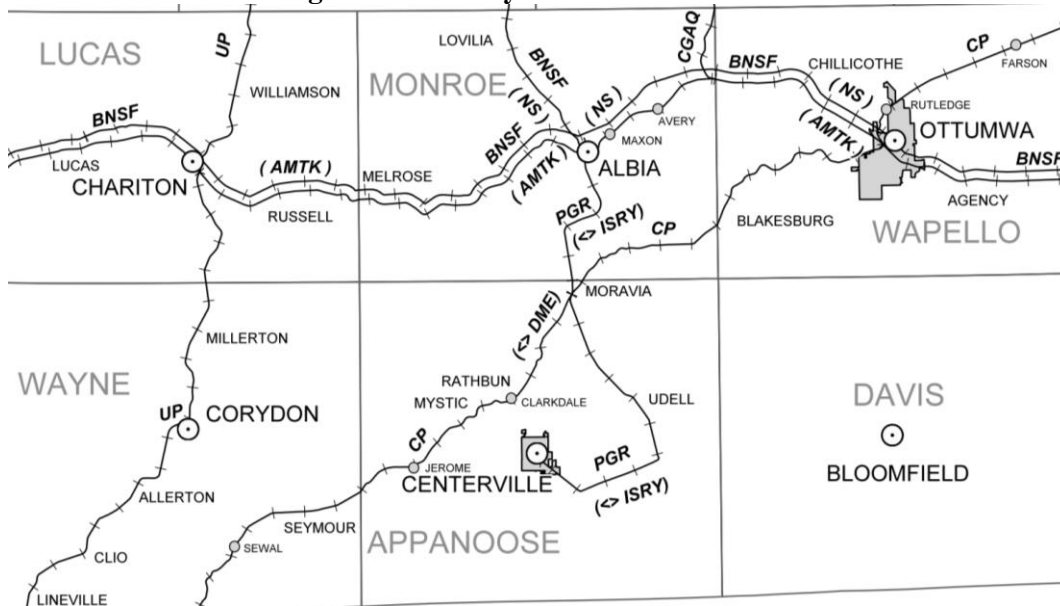
Rathbun – Railroad Transportation Incident

Rathbun is brushed by the MRL tracks on the very east edge of the community. An incident would likely affect 5% or 6 homes in this community there are numerous crossings present the opportunity for train-vehicle or pedestrian accidents. Derailments are also possible, while major derailments are less likely.

Railroad Davis County

There are no railway companies that operate in Davis County, nor are there any railroad lines that run through Davis County.

Exhibit 175: ADLM Region Railroad Systems



Railroad Lucas County - Unincorporated County Area

Multiple rail lines in the unincorporated region of Lucas County place many at risk in the event of a Rail Transportation Incident. There are two rail lines that intersect Lucas County. The rails are owned by Burlington Northern and Union Pacific. Burlington Northern cross-sections the county from East to West. It enters the city limits of Chariton, Russell, and Lucas. Union Pacific operates tracks that cross the county from north to south. It passes through Williamson and enters the eastern third of Chariton’s city limits. There multiple crossings present the opportunity for train-vehicle or pedestrian accidents. Derailments are also possible, while major derailments are less likely.

Chariton

Citizens of the community of Chariton are particularly concerned with the Union Pacific line that could potentially isolate the east third of the city from emergency personnel if there were to be a derailment. There are 3 intersections that keep that portion of the city connected to services and potentially all three could be affected in a disaster.

The City of Chariton has many buildings are located within about 500 feet of the line, including the industrial area home to Hy-Vee distribution center, grain elevator, and numerous small businesses. The western portion of the historic square in Chariton would be affect by a rail incident if it were to occur through that region of the tracks.

The rail line intersects the city of Chariton to provide service to the Industrial Park. On the journey, the rail passes near the western portion of the historic business square that places 12 businesses at risk of a rail incident. There are multiple industries in the Industrial Park, including Hy-Vee Distribution Center, and a grain elevator that lie within 75 yards of the rail line.

City of Lucas

There are two rail lines that intersect Lucas County. The rails are owned by Burlington Northern and Union Pacific. Burlington Northern cross-sections the county from East to West. It enters the city limits of Chariton, Russell, and Lucas. Burlington Northern Santa Fe is the rail line that crosses the southern half of Lucas from east to west. The community was built around the rail line/coal mining and, therefore, has several homes within 50 yards of the track line.

Russell

The community of Russell would jeopardize the safety of the Post Office, the Bank of Russell, a local insurance agency, and the small convenience store in a potential rail incident. Burlington Northern Santa Fe is the rail line that crosses the northern half of Russell from east to west. The community was built around the rail line and therefore has multiple structures and homes within 50 yards of the track line. Businesses at risk include the bank, insurance agency and abandon historical structures.

Williamson

Union Pacific operates tracks that cross the county from north to south. The Union Pacific rail line intersects the center of the city of Williamson from north to south and places many houses that are with 50 yards at risk. There multiple crossings present the opportunity for train-vehicle or pedestrian accidents. Derailments are also possible, while major derailments are less likely.

Railroad Monroe County

Albia

There are three railroad companies that operate lines in Monroe County: BNSF, APNC, and IMRL. APNC's rail line enters the county from the south and runs parallel to Highway 5 into the City of Albia. BNSF hosts the highest miles of rail line throughout Monroe County. There are 5 rail lines that exit the RELCO rail yard in Albia. Three BNSF lines extend to the northeast region of the county to affect the unincorporated communities Maxon, Avery, Lockman, and Frederic. One BNSF line parallels highway 5 to the northern boundary of the Monroe County line through the communities of Lovilia and Hagerty. The remaining BNSF rail line directs west through Albia to the south edge of Melrose and exits parallel to highway 34 at the west limit of Monroe/Lucas County line. There are numerous crossings present the opportunity for train-vehicle or pedestrian accidents. The BNSF line that operates east and west (and passes through Albia) is a designated route for the transport of Biodiesel Ethanol fuel. Derailments are also possible, while major derailments are less likely. The community of Albia is at a greater risk of experiencing a rail incident just due to the number of rail lines that intersect the city. There are five sets of tracks that travel through the city limits of Albia. Along the miles of those rail lines lie numerous houses and a few businesses. This places approximately 35% of

residential structures at risk and 10% of businesses. One rail line is within two city blocks of Kendall Elementary and the Jr. High section of the Jr/Sr High School building.

Lovilia

One BNSF line parallels highway 5 to the northern boundary of the Monroe County line through the communities of Lovilia and Hagerty. There are numerous crossings present the opportunity for train-vehicle or pedestrian accidents. Derailments are also possible, while major derailments are less likely. Lovilia also has a rail line that extends through the community from north to south. It runs parallel to state highway 5 and within 30 yards of it. This places travelers at risk, approximately 40% of businesses, and 45% of homes.

Melrose

One BNSF rail line directs west from Albia to the south edge of Melrose. A particular area of concern in Melrose is the land that is owned by Farm Services. The business stores numerous tanks of hazardous farm chemicals next to the railroad property and rail line. This places approximately 10% of commercial properties and 15% of residential structures.

Historical Occurrence- Railroad Transportation Incident

Participating jurisdictions state a significant concern for railroad incidences involving vehicles and railroad crossing locations. There have been 16 incidents from 2010-2020 according to the Federal Railroad Administration Office of Safety Analysis database

Exhibit 176: ADLM Regional Railroad Incidents 2010-2020								
<i>Report #</i>	<i>Reporting RR</i>	<i>Date</i>	<i>County</i>	<i>RR Equipment</i>	<i>Equipment Damage</i>	<i>Track Damage</i>	<i>Killed</i>	<i>Injured</i>
NE0110122	BNSF	1/30/2010	Lucas	Freight Train	\$179,895	\$160,000	0	0
NE0710123	BNSF	7/29/2010	Monroe	Freight Train	\$46,250	\$56,000	0	0
NE0810100	BNSF	8/3/2010	Monroe	Freight Train	\$1,329,954	\$711,000	0	0
NE1010101	BNSF	10/06/2010	Monroe	Freight Train	\$14,500	\$18,600	0	0
NE1010105	BNSF	10/19/2010	Monroe	Mtnce car	\$40,500	\$0	0	0
NE1213101	BNSF	12/01/2013	Monroe	Freight Train	\$20,899	\$60,250	0	0
NE0615111	BNSF	6/24/2015	Monroe	Freight Train	\$24,995	\$0	0	0
NE0615110	BNSF	6/26/2015	Monroe	Freight Train	\$159,676	\$41,000	0	1
NE1115107	BNSF	11/21/2015	Monroe	Freight Train	\$56,853	\$0	0	0
CH1116102	BNSF	11/8/2016	Monroe	Freight Train	\$6,811	\$258,000	0	0
CH1018105	BNSF	10/10/2018	Monroe	Freight Train	\$1,914,648	\$674,319	0	0
0419HL009	UP	4/8/2019	Lucas	Freight Train	\$279	\$114,604	0	0
CH0419107	BNSF	4/17/2019	Monroe	Freight Train	\$7,404	\$0	0	0
CH0719102	BNSF	7/7/2019	Monroe	Freight Train	\$21,825	\$0	0	0
07072019	ISRY	7/7/2019	Monroe	Not RPD or N/A	\$0	\$28,055	0	0
TOTAL	FRA (dot.gov)			--	\$3,824,489	\$2,121,828	0	1

3.) Waterway incident

Appanoose County

Risk of a waterway incident can occur in many locations throughout the un-incorporated region of Appanoose County. There are numerous farm ponds, fourteen creeks, Lake Sundown, and Lake Rathbun in Appanoose County. A drowning or contamination spill has the potential of occurring at any of these. The seasonal and permanent residents of Lake Sundown and visiting campers or resort guests could be affected by a waterway incident because the proximity to waters of lakes.

Centerville

The City of Centerville has the Upper Reservoir and Lower Reservoir in the city that allow fishing boats and a possibility for an event to occur.

Davis County

Numerous major US and state highways run through Davis County. U.S. Highway 63 runs north-south through Bloomfield in the middle of the county, while Iowa Highway 2 runs east-west through Bloomfield and Pulaski. Numerous paved county roads connect all the incorporated cities and unincorporated towns throughout the county. According to the Iowa Department of Transportation, the total daily traffic in Davis County is 54,840 and the total daily truck traffic is 5,978.

Lucas County

Chariton

There are limited places that would allow for a waterway incident to occur in the city limits of Chariton. There are small streams and small ponds on the outskirts of the city limits. The ponds could hold small fishing boats. Crystal Lake is on the west edge of city but outside the city boundary.

Lucas

The Lucas Bottoms is a small body of water in the city limits that a person could place a small canoe or boat for a possible waterway incident.

Russell

There are no large bodies of water within the city limits. There are two small streams.

Unincorporated County

There are multiple locations in rural Lucas County that could potentially experience a waterway incident. Although, none are considered large bodies of water, they are navigable by small boats. This region of Iowa is known for abundant fishing. The following bodies of water are frequently explored by outdoorsmen and families: Lake Morris, Lake Ellis, Crystal Lake, Red Haw Lake, Chariton River, Whitebreast Creek, and English Creek. Risk of a waterway incident can occur in many locations throughout the un-incorporated region of Lucas County and the following chart displays the maximum population at risk (Source 2010 US Census). A drowning or contamination spill has the potential of occurring at any of these. The campers or visitors of any lake could be affected by a waterway incident because the proximity to a body of water.

Monroe County

Unincorporated County

Risk of a waterway incident can occur in many locations throughout the un-incorporated region of Monroe County. There are numerous farm ponds, seven creeks, Lake Miami, and near-by Lake Rathbun that has tail waters extending into Monroe County. A drowning or contamination spill has the potential of occurring at any of these. The seasonal residents of Lazy Daz Ranch and Green Acres could be affected by a waterway incident because the proximity to tributaries and tail waters of Lake Rathbun. There are no public bodies of water in the city limits of Albia, Lovilia, or Melrose. One private pond is in the northeast tip of the Albia City Limits.

Historical Occurrence- Waterway Incident

The remaining type of transportation incidence is a waterway incidence. Exhibit 177 displays information about the type of recreational boating accidents in Iowa. Comprehensive accident data is not available at the local or county level. Lake Rathbun in Appanoose County that provides commerce and leisure activities for the region. Other significant waterways in the region would include Red Haw in Lucas County, Lake Miami in Monroe County, Lake Sundown in Appanoose County and Lake Wapello in Davis County. There are also numerous small lakes, ponds, and creeks located throughout the region that are used for recreation.

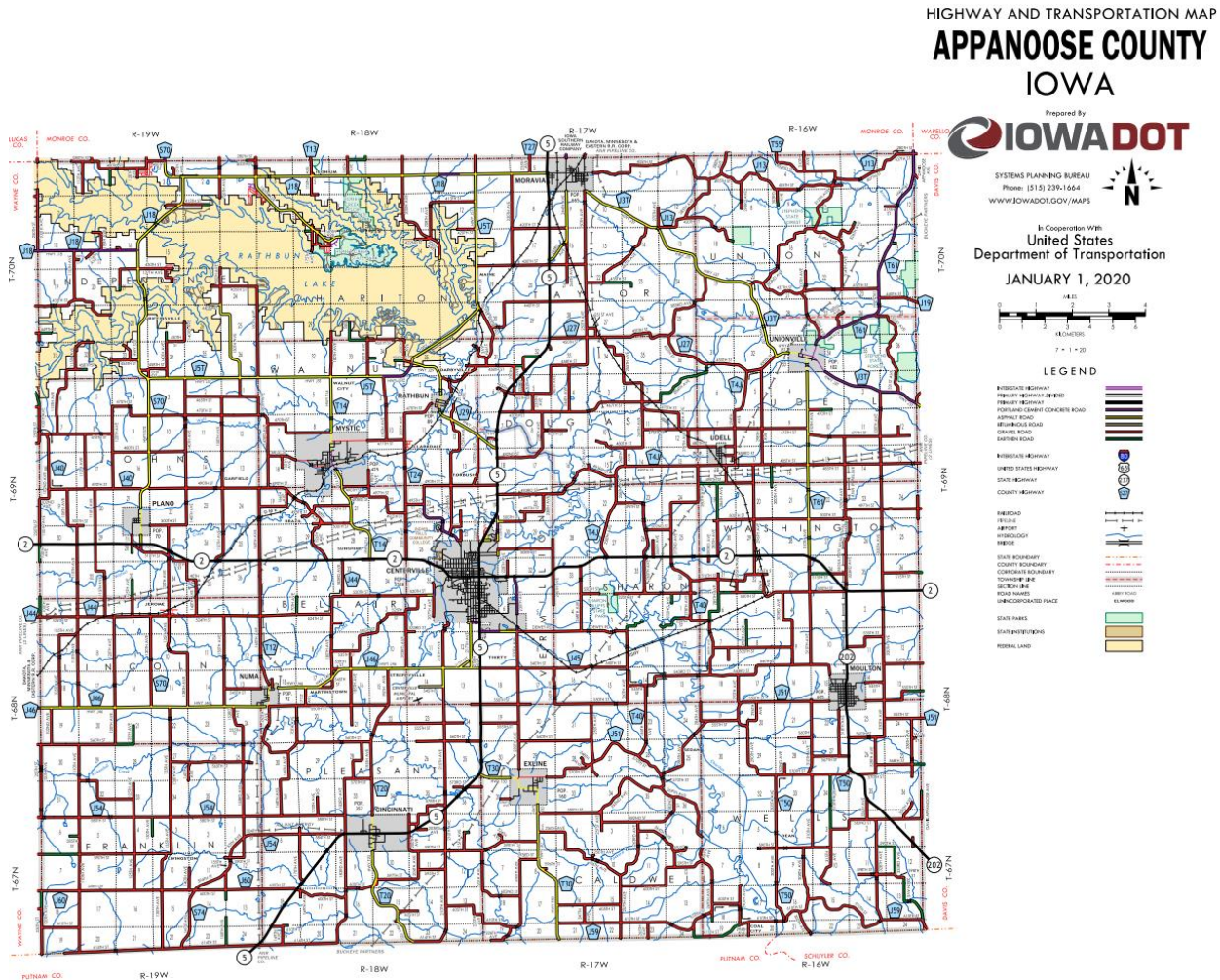
Exhibit 177: Iowa Recreational Boating Accidents 2009-2019				
ACCIDENT EVENT	ACCIDENTS	VESSELS	INJURIES	DEATHS
Capsizing	47	47	31	23
Collision with Fixed Object	52	56	38	1
Collision with Floating Object	10	10	4	1
Collision with Recreational Vessel	69	138	43	7
Collision with submerged object	14	14	7	2
Collision with vessel	41	83	31	2
Fall Overboard	45	48	25	19
Fire/explosion (fuel)	14	14	11	0
Fire/Explosion (not fuel)	2	2	2	0
Flooding/swamping	40	42	14	6
Grounding	35	35	7	0
Other	9	9	10	1
Person departed vessel	19	20	9	8
Person ejected from vessel	28	29	26	6
Person struck by propeller	10	11	9	1
Person struck by vessel	9	12	11	0
Sinking	1	1	0	0
Skier mishap	76	79	81	1

Source: United States Coast Guard Boating Safety Resource Center, January 2020

4.) Roadway Incident

Appanoose County Roadway Transportation Incident

Exhibit 178: Appanoose County Iowa Transportation System



Unincorporated County

Given the reliance on private vehicles and trucking in rural Iowa, the probability of an accident on any given roadway is relatively high. Three distinct state highways connect Appanoose County communities to one another and connect to communities in surrounding counties. State Highways 2 and 5 are major arterials for the county. Highway 202 extends access to Davis County and into Missouri. No interstate routes cross Appanoose County. There are eight county highways that consist of: J18, S70, J5T, J3T, T61, T30, T20, and J46. Iowa DOT has identified 127 candidates in their “Intersection Safety Improvement” locations throughout Appanoose County.

Centerville

Centerville has two state highways that intersect in the city. State Highway 5 transports people north and south, and State Highway 2 extends east and west across the city and county. Many accidents in the city occur along these two highways and around the Historic Square.

Cincinnati

Highway 5 transports traffic north and south across the county and intersects the heart of the City of Cincinnati.

Exline

County highway T30 provides access from State Highway 5 through Exline and south into Missouri. T30 intersects the center of Exline near the retirement village, museum, gas station, church, and post office.

Moravia

Highway 5 transports traffic north and south across the county and passes through the west edge of Moravia. County highway J18 enters the north edge of the city from east to west and provide access to Lake Rathbun. County highway J3T enters the city limits at the southeast corner and passes through the eastern edge of a residential area.

Moulton

Highway 202 spurs off State Highway 2 and offers access to Moulton. Highway 202 passes through the heart of the city, becomes its Main Street from north to south. This highway also extends down to Davis County and eventually the Missouri border.

Mystic

Highway T14 passes through the center of Mystic and provides access to Lake Rathbun located just north of the city.

Numa

County Highway J46 passes through Numa and is the backbone for the creation of the city. The highway runs from the west along the southern city limits, curves north the length of the city and again curves to the east to exit the northeast corner of the community.

Plano

Plano is located one half mile from Highway 2 and can be used as an alternate emergency route. Local highway S70 passes directly through Plano.

Rathbun

County highway J29 provides access from Highway 5 to Lake Rathbun. Highway J29 intersects the heart of the city and places about 25% of the community at risk.

Udell

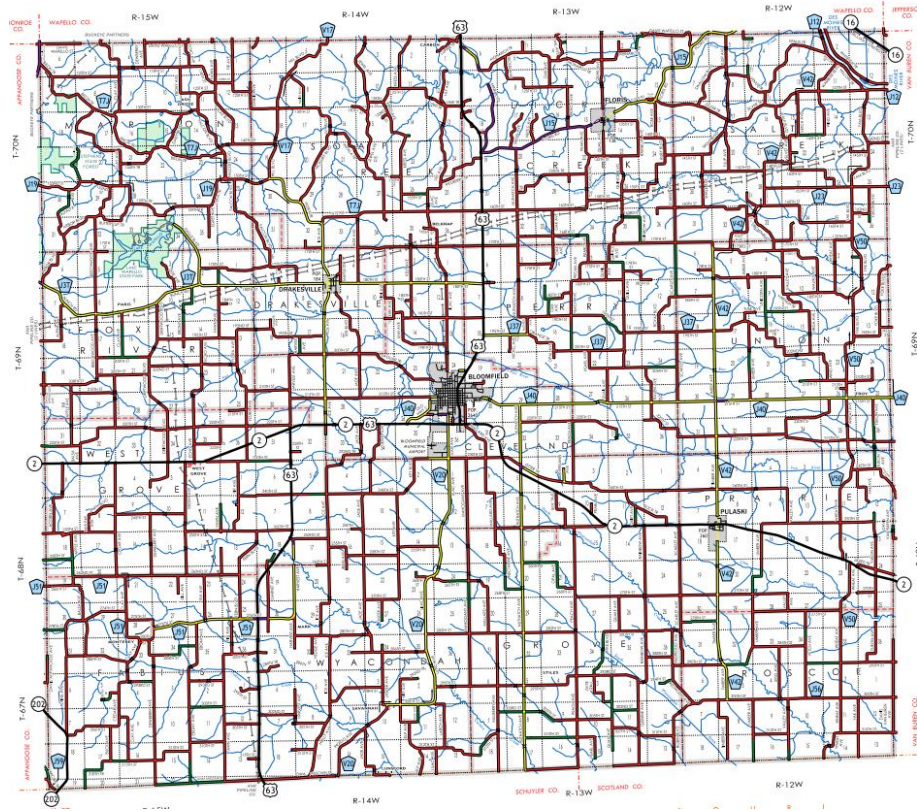
Given the reliance on private vehicles and trucking in rural Iowa, the probability of an accident on any given roadway is relatively high. The small, local highway T4J provides access to Udell from county highway T61.

Unionville

The City of Unionville has local highways J3T and T61 that intersect in the center of the community.

Davis County Roadway Transportation Incident

Exhibit 179: Davis County Iowa Transportation System



HIGHWAY AND TRANSPORTATION MAP

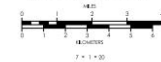
DAVIS COUNTY IOWA



Prepared By
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In Cooperation With
United States
Department of Transportation
JANUARY 1, 2020



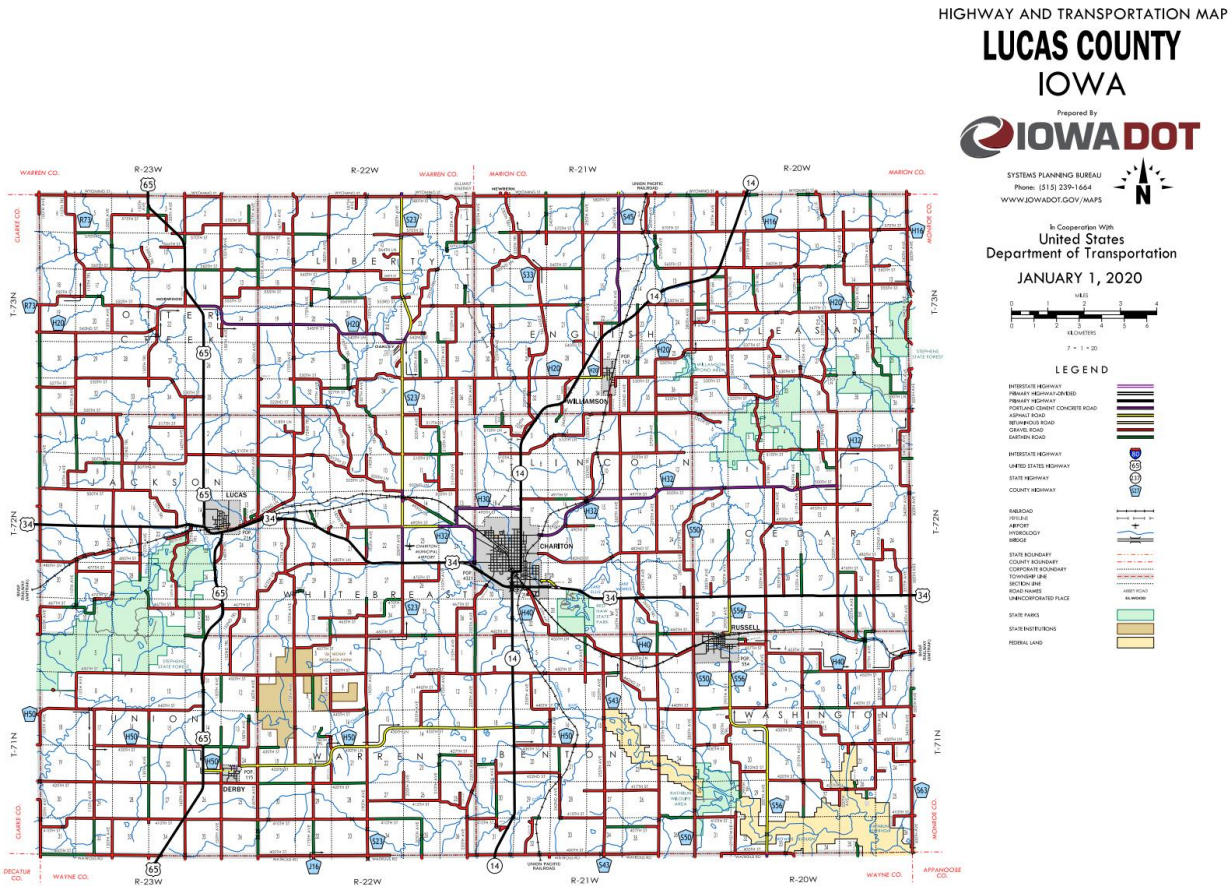
LEGEND

INCORPORATED HIGHWAY	
PRELUDE HIGHWAY	
PORTLAND COUNTY CONCRETE ROAD	
ASPHALT ROAD	
GRAVEL ROAD	
GRAVEL ROAD	
UNINCORPORATED HIGHWAY	
UNINCORPORATED HIGHWAY	
STATE HIGHWAY	
COUNTY HIGHWAY	
RAILROAD	
TRAIL	
WATER	
WATERWAY	
BRIDGE	
STATE BOUNDARY	
COUNTY BOUNDARY	
TOWNSHIP LINE	
SECTION LINE	
ROAD NAME	
UNINCORPORATED ROAD	
STATE PARKS	
STATE PRESERVE	
FEDERAL LAND	

Numerous major U.S. and state highways run through Davis County. U.S. Highway 63 runs north-south through Bloomfield in the middle of the county, while Iowa Highway 2 runs east-west through Bloomfield and Pulaski. A host of paved and gravel county roads connect all the incorporated and unincorporated towns throughout the county. According to Iowa DOT, the total daily traffic in Davis County is 54,840 and the daily truck traffic is 5,978.

Lucas County Roadway Transportation Incident

Exhibit 180: Lucas County Iowa Transportation System



Unincorporated County

The county has three state highways that are identified in the county. Highway 14 transports traffic north and south across the county, as well as highway 65 operating 9 miles west of highway 14 in Lucas County. Highway 34 extends east and west through Lucas County and passes through Chariton on the very south edge of Chariton's city limits as a 4-lane highway for approximately 3 miles. It also extends to bypass the city of Lucas. Highway 14 passes through the heart of Chariton's residential area and near Williamson on the north edge of the county. More than 20% of the serious accidents in Lucas County have occurred at intersections between 2004 and 2008. During that time, 27% of the accidents had be speed related. See Exhibit 183.

Transportation north to south through the county. Highway 65 extends 47 miles and passes near the communities of Lucas and Derby but does not enter either city limit. State highway 14 is approximately 40 miles in length from the south edge of the county, through the City of Chariton, and near the city of Williamson. Iowa State Highway 34 passes through the county from west boarder to east county line border. Highway 34 passes near Russell and Lucas but does enter the city limits of Chariton on its 46 miles of transportation. This creates multiple major intersections throughout the county and areas of concern are where the state highways intersect. However, it is acknowledged that there are many gravel road intersections that an incident could potentially occur.

Chariton

Iowa State Highway 14 and US Highway 34 offers an increased potential for a Roadway Transportation Incident. State Highway 14 extends the entire length of the city from north to south for 3 miles. This highway is also the only access route to the local hospital and multiple gas stations. State Highway 34 dusts the southern edge of Chariton's city limits. There are multiple exit/entrance ramps from the 4-lane highway that increase the potential for accidents.

Derby

County Highway H50 is a small highway that passes through the city of Derby and connects State highway 14 and State highway 65.

Lucas

Highway 34 passes on the south edge of city limits and highway 65 is just on the outskirts of the western city limits. Highway 34 intersects Lucas County from west to east. The route of the highway passes on the southern edge of the City of Lucas. This is the only highway access provided to the city that could provide opportunity for highway accidents. There are minimal structures placed at risk because the location is the extreme southern boundary.

Russell

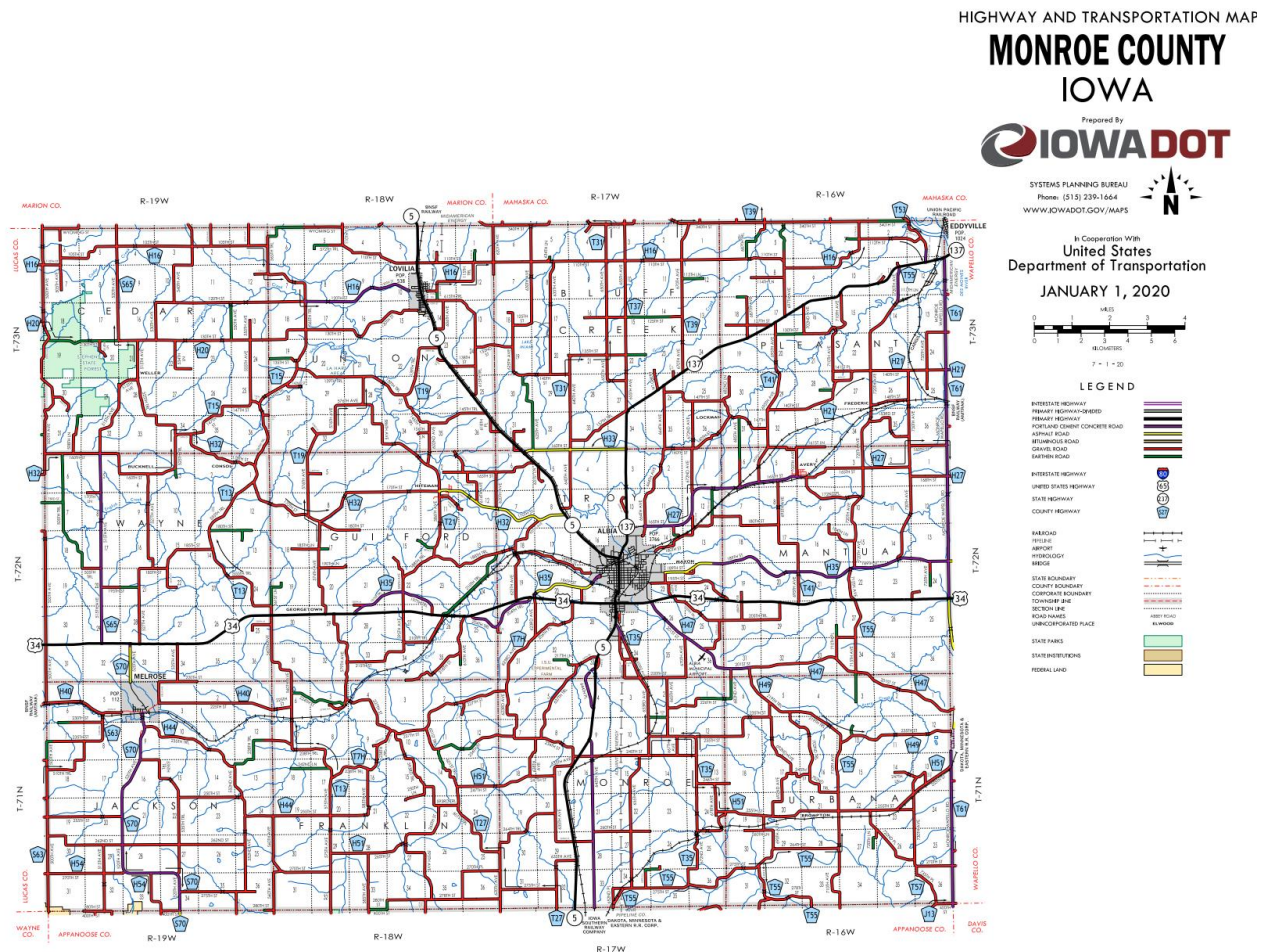
County Highway S56 goes through the center of the community from north to south.

Williamson

A short county highway spur, H20, connects Williamson to highway 14.

Monroe County Roadway Transportation Incident

Exhibit 181: Monroe County Iowa Transportation System



Unincorporated County

The county has two state highways and one US highway that are identified in the county. State Highway 5 transports traffic north and south across the county and US Highway 34 extends east and west through Monroe County. State Highway 137 branches off highway 5 on the north edge of Albia and continues northeasterly to the city of Eddyville.

Albia

The probability of highway transportation incidents is often higher on heavily used roads. Albia has one of the busiest intersections in the County on the south edge of the city limits. Iowa State Highways 5 and 34 passes through (and intersect) to offer an increased potential for an incident, although an accident can happen anywhere. Other locations of higher potential incident would include highway 5 passing on the east portion of the Albia square and at the point where Highway 5 and 137 splits on the north end of Albia.

Lovilia

Highway 5 transports traffic north and south across the county and travels through the heart of Lovilia. This places almost half of the residents and structures at risk. The community developed along the rail line, so it is long and not very wide to offer proximity to the railway.

Melrose

County highway S70 intersects the heart of the city from north to south. This roadway passes onto the Main Street of the city near the post office, city hall, community center and church.

Historical Occurrence- Roadway Transportation Incidence

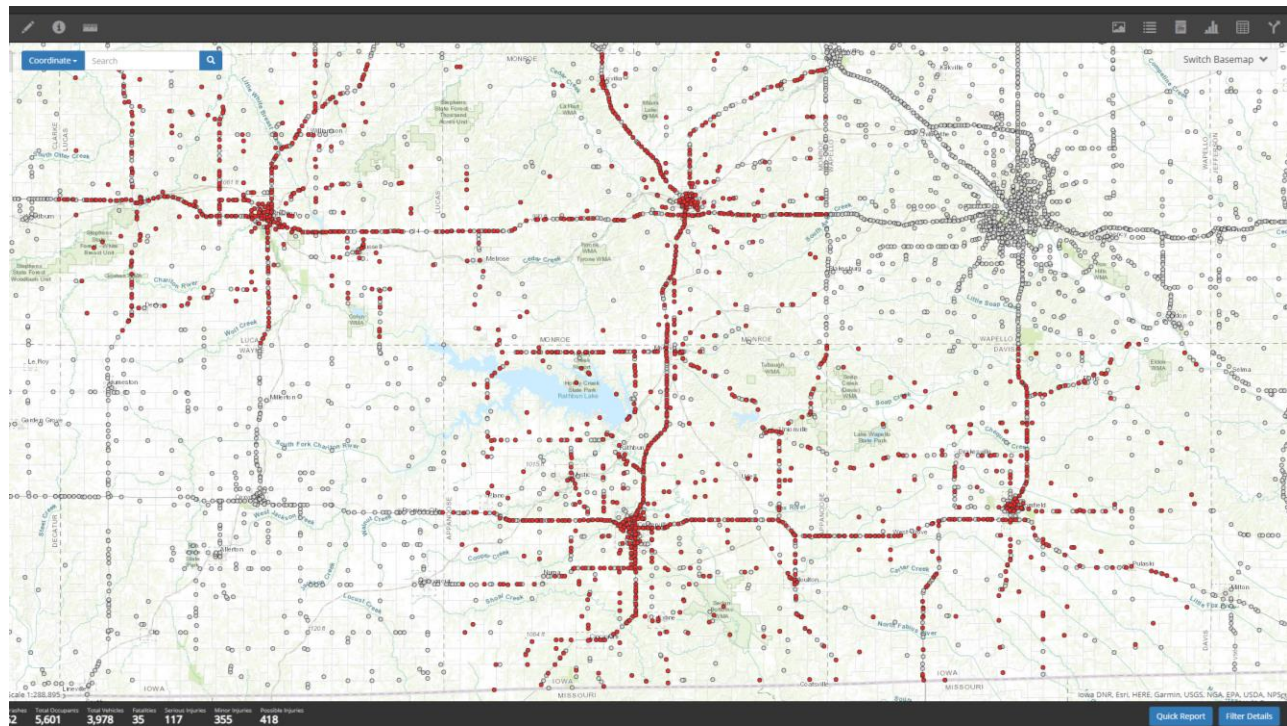
Highway transportation incidents are primarily handled by local emergency responders. Highway transportation incidents will rarely exceed local capabilities because the local emergency responders complete ongoing and interagency training for incidents that could occur along major and minor travel routes. Incidents that could exceed local capabilities would be crashes involving many vehicles or may involve large amounts of dangerous materials.

IDOT gathers crash data, however it not available for each jurisdiction in the region. The data is collected for counties and larger communities. There is a high frequency of crashes but few results in a fatality. Most crashes involve property damage only. The crash frequency has remained relatively consistent throughout the decade (see Exhibit 182). A location map can be seen Appendix A.

Exhibit 182: ADLM Regional Auto Crashes							
Location	Year	Crashes	Fatal	Serious Injury	Minor Injury	Possible Injury	# Vehicle affected
Appanoose County	2015	230	2	16	42	51	327
	2016	218	5	19	21	36	307
	2017	244	2	10	41	36	345
	2018	213	2	10	23	31	304
	2019	227	1	7	18	19	310
5yr Total		1,132	12	62	145	173	1593
Davis County	2015	112	2	13	21	27	166
	2016	94	3	8	12	22	139
	2017	83	0	3	8	30	126
	2018	118	3	4	15	27	170
	2019	209	4	6	26	44	295
5yr Total		498	9	30	67	126	726
Lucas County	2015	119	0	6	22	28	162
	2016	123	1	12	24	15	167
	2017	133	2	5	15	27	171
	2018	117	0	2	17	13	165
	2019	132	1	0	26	8	178
5yr Total		624	4	25	104	91	843
Monroe County	2015	128	2	6	5	25	184
	2016	117	2	1	7	14	168
	2017	111	0	2	9	19	149
	2018	132	2	1	13	24	168
	2019	165	2	3	14	20	229
5yr Total		653	8	13	48	102	898
REGIONAL TOTALS	2015	589	6	41	90	131	839
	2016	552	11	40	64	87	781
	2017	571	4	20	73	112	791
	2018	580	7	17	68	95	807
	2019	615	5	12	69	64	842
RRREGIONAL 5 YR TOTAL		2,907	33	130	364	489	4,060

Source: Iowa DOT, Iowa Crash Analysis Tool, December 2020

Exhibit 183: Crash Locations in ADLM Region



Probability

Since 1964 there has been 26 air transportation incidents resulting in one fatality in the region. Flight patterns over the region include several municipal airports which present a risk for air transportation incident. A limited history of air transportation incident occurring in the future, but the risk does exist. As part of the larger transportation incident hazard, an air transportation incident has an unlikely probability, especially relative to a highway transportation incident.

A few major and minor traffic accidents occur every day in the ADLM region. These accidents result in injury, death, and property damage in approximately 20% of incidents. Although traffic engineering, inspection and maintenance of infrastructure, land use management, and the readiness of local response agencies have increase, highway incidents continue to occur. When the traffic volume in the region is increasing, the number of traffic accidents also rises. The combination of large numbers of people on the road, wildlife, weather conditions, potential mechanical problems, and human error increases the probability of a transportation incident in the region. Overall, a highway transportation incident is likely.

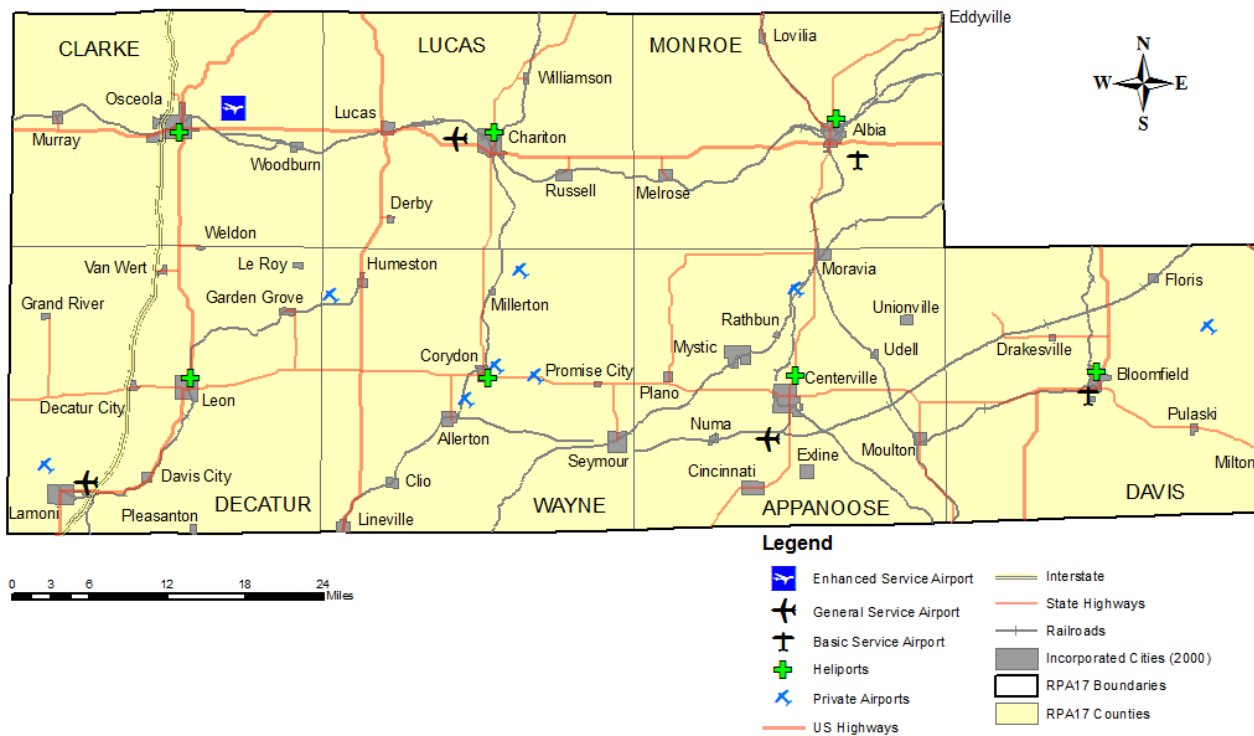
There have been 16 train accidents in 10 years in the region. Although recent incidents have not been fatal or exceeded local capabilities, rail traffic will continue and there for create an occasional probability of a rail incident occurring.

There have been few waterway incidents across Iowa and the ADLM region that have exceeded local capabilities. There has been search and rescue events involving a single person or small boats with only a couple of people on board. Small scale incidents have resulted in loss of life from pleasure craft collisions and falls from vessels, but the probability of a water way incident is unlikely.

Magnitude and Severity

An airway incident places the people aboard as the most vulnerable. Statistics from the National Transportation Safety Board and the airline industry show that the majority (over 75%) of airplane crashes and accident occur during the takeoff or landing phases of a flight. As a result, developed areas adjacent to the airports and in airport flight paths are particularly vulnerable to this hazard. For areas away from the airport, a smaller percentage of the population would be directly impacted. Because of the frequency of aircraft in the skies above areas away from the airport, these areas would not be considered as vulnerable.

Since most airway incidents occur during takeoffs and landings, the spatial extent of most incidents would occur on airport grounds or adjacent areas. The ADLM region has four smaller airports including Centerville Municipal Airport, Albia Municipal Airport, Chariton Municipal Airport and Bloomfield Municipal Airport. The extent to which the impacts would be felt depends on the materials involved. For example, if a cargo plane transporting volatile or hazardous substances were involved in an accident, the area of concern would be significantly larger than the area for an accident involving a small personal aircraft carrying stable materials. The largest share of accidents would likely affect only a few city blocks.



The people who use the surface transportation system a lot are the most vulnerable in a highway transportation incident. Travelers, truckers, delivery personnel, and commuters are always at risk that they are on the road. During rush hours, holidays, and major events the number of people on the road significantly increase and therefore so does the likelihood of an incident.

The ADLM region has many city streets, county roads, and Iowa highways (see Exhibit 183 or Appendix). Highway incidents are usually contained to areas on the roadway or directly adjacent to the road. Very few highway incidents affect areas outside the traveled portion of the road and right-of-way. Extensive segments of the transportation system can be impacted during significant weather events, such as a large snowstorm, when multiple and separate accidents occur. The area of impact could extend beyond the localized area if the vehicles involved transportation hazardous materials.

BNSF, DME, Iowa Southern Railway, and UP all have rail lines in the ADLM region and cross through multiple cities. People and property near railroad tracks, crossings, sidings, switching stations, and

loading/unloading points are at most risk. Those away from the railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

Rail and highway incidents are usually limited to areas in and near at-grade crossing. Rarely will an incident result in widespread effects. The direct area of impact is usually quite small but depending on the vehicle(s) and materials involved, the effects could reach miles beyond the incident. Harmful products may contaminate streams, rivers, bodies of water, water distribution systems and storm water systems. The ability of the response agencies to contain the product on-scene usually limits the area affected.

Passengers on a pleasure watercraft are most vulnerable in a waterway incident. The maximum extent of a waterway incident would be limited. Impacts would not extend beyond the immediate incident scene unless there is spillage of a toxic substance. The only exception would include search and rescue events that could expand the area.

The magnitude and severity are estimated to be limited for transportation incidents. A transportation incidence could result in injuries, up to 10% to 25% of property damage, and shutdown of facilities for a week. The property damage estimate is estimated high because if a transportation incident were to occur in a small jurisdiction, a high percentage of the community can be impacted. Overall, the magnitude and severity estimate are based on historical occurrences, existing hazard mitigation plans, the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

Warning Time

The amount of warning time prior to an aircraft accident could vary from several minutes to a matter of seconds. Crew aboard a troubled aircraft can radio to ground crew to prepare for the incident, but little can be done to lessen the direct effect of the impact. There is rarely adequate time to do more than position on-site emergency response personnel.

There is usually no warning of a highway incident. During snowstorms and other severe weather events that impede travel, travelers, response agencies, and hospitals alike can be notified of hazardous travel conditions. Flash flooding is a common travel hazard in the ADLM region. Warnings are often issued several hours before the flooding may occur.

Like other transportation incidents, a railway incident would occur without any warning. There may be a limited amount of time to warn those in the pathway of the harmful effects.

Leading causes of waterway incidents are inclement weather and operator error, which bot can occur without warning. Weather forecasts are generally available days in advance and would give ample time to take shelter away from water.

Duration

All transportation incidents of rail, air, and waterway related hazards are likely to create more intensive response and resources to protect life and safety of those affected.

Exhibit 184: Jurisdictional Transportation Incident Hazard Scoring						
Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	3	2	4	2	2.75	Moderate
Centerville	1	1	4	1	1.45	Low
Centerville Community Schools	1	1	4	1	1.45	Low
Cincinnati	2	1	4	2	3.2	High
Exline	1	1	4	1	1.45	Low
Moravia	1	1	4	1	1.05	Low
Moravia Community School	1	1	4	1	1.05	Low
Moulton	2	1	4	2	3.2	High
Mystic	1	1	4	1	1.45	Low
Plano	1	1	4	1	1.45	Low
Rathbun	2	1	4	2	3.2	High
Udell	2	1	4	2	3.2	High
Unionville	1	1	2	2	1.25	Low
Moulton-Udell Community School	3	1	4	2	3.2	High
MercyOne Medical	3	2	4	2	2.75	Moderate
Davis Unincorp Co	4	4	4	4	4.0	High
Davis Co Community Schools	4	4	4	4	4.0	High
Bloomfield	4	4	4	4	4.0	High
Drakesville	4	4	4	4	4.0	High
Floris	4	4	4	4	4.0	High
Pulaksi	4	4	4	4	4.0	High
Lucas Unincorp Co	2	3	4	4	1.75	Low
Chariton	4	1	4	2	2.9	Moderate
Chariton Community Schools	3	2	1	4	2.5	Moderate
Derby	2	2	4	1	2.2	Moderate
Lucas	4	4	4	4	4.0	High
Russell	3	4	4	4	3.55	High
Williamson	1	1	4	3	1.65	Low
Lucas Co Health Center	3	3	4	3	3.15	High
Monroe Unincorp Co	2	3	3	3	2.55	Moderate
Albia	1	1	4	1	1.45	Low
Albia Community Schools	2	1	4	3	2.1	Moderate
Eddyville	4	4	4	3	3.9	High
Lovilia	2	1	4	1	1.95	Low
Melrose	1	1	4	2	1.55	Low
Monroe Co Hospital	3	2	3	3	2.7	Moderate

F.) Human-Caused Hazards

1.) Terrorism

This hazard encompasses the following specific hazards: enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, cyber terrorism, radiological terrorism, and public disorder. This includes the use of multiple outlets to demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion, or ransom in violations of the criminals' laws of the United States. These actions may cause massive destruction and/or extensive casualties.

Potential Hazard Area

The entire ADLM region is for a terrorism event.

Historical Occurrences

There have not been any serious terrorism events in the ADLM region.

Probability

The Federal Government monitors the international political and military activities of other nations and would notify the State of Iowa of escalating military threats. There are many small military installations in Iowa; most are Iowa National Guard assets spread throughout the state comprised of various military units and functions. There have been no enemy attacks on or in Iowa in modern times. The only history of enemy attack dates to early settlement and the Civil War in the 1800s. The ADLM region has few areas of dense population and development locations and would be an unlikely target for during a conventional terrorism attack.

Despite not experiencing a full terrorism event, Iowa has experienced many terrorist threats. Most incidents have been limited to "suspect" powders, actual threats, and hoaxes. Beginning in 2001, Iowa experienced many responses of suspicious powders after the original "Amerithrax" scare.

Incidents of agro-terrorism have occurred in Iowa. In the past ten years, Iowa has experienced incidents in which animal rights activists have vandalized or released animals in agricultural facilities. There have been cases of vandalism of agricultural facilities or incident of disgruntled employees causing damage to animals and animal products.

Chemical terrorism has been limited in Iowa. Throughout the country public officials have received suspicious letters and this can happen in Iowa. In 2005, a subject mail rat poison to several state and local officials. One of the letters was torn open in a mail-sorting machine in Des Moines, which led to the closure of the Main Post Office and the Emergency Room of Mercy Medical Center.

Cyber terrorism is difficult to track incidents and threats, but there are definite incidents where account information has been jeopardized. Many of these notifications are concerning private companies where there could be financial concerns with data breach. There are multiple businesses in the ADLM region that could be potential targets for cyber terrorism.

There have been no radiological incidents in Iowa. The greatest concern lies with unstable international countries that have the potential to develop nuclear weapons. It is unlikely that radiological terrorism could affect the Midwest United States, but potential targets are in Iowa.

As for public disorders, there have been no recent mass demonstrations or conflicts with large groups of people in the ADLM region. There is always a possibility of a march, protest rally, or non-peaceful strike however the probability is low in this region.

Labor strikes and work stoppages are not considered part of this hazard unless they become a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target group or institution. Overall, most events are within the capacity of local law enforcement.

Recent national events have increased awareness of school safety. Although there has not been a major incident in the ADLM region, local schools complete training to teach staff how to respond during a potential intruder. Most schools have also installed limited access entrance systems.

Magnitude and Severity

For all types of terrorism, people who are targets, people located within targets or people located within or near a targeted area are extremely vulnerable. The potential injuries and deaths caused by terrorism event depends on the type of terrorism, the scale of the event, and whether the terrorism attempt is successful. In general, it is difficult to assume who and what structures could be potential targets.

The type, scale and success of a terrorism attempt will also determine how much of the ADLM region will be affected. Some terrorism attempts are limited in scale with specific targets while others are widespread. Some terrorism attempts are limited in scale with specific targets while others may be widespread. If a terrorism event is large scale, it is likely that it would affect more than a local county or even the region. Aside from public disorder type events, a terrorism event in the ADLM region has the potential to affect the entire region.

Warning Time

The United States federal government monitors worldwide political and military activity. The citizens and states would be put on heightened alert during periods of intense political or military conflict. With Iowa's position in the center of the United States, there would likely be significant warning of an impending enemy attack.

Acts of terrorism can be immediate and often come after little or no warning. There are occasions when terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat. Terrorists threaten people and facilities through "bomb threats" and other scare tactics. Even in it is a shallow threat, precautions must be taken to ensure the safety of the people and property involved.

In most incidents we would have no warning time. The only exception would be if someone called in a threat. Acts of terrorism can be immediate and often come after no warning. There are occasions where terrorists have warned the targeted organization beforehand, but often the attacks come without previous threat.

Even if it is an unlikely threat, precautions must be taken to ensure the safety of the people and property involved. Explosions are usually instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear.

Duration

The response to all sources of terrorism is extensive and will result in the need for outside resources and response from federal agencies in both the investigation of a crime scene and in the response to the direct threats to life and property.

Exhibit 185: Jurisdictional Terrorism Hazard Scoring

Jurisdiction	Probability	Magnitude	Warning Time	Duration	Score	Level
Appanoose Unincorp Co	2	2	4	4	2.5	Moderate
Centerville	1	3	4	1	2.05	Moderate
Centerville Community Schools	1	3	4	1	2.05	Moderate
Cincinnati	1	2	4	4	3.25	High
Exline	1	2	4	4	3.25	High
Moravia	1	1	4	1	1.05	Low
Moravia Community School	1	1	4	1	1.05	Low
Moulton	1	2	4	4	3.25	High
Mystic	1	1	4	1	1.45	Low
Plano	1	2	4	4	3.25	High
Rathbun	1	2	4	4	3.25	High
Udell	1	2	4	4	3.25	High
Unionville	1	1	4	1	1.05	Low
Moulton-Udell Community School	1	2	4	4	3.25	High
MercyOne Medical	2	2	4	4	2.5	Moderate
Davis Unincorp Co	1	4	4	4	2.65	Moderate
Davis Co Community Schools	1	4	4	4	2.65	Moderate
Bloomfield	1	4	4	4	2.65	Moderate
Drakesville	1	4	4	4	2.65	Moderate
Floris	1	4	4	4	2.65	Moderate
Pulaksi	1	4	4	4	2.65	Moderate
Lucas Unincorp Co	1	1	4	4	1.75	Low
Chariton	1	4	4	4	2.65	Moderate
Chariton Community Schools	2	3	3	4	2.65	Moderate
Derby	1	1	4	1	1.45	Low
Lucas	1	4	4	3	2.55	Moderate
Russell	1	3	4	4	1.35	Low
Williamson	1	1	4	2	1.55	Low
Lucas Co Health Center	2	2	4	4	2.5	Moderate
Monroe Unincorp Co	4	1	1	4	2.65	Moderate
Albia	1	1	4	2	1.55	Low
Albia Community Schools	1	1	4	4	1.75	Low
Eddyville	1	1	4	4	1.75	Low
Lovilia	1	1	4	1	1.45	Low
Melrose	1	1	4	1	1.45	Low
Monroe Co Hospital	1	3	4	4	2.35	Moderate

Presidential Disaster Declarations

The Robert T. Stafford Disaster Relief and Emergency Assistance Act Authorized the President of the United States to issue a disaster declaration when the President has determined that a disaster has caused damage of such severity that it is beyond the capabilities of state and local governments to respond. The Presidential Disaster Declaration allows the federal government to aid affected areas, such as Individual Assistance, Public Assistance, and Hazard Mitigation Assistance.

In the past 20 years, the ADLM region has been in a Presidentially Declared Disaster 10 times, which is approximately once every two years. Refer to Exhibit 186 for the hazard events that led to those declarations and the Public Assistance and Individual Assistance approved in response. In all declarations, the counties of the ADLM region were among other counties covered by the declaration. One declaration was in response to winter weather, which could be classified as a severe winter storm event in this plan. Seven declarations were in response to hazards associated with spring and summer weather. Within this plan they would be considered as flood (flash flood and river flood); thunderstorm, lightning, and hail; and tornado and windstorm hazard events.

Exhibit 186: ADLM Presidential Disaster Declarations 2000-2020		
<i>Date</i>	<i>Declaration</i>	<i>Hazard</i>
2020	DR-4483	COVID
2019	DR-4421	Flooding
2015	DR-4234	Severe Storms, Tornadoes, Flooding, & straight-line winds
2014	NA	NA
2013	DR-4126	Severe Storms, Tornadoes, & Flooding
2013	DR-4119	Severe Storms, Straight line winds, & Flooding
2010	DR-1930	Severe Storms, Tornadoes & Flooding
2008	DR-1763	Severe Storms, Tornadoes & Flooding
2007	DR-1737	Severe Winter Storms
2007	DR-1727	Severe Storms & Flooding
2004	DR-1518	Severe Storms, Tornadoes, & Flooding

In the following chapter, the hazards considered under this plan are prioritized based on the data collection for the risk assessment. The hazard events that were deemed to exceed local response capabilities, i.e., received a Presidential Declaration, reinforce the priority levels that result from the weighted average of four criteria: Probability, magnitude and severity, warning time, and duration. The winter weather and summer weather hazards that cause these events are all rated with the highest priority level and have wrought extensive loss across the region.

Operations and Resources

Local governments in Iowa are subject to Iowa Code, which gives the authority to protect the health, safety, and welfare of its residents and levy taxes to provide services. Participating jurisdictions have similar authority, but each jurisdiction varies in terms of size and governmental priorities. When developing a mitigation strategy in a multi-jurisdictional planning area, it is important to distinguish the variation in operations and resources among jurisdictions to ensure the mitigation strategy is feasible. In other words, it is important to consider whether each community has the expertise or access to the resources needed to complete a project. Appendix A. will display the operations and resources for each participating jurisdiction are included. The tables will be like Exhibit 187.

<i>Exhibit 187: Common County Operations & Resources</i>	
Officials, Commissions, & Committees	Board of Supervisors Emergency Management Commission County Conservation Board Economic Development Board ADLM Environmental Health Iowa Soil & Water Conservation District Board
Staff & Departments	Assessor's Office Attorney's Office Auditor's Office Community services Conservation Office Department of Human Services Emergency Medical Services Engineer's Office & Secondary Roads Department Environmental Services General Assistance Office County Transportation Medical Examiner's Office Public Health Office Recorder's Office Sheriff's Office Treasurer's Office Veteran's Affairs Office Weed Commissioner Emergency Management Board
County Services	Road & bridge maintenance Stormwater system maintenance Snow removal Vegetation management in public areas Law enforcement & response Emergency medical response Well & septic permits. Treasurer & Recorder services Transportation services Generators for sheriff's office, all radio tower sites, & ambulance service County website
Contracted or Agreement Services	Police & fire protection mutual aid agreements County Soil & Water Conservation District
Policies, Programs, & Plans	Capital Improvement Program County Code of Ordinances Floodplain ordinance & management program County Emergency Management Plan Coordinate with Iowa Dept of Natural Resources Coordinate with Iowa Dept of Public Health Multi-Jurisdictional Hazard Mitigation Plan Debris Management Plan Watershed Management Plan
Financial & Other Resources	County Budget Bonds Grants Donations
Other	

Existing Plan Incorporation

<i>Current Planning Mechanisms</i>	<i>Jurisdictions Currently in Place</i>	<i>Reviewed for information in HMP</i>	<i>Method of Incorporation</i>	<i>Who Responsible or Lead</i>
Comprehensive Land Use plan	Each County, Centerville, Albia, Chariton, Bloomfield	None	Review Each, develop in other jurisdictions	Zoning Commissions & staff, BOS
Capital improvement plan	Centerville, Chariton, Bloomfield	Limited	Modernize each, develop plans if they are outdated	City of Centerville
Economic Development plan	Regional Albia	Limited- out dated	Add a mitigation section to annual regional plan	CVPD, city of Centerville, Appanoose County Economic Dev
Open space/ conservation plan	Each County	None	Incorporate mitigation projects affecting open spaces into plans	Conservation board/staff, city parks
Watershed Protection plan	Appanoose & Davis Counties, Albia, Bloomfield	None	Address mitigation actions in watershed areas	Emergency management Coordinator
Zoning Ordinance	25% of Appanoose County, Centerville, Moravia, Moulton, Plano, Albia, Monroe Co, Chariton, Bloomfield	Limited	Review zoning code concerning applicable hazards	Zoning commissions & staff, BOS
Building Codes	Centerville, Chariton, Albia, Bloomfield	Yes	Update building codes for fire & wind standards	City councils, BOS
Tree Maintenance Codes	Limited but performed by each county & utility company	None	Consult with utilities	City of Centerville Utilities Dept, County Maintenance Dept
Soil erosion/ water control ordinance	Limited in the region	N.A.	Consult with RRWA	Emergency management coordinator
Solid/hazardous waste regulations	Optional for most jurisdictions in the region & limited enforcement	Yes	Review regulations as to what can be landfilled, add hazard maps	Landfill owner, Emergency Management Coordinator
Public Health Regulations	Each county has respective PH office	Yes, on Committee to provide recent initiatives	Collaborate with PH agencies to incorporate new protocols	Emergency Management Coordinator, Public Health Board, & staff
Historic District Programs	Centerville, Albia, Bloomfield, Chariton	Yes	Provide data to assist in protecting properties	Development of groups with state IDED assistance
Long-Range Transportation Plan	Regional Plan	Yes	Incorporate hazard maps & transportation improvement ideas	County engineer, CVTPA, IDOT, BOS
Water source plan	Counties each have through inter-governmental agreements	N. A	Include mitigation actions related to relevant hazards	RRWA
Storm water Management program	Centerville, Moravia	Yes	Include mitigation actions related to flash flooding	City Councils, Emergency Management Coord,
Housing & Special Needs plan	Albia, Centerville, Chariton, Lovilia, Bloomfield	N. A	Consider mitigation recommendations in housing plans & funding requests for improvements	City Councils, CVPD, hospitals, Emergency Management Coord
Administrative Operations processes- departments & boards	All jurisdictions	N. A	Convene meetings where possible, realignment of tasks, new or improved tasks & processes, & board goals are updated,	Emergency Management Coord, elected officials, clerks & board chairs
Comprehensive Economic Development Strategy	Regional Plan	Yes	Infrastructure development, location consideration,	Chariton Valley Planning & Development COG
County Multi-Jurisdictional Hazard Mitigation Plan	Each respective County	Yes	Extensive reference & information brought forward	ADLM Emergency Management Coordinator

Mitigation Progress Update

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.

For jurisdictions with existing hazard mitigation plans, it is important to document the mitigation actions that have been completed since the plan was adopted. The jurisdictions that participated in the previously approved plan completed mitigation actions that significantly reduce the risk of high priority hazards in the community.

The following section provides an update on the completed mitigation actions. A table is included that displays information about priority actions, whether the action was included in the previous plan, and notes on other work completed. Generally, in a jurisdiction's progress update, the mitigation actions that were included in the previous hazard mitigation plan show a commitment to and documented progress toward completing mitigation actions.

It should be noted that although a mitigation action may be included in a jurisdiction's progress update as a completed mitigation action, the mitigation action may not necessarily be excluded from the jurisdiction's updated mitigation strategy in this plan. Most hazard mitigation actions are ongoing in nature, as risk and vulnerability change throughout a jurisdiction. In addition, most mitigation actions require multiple projects over a span of time that extends beyond the five-year life of a hazard mitigation plan, which is often due to the cost of completing large or multi-stage mitigation actions.

During the meeting, previous mitigation actions were being evaluated and jurisdictions updated local accomplishments and challenges. Some of the main accomplishments include installation of storm sheds at Lake Miami Campground, Public Health office and at the Secondary Roads location; Albia and Centerville installed additional early storm warning systems; active shooter trainings have occurred at schools, courthouses and businesses in the region; each county has an active "Main Street" program that is working to preserve historic buildings and businesses in the historic courthouse squares of each county seat; and Radon Testing Kits are now available at the local Environmental Health office.

The existing mitigation strategies were reviewed, and the committee felt were still pertinent for the hazards identified. The mitigation actions considered by the committee were included in this plan and were then prioritized based on several criteria, whether they address a high-risk hazard, how many hazards they address, what kind of priority each strategy is, the estimated timeline, and the estimated cost. The logic of this was much like ranking the hazards, the actions with the broadest positive impact would be naturally raised to the top of the list while those that would be costly or be limited in impact would naturally fall to the bottom.

Mitigation Strategy

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 Regional Hazard Mitigation Planning Committee based on the updated risk assessment. The mitigation strategy was developed through a collaborative group process and consists of goals that 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 March 2013 *Local Mitigation Planning Handbook* identifies "Mitigation Actions as specific actions that help achieve goals".

Appanoose County Mitigation Action Summary

Exhibit 188 : Top Priority Mitigation Action results per Jurisdiction

Jurisdiction	Action Title	2018 Action Status	Comments/Notes	Keep in next plan?
Unincorporated Appanoose County	Public education & outreach of warnings and self-protection	Ongoing	National Weather Service promotes; Fire Dept visits schools & buildings; FEMA has multiple promotions;	Yes
	Develop an emergency response team for post disaster	Ongoing	Local fire departments ID as recovery teams;	Yes
	Continuity of Operation Plan for post disaster	Ongoing	Emergency Management responsible for ensuring current plan;	Yes
	Encourage residents to obtain weather radios for better storm communication	Ongoing	Residents' responsibility	Yes
	Maintain current evacuation plans for all public buildings, schools & cities.	Ongoing	Schools confirm plans annually; public buildings are required to post;	Yes
	Other accomplishments:		County removed several dilapidated structures; Iowa DNR is working to ID abandon mines & potential sinkholes; County PH has current mass casualty plan; Radon testing kits available at ADLM Env. Health; Active shooter trainings at courthouse; annual trimming along county roads;	
City of Centerville	Updated search & rescue training/equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Acquisition & installation of storm warning sirens	Completed	Placed 2 additional warning sirens on edges of city. Also adding community alert system w/ emails, SMS & phone capabilities; "squawk boxes" in industrial park, schools, etc.	No
	Implement Building Code Enforcement	Continue- In-Progress	PT building code enforcement officer; demolishing 6-8 dilapidated houses per year; codes updated to reflect fire safety	Yes
	Rehabilitate older buildings when feasible	Ongoing	Now established "Main Street" program; Buildings on Historic Square had opportunity for inspections;	Yes
	Secure funding for vacant/collapsed buildings to be removed or repaired, safe rooms, for school or hospital	Ongoing	demolishing 6-8 dilapidated houses per year from budget; no certified safe rooms	Yes
	Public education & outreach of warning & self-protection	Ongoing	National Weather Service promotes; Fire Dept visits schools & buildings; FEMA has multiple promotions;	Yes
	Other accomplishments:		Centerville fire dept places free smoke detectors, active NFIP participation; storm water ordinance in place; flood plain mapping completed & shows 2 bldg. in floodplain; Radon education mailed out w/ water bills; existing ordinance prohibiting illicit storm water connections; Alliant in process of burying power lines around Square.; Radon testing kits available at ADLM Env. Health: Hospital has new generator; Active shooter trainings at	

			school bldgs. & hospital; Hospital conducts mass casualty training annually;	
Cincinnati	Update search & rescue training/equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Obtain generators for shelter locations	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Removal of 3 dilapidated bldgs.; Radon testing kits available at ADLM Env. Health;	
Exline	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Obtain generators for shelter locations	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health;	
Moravia	Update Search & rescue training/equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Acquisition & installation of storm warning sirens	Completed	System upgrade now covers entire community	No
	Other accomplishments:		Fire dept trained for emergency response team; has removed several dilapidated bldgs.; existing ordinance prohibiting illicit storm water connections; Radon testing kits available at ADLM Env. Health; Active shooter trainings at school bldgs.;	
Moulton	Update Search & rescue training/equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Obtain generators for shelter location	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Require mandatory trash pickup; existing ordinance prohibiting illicit storm water connections; Radon testing kits available at ADLM Env. Health; Active shooter trainings at school bldgs.;	
Mystic	Update Search & rescue training/equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Secure funding for vacant/collapsed buildings to be removed or repaired	Continue- In-Progress	Iowa DNR offers assistance	Yes
	Replace/relocate sewage lift station that lies in the floodplain	Completed	Was elevated & replaced	No

	Other accomplishments:		Fire hydrant pressure checked annually; community center ID as storm shelter sites; ordinance in place for manufactured home tie down requirements; city has a portable generator; Reservoir dam has been repaired; have a burning ordinance in place; one collapsed building removed in 2019; Radon testing kits available at ADLM Env. Health;	
Numa	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health;	
Plano	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		existing ordinance prohibiting illicit storm water connections; Radon testing kits available at ADLM Env. Health;	
Rathbun	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health;	
Udell	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health;	
Unionville	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		New smoke detectors & fire extinguishers donated for community bldg.; gym received new roof & safety updates for rehabilitation; Radon testing kits available at ADLM Env. Health;	

Davis County Mitigation Action Summary

Exhibit 189: Unincorporated Davis County Mitigation Action Summary

Action ID	Action Title	2018 Action Status	2018 Action Status Comment	Keep in Next Plan
Unincorporated Davis County-1	Make improvements to existing storm water and sewer systems	Continue- In-Progress	Storm water and sewer system improvements have been ongoing in the county, including upsizing culverts, debris clearing in ditches and relocating system equipment	Yes
Unincorporated Davis County-2	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Unincorporated Davis County-3	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes
Unincorporated Davis County-4	Pursue the construction of flood protection infrastructure in affected areas	Continue- In-Progress	Areas throughout the county have been rip-wrapped. Banks have been stabilized. Actions targeted to communities that flood, and implemented were needed	Yes
Unincorporated Davis County-5	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Unincorporated Davis County-6	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes
Unincorporated Davis County-7	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Unincorporated Davis County-8	Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse	NEW	N/A	Yes
Unincorporated Davis County-9	Encourage buyouts of structures located floodplains and repetitive loss properties	NEW	N/A	Yes
Unincorporated Davis County-10	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Unincorporated Davis County-7	Initiate system to inventory locations of sinkholes and abandoned wells and mines	Continue- In-Progress	Mostly done by DNR; identification is voluntary. Continue community and county support of the program	Yes
Unincorporated Davis County-11	Remove debris from areas prone to flash flooding	NEW	N/A	Yes
Unincorporated Davis County-12	Generator hookups	NEW	N/A	Yes

Unincorporated Davis County-13*	Encourage compliance in the National Flood Insurance Program (NFIP)	Continue- In-Progress	Bloomfield, Floris, and the Unincorporated County are members in good standing with the National Flood Insurance Program	Yes
Unincorporated Davis County-14	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Unincorporated Davis County-15	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes
Bloomfield-1	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Bloomfield-2	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes
Bloomfield-3	Pursue the construction of flood protection infrastructure in affected areas	Continue- In-Progress	Areas throughout the county have been rip-wrapped. Banks have been stabilized. Actions targeted to communities that flood, and implemented were needed	Yes
Bloomfield-4	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Bloomfield-5	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes
Bloomfield-6	Review warning siren coverage in Bloomfield and update as appropriate	NEW	N/A	Yes
Bloomfield-7	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Bloomfield-8	Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse	NEW	N/A	Yes
Bloomfield-9	Encourage buyouts of structures located floodplains and repetitive loss properties	NEW	N/A	Yes
Bloomfield-10	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Bloomfield-11	Initiate system to inventory locations of sinkholes and abandoned wells and mines	Continue- In-Progress	Mostly done by DNR; identification is voluntary. Continue community and county support of the program	Yes
Bloomfield-12	Improve sidewalks around public schools to increase public safety	NEW	N/A	Yes
Bloomfield-13	Remove debris from areas prone to flash flooding	NEW	N/A	Yes
Bloomfield-14	Generator hookups	NEW	N/A	Yes

Bloomfield 15*	Encourage compliance in the National Flood Insurance Program (NFIP)	Continue- In-Progress	Bloomfield, Floris, and the Unincorporated County are members in good standing with the National Flood Insurance Program	Yes
Bloomfield-16	Make improvements to existing storm water and sewer systems	Continue- In-Progress	Storm water and sewer system improvements have been ongoing in the county, including upsizing culverts, debris clearing in ditches and relocating system equipment	Yes
Bloomfield-17	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Bloomfield-18	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes
Davis County Schools-1	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Davis County Schools-2	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Floris added a new roof to City Hall. Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes
Davis County Schools-3	Pursue the construction of flood protection infrastructure in affected areas	Continue- In-Progress	Areas throughout the county have been rip-wrapped. Banks have been stabilized. Actions targeted to communities that flood, and implemented where needed	Yes
Davis County Schools-4	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Davis County Schools-5	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes
Davis County Schools-6	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Davis County Schools-7	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Davis County Schools-8	Improve sidewalks around public schools to increase public safety	NEW	N/A	Yes
Davis County Schools-9	Generator hookups	NEW	N/A	Yes
Davis County Schools-10	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Davis County Schools-11	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes
Drakesville-1	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Drakesville-2	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Floris added a new roof to City Hall. Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes

Drakesville-3	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Drakesville-4	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes
Drakesville-5	Replace Drakesville sirens and implement system upgrades	NEW	N/A	Yes
Drakesville-6	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Drakesville-7	Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse	NEW	N/A	Yes
Drakesville-8	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Drakesville-9	Initiate system to inventory locations of sinkholes and abandoned wells and mines	Continue- In-Progress	Mostly done by DNR; identification is voluntary. Continue community and county support of the program	Yes
Drakesville-10	Remove debris from areas prone to flash flooding	NEW	N/A	Yes
Drakesville-11	Generator hookups	NEW	N/A	Yes
Drakesville-12	Make improvements to existing storm water and sewer systems	Continue- In-Progress	Storm water and sewer system improvements have been ongoing in the county, including upsizing culverts, debris clearing in ditches and relocating system equipment	Yes
Drakesville-13	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Drakesville-14	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes
Floris-1	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Floris-2	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Floris added a new roof to City Hall. Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes
Floris-3	Pursue the construction of flood protection infrastructure in affected areas	Continue- In-Progress	Areas throughout the county have been rip-wrapped. Banks have been stabilized. Actions targeted to communities that flood, and implemented where needed	Yes
Floris-4	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Floris-5	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes

Floris-6	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Floris-7	Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse	NEW	N/A	Yes
Floris-8	Encourage buyouts of structures located floodplains and repetitive loss properties	NEW	N/A	Yes
Floris-9	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Floris-10	Initiate system to inventory locations of sinkholes and abandoned wells and mines	Continue- In-Progress	Mostly done by DNR; identification is voluntary. Continue community and county support of the program	Yes
Floris-11	Remove debris from areas prone to flash flooding	NEW	N/A	Yes
Floris-12	Generator hookups	NEW	N/A	Yes
Floris-13*	Encourage compliance in the National Flood Insurance Program (NFIP)	Continue- In-Progress	Bloomfield, Floris, and the Unincorporated County are members in good standing with the National Flood Insurance Program	Yes
Floris-14	Make improvements to existing storm water and sewer systems	Continue- In-Progress	Storm water and sewer system improvements have been ongoing in the county, including upsizing culverts, debris clearing in ditches and relocating system equipment	Yes
Floris-15	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Floris-16	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes
Pulaski-1	Designate shelter sites and provide with adequate supplies and overnight accommodations	Continue- Not Started	Communities reviewed existing sites and kept them, including fire station and schools. Each community will review shelter sites to identify any new additions to the list	Yes
Pulaski-2	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Continue- In-Progress	Floris added a new roof to City Hall. Improvements have been made to County Courthouse. Other improvements throughout the county.	Yes
Pulaski-3	Install proper generator hookups at designated shelter sites to ensure shelters can support generator power	NEW	N/A	Yes
Pulaski-4	Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power	NEW	N/A	Yes
Pulaski-5	Develop safe rooms in schools and critical public facilities	Continue- Not Started	No progress due to lack of resources. County is on the State list to place safe room at the high school	Yes
Pulaski-6	Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse	NEW	N/A	Yes

Pulaski-7	Encourage citizens to create family preparedness kits to be used in case of emergency	Continue- In-Progress	Provided through a variety of mechanisms, including severe weather awareness week	Yes
Pulaski-8	Initiate system to inventory locations of sinkholes and abandoned wells and mines	Continue- In-Progress	Mostly done by DNR; identification is voluntary. Continue community and county support of the program	Yes
Pulaski-9	Remove debris from areas prone to flash flooding	NEW	N/A	Yes
Pulaski-10	Generator hookups	NEW	N/A	Yes
Pulaski-11	Make improvements to existing storm water and sewer systems	Continue- In-Progress	Storm water and sewer system improvements have been ongoing in the county, including upsizing culverts, debris clearing in ditches and relocating system equipment	Yes
Pulaski-12	Follow Davis County Infrastructure Study and repair or replace priority bridges	NEW	N/A	Yes
Pulaski-13	Follow Davis County Infrastructure Study and repair or replace culverts and ditches	NEW	N/A	Yes

Lucas County Jurisdiction Mitigation Action Summary

Exhibit 190: Priority Mitigation Action results per Jurisdiction

Jurisdiction	Action Title	2018 Action Status	Comments/Notes	Keep in next plan?
Unincorporated Lucas County	Up-to-date Continuity of Operations Plan	Ongoing	ADLM Emergency Management supports cities in developing plan	Yes
	Constructing a Safe Rooms or shelters at camping sites	Continue- Not Started	Lack of funding	Yes
	Other accomplishments:		Iowa DNR is working to ID abandon mines & potential sinkholes; County PH has current mass casualty plan; Radon testing kits available at ADLM Env. Health; Active shooter trainings at courthouse; annual trimming along county roads; snow fences installed by state roads dept;	
Chariton	Update search & rescue training and equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	Yes
	Safe room at the school and/or hospital	Continue- Not Started	Lack of funding	Yes
	New Storm shelter at Northwest Park	Continue- Not Started	Lack of funding	Yes
	Improvements to Storm Water System ordinance & system	In progress	Ongoing system improvements; existing ordinance prohibiting illicit connections;	Yes
	Other accomplishments:		Good standing with NFIP participation: Active shooter trainings at school bldgs. & hospital; trash service required; building code enforcement by FT officer; Radon testing kits available at ADLM Env. Health; expansion of broadband services; Hospital conducts mass casualty training annually; Fairgrounds has "weather shelter"; Hospital has new generators; there is a berm around the sewer treatment plant; sidewalks improved near Van Allen School bldg.; current ordinance prohibits burning; city sponsors hazardous materials clean up drive; exploring options to bury power lines around Square; have received 'Downtown Revitalization' grants for rehab buildings; generators available to the school bldgs.; school preforms occasional radon testing;	
Derby	Acquisition & installation of storm warning sirens	Continue- Not started	Lack of funding	Yes
	Generators for emergency shelter site	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health; expansion of broadband services;	
City of Lucas	Generator for emergency shelter site	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Good standing with NFIP participation: Radon testing kits available at ADLM Env. Health; expansion of broadband	

			services;	
Russell	Generators for emergency shelter site	Continue- Not Started	No progress – lack of funding	Yes
	Acquisition & installation of storm warning sirens	Continue-Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Trash service required; Radon testing kits available at ADLM Env. Health; expansion of broadband services; removal of several dilapidated structures;	
Williamson	Acquisition & installation of storm warning sirens	Continue- Not Started	No progress – lack of funding	Yes
	Updating search and rescue training and equipment for first responders		Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology.	
	Other accomplishments:		Radon testing kits available at ADLM Env. Health; expansion of broadband services;	

Monroe County Jurisdiction Mitigation Action Summary

Exhibit 191: Priority Mitigation Action results per Jurisdiction

Jurisdiction	Action Title	2018 Action Status	Comments/Notes	Keep in next plan?
Unincorporated Monroe County	Public education and outreach of warnings and self-protection	Ongoing	National Weather Service promotes; Fire Dept visits schools & buildings; FEMA has multiple promotions;	Yes
	Develop & maintain emergency response team for post-disaster	Ongoing	Local fire departments ID as recovery teams;	Yes
	Continuity of Operations Plan for post disaster	Ongoing	ADLM Emergency Management supports cities in developing plan	Yes
	Encourage residents obtaining weather radios	Ongoing	Residents' responsibility	Yes
	Maintain a current evacuation plan for public buildings, schools, and cities.	Ongoing	Schools confirm plans annually; public buildings are required to post;	Yes
	Other accomplishments:		Active shooter trainings at courthouse; recently updated zoning codes; Radon testing kits available at ADLM Env. Health; annual installation of snow fences; expansion of broadband services; New security cameras at courthouse; New County website; annual trimming along county roads; floodplain enforcement occurs through countywide zoning; school conducts radon testing every 3yrs; Hospital conducts mass casualty training annually; Iowa DNR is working to ID abandon mines & potential sinkholes;	
Albia	Acquisition & installation of storm warning sirens	Continue- Not Started		Yes
	Develop a community response team	Ongoing	Local fire departments ID as recovery teams;	Yes
	Update search & rescue training and equipment for first responders	Ongoing	Up-to-date education is an ongoing process. Equipment continually needs updated and replaced with more efficient technology; new fire truck;	Yes
	Other accomplishments:		Active shooter trainings at school bldgs. & hospital; fire dept received grant to distribute free weather radios; city in process of replacing water/sewer lines; city & utility companies provide tree trimming; building code enforcement with PT officer; in process of updating codes & ordinances; Radon testing kits available at ADLM Env. Health; Removal of several dilapidated structures & rehabilitation of several others; Alliant began burying power lines; expansion of broadband services; REC buried some power lines in Industrial Park.	
Lovilia	Installation of generators for storm shelter site	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health; expansion of broadband services;	
Melrose	Installation of generators for critical facilities/emergency storm shelter site	Continue- Not Started	No progress – lack of funding	Yes
	Other accomplishments:		Radon testing kits available at ADLM Env. Health; expansion of broadband services;	

Mitigation Strategy

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 committee 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.

Actions toward the top of the list should be where the Region/County's mitigation efforts should be directed, however where opportunities to pursue lower ranked actions arise, they should be taken so long as they do not preclude taking an action with a broader positive impact is possible. For example, if grant funds for a project are available that would address an action ranked near the middle of the spectrum, then the County or any jurisdiction should pursue the grant opportunity. If such a grant opportunity is presented and it could be used for two or more identified actions, then it should be directed toward the highest ranked of the potential projects where practicable.

Each action is profiled along similar lines as the hazards. Each action profile contains a description of the action, estimated cost with either an approximate dollar amount or listed as voluntary, minimal, moderate, or high. These categories are loosely defined as follows.

- Voluntary – reliant on donated time or resources
- Minimal – little or no cost, may be a nominal increase in day-to-day activities.
- Moderate – would likely require outside funds potentially from multiple sources or potential tax / fee increases.
- High – would require outside funds such as in the form of grant programs through State or Federal agencies

Prevention: Government administrative or regulatory measures or processes that influence the way land and buildings are developed and built. These measures also include public actions to reduce hazard losses to property and human health impacts. Examples include:

- Hazard mapping
- Studies/data collection and analysis to support prevention measures.
- Floodplain regulations
- Multi-jurisdictional agreements that reduce hazard risks
- Other regulatory measures or processes that reduce hazard risks.

Property Protection: Measures that involve modifying existing buildings or structures to protect them from a hazard, or removing buildings or structures from the hazard area, or providing insurance to cover potential losses. Examples include:

- Acquisition, elevation, or relocation of hazard-prone property
- Safe room/storm shelter retrofits
- Critical facility protection

- Risk reduction retrofits (modifications) to hazard prone properties.
- Studies/data collection and analysis to develop property protection measures.
- Continued National Flood Insurance Program (NFIP) participation

Public Education and Awareness: Measures to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Examples include:

- Programs to improve awareness of hazard risk.
- Programs to improve awareness of hazard risk prevention and reduction.
- Education programs directed toward specialized audience, i.e., buildings, developers, and hazard prone neighborhoods

Natural Resource Protection: Measures that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. Examples include:

- Sensitive areas ordinance (development restrictions)
- Stream corridor restoration, watershed management
- Forest and vegetation management
- Wetland restoration and preservation

Emergency Services: Measures taken before, during and after a hazard event to protect people, and property; although these measures are not typically considered “mitigation, they significantly minimize the events impact and preserve the community’s health and safety. Examples include:

- Emergency response facilities and personnel
- Hazard warning systems and equipment
- Health, safety, environmental risk prevention or reduction
- Emergency response infrastructure, equipment, planning, or training
- Emergency response services studies and data collection
- Emergency response communication systems

Structural Projects: These are measures that involve the construction and maintenance of structures and infrastructure that will reduce the impact of a hazard or redirect the impact away from people and property. Examples include:

- Channel modification/maintenance
- Dam and reservoir construction/maintenance
- Levee and floodwall construction and maintenance
- Safe room or storm shelter construction
- Infrastructure construction and maintenance
- Studies and data collection to develop structural projects.

Identification and Analysis of Mitigation Actions

During the first meeting the HMPC was reminded of the purpose of Hazard Mitigation planning and reviewed hazard risk assessment updates and data collection. Each jurisdiction was mailed a packet of information regarding the update to the Hazard Mitigation Plan in February of 2021. The packet included

in the previous hazard mitigation strategies and requested representatives to indicated accomplishments. The status updates were provided via mail correspondence and HMP committee meetings.

When evaluating new mitigation strategies, members were able to consider the previous mitigation strategies as well as new mitigation options that were provided in: Validated plan goals, previous actions from 2016 Plan, Key Issues from Risk Assessment, FEMA’s Mitigation Ideas Booklet, State Priorities for Hazard Mitigation Assistance Grants, and public opinion survey. Discussions were held to identify possible gaps that may exist between any problems identified and actions already developed to address it if any other potential options were recommended in FEMA’s booklet. After considering all options, jurisdictions reviewed the materials to determine the final mitigation strategies for the plan update.

The jurisdictions were encouraged to be comprehensive and include all appropriate actions to work toward become more disaster resistant. Members were encouraged to maintain a realistic approach and remember that this “living document” will need to be updated as items are change, are accomplished, and may need deleted. Members were also instructed to consider the potential cost of each project in relation to the anticipated future cost savings.

Committee members worked to select mitigation strategies for each corresponding potential hazard and how the strategy will help accomplished the goals outlined in the plan. Below are the approved goals and the selected mitigation strategies to move towards accomplishing the goals:

2021 ADLM Regional HMP Goals & Strategies

1. Protect the health and safety of residents, visitors, staff, and emergency personnel (paid and volunteer) during hazard events.

Objective 1.1

Seek mitigation projects that provide the highest degree of hazard protection at the least cost.

- Strategy 1.1A: Develop, update & publicize Continuity of Operations Plan
- Strategy 1.1B: Public Education & Outreach of Warnings and encourage self-protection.
- Strategy 1.1C: Establish & Maintain Community Emergency Response Team
- Strategy 1.1D: Maintain local Hazardous Materials Capabilities
- Strategy 1.1E: Establish Hazardous Materials Protection for Storm Shelters
- Strategy 1.1F: Maintain Current Evacuation Plans
- Strategy 1.1G: Up-to-Date Search & Rescue Training and Equipment for First Responders
- Strategy 1.1H: Promote & Educate residents on Digging Hotline/Pipeline Safety Regulations
- Strategy 1.1I: Temporary Debris Disposal Plan
- Strategy 1.1J: Provide data collection for Expanded Hazard Area Mapping OF Mine Locations, abandon wells & sinkholes.
- Strategy 1.1K: Develop Mass Casualty Preparation procedures
- Strategy 1.1L: Evaluate all early storm warning sirens for proper coverage. Purchase & update as needed.
- Strategy 1.1M: Encourage citizens to create family preparedness kits & all hazards Weather Radios.
- Strategy 1.1N: Residents have Surge Protection/Lightning Protection
- Strategy 1.1O: Burying Power Lines
- Strategy 1.1P: Participation in Community Rating System for Flooding
- Strategy 1.1Q: Flood Proofing of Properties
- Strategy 1.1R: Make improvements to existing stormwater and sewer systems which may include elevating and/or protecting.
- Strategy 1.1S: Purchase mobile generators and make available to any shelter sites and other critical infrastructure locations.
- Strategy 1.1T: Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.
- Strategy 1.1U: Establish Natural & Artificial Snow Fences/Barrier
- Strategy 1.1V: Regular Maintenance of Heating & Cooling Systems
- Strategy 1.1W: Tree Management/Trimming
- Strategy 1.1X: Collection & Protection of Vital Records by private residents
- Strategy 1.1Y: Acquisition or Relocation of repetitive loss Buildings in Floodplain
- Strategy 1.1Z: Hazardous Material Disposal Program
- Strategy 1.1AA: Develop Safe Rooms in School, Mobile Home Parks, Campgrounds, Fairgrounds, and other critical public facilities.
- Strategy 1.1BB: Identify and remove derelict, unsafe or structurally unsound buildings in the region and all jurisdictions to reduce safety concerns of collapse.
- Strategy 1.1CC: Review Floodplain Management for Effectiveness
- Strategy 1.1DD: Flood Insurance by Homeowners
- Strategy 1.1EE: Evaluate & Rehabilitate Older Buildings when feasible.
- Strategy 1.1FF: Jurisdictions & residents establish water Storage Saving Plan & Reduce Usage
- Strategy 1.1GG: Evaluate/Maintain/Repair conditions of Area Dams.
- Strategy 1.1HH: Encourage Smoke/Fire/ Carbon Monoxide Detectors & sprinkler systems.
- Strategy 1.1II: Immunization plans FOR Emergency clinics & regularly scheduled.
- Strategy 1.1JJ: Pest Management through Property Regulations
- Strategy 1.1KK: Promote Radon/Lead Mitigation
- Strategy 1.1LL: Critical Infrastructure Protection from Terrorism
- Strategy 1.1MM: Assessment Risk for Terrorism
- Strategy 1.1NN: Jurisdictions establish Manufactured Home Tie-Down Regulation/Ordinance
- Strategy 1.1OO: Jurisdictions establish & implement Building Code Enforcement
- Strategy 1.1PP Encourage compliance with National Flood Insurance Program (NFIP)
- Strategy 1.1QQ: Jurisdictions Establish Burning Restrictions
- Strategy 1.1RR: Private Fireplace Maintenance
- Strategy 1.1SS: Jurisdictional Waste Disposal Enforcement
- Strategy 1.1TT: Develop local process for Hazard Occurrence Data Collection & Reporting System

plans.

Strategy NEW 1.1UU: Pursue the construction of flood protection infrastructure in affected areas by implementing watershed plans & developing strategically placed watersheds.

Strategy NEW 1.1VV: Improve sidewalks around public schools to increase public safety.

Strategy NEW 1.1WW: Remove debris from areas prone to flash flooding.

Strategy NEW 1.1XX: Follow County & jurisdictional infrastructure studies that identify repairs or replacement to culverts, ditches, and bridges capable of meeting flow requirements.

Strategy NEW 1.1YY: Establish an inventory of dams with Emergency Action Plans and promote creation of such plans.

Strategy NEW 1.1ZZ: Remove asbestos from all public buildings.

Strategy NEW 1.1AAA: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.

Strategy NEW 1.1BBB: Install proper generator hook ups for generators at shelter sites to ensure power.

Strategy 1.1CCC: Maintain, improve, and protect public buildings, facilities & utilities against all hazards.

Strategy 1.1DDD: Identify derelict, unsafe or structurally unsound buildings in the county & jurisdictions and remove them to reduce safety concerns associated with collapse.

Strategy 1.1EEE: Make improvements to existing storm water and sewer systems.

Strategy 1.1FFF: Health emergency plans for immunization process- scheduled & emergency situations.

Strategy 1.1GGG: Storm Water Management ordinance preventing illicit connections.

Objective 1.2

Strengthen partnerships and collaboration of jurisdictions, as well as invite corporate partners, education systems, agencies, and faith-based representatives to participate in emergency planning and recovery.

Strategy 1.2A: Develop, update & publicize Continuity of Operations Plan

Strategy 1.2B: Public Education & Outreach of Warnings and encourage self-protection.

Strategy 1.2C: Establish & maintain Community Emergency Response Team

Strategy 1.2D: Maintain Local Hazardous Materials Capabilities

Strategy 1.2E: Establish Hazardous Materials Protection for Storm Shelters

Strategy 1.2F: Maintain Current Evacuation Plans

Strategy 1.2G: Provide up-to-date Search & Rescue Training and Equipment for First Responders

Strategy 1.2H: Promote & educate residents on Digging Hotline/Pipeline Safety Regulations

Strategy 1.2I: Temporary Debris Disposal Plan

Strategy 1.2J: Provide data collection for Expanded Hazard Area Mapping OF Mine Locations, abandon wells and sink holes.

2. Minimize losses to existing and future structures in hazard areas. Critical facilities are priority structures.

Objective 2.1

Ensure that property owners can maintain & improve their properties to reduce hazard effects.

Strategy 2.1A: Develop, update & publicize Continuity of Operations Plan

Strategy 2.1B: Public Education & Outreach of Warnings and encourage self-protection.

Strategy 2.1C: Establish & maintain Community Emergency Response Team

Strategy 2.1D: Maintain Local Hazardous Materials Capabilities

Strategy 2.1E: Establish Hazardous Materials Protection for Storm Shelters

Strategy 2.1F: Maintain Current Evacuation Plans

Strategy 2.1G: Up-to-date Search & Rescue Training and Equipment for First Responders

Strategy 2.1H: Promote & educate residents on Digging Hotline/Pipeline Safety Regulations

Strategy 2.1I: Temporary Debris Disposal Plan

Strategy 2.1J: Provide data collection for Expanded Hazard Area Mapping OF Mine Locations, abandon wells & sinkholes.

Strategy 2.1K: Residents should have Surge Protection/Lightning Protection

Strategy 2.1L: Hazardous Material Disposal Program

Strategy 2.1M: Regular Maintenance of Heating & Cooling Systems

Strategy 2.1N: Encourage citizens to create family preparedness kits & have NOAA all hazards Weather Radios.

Strategy 2.1O: Encourage resident to have Surge Protection/Lightning Protection

Strategy 2.1P: Establish Natural & Artificial Snow Fences/Barriers

Strategy 2.1Q: Collection & Protection of Vital Records by private residents

Strategy 2.1R: Jurisdictions & residents establish Water Storage Saving Plan & Reduce Usage

NEW 2.1S: Pursue the construction of flood protection infrastructure in affected areas by implementing watershed plans & developing strategically placed watersheds.

Strategy NEW 2.1T: Improve sidewalks around public schools to increase public safety.

Strategy NEW 2.1U: Remove debris from areas prone to flash flooding.
Strategy NEW 2.1V: Follow County & jurisdictional infrastructure studies that identify repairs or replacement to culverts, ditches, and bridges capable of meeting flow requirements.
Strategy NEW 2.1W: Establish an inventory of dams with Emergency Action Plans and promote creation of such plans.
Strategy NEW 2.1X: Remove asbestos from all public buildings.
Strategy NEW 2.1Y: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.
Strategy 2.1Z: Maintain, improve, and protect public buildings, facilities & utilities against all hazards.
Strategy 2.1AA: Identify derelict, unsafe or structurally unsound buildings in the county & jurisdictions and remove them to reduce safety concerns associated with collapse.
Strategy 2.1BB: Storm Water Management ordinance preventing illicit connections.

Objective 2.2

Ensure that disaster recovery can proceed promptly following a disaster.

Strategy 2.2A: Develop, update & publicize Continuity of Operations Plan
Strategy 2.2B: Public Education & Outreach of Warnings and encourage self-protection.
Strategy 2.2C: Establish & maintain Community Emergency Response Team
Strategy 2.2D: Maintain Local Hazardous Materials Capabilities
Strategy 2.2E: Establish Hazardous Materials Protection for Storm Shelters
Strategy 2.2F: Maintain Current Evacuation Plans
Strategy 2.2G: Provide Up-to-date Search & Rescue Training and Equipment for First Responders
Strategy 2.2H: Temporary Debris Disposal Plan
Strategy 2.2I: Purchase mobile generators and make available to any shelter sites and other critical infrastructure locations.
Strategy NEW 2.2J: Install proper generator hook ups for generators at shelter sites to ensure power.
Strategy 2.2K: Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.
Strategy 2.2L: Collection & Protection of Vital Records by private residents
Strategy 2.2M: Jurisdictions & residents establish Water Storage Saving Plan & Reduce Usage
Strategy 2.2N: Immunization plans for Emergency clinics & regularly Scheduled.
Strategy 2.2O: Jurisdictional Waste Disposal Enforcement
Strategy NEW 2.2P: Establish an inventory of dams with Emergency Action Plans and promote creation of such plans.
Strategy NEW 2.2Q: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.
Strategy 2.2R: Health emergency plans for immunization process- scheduled & emergency situations.

Objective 2.3

Provide back-up energy supplies in all vital assets identified in this plan.

Strategy 2.3A: Develop, update & publicize Continuity of Operations Plan
Strategy 2.3B: Public Education & Outreach of Warnings and encourage self-protection.
Strategy 2.3C: Establish & maintain Community Emergency Response Team
Strategy 2.3D: Maintain Local Hazardous Materials Capabilities
Strategy 2.3E: Establish Hazardous Materials Protection for Storm Shelters
Strategy 2.3F: Maintain Current Evacuation Plans
Strategy 2.3G: Provide up-to-date Search & Rescue Training and Equipment for First Responders
Strategy 2.3H: Residents should have Surge Protection/Lightning Protection
Strategy 2.3I: Purchase mobile generators and make available to any shelter sites and other critical infrastructure locations.
Strategy 2.3J NEW: Install proper generator hook ups for generators at shelter sites to ensure power.
Strategy 2.3K: Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.
Strategy 2.3L: Tree Management/Trimming
Strategy 2.3M: Jurisdictions & residents establish Water Storage Saving Plan & Reduce Usage

Objective 2.4

Promote improving zoning codes, building codes, nuisance abatement, and health codes, especially in relation to areas with older buildings.

Strategy 2.4A: Promote & educate residents on Digging Hotline/Pipeline Safety Regulations
Strategy 2.4B: Flood Proofing of Properties

Strategy 2.4C: Make improvements to existing stormwater and sewer systems which may include elevating and/or protecting.

Strategy 2.4D: Tree Management/Trimming

Strategy 2.4E: Acquisition or Relocation of Repetitive Loss Buildings in Floodplain

Strategy 2.4F: Identify and remove derelict, unsafe or structurally unsound buildings in the region and all jurisdictions to reduce safety concerns of collapse.

Strategy 2.4G: Evaluate Rehabilitate Older Buildings when feasible.

Strategy 2.4H: Jurisdictions & residents establish Water Storage Saving Plan & Reduce Usage

Strategy 2.4I: Pest Management through Property Regulations

Strategy 2.4J: Promote Radon/Lead Mitigation

Strategy 2.4K: Jurisdictions establish Manufactured Home Tie-Down Regulation/Ordinance

Strategy 2.4L: Jurisdictions establish & implement Building Code Enforcement

Strategy 2.4M: Jurisdictions Establish Burning Restrictions

Strategy 2.4N: Jurisdictional Waste Disposal Enforcement

Strategy NEW 2.4O: Remove asbestos from all public buildings.

Strategy NEW 2.4P: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.

Strategy 2.4Q: Identify derelict, unsafe or structurally unsound buildings in the county & jurisdictions and remove them to reduce safety concerns associated with collapse.

Strategy 2.4R: Storm Water Management ordinance preventing illicit connections.

Objective 2.5

Improve protection of residents & structures from effects of flooding.

Strategy 2.5A: Maintain Current Evacuation Plans

Strategy 2.5B: Provide up-to-date Search & Rescue Training and Equipment for First Responders

Strategy 2.5C: Temporary Debris Disposal Plan

Strategy 2.5D: Encourage citizens to create family preparedness kits and have NOAA all hazards Weather Radios.

Strategy 2.5E: Participation in Community Rating System for Flooding

Strategy 2.5F: Flood Proofing of Properties

Strategy 2.5G: Make improvements to existing stormwater and sewer systems which may include elevating and/or protecting.

Strategy 2.5H: Acquisition or Relocation of Repetitive loss Buildings in Floodplain

Strategy 2.5I: Review Floodplain Management for Effectiveness

Strategy 2.5J: Flood Insurance by Homeowners

Strategy 2.5K: Evaluate/Maintain/Repair conditions of Area Dams.

Strategy NEW 2.5L: Pursue the construction of flood protection infrastructure in affected areas by implementing watershed plans & developing strategically placed watersheds.

Strategy NEW 2.5M: Remove debris from areas prone to flash flooding.

Strategy NEW 2.5N: Follow County & jurisdictional infrastructure studies that identify repairs or replacement to culverts, ditches, and bridges capable of meeting flow requirements.

Strategy NEW 2.5O: Establish an inventory of dams with Emergency Action Plans and promote creation of such plans.

Strategy 2.5P: Make improvements to existing storm water and sewer systems.

3. Maintain local services and infrastructure to reduce community, economic and environmental disruption during and after hazard events.

Objective 3.1

Review & upgrade warning systems and communications for sufficient coverage.

Strategy 3.1A: Develop, update & publicize Continuity of Operations Plan

Strategy 3.1B: Public Education & Outreach of Warnings and encourage self-protection.

Strategy 3.1C: Establish & maintain Community Emergency Response Team

Strategy 3.1D: Evaluate all early storm warning sirens for proper coverage. Purchase & update as needed.

Strategy 3.1E: Encourage citizen to create family preparedness kits and NOAA all hazards Weather Radios.

Objective 3.2

Provide certified shelters/safe rooms.

Strategy 3.2A: Establish Hazardous Materials Protection for Storm Shelters

Strategy 3.2B: Provide up-to-date Search & Rescue Training and Equipment for First Responders

- Strategy 3.2C: Purchase mobile generators and make available to any shelter sites and other critical infrastructure locations.
- Strategy 3.2D: Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.
- Strategy 3.2E: Develop Safe Rooms in School, Mobile Home Parks, Campgrounds, Fairgrounds, and other critical public facilities.

Objective 3.3

Provide adequate training, equipment and exercises to train responding emergency personnel.

- Strategy 3.3A: Develop, update & publicize Continuity of Operations Plan
- Strategy 3.3B: Provide up-to-date Search & Rescue Training and Equipment for First Responders
- Strategy 3.3C: Establish & maintain Community Emergency Response Team
- Strategy 3.3D: Hazardous Material Disposal Program
- Strategy 3.3E: Develop Mass Casualty Preparation procedures
- Strategy 3.3F: Immunization plans FOR Emergency clinics & regularly scheduled.
- Strategy 3.3G: Critical Infrastructure Protection from Terrorism
- Strategy 3.3H: Develop local process for Hazard Occurrence Data Collection & Reporting System
- Strategy 3.3I: Health emergency plans for immunization process- scheduled & emergency situations.

Objective 3.4

Maintain current & create new planning and exercises related to any terrorism event.

- Strategy 3.4A: Develop, update & publicize Continuity of Operations Plan
- Strategy 3.4B: Provide up-to-date Search & Rescue Training and Equipment for First Responders
- Strategy 3.4C: Establish & maintain Community Emergency Response Team
- Strategy 3.4D: Develop Mass Casualty Preparation procedures
- Strategy 3.4E: Critical Infrastructure Protection from Terrorism
- Strategy 3.4F: Assessment Risk for Terrorism

Objective 3.5

Identify and map the greatest risk potential of hazards to determine locations where improvements could be made.

- Strategy 3.5D: Acquisition or Relocation of repetitive loss Buildings in Floodplain
- Strategy 3.5E: Identify and remove derelict, unsafe or structurally unsound buildings in the region and all jurisdictions to reduce safety concerns of collapse.
- Strategy 3.5F: Review Floodplain Management for Effectiveness
- Strategy 3.5G: Evaluate & Rehabilitate Older Buildings when feasible.
- Strategy 3.5H: Evaluate/Maintain/Repair conditions of Area Dams.
- Strategy 3.5I: Pest Management through Property Regulations
- Strategy NEW 3.5J: Pursue the construction of flood protection infrastructure in affected areas by implementing watershed plans & developing strategically placed watersheds.
- Strategy NEW 3.5K: Improve sidewalks around public schools to increase public safety.
- Strategy NEW 3.5L: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.
- Strategy 3.5M: Maintain, improve, and protect public buildings, facilities & utilities against all hazards.
- Strategy 3.5N: Identify derelict, unsafe or structurally unsound buildings in the county & jurisdictions and remove them to reduce safety concerns associated with collapse.
- Strategy 3.5O: Make improvements to existing storm water and sewer systems.

4. Educate residents and visitors about local hazards and the resources available in the community.

Objective 4.1

Educate members of the county about hazards, how to be prepared, & shelter locations.

- Strategy 4.1A: Develop, update & publicize Continuity of Operations Plan
- Strategy 4.1B: Public Education & Outreach of Warnings and encourage self-protection.
- Strategy 4.1C: ESTABLISH & MAINTAIN Community Emergency Response Team
- Strategy 4.1D: Up-to-date Search & Rescue Training and Equipment for First Responders

Strategy 4.1E: Establish Hazardous Materials Protection for Storm Shelters
 Strategy 4.1F: Promote & educate residents on Digging Hotline/Pipeline Safety Regulations
 Strategy 4.1G: Provide up-to-date Search & Rescue Training and Equipment for First Responders
 Strategy 4.1H: Evaluate all early storm warning sirens for proper coverage. Purchase & update as needed.
 Strategy 4.1I: Encourage citizens to create family preparedness kits AND NOAA all hazards Weather Radios.
 Strategy 4.1J: Residents should have Surge Protection/Lightning Protection
 Strategy 4.1K: Establish Natural & Artificial Snow Fences/Barriers
 Strategy 4.1L: Collection & Protection of Vital Records by private residents
 Strategy 4.1M: Develop Safe Rooms in School, Mobile Home Parks, Campgrounds, Fairgrounds, AND other critical public facilities.
 Strategy 4.1N: Encourage Smoke/Fire/ Carbon Monoxide Detectors & sprinkler systems.
 Strategy 4.1O: Promote Radon/Lead Mitigation
 Strategy 4.1P: Jurisdictions Establish Burning Restrictions
 Strategy 4.1Q: Develop local process for Hazard Occurrence Data Collection & Reporting System
 Strategy NEW 4.1R: Establish an inventory of dams with Emergency Action Plans and promote creation of such plans.
 Strategy 4.1S: Health emergency plans for immunization process- scheduled & emergency situations.

5. Apply public funds to hazard mitigation projects in an efficient and fair manner to minimize dependence on Federal resources.

Objective 5.1

Utilize public funds/grant opportunities to protect critical facilities, public services & transportation entities.

Strategy 5.1A: Develop, update & publicize Continuity of Operations Plan
 Strategy 5.1B: Maintain Local Hazardous Materials
 Strategy 5.1C: Provide up-to-date Search & Rescue Training and Equipment for First Responders
 Strategy 5.1D: Evaluate all early storm warning sirens for proper coverage. Purchase & update as needed.
 Strategy 5.1E: Encourage citizens to create family preparedness kits and NOAA all hazards Weather Radios.
 Strategy 5.1F: Residents should have Surge Protection/Lightning Protection
 Strategy 5.1G: Burying Power Lines
 Strategy 5.1H: Make improvements to existing stormwater and sewer systems which may include elevating and/or protecting.
 Strategy 5.1I: Purchase mobile generators and make available to any shelter sites and other critical infrastructure locations.
 NEW 5.1J: Install proper generator hook ups for generators at shelter sites to ensure power.
 Strategy 5.1K: Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.
 Strategy 5.1L: Establish Natural & Artificial Snow Fences/Barriers
 Strategy 5.1M: Acquisition or Relocation of repetitive loss Buildings in Floodplain
 Strategy 5.1N: Develop Safe Rooms in School, Mobile Home Parks, Campgrounds, Fairgrounds, and other critical public facilities.
 Strategy 5.1O: Identify and remove derelict, unsafe or structurally unsound buildings in the region and all jurisdictions to reduce safety concerns of collapse.
 Strategy 5.1P: Evaluate & Rehabilitate Older Buildings when feasible.
 Strategy 5.1Q: Evaluate/Maintain/Repair conditions of Area Dams.
 Strategy 5.1R: Encourage Smoke/Fire/ Carbon Monoxide Detectors & sprinkler systems.
 Strategy 5.1S: Promote Radon/Lead Mitigation
 Strategy 5.1T: Critical Infrastructure Protection from Terrorism
 Strategy NEW 5.1U: Follow County & jurisdictional infrastructure studies that identify repairs or replacement to culverts, ditches, and bridges capable of meeting flow requirements.
 Strategy NEW 5.1V: Continual evaluation and improvements to jurisdictional water lines/mains to ensure proper flow to fire hydrants.

Selected Mitigation Actions

The table below provides the list of selected mitigation actions and which jurisdictions chose it:

<i>Community</i>	<i>Action Title</i>	<i>Responsible Entity</i>	<i>Hazards Addressed</i>	<i>Goal</i>	<i>Priority</i>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co.</p> <p>Lucas County: Chariton, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community School</p>	Designate shelter sites and provide with adequate supplies and overnight accommodations	City councils, BOS, emergency management	Tornado, Windstorm, Thunderstorms and Lightning, Hailstorm	1, 2, 3, 5	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Maintain, improve, and protect public buildings, facilities, and utilities against all hazards	Private property owners, City Councils, BOS,	River Flooding, Severe Winter Storm, Tornado, Windstorm, Thunderstorms and Lightning, Hailstorm, Flash Flood, Drought, Extreme Heat, Grass/Wildland Fire, Dam Failure, Earthquake, Expansive Soils, Landslide, Sinkholes	1, 2, 3	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p>	Pursue the construction of flood protection infrastructure in affected areas	City Councils, BOS	River Flooding, Flash Flood	1, 2, 3	M

<p>Davis County: Bloomfield, Davis Co Schools, Floris, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools,</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>					
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Install proper generator hookups at designated shelter sites to ensure shelters can support generator power</p>	<p>City Councils/BOS, critical facility property owners, Fire Departments</p>	<p>Dam/Levee Failure; Drought; Earthquake; Extreme Heat; Flash Flood; Grass/Wildland Fire; Hazardous Materials Incident; Infrastructure Failure; River Flooding; Severe Winter Storm. Thunderstorm/Lightning/Hail; Tornado/Windstorm</p>	<p>1, 2, 5</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Albia Community School, Lovilia, Melrose, Unincorporated County</p>	<p>Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power</p>	<p>City Councils/BOS, critical facility property owners, Fire Departments</p>	<p>Dam/Levee Failure; Earthquake; Extreme Heat; Flash Flood; Grass/Wildland Fire; Hazardous Materials Incident; Infrastructure Failure; River Flooding; Severe Winter Storm. Thunderstorm/Lightning/Hail; Tornado/Windstorm</p>	<p>1, 2, 3, 5</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools,</p>	<p>Develop safe rooms in schools and critical public facilities</p>	<p>City Councils/BOS, critical facility</p>	<p>Tornado, Windstorm, Thunderstorms and Lightning, Hailstorm</p>	<p>1, 3, 4, 5</p>	<p>M</p>

<p>Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>		<p>property owners, school systems, hospitals</p>			
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Identify derelict, unsafe or structurally unsound buildings in the County and its communities and remove them to reduce safety concerns associated with collapse</p>	<p>City Councils/BOS, private property owners, Environmental Health</p>	<p>Earthquake; Infrastructure Failure; Severe Winter Storm; Thunderstorm/Lightning/Hail; Tornado/Windstorm</p>	<p>1, 2, 3</p>	<p>M</p>
<p>Appanoose County: Centerville, Moulton, Mystic, Rathbun, Unincorp Co</p> <p>Davis County: Bloomfield, Floris, Unincorp Co</p> <p>Lucas County: Chariton, Lucas, Russell, Unincorp County,</p> <p>Monroe County: Melrose, Unincorporated County</p>	<p>Acquisition or relocation of repetitive loss buildings in floodplain</p>	<p>City Councils/BOS</p>	<p>River Flooding</p>	<p>1, 2, 3, 5</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville,</p>	<p>Encourage citizens to create family preparedness kits & have all hazards radio</p>	<p>Residents, Emergency Management, Fire Departments, etc</p>	<p>Animal/Plant/Crop Disease; Dam/Levee Failure; Drought; Earthquake; Expansive Soils; Extreme Heat; Flash Flood; Grass/Wildland Fire; Hazardous Materials</p>	<p>1, 2, 3, 4, 5</p>	<p>M</p>

<p>Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski,</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>			<p>Incident; Human Disease; Infrastructure Failure; Landslide; Radiological Incident; River Flooding; Severe Winter Storm; Sinkholes; Terrorism; Thunderstorm/Lightning/Hail. Tornado/Windstorm; Transportation Incident</p>		
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski,</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Provide data collection for expanded hazard area mapping of mine locations, abandon wells and sinkholes</p>	<p>Residents, City Councils, BOS, IDNR</p>	<p>Sinkholes</p>	<p>1, 2</p>	<p>L</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Moravia, Moulton, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools,</p> <p>Lucas County: Chariton, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Albia Community Schools</p>	<p>Improve sidewalks around public schools to increase public safety</p>	<p>Private homeowners, city councils, school districts</p>	<p>Transportation Incident</p>	<p>1, 2, 3</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville,</p>	<p>Remove debris from areas prone to flash flooding</p>	<p>City Councils, BOS, Road/Maintenance Depr</p>	<p>Flash Flood</p>	<p>1, 2</p>	<p>H</p>

<p>Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski,</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>					
<p>Appanoose County: Centerville, Mystic, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Floris, Unincorp Co</p> <p>Lucas County: Chariton, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Melrose, Unincorporated County</p>	Encourage compliance in the National Flood Insurance Program (NFIP)	City Councils, BOS	River Flooding, Flash Flood	1	H
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Make improvements to existing storm water and sewer systems	City Councils, Environmental Health	River Flooding, Severe Winter Storm, Thunderstorms and Lightning, Flash Flood, Expansive Soils	1, 2, 3	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p>	Follow county & jurisdictional infrastructure studies that identify repairs or replacement to culverts, ditches, and bridges to improve flow requirements	City Councils, BOS	Infrastructure Failure; River Flooding; Flash Flooding	1, 2, 5	M

<p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>					
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville,</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose</p>	<p>Evaluate all early storm warning sirens for proper coverage. Purchase & update as needed.</p>	<p>Fire Departments/ First Responders, City Councils, Emergency management</p>	<p>Tornado/Windstorm. Thunderstorm/Lightning/Hail</p>	<p>1, 3, 4, 5</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community Schools</p>	<p>Public Education & Outreach of warnings & self-protection</p>	<p>Emergency management, public health, environmental health, city councils, residents</p>	<p>Flash flood, thunderstorm / lightning, Infrastructure failure, severe winter storm, hazardous materials incident, transportation incident, Windstorm/High Wind Event, river flooding, tornado, hailstorm, dam failure, sink hole, human disease incident, earthquake,</p>	<p>1, 2, 3, 4</p>	<p>H</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano,</p>	<p>Develop, update, & publicize continuity of operations plan</p>	<p>Local government, City council, BOS</p>	<p>Flash Flooding, thunderstorm / lightning, Infrastructure Failure, severe winter storm, hazardous materials incident, transportation incident,</p>	<p>1, 2, 3, 4, 5</p>	<p>H</p>

<p>Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School,</p> <p>Davis County: Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>			<p>Windstorm/High Wind Event River flooding, tornado, hailstorm, dam failure, sink hole, human disease incident, earthquake</p>		
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Up-to-date Search & Rescue Training and equipment for First Responders</p>	<p>Fire Departments, First Responders, Local hospitals, city councils</p>	<p>Flash Flooding, Infrastructure Failure, Severe Winter Storm, Hazardous Materials Incident, Transportation Incident, River Flooding, Tornado, Windstorm/High Wind Event, Dam Failure, Sink Holes, Earthquake, Landslide</p>	<p>1, 2, 3, 4, 5</p>	<p>H</p>
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County; Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Flood proofing of properties</p>	<p>Private property owners</p>	<p>Flash Flooding, river flooding</p>	<p>1, 2</p>	<p>L</p>
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p>	<p>Develop & maintain a current plan for Mass Casualty Preparation & Up-to-date training</p>	<p>Emergency management, city councils, first responders</p>	<p>Flash Flooding, Infrastructure Failure, Severe Winter Storm, Hazardous Materials Incident, Transportation Incident, River Flooding, Tornado, Human</p>	<p>1, 3</p>	<p>M</p>

<p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson,</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>			<p>Disease Incident, Dam Failure, Sink Holes, Earthquake</p>		
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community Schools</p>	<p>Encourage Smoke/ Fire/ Carbon Monoxide Detectors & sprinkler systems</p>	<p>Private property owners, city councils, fire departments</p>	<p>Infrastructure Failure, Structure fire,</p>	<p>1, 5</p>	<p>H</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community Schools</p>	<p>Designate shelter sites (including heating/cooling shelters) and provide with adequate supplies and overnight accommodations.</p>	<p>Emergency Management, City Councils,</p>	<p>Flash Flooding, thunderstorm / lightning, Infrastructure failure, severe winter storm, hazardous materials, Windstorm/High Wind Event, tornado, hailstorm, sink hole, earthquake</p>	<p>1, 2, 3, 5</p>	<p>M</p>

<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Flood Insurance by property owners</p>	<p>Private Property owners</p>	<p>Flash Flooding, river flooding</p>	<p>1, 2</p>	<p>H</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community Schools</p>	<p>Regula maintenance of Heating/ cooling systems</p>	<p>Private Property owners</p>		<p>1, 2</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County:</p>	<p>Collection & Protection of Vital Records by private residents</p>	<p>Local residents</p>	<p>Flash Flooding, Thunderstorm / Lightning, Infrastructure Failure, Severe Winter Storm, Hazardous Materials Incident, Transportation Incident, Windstorm/High Wind Event, River Flooding, Tornado, Hailstorm, Dam Failure, Sink Hole, Extreme Heat, Human Disease Incident, Earthquake, Landslide</p>	<p>1, 2, 4</p>	<p>L</p>

Chariton, Derby, Lucas, Russell, Unincorp County, Williamson Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community Schools					
Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community School	Promote & educate on Digging hotline/ pipeline safety regulations of pipelines education	City councils, BOS, pipeline companies,	Flash Flooding, tornado, sinkholes, pipeline,	1, 2, 4	M
Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools Monroe County; Albia, Lovilia, Melrose, Albia Community School	Health emergency plans for Immunization process – scheduled & emergency situations	Public health	Human Disease, Pandemic	1, 2, 3, 4	M
Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano,	Develop local process for Hazard Occurrence Data Collection & reporting	Emergency management	ALL	1, 3, 4	L

<p>Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>					
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Tree Management/ Trimming by homeowners, utilities & county</p>	<p>Private companies, private property owners, city maintenance department</p>	<p>Infrastructure Failure, Severe winter storm, Windstorm/High Wind Event</p>	<p>1, 2</p>	<p>M</p>
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County, Albia Community School</p>	<p>Residents should have Surge Protection/ Lightning Protection</p>	<p>Residents</p>	<p>Thunderstorm / Lightning, Communications Failure, Infrastructure failure</p>	<p>2, 4, 5</p>	<p>L</p>
<p>Appanoose County: Centerville, Mystic, Rathbun, Unincorp Co</p>	<p>Evaluate/ maintain/ repair area dams</p>	<p>IDNR, BOS, City Councils,</p>	<p>Flash Flooding, Infrastructure Failure, River Flooding, Dam Failure</p>	<p>1, 2, 3, 5</p>	<p>H</p>

<p>Davis County: Bloomfield, Unincorp Co</p> <p>Lucas County: Chariton, Lucas, Unincorp County,</p> <p>Monroe County: Unincorporated County</p>					
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Jurisdictions establish Burning Restrictions	City Councils, BOS	Infrastructure, Hazardous Materials, Land & Wildfire	1, 2, 4	M
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Jurisdictional Waste Disposal Enforcement	City Councils, BOS	Windstorm/High Wind Event, Hazardous Materials Incident, Tornado, Human Disease Incident	1, 2	L
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p>	Jurisdictions establish Manufactured Home Tie-Down's regulation/ordinance	City Councils, BOS, Zoning Commissions	Infrastructure failure, river flooding, tornado, Windstorm/High Wind Events	1, 2	L

Monroe County: Albia, Lovilia, Melrose, Unincorporated County					
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County; Albia, Lovilia, Melrose, Unincorporated County</p>	Jurisdictions establish & implement Building Code Enforcement	City Councils, BOS, Zoning Commissions	Severe winter storm, structural failure, structural fire, Human disease pandemic, Human disease incident, earthquake,	1, 2	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Promote Radon/Lead Mitigation	Public Health	Human Disease	1, 2, 4, 5	M
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson,</p>	Jurisdictions and residents establish Water Storage Saving Plan to reduce usage	City Councils, residents	Infrastructure Fire, Drought	1, 2	L

Monroe County: Albia, Lovilia, Melrose, Unincorporated County					
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose,</p>	Storm water Management ordinance preventing illicit connections	City Councils, BOS, Zoning Commissions	Flash Flooding, Thunderstorm / Lightning, Severe Winter Storm, River Flooding, Sink Holes	1, 2	L
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Hazardous Materials Protection for Storm Shelters	City Councils, BOS,	hazardous materials, transportation incident, Infrastructure Failure, human disease incident	1, 2, 3, 4	M
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p>	Establish natural and artificial Snow Fences/ Barriers on open roadways prone to drift	City Councils, BOS, Street/Roads Dept	Severe Winter Storms, Windstorm/High Wind Event	1, 2, 4, 5	L

Monroe County: Albia, Lovilia, Melrose, Unincorporated County					
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Assessment Risk for Terrorism	City Councils, BOS, Emergency Management,	All forms of terrorisms	1, 3	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County: Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson, Chariton Community Schools</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	Hazardous Material Disposal Program	Public Health, City Councils	hazardous materials, transportation incident, Infrastructure Failure, human disease incident	1, 2, 3	M
<p>Appanoose County: Centerville, Centerville Community Schools, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Moulton-Udell Community School, Moravia School, Unincorp Co</p> <p>Davis County:</p>	Establish & maintain Local Hazardous Materials Capabilities	Public Health, City Councils, First Responders	hazardous materials, transportation incident, Infrastructure Failure, human disease incident	1, 2	M

<p>Bloomfield, Davis Co Schools, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>					
<p>Appanoose County: Centerville, Cincinnati, Exline, Moravia, Moulton, Mystic, Plano, Rathbun, Udell, Unionville, Unincorp Co</p> <p>Davis County: Bloomfield, Drakesville, Floris, Pulaski, Unincorp Co</p> <p>Lucas County: Chariton, Derby, Lucas, Russell, Unincorp County, Williamson</p> <p>Monroe County: Albia, Lovilia, Melrose, Unincorporated County</p>	<p>Bury Powerlines</p>	<p>Private Companies, City Councils</p>	<p>Thunderstorm / Lightning, Infrastructure Failure, Hazardous Materials, Transportation Incident,</p>		<p>L</p>

Implementation of Mitigation Actions

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 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.

Prioritized Mitigation Activities

Mitigation actions were evaluated by various factors as previously mentioned; each of the factors was assigned a numerical value to aid in ranking the actions according to their anticipated positive impacts and drawbacks. The numerical values that were substituted in for estimated cost and timelines are as follows.

Number of Hazard:

- Number of hazards that the mitigation strategy applies to and each it is worth one point toward that strategy.

Cost:

- Voluntary (+1) – reliant on donated time or resources
- Minimal (0)– little or no cost, may be a nominal increase in day-to-day activities.
- Moderate (-1) – would likely require outside funds potentially from multiple sources or potential tax / fee increases.
- High (-2)– would require outside funds such as in the form of grant programs through State or Federal agencies

Priority:

- High priority +2pt
- Medium priority +1pt
- Low priority 0

Timeline:

- Ongoing (+1) – activities that are currently in practice or are suspected to have been implemented previously.
- Short Term (1-2yrs) (0) – relatively low cost, low complexity activities that may be implemented in the next year.
- Medium Term (3-5yrs) (-1)– low to modest cost activities that may require more effort and / or time to properly implement such as review of regulatory measures for effectiveness or development of new regulations or programs, implementable within a period of 5 years and likely within 2-3 years.
- Long Term (5+yrs) (-2)– high cost and time-intensive activities that require outside funds, significant administrative investment (temporary or permanent), and generally involve construction, anticipated to take 5 years or more from time of initial planning to securing funding to completion of activity.

Require Political Support?

- Yes 0pts
- No +1pt

Protect Life and/or Prevent Injuries?

- Yes +1pt
- No 0pt

Will it reduce or eliminate damage to structures or infrastructure?

- Yes +1pt
- No 0pts

This ranking system is crude, but it helps to organize the actions in a way that begins to show a prioritization of what can provide the biggest positive impact for the effort required to implement them. A more sophisticated ranking system may include weighting for various factors depending on community priorities and concerns.

The composite ranking of mitigation actions is as follows:

Appanoose County Mitigation Priorities

1. Encourage compliance with National Flood Insurance Program (NFIP)
2. Develop/Implement storm water management ordinance preventing illicit connections.
3. Educate residents to develop a water storage savings plan to reduce usage.
4. Jurisdictions conduct annual risk assessments for terrorism.
5. Ensure current health emergency plans for mass immunizations process (scheduled & emergency)
6. Promote digging hotline/pipeline safety regulations & education.
7. Evaluate/Replace municipal sirens and implement system upgrades.
8. Improve sidewalks around public schools to increase public safety.
9. Develop safe rooms in schools & critical public facilities.
10. Jurisdictions install snow fences/barriers on open roadways prone to drifting.
11. Establish local hazardous materials capabilities.
12. Implement local hazardous materials disposal program.
13. Make improvements to existing water and sewer systems.
14. Encourage buyouts of structures located floodplains & repetitive housing loss.
15. Require manufactured home tie-down regulation/ordinance.
16. Encourage private residents to provide protection of vital records.
17. Provide information & support Iowa DNR in identification of locations for sinkholes and abandon wells & mines in the region.
18. Pursue the construction of flood protection for infrastructure in affected areas.
19. Implement local burning restrictions.
20. Designate shelter sites and provide with adequate supplies and overnight accommodations.
21. Educate residents on radon/lead concerns & how to mitigate.
22. Improve sidewalks around public schools to increase public safety.
23. Establish a local hazard occurrence data collection & reporting system.
24. Jurisdictional waste disposal enforcement for all residents & businesses
25. Encourage annual tree management/trimming by homeowners, utilities, & county.
26. Provide public education & outreach of warning & self-protection.
27. Utilize building code enforcement to identify derelict, unsafe, or structurally unsound buildings in the region and help remove them to reduce safety concerns associated with collapse.
28. Install/purchase mobile generators & make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power.
29. Maintain, improve, & protect public buildings, facilities, and utilities against all hazards.
30. Encourage flood proofing & flood insurance by property owners.
31. Provide hazardous materials protection for all identified storm shelters.
32. Follow DOT, county roads, & local studies to repair/replace bridges, culverts, & ditches
33. Remove debris from areas prone to flash flood.
34. Encourage citizens to create family preparedness kits to be used in case of emergency.
35. Encourage smoke/fire/carbon monoxide detectors & sprinkler systems.
36. Bury powerlines.
37. Generator hookups for critical facilities
38. Encourage businesses & residents to have surge protection/lightning protection.
39. Maintain up-to-date search & rescue trainings, certifications, & equipment for first responders

Davis County Mitigation Priorities

1. Remove debris from areas prone to flood.
2. Encourage compliance in the National Flood Insurance Program (NFIP)
3. Pursue the construction of flood protection for infrastructure in affected areas.
4. Utilize building code enforcement to identify derelict, unsafe, or structurally unsound buildings in the region and help remove them to reduce safety concerns associated with collapse.
5. Install/purchase mobile generators & make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power.
6. Follow DOT, county roads, & local studies to repair/replace bridges, culverts, & ditches
7. Encourage citizens to create family preparedness kits to be used in case of emergency.
8. Develop safe rooms in schools & critical public facilities.
9. Maintain, improve, & protect public buildings, facilities, and utilities against all hazards.
10. Improve sidewalks around public schools to increase public safety.
11. Designate shelter sites and provide with adequate supplies and overnight accommodations.
12. Generator hookups for critical facilities
13. Encourage buyouts of structures located floodplains & repetitive housing loss.
14. Make improvements to existing water and sewer systems.
15. Evaluate/Replace municipal sirens and implement system upgrades.
16. Provide information & support Iowa DNR in identification of locations for sinkholes and abandoned wells and mines in the region.
17. Provide public education and outreach of warnings & self-protection.
18. Maintain up-to-date search & rescue trainings, certification, and equipment for first responders.
19. Maintain a current plan for Mass casualty preparation & up to date training.
20. Encourage smoke/fire/carbon monoxide detectors & sprinkler systems.
21. Encourage flood proofing & flood insurance by property owners.
22. Encourage routine maintenance of heating/cooling systems.
23. Encourage private residents to provide protection of vital records.
24. Promote digging hotline/pipeline safety regulations of pipeline education.
25. Ensure current health emergency plans for mass immunization process- scheduled & emergency.
26. Establish a local hazard occurrence data collection & reporting system.
27. Encourage annual tree management/trimming by homeowners, utilities & county.
28. Encourage businesses & residents to have surge protection/lightning.
29. Evaluate /maintain/repair area dams on routine basis.
30. Implement local burning restrictions.
31. Jurisdictional waste disposal enforcement for residents/businesses
32. Required manufactured home tie-down regulations/ordinance.
33. Educate residents on radon/lead concerns & how to mitigate.
34. Educate residents to develop water storage saving plan to reduce usage.
35. Develop/Implement storm water management ordinance preventing illicit connections.
36. Provide hazardous materials protection for all identified storm shelters.
37. Jurisdictions install snow fences/barriers on open roadways prone to drifting.
38. Jurisdictions conduct annual risk assessment for terrorism.
39. Implement local hazardous materials disposal program.
40. Establish local hazardous materials capabilities.
41. Bury powerlines.

Lucas County Mitigation Priorities

1. Encourage private residents to provide protection of Vital Records.
2. Encourage citizens to create family preparedness kits to be used in case of emergency.
3. Provide Public Education & Outreach of warnings & self-protection.
4. Maintain up-to-date Search & Rescue trainings, certification, and equipment for First Responders.
5. Maintain a current plan for Mass Casualty Preparation & Up-to-date training
6. Establish a local Hazard Occurrence Data Collection & reporting system.
7. Designate shelter sites and provide with adequate supplies and overnight accommodations.
8. Install/Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power.
9. Encourage businesses & residents to have Surge Protection/ Lightning Protection
10. Bury Powerlines
11. Maintain, improve, and protect public buildings, facilities, and utilities against all hazards.
12. Encourage annual Tree Management/ Trimming by homeowners, utilities & county.
13. Remove debris from areas prone to flash flooding.
14. Generator hookups for critical facilities
15. Provide information & support Iowa DNR in identification of locations for sinkholes and abandoned wells and mines in the region.
16. Encourage Smoke/ Fire/ Carbon Monoxide Detectors & sprinkler systems.
17. Promote Digging hotline/ pipeline safety regulations of pipelines education.
18. Ensure current health emergency plans for mass Immunization process – scheduled & emergency situations.
19. Follow DOT, County Roads, & local studies to repair/replace bridges, culverts, and ditches.
20. Evaluate/Replace municipal sirens and implement system upgrades.
21. Develop safe rooms in schools and critical public facilities.
22. Jurisdictional Waste Disposal Enforcement for all residents/businesses
23. Utilize building code enforcement to identify derelict, unsafe or structurally unsound buildings in the region and help remove them to reduce safety concerns associated with collapse.
24. Improve sidewalks around public schools to increase public safety.
25. Maintenance of Heating/fireplace/ cooling systems
26. Evaluate/ maintain/ repair area dams on routine basis.
27. Pursue the construction of flood protection for infrastructure in affected areas.
28. Implement local Burning Restrictions.
29. Education residents on Radon/Lead concerns & how to mitigation
30. Require Manufactured Home Tie-Down's regulation/ordinance.
31. Make improvements to existing water and sewer systems.
32. Encourage jurisdictions to join or maintain compliance with NFIP
33. Encourage flood proofing & Flood Insurance by property owners.
34. Implement local Hazardous Materials Disposal Program
35. Establish Local Hazardous Materials Capabilities
36. Educate residents to develop a Water Storage Saving Plan to reduce usage.
37. Encourage buyouts of structures located floodplains and repetitive loss properties.
38. Provide Hazardous Materials Protection for all identified Storm Shelters.
39. Jurisdictions install Snow Fences/ Barriers on open roadways prone to drift.
40. Jurisdictions conduct annual Risk Assessment for Terrorism
41. Develop/Implement Storm water Management ordinance preventing illicit connections.

Monroe County Mitigation Priorities

1. Encourage citizens to create family preparedness kits to be used in case of emergency.
2. Encourage private residents to provide protection of Vital Records.
3. Provide Public Education & Outreach of warnings & self-protection.
4. Maintain up-to-date Search & Rescue trainings, certification, and equipment for First Responders.
5. Establish a local Hazard Occurrence Data Collection & reporting system.
6. Maintain a current plan for Mass Casualty Preparation & Up-to-date training
7. Designate shelter sites and provide with adequate supplies and overnight accommodations.
8. Encourage businesses & residents to have Surge Protection/ Lightning Protection
9. Install/Purchase mobile generators and make them available to ensure that designated shelter sites and other critical infrastructure sites can be provided with supplemental power.
10. Bury Powerlines
11. Maintain, improve, and protect public buildings, facilities, and utilities against all hazards.
12. Remove debris from areas prone to flash flooding.
13. Generator hookups for critical facilities
14. Encourage annual Tree Management/ Trimming by homeowners, utilities & county.
15. Evaluate/Replace municipal sirens and implement system upgrades.
16. Encourage Smoke/ Fire/ Carbon Monoxide Detectors & sprinkler systems.
17. Maintenance of Heating/fireplace/ cooling systems
18. Promote Digging hotline/ pipeline safety regulations of pipelines education.
19. Ensure current health emergency plans for mass Immunization process – scheduled & emergency situations.
20. Pursue the construction of flood protection for infrastructure in affected areas.
21. Follow DOT, County Roads, & local studies to repair/replace bridges, culverts, and ditches.
22. Develop safe rooms in schools and critical public facilities.
23. Utilize building code enforcement to identify derelict, unsafe or structurally unsound buildings in the region and help remove them to reduce safety concerns associated with collapse.
24. Provide information & support Iowa DNR in identification of locations for sinkholes and abandoned wells and mines in the region.
25. Improve sidewalks around public schools to increase public safety.
26. Evaluate/ maintain/ repair area dams on routine basis.
27. Jurisdictional Waste Disposal Enforcement for all residents/businesses
28. Implement local Burning Restrictions.
29. Education residents on Radon/Lead concerns & how to mitigation
30. Make improvements to existing water and sewer systems.
31. Encourage jurisdictions to join or maintain compliance with NFIP.
32. Encourage flood proofing & Flood Insurance by property owners.
33. Require Manufactured Home Tie-Down's regulation/ordinance.
34. Jurisdictions conduct annual Risk Assessment for Terrorism
35. Implement local Hazardous Materials Disposal Program
36. Establish Local Hazardous Materials Capabilities
37. Educate residents to develop a Water Storage Saving Plan to reduce usage.
38. Encourage buyouts of structures located floodplains and repetitive loss properties.
39. Provide Hazardous Materials Protection for all identified Storm Shelters.
40. Jurisdictions install Snow Fences/ Barriers on open roadways prone to drift.
41. Develop/Implement Storm water Management ordinance preventing illicit connections.

Plan Maintenance Process

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.

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.

With the adoption of this plan, the HMPC will continue to be tasked with the plan monitoring, evaluation, and maintenance. The participating jurisdictions and agencies, led by the ADLM Emergency Management Coordinator, agreed 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- to no-cost recommended actions.
- Maintain vigilant monitoring 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 respective 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 the 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.

Plan Maintenance Schedule

The HMPC agrees to meet annually to monitor progress, discuss recent hazard events and changes in development that impact vulnerability, and update the mitigation strategy. The ADLM Emergency Management Coordinator will be responsible for initiating the plan reviews.

In coordination with the other participating jurisdictions, a written update of the plan will be submitted to the Iowa Homeland Security and Emergency Management Department and FEMA Region VII for approval within the required five-year cycle 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.

Incorporation into Existing Planning Mechanisms

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

Many of the small jurisdictions throughout the four counties ADLM region 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 that do exist to some degree within the participating jurisdictions include:

- Comprehensive Plans
- Various ordinances of participating jurisdictions
- Emergency Operations Plans
- Infrastructure Plans
- Capital Improvement Plans

Incorporation of Updated Hazard Plan into existing Planning Mechanisms

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.

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 ADLM Emergency Management Coordinator will provide the updated Mitigation Strategy with the status of each mitigation action to the County Board of Supervisors and County Department Heads as well as all Mayors, City Clerks, School District Superintendent, and governing boards requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms.

Jurisdiction	Incorporation of 2016-2019 Plan into Existing Planning Mechanisms	Integration Process for Plan Update
Davis County	None	Plan will be incorporated into the County Infrastructure Plan, and mitigation actions will be reviewed periodically
Bloomfield	None reported	None reported
Drakesville	None reported	None reported
Floris	None reported	Plan will be incorporated into City infrastructure plan and reviewed
Pulaski	None reported	None reported
Davis County CSD	None reported	Plan will be incorporated into Comprehensive Plan, Capital Improvement Plan, Infrastructure Plan, and Emergency Plan
Soap Creek Watershed Board	N/A	Plan will be incorporated into Comprehensive Plan and Watershed Management Plan

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 and providing a summary of mitigation action status updates and highlights of specific completed mitigation actions, as applicable. The public will be invited to provide comments on HMPC meeting outcomes and/or attend HMPC meetings.

The update process provides an opportunity to publicize success stories from the plan’s implementation and seek additional public comment. 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 notices will be posted through available website postings, community message boards, and social media outlets.

U.S. Department of Homeland Security
FEMA Region VII
11224 Holmes Road
Kansas City, MO 64131



FEMA

March 1, 2022

John Benson
Director
Iowa Homeland Security & Emergency Management Division
7900 Hickman Road, Suite 500
Windsor Heights, IA 50324

Subject: Review of Appanoose, Davis, Lucas and Monroe Counties, Iowa Multi-jurisdiction Hazard Mitigation Plan

Dear Mr. Benson:

The purpose of this letter is to provide the status of the above referenced Local Hazard Mitigation Plan, pursuant to the requirements of 44 CFR Part 201 - Mitigation Planning and the Local Multi-Hazard Mitigation Planning Guidance. The Local Hazard Mitigation Plan Review Tool documents the Region's review and the plan compliance with all required elements of 44 CFR Part 201.6. The Plan Review Tool also identifies the jurisdictions participating in the planning process. Federal Emergency Management Agency (FEMA) approval will be for a period of five years effective starting with the approval date indicated below.

Prior to the expiration of the plan, the community will be required to review and revise their plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities. After the review or revisions are completed, the plan will need to be resubmitted for approval by FEMA in order to continue to be eligible for mitigation project grant funding.

Plan Name	Date Received	Date Approved	Date of Plan Adoption	Date of Plan Expiration	Review Status
Appanoose, Davis, Lucas and Monroe Counties	January 25, 2022	March 1, 2022	May 17, 2021	March 1, 2027	Approved

If you should have any questions or concerns, please contact Joe Chandler, Planning Team Lead at (816) 283-7071.

Sincerely,

CATHERINE R
SANDERS

Catherine R. Sanders, Director
Mitigation Division

Digitally signed by CATHERINE R SANDERS
Date: 2022.03.09 08:32:41 -06'00'

www.fema.gov

Jurisdiction: Appanoose, Davis, Lucas & Monroe Counties in Iowa	Title of Plan: A.D.L.M. Regional Hazard Mitigation Plan	Date of Plan: June 2021
Local Point of Contact: Mike Lamb	Address: 12307 Highway 5 North P.O. Box 399 Moravia, IA 52571	
Title: Emergency Coordinator		
Agency: ADLM Emergency Management		
Phone Number: 641-724-3223/641-895-0407 cell	E-Mail: adlmema@iowatelecom.net	
Funding Source:		
State Reviewer: Mat Noble	Title: Planner	Date: 1/24/2022
FEMA Reviewer: Justin Sorg Diana Mendoza-Cauley	Title: Community Planner Community Planner	Date: March 1, 2022
Date Received in FEMA Region VII	January 25, 2022	
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved	March 1, 2022	

Jurisdiction:	NFIP Status*	
	Y	NP
1. Appanoose County (<i>Adopted 6.7.21</i>)	Y 190843	
2. Centerville (<i>Adopted 7.6.21</i>)	Y 190009	
3. Cincinnati	Y 195223	
4. Exline (<i>undated resolution</i>)		NP
5. Moravia (<i>Adopted 6.8.21</i>)		NP
6. Moulton (<i>Adopted 6.7.21</i>)		NP
7. Unionville (<i>Adopted 6.16.21</i>)	Y 190923	
8. Udell		NP
9. Mystic (<i>Adopted 6.10.21</i>)	Y 190010	
10. Numa (<i>Adopted 6.1.21</i>)		NP
11. Plano (<i>Adopted 10.4.21</i>)		NP
12. Rathbun (<i>Adopted 6.2.21</i>)	Y 195219	
13. Centerville Community School (<i>Adopted 8.9.21</i>)		NP
14. Moravia Community School (<i>Adopted 6.14.21</i>)		NP

HAZARD MITIGATION PLAN REVIEW TOOL		FEMA Region VII
Appanoose, Davis, Lucas, Monroe Counties, IA		1 st Review
	APPROVED	PENDING ADOPTION
15. Moulton-Udell Community School (<i>Adopted 7.26.21</i>)		NP
16. MercyOne Centerville Medical Center (<i>Adopted 8.19.21</i>)		NP
17. Davis County (<i>Adopted 5.17.21</i>)	Y 190861	
18. Bloomfield (<i>Adopted 7.22.21</i>)	Y 190938	
19. Drakesville (<i>Adopted 6.24.21</i>)		NP
20. Floris (<i>Adopted 9.7.21</i>)	Y 190080	
21. Pulaski (<i>Adopted 6.7.21</i>)		NP
22. Davis County Community School (<i>Adopted 6.21.21</i>)		NP
23. Davis County Hospital & Clinics (<i>Adopted 10.18.21</i>)		NP
24. Lucas County (<i>Adopted 5.19.21</i>)	Y 190885	
25. Chariton (<i>Adopted 5.17.21</i>)	Y 190195	
26. Derby (<i>Adopted 5.19.21</i>)		NP
27. Lucas (<i>Adopted 5.19.21</i>)	Y 190196	
28. Russell (<i>Adopted 9.14.21</i>)	Y 190649	
29. Williamson (<i>Adopted 7.15.21</i>)		NP
30. Chariton Community School (<i>Adopted 8.10.21</i>)		NP
31. Lucas County Health Center (<i>Adopted 8.31.21</i>)		NP
32. Monroe County (<i>Adopted 5.18.21</i>)	Y 190894	
33. Albia (<i>Adopted 5.17.21</i>)	Y 190541	
34. Lovilia (<i>Adopted 6.1.21</i>)		NP
35. Melrose (<i>Adopted 9.14.21</i>)	Y190465	
36. Albia Community School (<i>Adopted 6.14.21</i>)		NP
37. Monroe County Hospital (<i>Adopted 8.25.21</i>)		NP
38. Soap Creek WMA (<i>Adopted 9.2.21</i>)		NP
39. South Central Iowa Cedar Creek WMA		NP

* Notes: Y = Participating NP = Not Participating in NFIP S- Sanctioned R-Rescinded

SECTION 1: REGULATION CHECKLIST

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Introduction Page 12	✓		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Plan Development Page 13-18	✓		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Plan Development Page 12-16	✓		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Operations & Resources Page 375	✓		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Plan Maintenance Process Page 374	✓		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Plan Maintenance Process Page 374	✓		
ELEMENT A: REQUIRED REVISIONS				
<i>Opportunities for Improvement</i>				
<ul style="list-style-type: none"> On page 16 Exhibit 2 references CRS planning steps and Mitigation Planning tasks but no explanation for cross comparison or opportunities that communities have to complete an Activity 510 and Hazard Mitigation Plan concurrently. Please address or adjust table. Appendix B does not have copy of the online public survey and results (referenced on page 16) The table on page 375 presents data on Davis County and Soap Creek Watershed Board only. Was the plan incorporated into other County (Appanoose, Lucas, and Monroe) local jurisdiction Plans? Please make sure all County and local jurisdiction plans are accounted for. The Local Mitigation Plan Review Guide is currently being updated and there will be new requirements. For the next update plan, consider inclusion of other sectors, economic development, housing, floodplain management, codes and land use, infrastructure etc. The plan should also describe the effects of climate change, as it relates to location, extent, and probability of future hazard occurrences. 				

1. REGULATION CHECKLIST			
Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Types of Hazards Identified Page 141	✓	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Natural Hazard, Technological Hazards, Human-Caused Hazards Page 145-324	✓	
B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Natural Hazard, Technological Hazards, Human-Caused Hazards Page 145-324	✓	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Flood Hazard Page 170	✓	
ELEMENT B: REQUIRED REVISIONS			
<i>Opportunities for Improvement</i>			
<ul style="list-style-type: none"> Individual jurisdiction hazard prioritization results that are reference on page 44 are included at the end of every hazard analysis not in Appendix A. Please correct reference. On page 223 venerable structures are referenced in Exhibit 111 but are not addressed in the severe winter storm hazard description. I recommend either addressing structures in the descriptive text or delete table. The same exhibit is referenced in Tornado section (page 257). The connection between sink hole discussion and coal mine locations depicted in Exhibit 114 through 126 is not clear and the reference to the exhibits are confusing. 			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Appendix Page 340	✓	
C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Flooding Page 170	✓	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Mitigation Strategy Page 346	✓	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Implementation of Mitigation Actions Page 352-367	✓	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Implementation of Mitigation Actions Page 352-367	✓	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Plain Maintenance Page 374	✓	

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)

Location in Plan (section and/or page number)	Met	Not Met
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ELEMENT C: REQUIRED REVISIONS

Opportunities for Improvement

- ADLM Regional Goals listed on page 19 are duplicated, there are 5 goals, and the introduction sentence reads incorrect. It should refer to 2021 Regional goals, not Davis County goals.
- There is a disconnect with the mitigation actions that were carried over from the previous plan (Exhibit 188 - 191), those presented in the Selected Mitigation Action table starting on page 352 and the composite ranking of mitigation actions list starting on page 369. Furthermore, the method used to prioritize action described on page 344 and page 368 is duplicative and inconsistent. Please make sure this is clear so the reader can follow the process. The prioritizing method should not only be described but the results should be included in the Appendix for support.
- There are mitigation actions identified which are routine maintenance, operational preparedness or emergency response in nature. While these need not be removed, they are not eligible activities for FEMA mitigation funding. In future plan updates, the planning team is encouraged to focus efforts on developing mitigation strategies that reduce long-term vulnerability and are eligible for FEMA mitigation grants.

ADLM Regional Hazard Mitigation Plan 2021

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