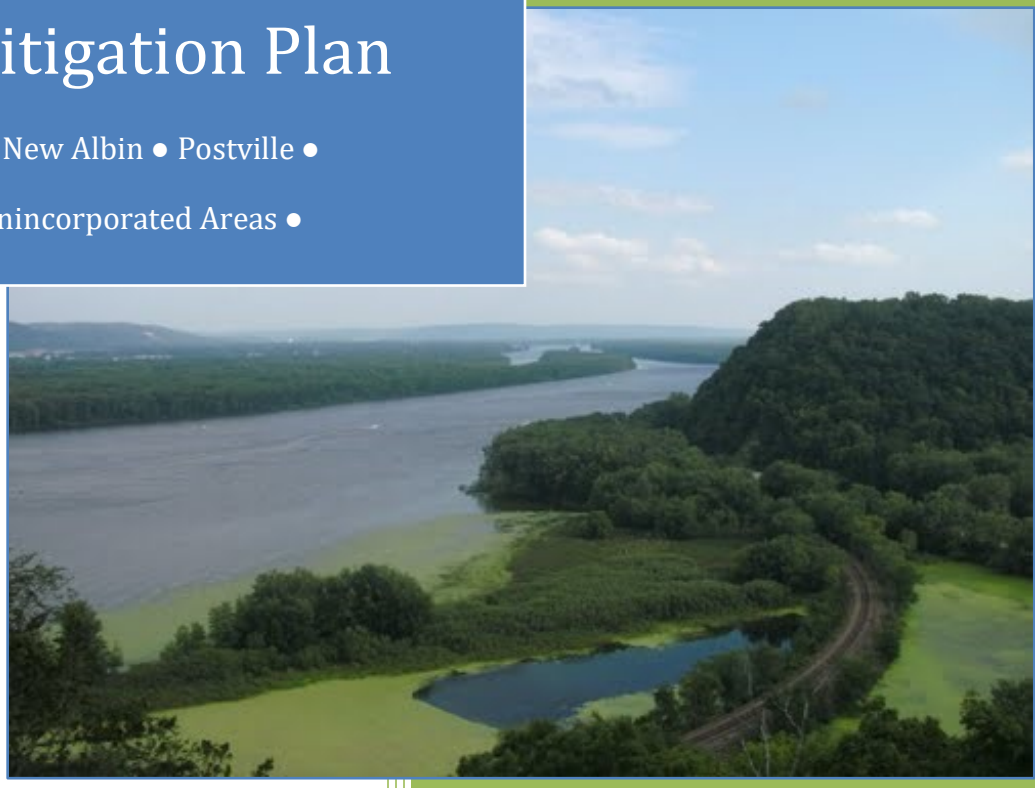
2018

Allamakee County, Iowa Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan

● Harpers Ferry ● Lansing ● New Albin ● Postville ●

● Waterville ● Waukon ● Unincorporated Areas ●



FEMA APPROVED:
_____, 2018
EXPIRES:
_____, 2022

Developed by:

The Cities of Harpers Ferry, Lansing, New Albin, Postville, Waterville, Waukon and the County's unincorporated areas

Professional planning assistance provided by Upper Explorerland Regional Planning Commission (UERPC)

upper explorerland regional planning commission

Acknowledgements

County Supervisors:		
Denis Koenig	Dan Byrnes	Larry Schellhammer
City of Harpers Ferry Jerry Valley, Mayor* Richard Smrcina** Nancy Walleser** Don Gibson** Tom Boots** Betty Palmer **City Clerk** Michelle Waite	**City of Lansing** Mike Brennan, Mayor* Pat Wagner Dick Roeder Rebecca Conway Dave Darling Ross Kolsrud Deb Volver **City Clerk** Katie Becker	**City of New Albin** Josh Dreps, Mayor** Alexie Grotegut Kathy Goetzinger** Deb Crane** George Blair** Ralph Nelson** **City Clerk** Deb Stantic*,**
City of Postville Leigh Rekow, Mayor*,** Donald Miller** Ross Malcom Mary Straate** Larry Moore** Mary Engstrom **City Clerk** Darcy Radloff**	**City of Waterville** Dave Monserud, Mayor*,** Kurt Rathbun Robbie Burrett** Matt Rathbun** Joe Weipert Mark Vanderkolk** **City Clerk** Kim Yohe**	**City of Waukon** Duane Dewalle, Mayor*,** Stephen Wiedner** Don Steffens** John Lydon** Ben Rausch** Dewey Jones** **City Clerk** Al Lyon**
**Hazard Mitigation Planning Committee Members*		***Attended City Planning Meetings*

Additional Hazard Mitigation Planning Committee Members:			
Clark Mellick, Sheriff, Allamakee County	Bill O'Conner Lansing Resident	Ardie Kuhse Waukon Economic Development	David Martin, Chief, Waukon Fire Department
David Mooney Allamakee Solid Waste	Erik Helgersen, President, Allamakee County Fair Board	Mike Reburn, Chief, New Albin Fire Department	Teresa Wiemerslage, ISU Extension Allamakee County
Dave Cota, Chief, Harpers Ferry Fire Department	Bruce Palmborg, Lansing Main Street Matters		

Allamakee County Emergency Management Commission			
Corey Snitker, Coordinator	Jerry Valley	Mike Brennan	Debra Stantic
	Leigh Rekow		

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Planning Process

Chapter 1- Introduction and Planning Process

What is Hazard Mitigation?

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 documents the county-wide hazard mitigation planning process and identifies relevant hazards, vulnerabilities and strategies the Participating Jurisdictions will use to decrease vulnerability and increase resiliency and sustainability. It will affect activities and decisions for proactive mitigation planning that will help reduce the cost of disaster response. Hazard mitigation is described as:

- Any action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects – an effort to reduce loss of life and property by lessening the impact of disasters.
- Hazard mitigation is specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage.
- Mitigation is taking action now—before the next disaster—to reduce human and financial consequences later by analyzing risk, reducing risk and insuring against risk.

Why Do We Plan?

Each year in the United States natural 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 subsequent expenses incurred by insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be minimized or even eliminated. Planning allows the stakeholders to identify policies and actions that can be implemented over the long term to reduce risk and future losses. Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. Plans create a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters. Planning has many benefits:

- Planning identifies cost effective actions for risk reduction that are agreed upon by stakeholders and the public
- Planning focuses resources on the greatest risks and vulnerabilities
- Planning builds partnerships by involving people, organizations, and businesses
- Planning increases education and awareness of hazards and risk
- Planning communicates priorities to state and federal officials
- Planning aligns risk reduction with other community objectives

Key Steps in the Planning Process

Figure 1 illustrates the key steps in the planning process. More specifically, each step can be further described as:

Figure 1: Hazard Mitigation Planning Process

Step 1: From the start, communities should focus on the resources needed for a successful mitigation planning process. An essential first step is to identify and organize interested members of the community as well as including the technical expertise required during the planning process.

Step 2: Next, communities identify the characteristics and potential consequences of hazards through a hazard identification process. It is important to understand how much of the community can be affected by specific hazards and what the impacts would be on important community assets. This is accomplished through a vulnerability assessment.

Step 3: Armed with an understanding of the risks posed by hazards, communities determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a hazard mitigation plan that identifies mitigation strategies and actions for implementation.

Step 4: Bring the plan to life. Communities can do this in a variety of ways, ranging from implementing specific mitigation projects to changes in day-to-day organizational operations. To ensure the success of an ongoing program, it is critical that the plan remains relevant. Therefore, it is important to conduct periodic evaluations and make revisions as needed, a plan maintenance process.

Participants

Requirement §201.6(a)(3):
Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process

The Participating Jurisdictions developed this multi-hazard mitigation plan to reduce future losses in the planning area from identified potential hazards. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR Part 201) and finalized on October 31, 2007. While the Disaster Mitigation Act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet or exceed in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

Information in this plan will be used to help guide and coordinate mitigation and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The planning area has been affected by hazards in the past and is therefore committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

The Disaster Mitigation Act requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan. This plan includes several participating local governments:

- City of Harpers Ferry
- City of New Albin
- City of Waterville
- Unincorporated Areas of Allamakee County
- City of Lansing
- City of Postville
- City of Waukon

Planners met directly with the city councils of each governmental unit. Each governing body reviewed their jurisdictional profiles; discussed their progress on and status of, previously identified mitigation actions; determined the planning significance of various hazards within their communities; and identified the mitigation actions they would pursue throughout the implementation of this plan. The Hazard Mitigation Planning Committee, the Allamakee County Emergency Management Commission and the Allamakee County Board of Supervisors ensured that the county as a whole, along with its unincorporated areas went through the same process of profile review, previous action status, determination of significance for specific hazards and mitigation action identification. See Acknowledgements for a listing of individuals involved in the planning process.

Allamakee County school districts authorized Allamakee County Emergency Management and Upper Explorerland Regional Planning Commission planners to represent them on the countywide planning committee (see Appendix). School representatives provided information for the plan upon request (including possible mitigation actions) and were given an opportunity to review the draft plan. In addition, the school districts are featured in this plan as separate sections.

Table 1 documents the specific ways that participating jurisdictions were involved in the planning process.

Table 1: Jurisdictional Involvement in the Development of MJ-7

Jurisdiction:	Involvement:
Allamakee County	• Representation on the HMPC (Mellick, Schellhammer, Mooney, Helgersen, Wiemerslage) • Participation at HMPC meetings (see Appendix C) • Assistance with data collection (assessor, emergency management coordinator, engineer, GIS) • Mitigation Action Identification • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
Jurisdiction:	Involvement:
City of Harpers Ferry	• Representation on the HMPC (Valley, Cota) • Participation at HMPC meetings (see Appendix C) • Assistance with jurisdictional description • Mitigation Action Identification (city meeting on 8-14-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____

City of Lansing	• Representation on the HMPC (Brennan, O'Conner, Mooney, Helgersen, Palmborg) • Participation at HMPC meetings (see Appendix C) • Mitigation Action Identification (city meeting on 5-15-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
City of New Albin	• Representation on the HMPC (Stantic, Reburn) • Participation at HMPC meetings (see Appendix C) • Assistance with jurisdictional description • Mitigation Action Identification (city meeting on 6-12-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
City of Postville	• Representation on the HMPC (Rekow) • Mitigation Action Identification (city meeting on 8-14-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
City of Waterville	• Representation on the HMPC (Monserud) • Participation at HMPC meetings (see Appendix C) • Mitigation Action Identification (city meeting on 8-7-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
City of Waukon	• Representation on the HMPC (DeWalle, Kuhse, Martin) • Participation at HMPC meetings (see Appendix C) • Mitigation Action Identification (city meeting on 7-17-17) • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
Allamakee CSD	• Mitigation Action Identification • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
Eastern Allamakee CSD	• Mitigation Action Identification • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
Postville CSD	• Mitigation Action Identification • Plan review and comment • Hosted public meeting for presentation of plan on _____ • Formally adopted plan on _____
Jurisdiction:	Involvement:
Northeast Iowa Community College	• Mitigation Action Identification • Plan review and comment • Hosted public meeting for presentation of plan on _____ Formally adopted plan on _____

Local Planning Process

Requirements §201.6(b)(1-3) and §201.6(c)(1):

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This plan is a full update of the previous FEMA-approved Allamakee County, Iowa Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan approved by FEMA in February of 2012. The planning process began in the spring of 2016 and followed methodology prescribed by FEMA, with identification and formal appointment of a Hazard Mitigation Planning Committee comprised of key stakeholders from the Participating Jurisdictions. Key stakeholders included in the process included fire departments and law enforcement; public and private school districts; higher learning institutions; economic development; city clerks/city managers/city staff/city mayor and councils; county supervisors/county treasurer/county assessor/county engineer/county solid waste/county fair board; ISU Extension; Main Street Matters; Iowa DNR; and business/industry. Upper Explorerland Regional Planning Commission facilitated the process and assembled all input, information and data to develop the written document.

Local and regional agencies were invited to attend the hazard mitigation meetings and/or review and comment on the draft version Allamakee County Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan via email, telephone, or attendance at hazard mitigation planning meetings. Meeting agendas were posted at the county courthouse. Public notices and/or press releases in county-wide publications were utilized to ensure notification, inclusion, and opportunity for involvement to all concerned business, private non-profit organizations, and the general public. Appendix D offers a sampling of the notices, articles and information distributed by the planning agency and the emergency management coordinator.

As part of coordination with other agencies, the HMPC and Upper Explorerland collected and reviewed existing technical data, reports, and plans. These included the State of Iowa Hazard Mitigation Plan, literature on local communities as well as other data from state and federal agencies. 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 are documented throughout the plan and in Appendix A, References/Sources.

Those who attended the Allamakee County Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan public meetings to provide input, while not necessarily designated as HMPC members, are included in the record of all meeting participants and are noted in the minutes and sign-in sheets in Appendix D.

Several public meetings were held throughout the development of this plan including seven countywide meetings and one meeting in each of the county's communities. At the completion of the draft plan, additional public meetings were held to review the plan (included in Table 1).

The planning timeline was laid out as follows:

1. A planning kick-off meeting was held on July 7, 2016. Attendees discussed the purpose of mitigation planning and what the planning process would entail. Commitment to the HMPC was confirmed. The HMPC includes members who bring expertise in emergency management and response, members who operate critical facilities and members who represent vulnerable populations and communities from across the county.
2. The planning committee reconvened at an open meeting on September 13th, 2016. The purpose and process of mitigation planning were reviewed. Community profile information for cities and the county were reviewed and discussed. And brief review of risk assessment process.
3. At a meeting on October 26th, 2016 the planning committee reviewed Hazard Identification information provided by the Upper Explorerland planner, and finalized hazards for inclusion in the plan.
4. Hazard Profiles were developed by Upper Explorerland and reviewed by the HMPC at a meeting on December 14th, 2017. CPRI scoring for county hazards was worked on at this meeting.
5. At a meeting on February 22nd, 2017, Hazard Profile review and CPRI scoring was finalized. The committee discussed the vulnerability assessment briefly.
6. Previous hazard mitigation plans, as well as the region's Long Range Transportation Plan and the Iowa Hazard Mitigation Plan were reviewed and incorporated where relevant. In addition, a number of references were consulted in the development of this plan (see Appendix A).
7. A Vulnerability Assessment was completed by Upper Explorerland and discussed by the HMPC at the February 22nd, 2017 meeting, as well as at each city meeting.
8. The next step was to develop mitigation strategies and actions for each participating jurisdiction. Open meetings were held in each community to 1) review their community profile, 2) discuss hazards specific to their community, and 3) develop strategies and actions to minimize or mitigate harm from potential hazards. The countywide HMPC met on October 4th, 2017 to review and discuss previous county hazard mitigation actions, and develop strategies and mitigation actions for the unincorporated areas of the county. STAPLEE scoring was also completed at that time. And on December 13th, 2017, the HMPC met to discuss plan implementation, including mitigation implementation details.
9. The written document was finalized by Upper Explorerland and reviewed by the HMPC and each jurisdiction (copies of the draft plan were emailed to each jurisdiction for review and distribution to stakeholders for additional comments).
10. Public input was sought through several outlets:
    a. The draft plan was available on the Upper Explorerland Planning Website where comments could be left through an online form or by direct contact with planners. The Web address was announced through a press release in the Allamakee County newspapers.
    b. Presentations of the plan were made at public meetings throughout the county. Committee members and planners gave the presentations in several venues as noted in Table 1.
11. Public input was incorporated into the planning document as appropriate. All questions were answered as part of the presentation process.
12. The plan was adopted by Allamakee County on January 8, 2018 (see Table 2) and submitted to FEMA for approval by January 19, 2018.

13. Any revisions to the draft plan from FEMA were addressed, and the plan was adopted by each jurisdiction in the spring of 2018 (see Table 2). The final plan was forwarded to FEMA by May of 2018, including all adoption resolutions.

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 each jurisdiction requesting approval of the plan

The Allamakee County Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan will be updated within a five-year timeframe and has been formally adopted by the following entities as shown in Table 2below (adoption documentation in Appendix):

Table 2: Jurisdiction Adoption Dates

Jurisdiction:	Adoption Date:
Allamakee County Board of Supervisors	January 8, 2018
City of Harpers Ferry	
City of Lansing	
City of New Albin	
City of Postville	
City of Waterville	
City of Waukon	
Allamakee Community School District	
Eastern Allamakee Community School District	
Postville Community School District	
Northeast Iowa Community College	

Chapter 2- Planning Area Profile and Capabilities

Overview

Requirement §201.6(c)(3):
[The plan shall] 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(d)(3):
[The plan shall] be revised to reflect changes in development, progress in local mitigation efforts and changes in priorities

This section of the Allamakee County Hazard Mitigation includes a community profile for the county and incorporates each of the jurisdictions participating in the plan. This section will review the climate and weather, geography, land use, and other conditions that impact the county, as well an overview of location, history, demographic trends and background information for the county. This section will also include relevant data for communities within the county. The County is governed by a three member Board of Supervisors. Additional elected officials include:

- County Auditor
- County Recorder
- County Sheriff
- County Treasurer

Key staff positions include:

- County Assessor
- County Attorney
- County Central Point of Coordination (CPC)
- County Conservation Director
- County Emergency Management Coordinator
- County Engineer
- County Environmental Health
- County GIS Coordinator
- County Landfill Coordinator
- County Planning and Zoning Administrator (also the Flood Plain Administrator
- County Public Health Administrator
- County Recycling Coordinator
- County VA Administrato

The Allamakee County Sheriff's office provides law enforcement to the unincorporated parts of the county and Allamakee County Emergency Management provides emergency management services.

All Police Departments, Fire Departments, and Ambulance services in the County as well as some neighboring counties have a mutual aid agreement to respond and assist with an incident as appropriate. Fire Department coverage is illustrated in Figure 2.

Allamakee County children attend one of five school districts covering the county. There are three independent community school districts and several private schools with administrative headquarters located within the county. School districts include: Allamakee CSD, Eastern Allamakee CSD and Postville CSD. Private schools include: Bais Chaya Muschka, Bais Sholom, Postville Alternative High School and St. Patrick Catholic School. Two other districts serve children from the county, but are physically located in

neighboring counties: MFL MarMac & Decorah Community School Districts. School District coverage is illustrated in Figure 3.

Property valuations for the County were $674,688,880 as of January, 2017 (Iowa Department of Management, 2017). Fiscal tools for funding mitigation activities include bonding, both General Obligation and Revenue, loan agreements, fees, taxes for specific purposes and grants.

Allamakee County Emergency Management and the County GIS departments provide technical resources and services to the County and its emergency responders. Allamakee County contracts with the Northeast Iowa Response Group (NIRG), a specialized HAZMAT Team from the Waterloo Fire Department, to provide technician-level incident response throughout the county.

The County utilizes County Zoning Ordinance to control land use and direct decision-makers. The County adopted the Allamakee County Comprehensive Plan 2002 which outlines goals, strategies and actions for future growth and development. The County utilizes the Allamakee County Emergency Support Functions Plan. All Response Personnel follow appropriate protocol and guidance.

Figure 2: Allamakee County Fire Department Coverage

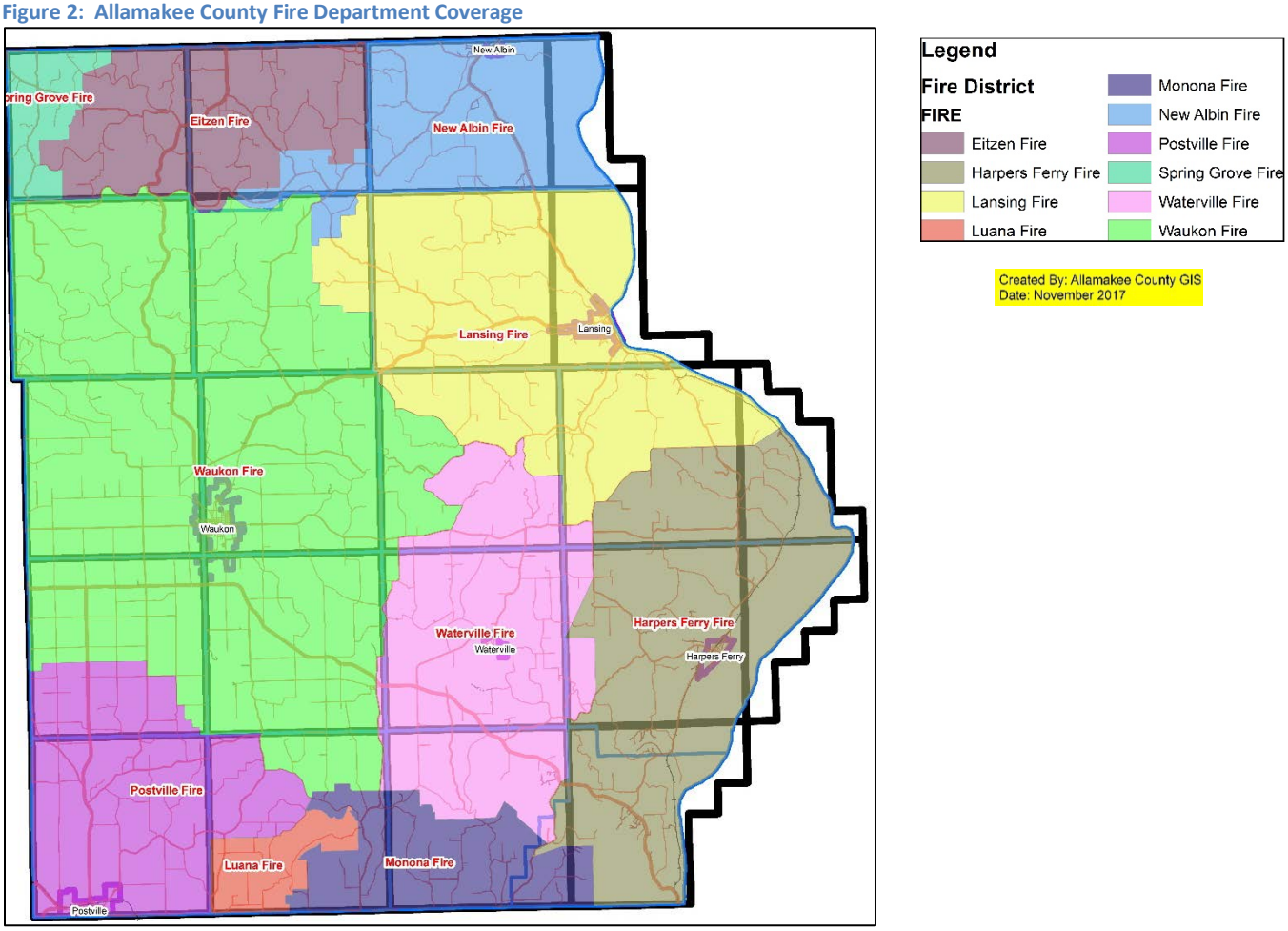
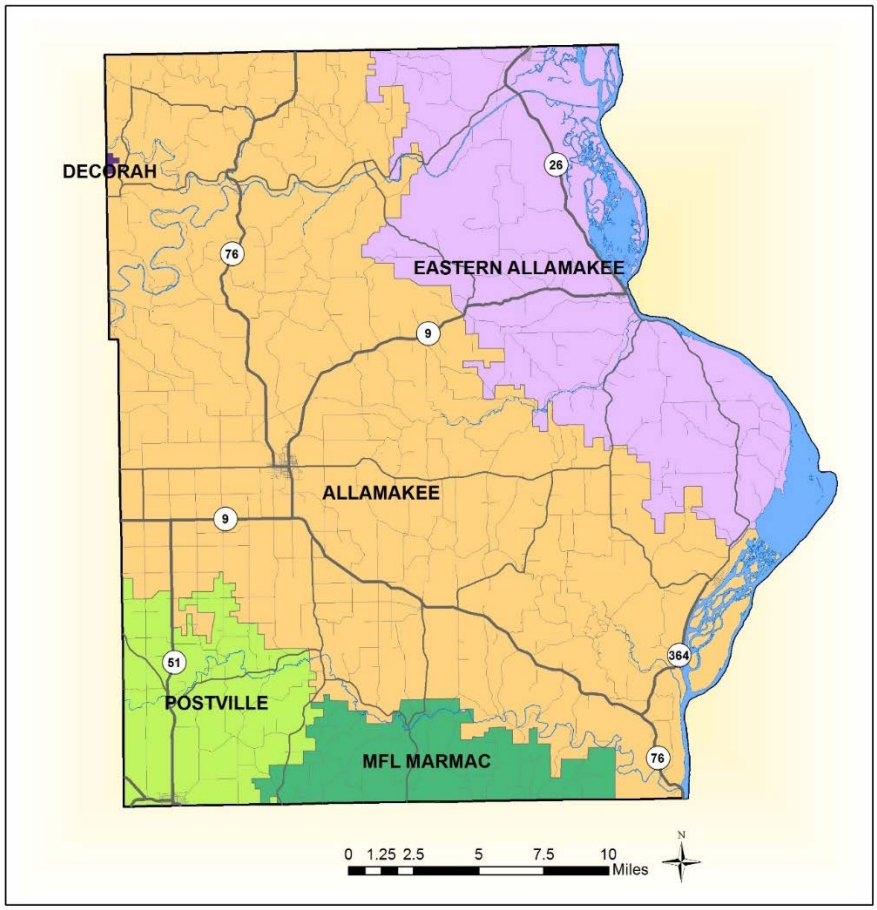


Figure 3: Allamakee County School District Boundaries



Mitigation Activities

Status and Progress on Previous Mitigation Actions

1. Establish and maintain a well-equipped and well-trained emergency response capabilities with active partnership
    - Fire departments have updated and replaced various pieces of equipment.
    - County continues to maintain agreement with Waterloo Fire HAZMAT through the Northeast Iowa Response Group.
2. Purchase, upgrade, maintain and implement compatible regional interoperable fixed and/or portable communications systems and the supporting infrastructure
    - This is currently being worked on and will be the focus of the upcoming 5 year period of the updated plan.
3. Purchase, install, upgrade, and maintain warning and alert notification equipment and/or system(s)
    - Not completed/no known projects; will reevaluate as necessary.
4. Purchase and install generator(s) and additional power supply equipment
    - Not completed/no known projects; will reevaluate as necessary.
5. Encourage pre-disaster and recovery planning, providing awareness and education of hazards to the public and businesses, maximizing potential resources for pre- and post-disaster assistance
    - The annual County Fair is used to provide information on disaster preparedness.
    - Monthly articles are published in the local papers on emergency and disaster planning at the start of each month.

6. Establish and stock community shelter location(s), designing and constructing if [additional] site(s) sought
    - EMA has a shelter trailer with cots and bedding, along with some tents.
7. Develop, upgrade, enhance, and protect infrastructure, and/or critical facilities
    - Not completed/no known projects; will reevaluate as necessary.
8. Construct FEMA-compliant tornado safe room(s)
    - Not completed/no known projects; will reevaluate as necessary.
9. Develop, implement, and keep current city, county, school, emergency services, stormwater management, business continuity, and other regional planning documents; maximize code/ordinance enhancement and enforcement
    - The Morgan Creek Road study discusses this.
10. Provide increased flood mitigation efforts and enhancements, including levees
    - Not completed/no known projects; will reevaluate as necessary.
11. Evaluate sinkholes and karst topography through engineering studies and implement appropriate safety protocols, including increased education to the public
    - Not completed/no known projects; will reevaluate as necessary.
12. Create, maintain and utilize a communication network for quantity and quality reporting along water sources Obtain an oblique photography product/program
    - Not completed/no known projects; will reevaluate as necessary.
13. Construct and stock FEMA-compliant tornado safe room(s)
    - Not completed/no known projects; will reevaluate as necessary.
14. Develop and construct safer routes for all traffic modes including the education of residents on the maximization of these routes
    - Not completed/no known projects; will reevaluate as necessary.
15. Promote Allamakee County Multi-Jurisdiction (MJ-7) Multi-Hazard Mitigation Plan to the public
    - Plan approval was announced, but further public promotion has not taken place.
16. Develop and enhance technology resources
    - County uses an off-site service for internet services.
17. Acquisition, storage, restoration or demolition of damaged structure(s) and property
    - Not completed/no known projects; will reevaluate as necessary.
18. Provide increased awareness to National Flood Insurance Program (NFIP) participation, encouraging [continued] participation
    - County and Cities participate, but increased awareness to public has not been prioritized.
19. Purchase, install, maintain, and upgrade fiber optic cable, equipment and related technology to allow for reliable movement of communication and data
    - Not completed/no known projects; will reevaluate as necessary.
20. Evaluate sinkholes and karst topography through engineering studies and implement appropriate safety protocols, including increased education to the public
    - Not completed/no known projects; will reevaluate as necessary.

Mitigation Actions to Pursue Through MJ-7 Implementation:

1. Train a CERT Team (Community Emergency Response Team) to perform limited life-saving capabilities to aid First Responders
2. Work with public health to develop an inventory of special needs individuals to provide to emergency response teams
3. Continue to use and build public knowledge of warning systems/alert notification providers, including reverse 911 through county dispatch, Alert Iowa, and Code Red

4. County/cities to transition to sirens with the capability for automated activation by the Allamakee County Sheriff's Office
5. Create a countywide Community Shelter Plan
6. Create a Rail Response Plan to prepare for the possibility of a rail accident
7. Research and/or update zoning regulations to control development on landslide prone areas and steep slopes
8. Lead initiative to form a countywide disaster response coalition to serve residents during and following storm or emergency events
9. Evaluate areas that experience flood damage, and for which mitigation tools and/or strategies could minimize flooding vulnerabilities
10. Participate in regional watershed planning and flood mitigation initiatives
11. Construct on-road structures as funding becomes available; focus on Coon Creek Watershed
12. Assist cities in identifying generator needs, including considering transfer switches, storage location and fuel needs
13. School districts to attain additional generators as needed
14. Ensure that the Allamakee County MJ-7 Hazard Mitigation plan remains current and publicly available, is updated through public participation and is submitted for approval every 5 years with annual updates as needed
15. Inventory high risk areas in the county (e.g. mobile home parks, recreation areas, schools, etc.), and assess locations for safe room sites
16. School districts to construct a facility outside of the floodplain that can be used as a storm shelter / tornado safe room
17. Complete study of Volney Hill Curve fertilizer spill, and pursue mitigation actions if/when identified
18. Assess other county roads that are at risk of truck accidents due to steep topography, curvature, or conditions. Research applicable mitigation measures, and pursue implementation of measures at high risk locations.
19. Review Upper Iowa River Watershed Management Authority Plan once complete, and implement recommended flood mitigation measures across county as applicable
20. Continue involvement in Upper Iowa River Watershed Management Authority planning and engagement
21. Pursue opportunities for engaging cities and county agencies in watershed and flood mitigation planning and education
22. Maintain membership in NFIP
23. Develop a communication plan or system for local/county points of contact to exchange information on rainfall amounts, flooding conditions and contamination of waterways or water sources

Brief History

There is some debate over the origin of the county name. Some say the county is named after Allan Magee, an Indian trader and trapper, who was known by the Winnebago Indians. Other sources say the name is purely of an Indian origin.

The first county seat was located just northwest of Rossville, at a place called "The Old Stake." This site was considered useless as there were other points of greater importance already settled in Allamakee County.

In April 1851, the voters went to the polls to select a county seat. The towns Vailsville, Smith's Mill and Columbus were choices. None of them received a majority of the votes. A second election was held the

following May, with Columbus receiving the most votes. Soon after Columbus was selected as the county seat, a rivalry developed between Columbus and Lansing. Due to this a commission was appointed to select the county seat. The site they selected was Waukon. The choice went to an election. Even though Columbus fought the decision, the results were overwhelmingly for Waukon.

A courthouse was built in 1853. It was a small frame structure that cost $325 to construct. It was used until 1857, when a similar building was constructed next to it. These two buildings served the county until 1861, when the county seat was moved again.

A heated contest between the towns of Waukon and Lansing developed. Both towns agreed to build on suitable lots and both towns offered substantial "rewards" for the county seat. Lansing offered $8000 and Waukon offered $5000 towards the courthouse.

Between 1860-1861, following an election, a $13,000 courthouse was built in Waukon. The city paid $5000 as promised. Although Waukon had a courthouse, it was not the county seat. That distinction went to "The Point". Located between Lansing and Capoli, "The Point" became the site of a $5000, stone structure courthouse. The cost was paid by the citizens of Lansing.

In the summer of 1866 the citizens of Waukon attempted to regain the county seat. A gang of 30 men from Waukon tried to steal the county records from the courthouse at "The Point." This attempt failed, but the one in 1867 did not. A 10th county seat election was held. Waukon won out, after a 25-year long battle.

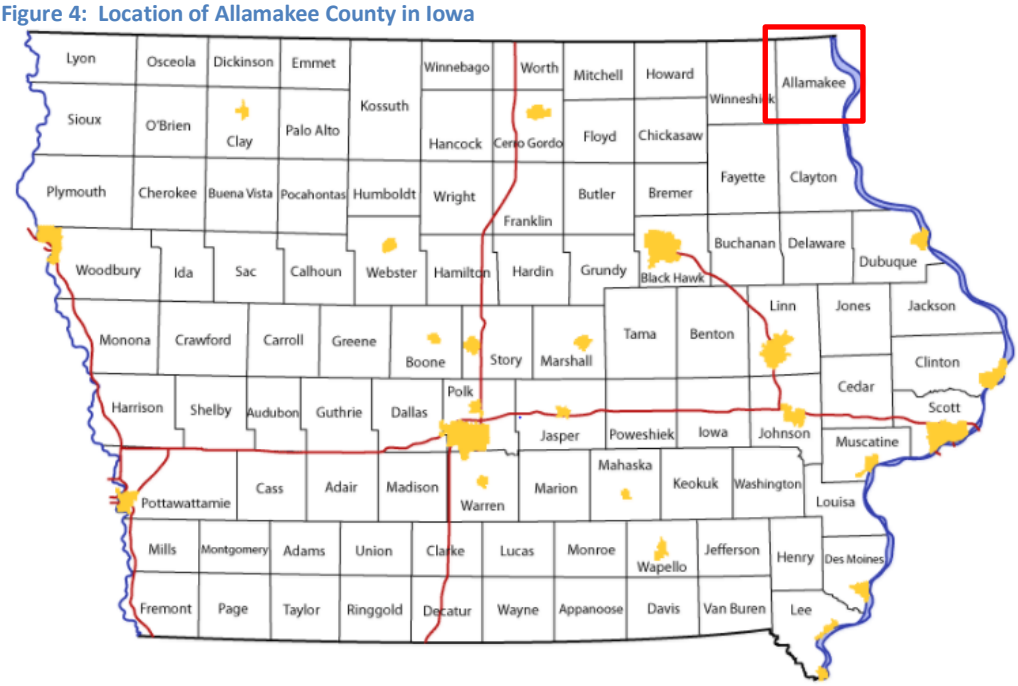
The present courthouse is of modern design. It was built between 1940 and 1941, and it replaced the $13,000 courthouse built in 1861. The old courthouse was taken over by the Allamakee County Historical Society; it now functions as a museum (Allamakee County, 2017).

Geography and Environment

Location

Allamakee County is located in the northeastern corner of the State of Iowa, shown in Figure 4. The county is approximately 25 miles by 30 miles in linear dimension. The northern boundary of the county borders the State of Minnesota and the eastern boundary approximately aligns with the Mississippi River, dividing Allamakee County from the State of Wisconsin. Beginning with the north and going clockwise, Allamakee County is bounded by Houston County, MN, Vernon County, WI, Crawford County, WI, Clayton County, IA, Fayette County, IA, and Winneshiek County, IA. Figure 5 illustrates the location of the incorporated communities within the county, and the bordering counties.

Figure 4: Location of Allamakee County in Iowa



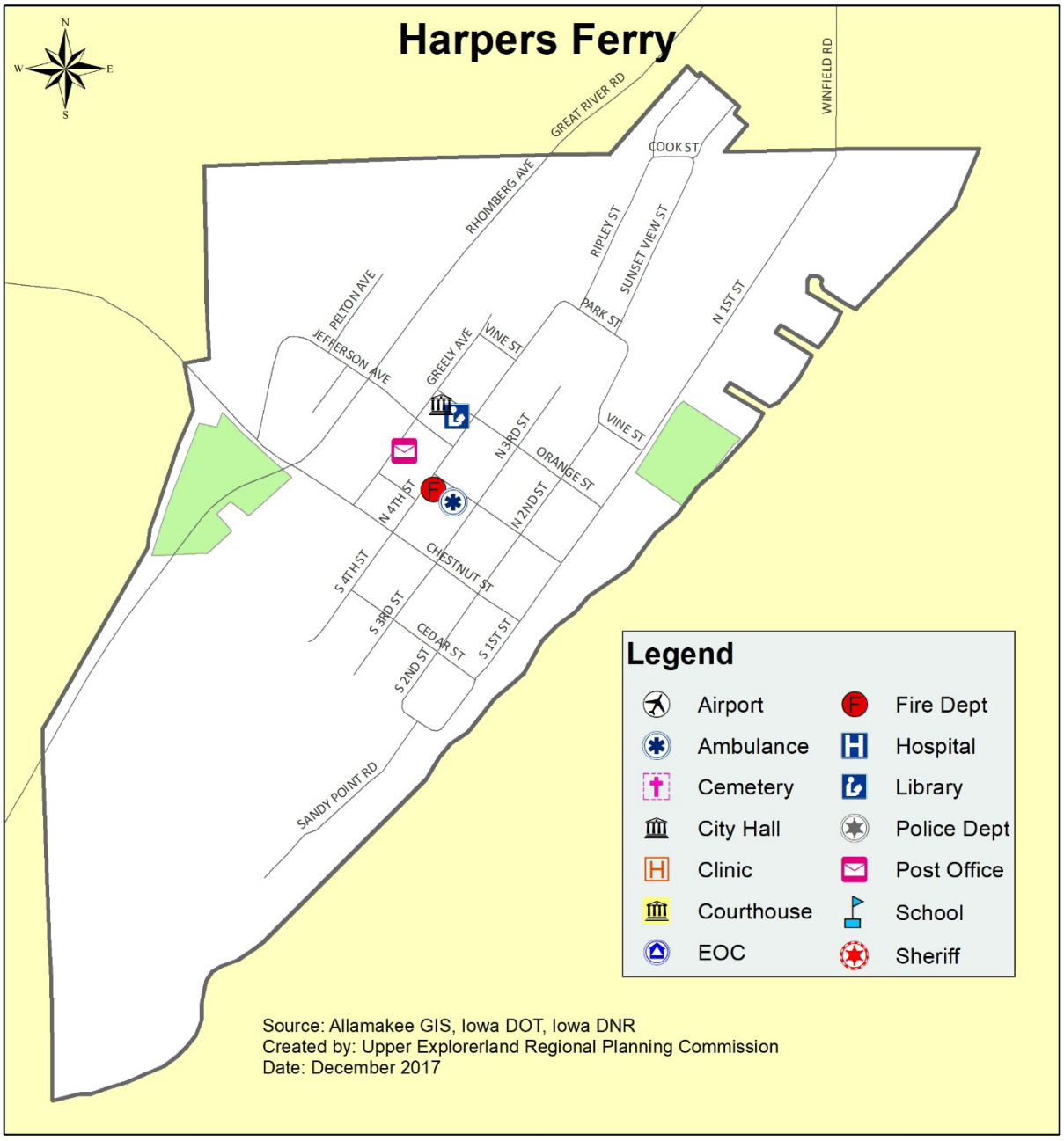
(Iowa Department of Transportation, 2017)
Note: The red rectangle indicates the approximate location of Allamakee County, Iowa

Figure 5: Base Map of Allamakee County and its Incorporated Communities

Source: (Iowa Department of Transportation, 2017)

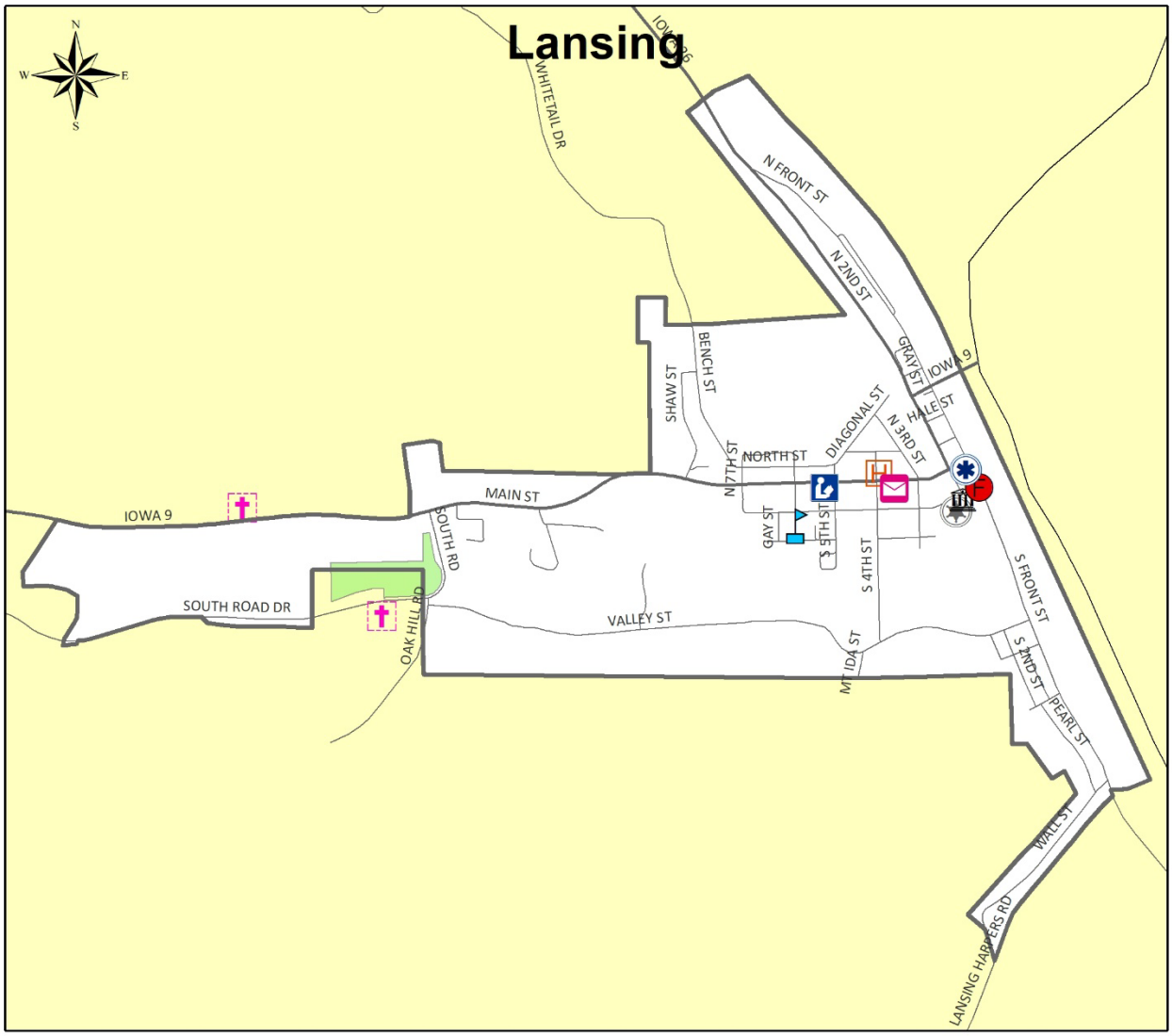
The following figures provide maps to reflect the city limits of the participating cities: Harpers Ferry, Lansing, New Albin, Postville, Waterville and Waukon.

Figure 6: City of Harpers Ferry Planning Area, 2017



Note: The land area of city limits is 0.61 square miles (City-data.com, 2017)

Figure 7: City of Lansing Planning Area, 2017



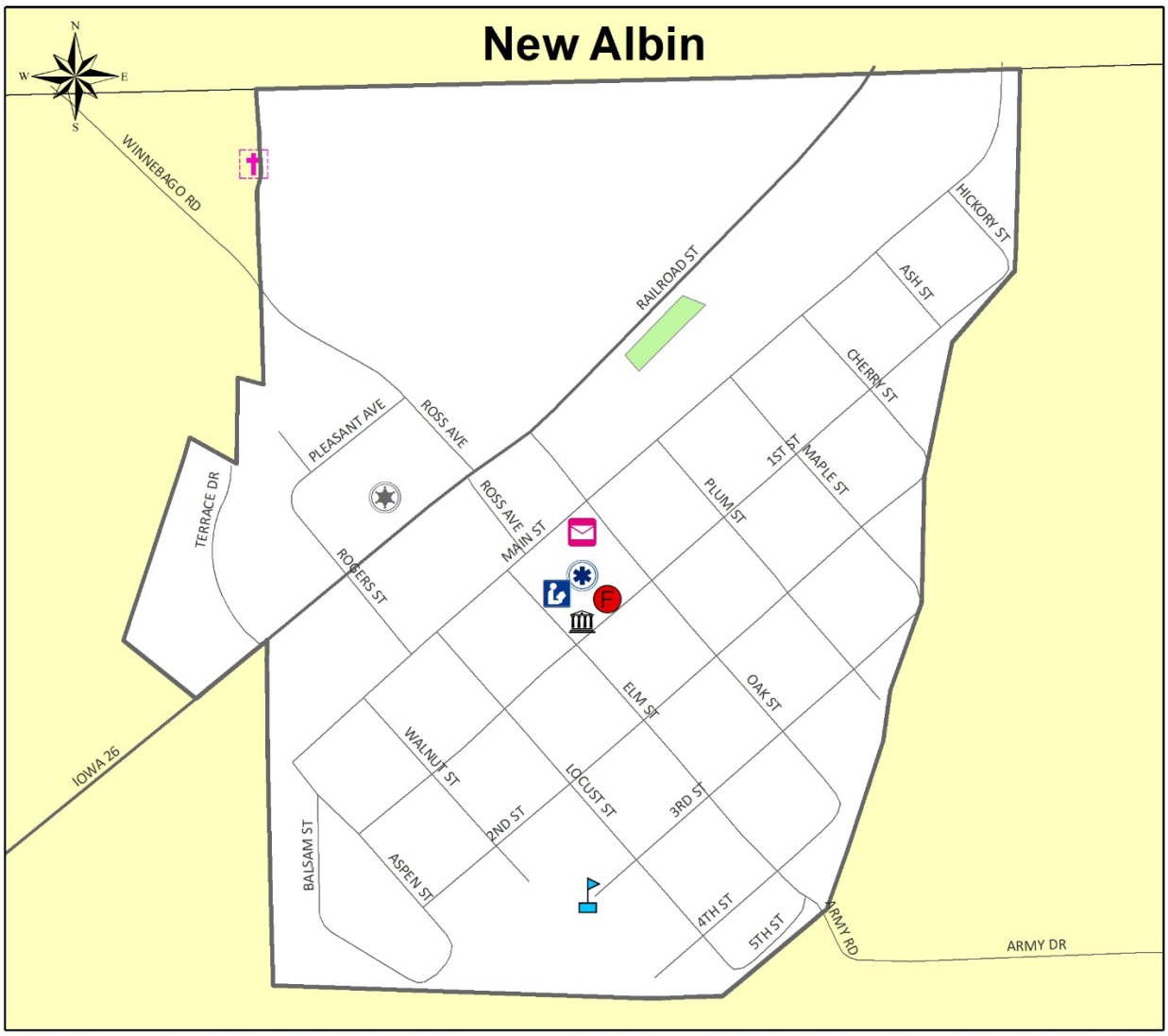
Legend

Airport	Fire Dept
Ambulance	Hospital
Cemetery	Library
City Hall	Police Dept
Clinic	Post Office
Courthouse	School
EOC	Sheriff

Source: Allamakee GIS, Iowa DOT, Iowa DNR
Created by: Upper Explorerland Regional Planning Commission
Date: December 2017

Note: The land area of city limits is 1.08 square miles (City-data.com, 2017)

Figure 8: City of New Albin Planning Area, 2017



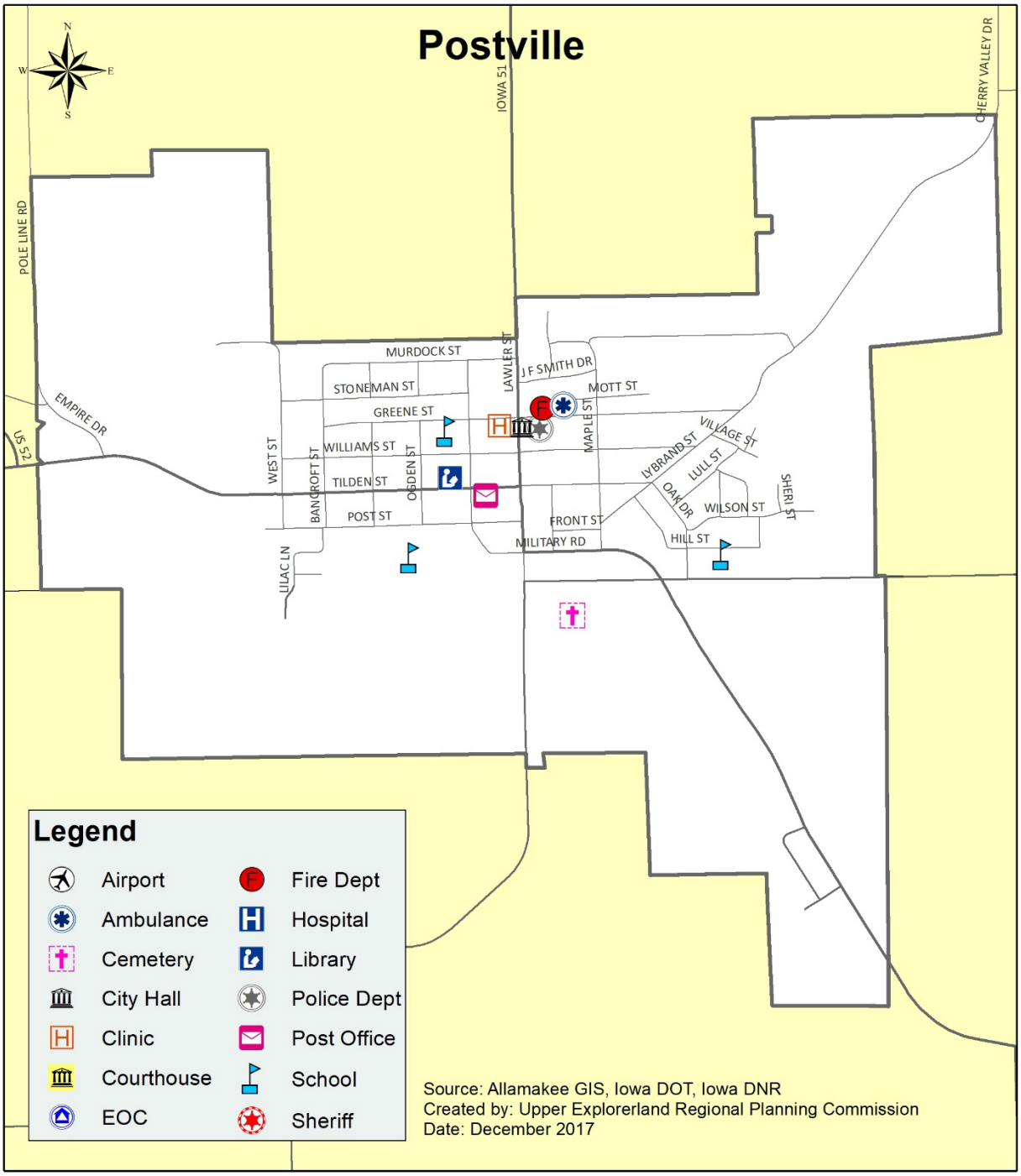
Legend

Airport	Fire Dept
Ambulance	Hospital
Cemetery	Library
City Hall	Police Dept
Clinic	Post Office
Courthouse	School
EOC	Sheriff

Source: Allamakee GIS, Iowa DOT, Iowa DNR
Created by: Upper Explorerland Regional Planning Commission
Date: December 2017

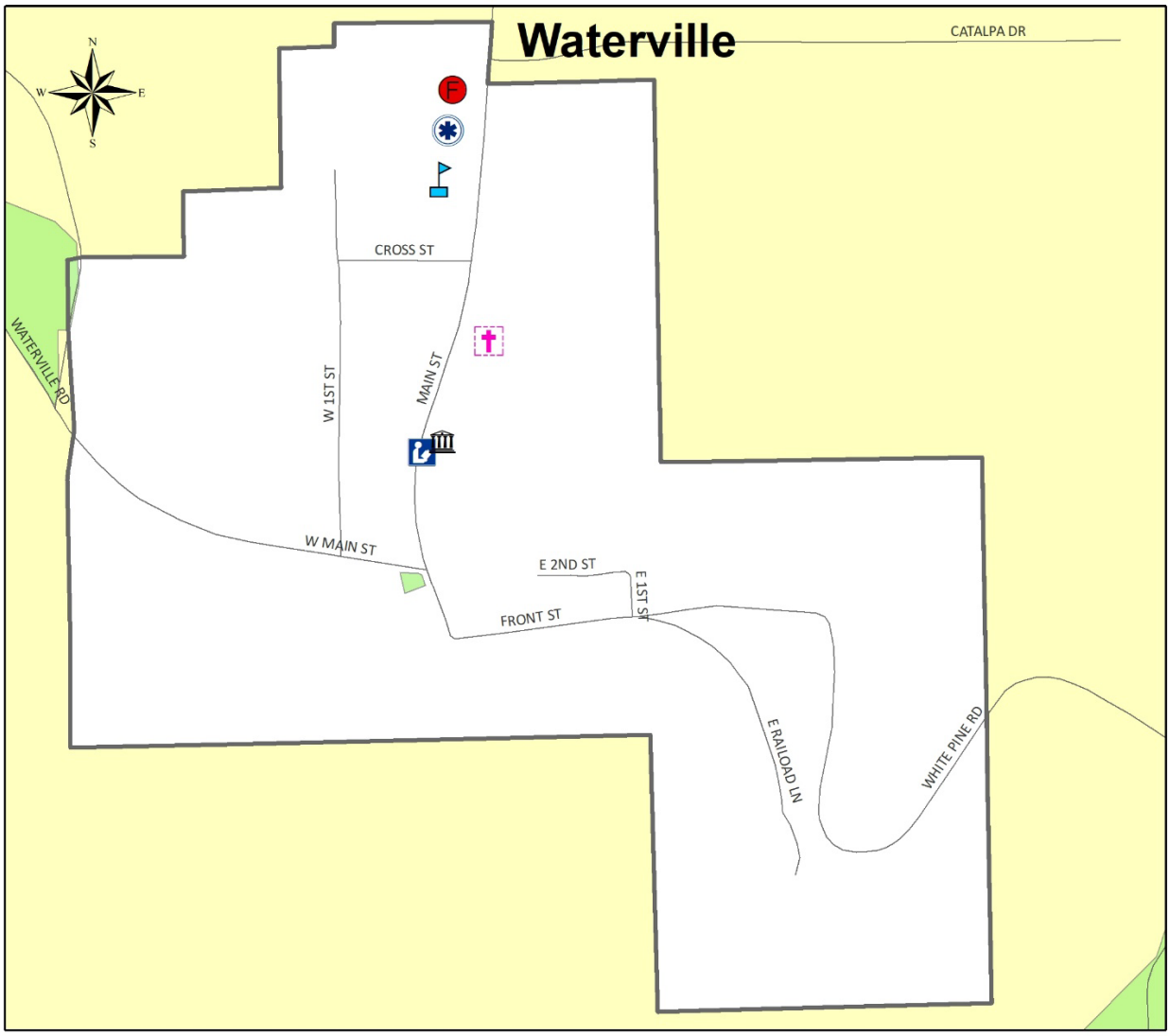
Note: The land area of city limits is 0.22 square miles (City-data.com, 2017)

Figure 9: City of Postville Planning Area, 2017



Note: The land area of city limits is 2.08 square miles (City-data.com, 2017)

Figure 10: City of Waterville Planning Area, 2017



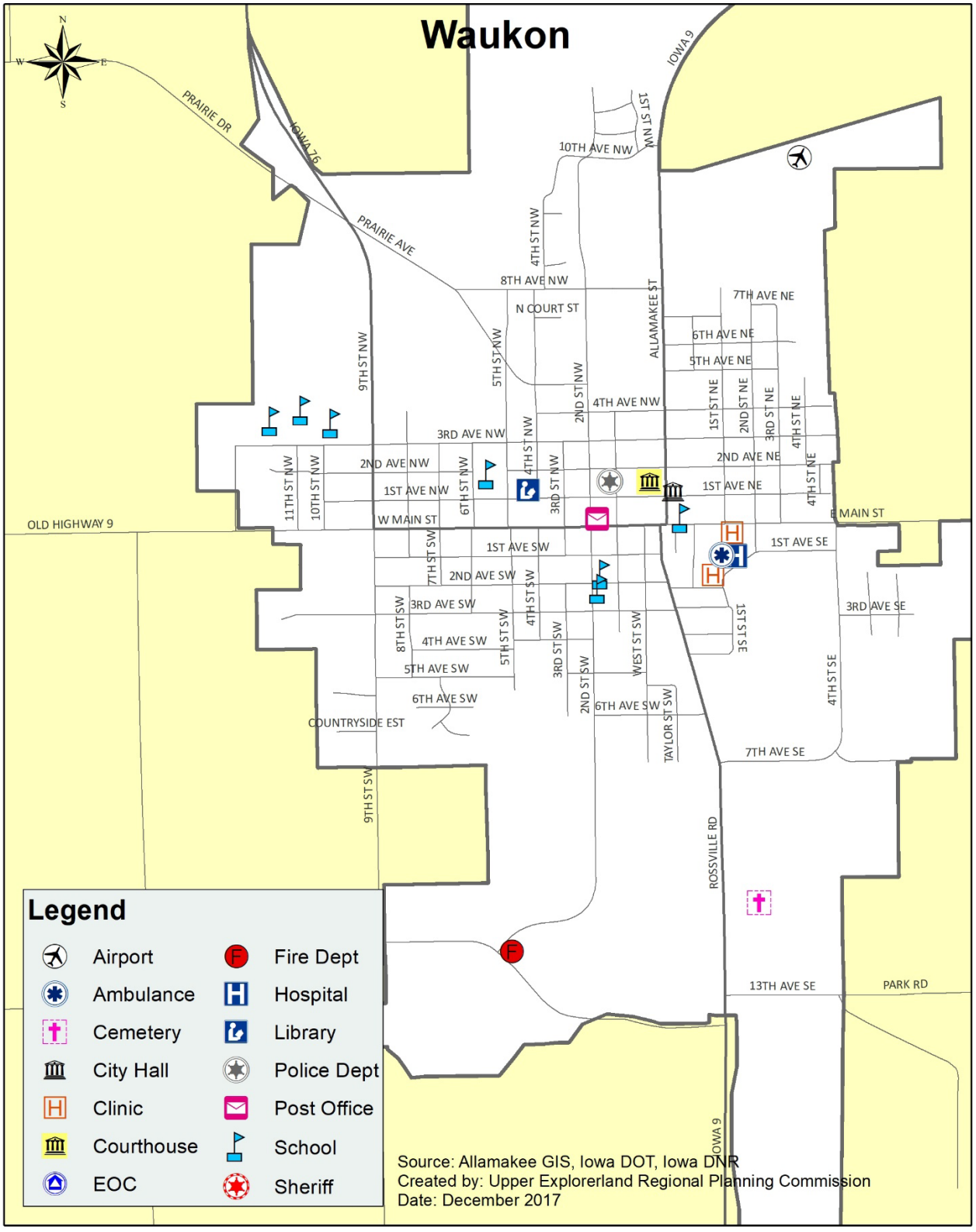
Legend

Airport	Fire Dept
Ambulance	Hospital
Cemetery	Library
City Hall	Police Dept
Clinic	Post Office
Courthouse	School
EOC	Sheriff

Source: Allamakee GIS, Iowa DOT, Iowa DNR
Created by: Upper Explorerland Regional Planning Commission
Date: December 2017

Note: The land area of city limits is 0.43 square miles (City-data.com, 2017)

Figure 11: City of Waukon Planning Area, 2017



Note: The land area of city limits is 2.94 square miles (City-data.com, 2017)

Land Cover and Land Use

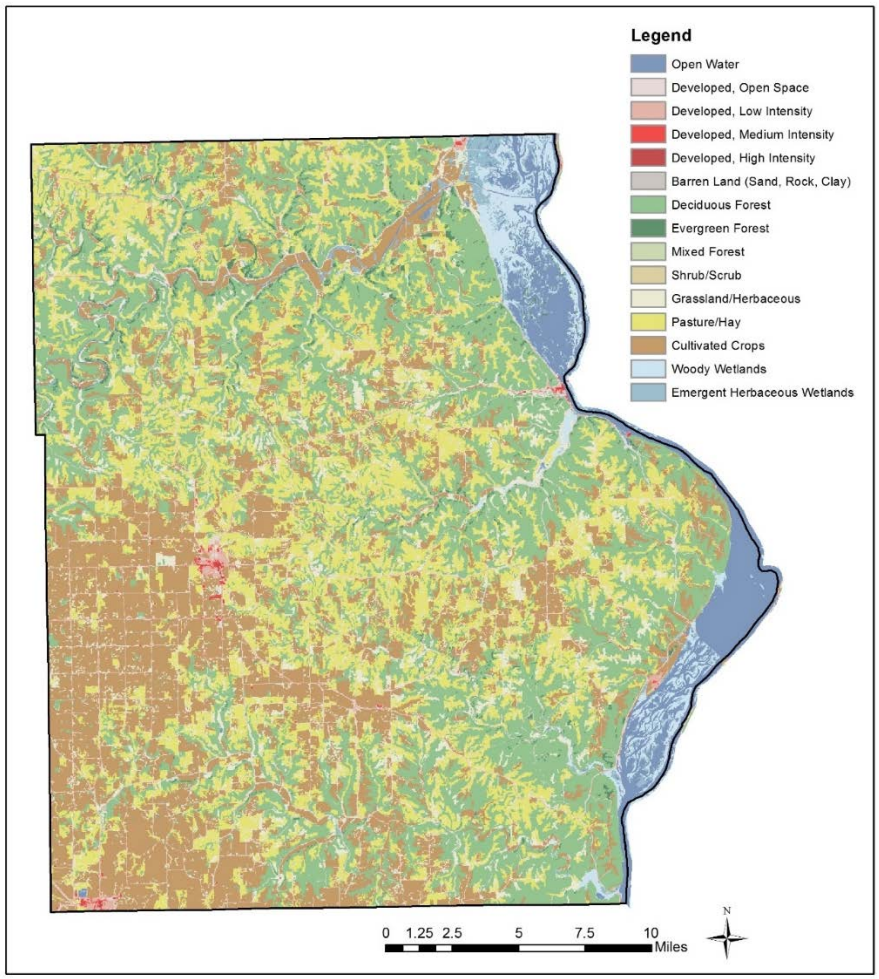
Originally, the land surrounding and including Allamakee County was covered with prairie grass and light forestation. Modern agricultural practices have changed this setting to predominately cultivated crops and pasture settings in the rural areas. Agricultural operations utilize 93,583 acres of land in the county, nearly 55% of the total land cover (U.S. Geological Survey, 2011). Table 3 breaks down the land cover by type for Allamakee County. **Error! Reference source not found.**illustrates the land cover for the county, with about half in agricultural vegetation and about a third in forest and woodland.

Table 3: Land Cover for Allamakee County

Land Cover Type:	Square Miles	% Total Area
Forest and Woodland	232.61	35.33%
Recently Disturbed or Modified	7.05	1.07%
Open Water	28.41	4.32%
Shrub land and Grassland	.52	.08%
Agricultural Vegetation	361.33	54.87%
Developed and other Human Use	28.47	4.32%
Introduced and Semi-Natural Vegetation	.07	.01%

Source: (U.S. Geological Survey, 2011)

Figure 12: Land Cover, Allamakee County



Source: (U.S. Geological Survey, 2011)

Land use differs from land cover in that various land covers could potentially fall under the same land use (agriculture, for example). The current land uses in Allamakee County, as categorized by the County Assessor for taxing purposes, are identified in Table 4. While not completely accurate as actual use and classification may differ slightly, the data provides a snapshot of how the land in the county is being utilized and taxed.

Table 4: Land Use Breakdown by Property Tax Classification

Land Use Classification	Acres	Percent
Agriculture		
Residential		
Commercial		
Industrial		
Exempt Properties (non-taxable properties e.g. churches, government buildings and nonprofits)		
Other (right-of-ways)		
Total		

Source: (Allamakee County, GIS Coordinator, 2017)

Elevation

The topography of Allamakee County ranges from the rare relatively flat farm land, to hilly terrain with bluffs overlooking valleys and the Mississippi River.

Rivers, Streams and Lakes

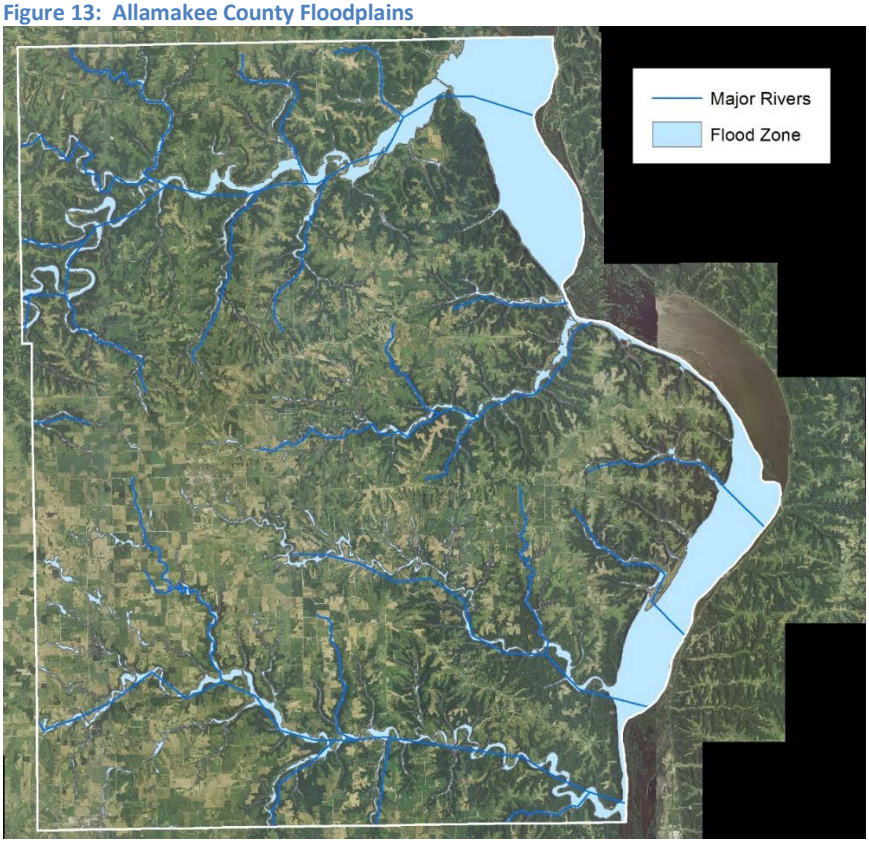
The surface waters of Allamakee County drain into the Mississippi River and its tributaries, the largest being the Upper Iowa River followed by the Yellow River. The major creek tributaries emptying into the Mississippi River are Village Creek and Paint Creek.

The Mississippi River forms the eastern boundary of the county. The flood plain of this river is about four miles wide and is now largely occupied by water of the lake formed by the lock and dam system in the river. The bluffs along the river rise to about 600 feet above the river, attaining an elevation of nearly 1200 feet above sea level. The flood plain of the Upper Iowa River, originating in Minnesota and crossing a small part of northeastern Iowa, has a width of three-fourths of a mile, widening at its lower end to about a mile. The Yellow River is similar in appearance, but has a smaller flood plain.

Stream divides and drainage areas consist of parallel or sub-parallel east-west ridges. The summits, which have not been reduced by the streams, rise to a common level testifying to the fact that, at an earlier geologic time, this was all a great plain at/or near sea level. Another erosion level exists at about 1100 feet near the Upper Iowa River and can be seen in the lateral spurs that separate the valleys. The crests of these spurs, capped by the Saint Peter sandstone, are all at nearly the same level. This plain, developed by the early Upper Iowa River, was about ten miles wide.

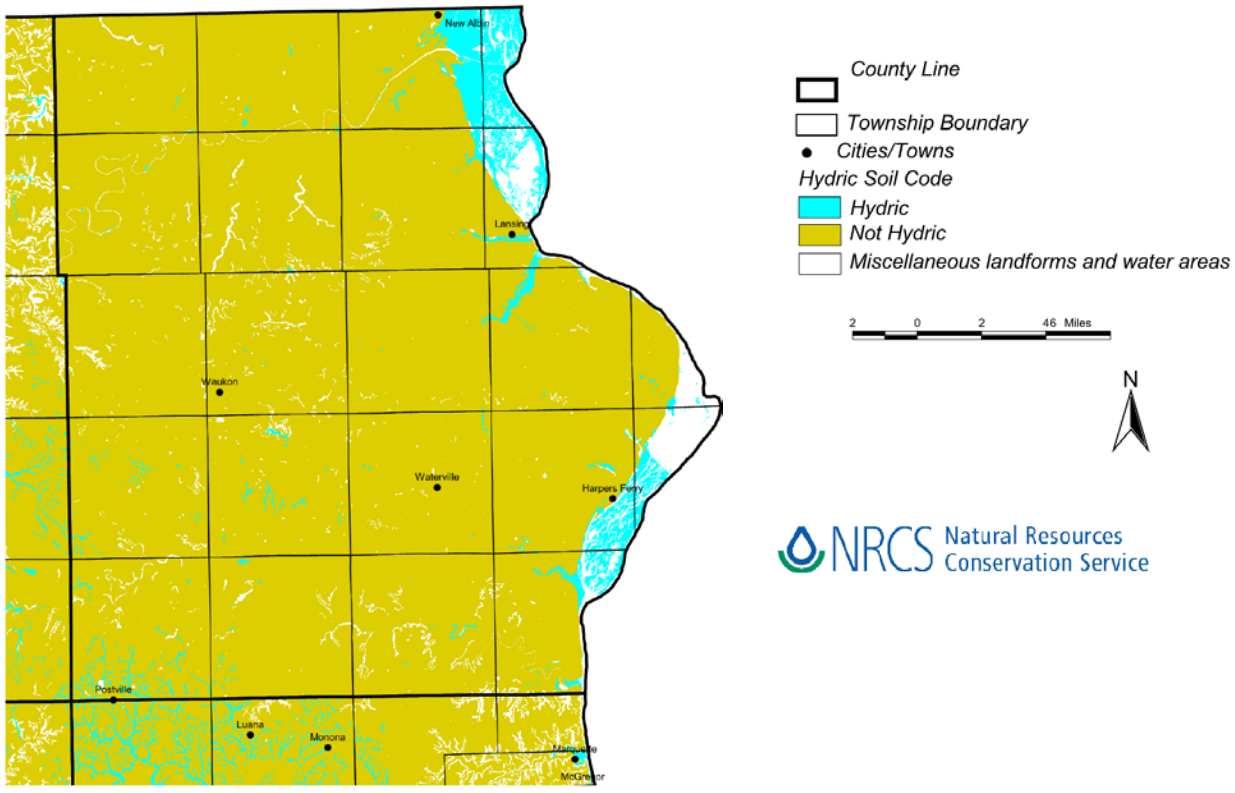
The County's floodplain areas are illustrated in Figure 13. Hydric soils for Allamakee County are shown in Figure 14.

Figure 13: Allamakee County Floodplains



Source: (Federal Emergency Management Agency, 2013); (Upper Explorerland Regional Planning Commission, 2016)

Figure 14: Hydric Soils in Allamakee County (wetland or wetland potential)



Source: (United States Department of Agriculture, 2001)

Watersheds

Watersheds are divided and subdivided into successively smaller units; each is given a number, called a Hydrologic Unit Code, or HUC. Eight-digit HUCs, called sub-basins, are the largest watershed units. As illustrated in Figure 15, Allamakee County crosses two watershed sub-basins: Upper Iowa and Coon-Yellow. A negligible portion of the Turkey Watershed falls within the county on the very south edge.

Figure 15: Watersheds in Allamakee County

Climate and Weather

The area experiences a temperate climate with both warm and cold season extremes. The summer high is around 82 degrees in July and the winter low is 9 in January. Winter months can bring occasional heavy snows, intermittent freezing precipitation or ice and prolonged periods of cloudiness. The strongest storms can produce associated severe weather such as tornadoes, large hail or damaging wind. Both river flooding and flash flooding can occur, along with urban-related flood problems. The terrain can lead to mudslides in the area. Heat and high humidity are typically observed in June, July and August. The fall season usually has the quietest weather. Valley fog can commonly be seen in the late summer and early fall months. On calm nights, colder air settles into valleys leading to cooler low temperatures, compared to ridge top locations. Table 5compares the average county climate to the average U.S. climate.

Table 5: Climate Statistics

Climate	Allamakee County	U.S.
Annual Rainfall (inches)	34.2	39.2
Annual Snow (inches)	38.8	25.8
Precipitation Days (annual total)	64	102
Sunny Days (annual total)	192	205
Average July High Temperature (°F)	82	86
Average January Low Temperature (°F)	9	23

Source: (Sperlings Best Places, 2017)

Population and Households

Population

The population of Allamakee County as of the 2010 Census was 14,330, ranking 57th out of 99 counties in Iowa. In the last century, the County's population declined from a high in 1880 of 19,791 to a low of 13,855 in 1990 (U.S. Census Bureau, 2010 Decennial, 2017). From 1980 to 2010, the County noted an overall decline of 5%. Table 6 compares the population growth or decline for each of the county's jurisdictions from 1980 to 2010 to the county as a whole and the state. The County's largest community is Waukon, the county seat. Postville and Lansing are the next largest communities.

Table 6: Population Comparison, 1980-2010, All Cities, County and State

Community	1980	1990	2000	2010
Harpers Ferry	258	284	330	328
Lansing	1,181	1,007	1,012	999
New Albin	609	534	527	522
Postville	1,475	1,472	2,273	2,227
Waterville	157	140	145	144
Waukon	3,983	4,019	4,131	3,897
Allamakee County	15,108	13,855	14,675	14,330
State of Iowa	2,913,808	2,776,831	2,926,324	3,046,355

Source: (State Data Center of Iowa, 2017); (U.S. Census Bureau, 2010 Census, 2017)

Allamakee County has a median population age of 45.1. Table 7 provides the median age, by rank, for each community in the county.

Table 7: Median Age of Allamakee County Communities

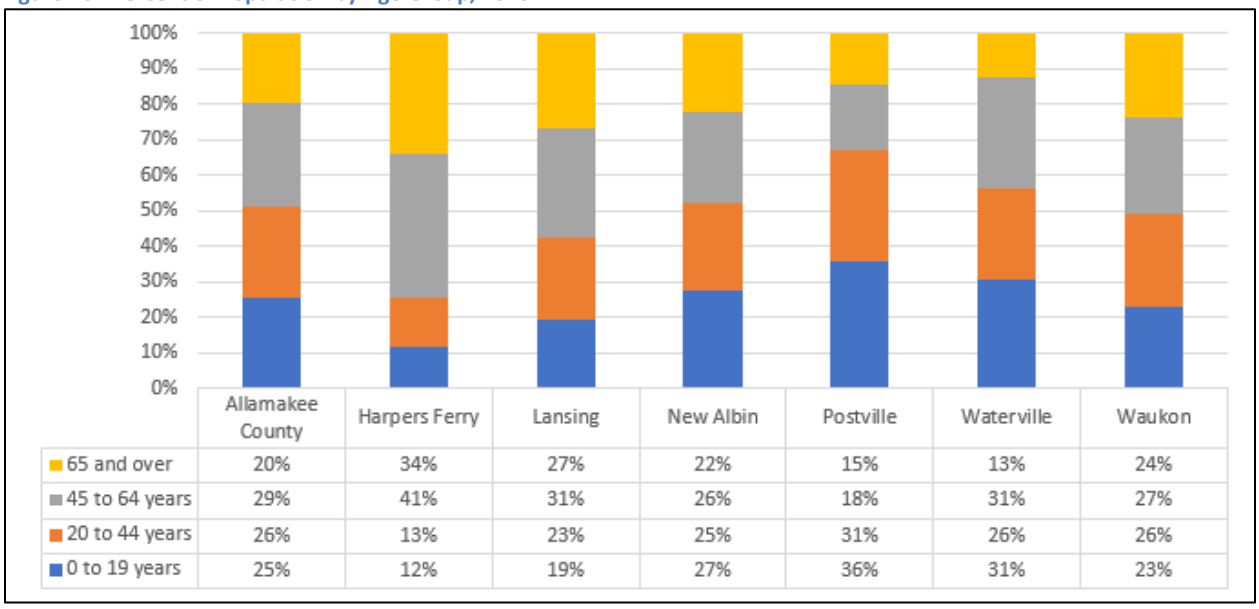
Community:	Median Age:
Harpers Ferry	62.8
Lansing	51.1
New Albin	38.5
Postville	27.7
Waterville	46.4
Waukon	45.5

Source: (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Allamakee County has little diversity in race, with 96% of the population self-identifying as "white" in the 2010 Census. The County's heritage is European, with 45% of the population from German ancestry, 20% from Norwegian ancestry, and 18% from Irish ancestry (U.S. Census Bureau, American Community Survey 2011-2015, 2017).

Figure 16 illustrates the population breakdown by age group for the county and each community.

Figure 16: Percent of Population by Age Group, 2010



	Allamakee County	Harpers Ferry	Lansing	New Albin	Postville	Waterville	Waukon
65 and over	20%	34%	27%	22%	15%	13%	24%
45 to 64 years	29%	41%	31%	26%	18%	31%	27%
20 to 44 years	26%	13%	23%	25%	31%	26%	26%
0 to 19 years	25%	12%	19%	27%	36%	31%	23%

Source: (U.S. Census Bureau, 2010 Census, 2017)

Households

As of the 2010 Census, there were 6,048 households in the county. Of these households overall, 65% were families and 35% represented non-families. Harpers Ferry and New Albin have the highest percentages of householders over the age of 65 living alone. **Error! Reference source not found.**Table 8 provides additional household and family data for each jurisdiction.

Table 8: Household Data, Allamakee County and Communities

	Total house-holds	Family households		Non-family households		Householder living alone		Householder 65 years and older living alone		Average house-hold size	Average family size
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Number
Allamakee County	5,845	3,885	66%	1,960	33%	1,653	28%	214	13%	2.39	2.9
Harpers Ferry	173	106	61%	67	38%	57	33%	11	20%	1.9	2.3
Lansing	451	257	57%	194	43%	169	37%	25	15%	2.1	2.7
New Albin	222	138	62%	84	37%	73	32%	13	18%	2.3	3
Postville	744	497	66%	247	33%	200	26%	28	14%	2.9	3.5
Waterville	59	37	62%	22	37%	18	30%	1	8%	2.4	3.1
Waukon	1,781	1,008	56%	773	43%	668	37%	100	15%	2.1	2.8

Source: (U.S. Census Bureau, 2010 Census, 2017); (U.S. Census Bureau, 2011-2015 American Community Survey 5-year Estimates, 2017)

Housing

As of the 2010 Census, there were 7,617 housing units in the county. Table 9 demonstrates the change in the number of housing units in each of the jurisdictions.

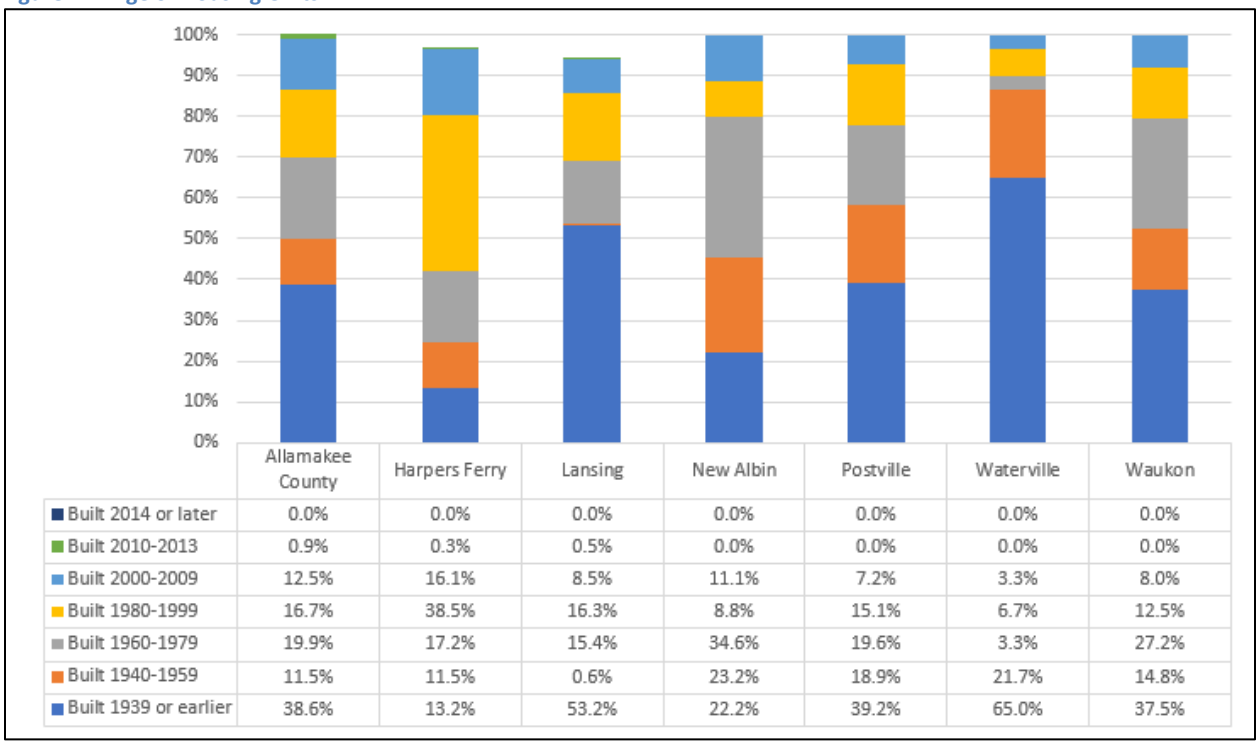
Table 9: Number of Housing Units from 2000-2010

Community	2000	2010
Harpers Ferry	560	578
Lansing	573	598
New Albin	247	257
Postville	824	902
Waterville	63	61
Waukon	1,909	1,946
Allamakee County	7,142	7,617
State of Iowa	1,232,511	1,336,417

Source: (U.S. Census Bureau, 2010 Decennial)

Single unit homes constitute the majority of housing in the county at nearly 77%. Mobile homes represent nearly 14% of the county's housing stock and multi-unit dwellings nearly 10%. 2,590 of the housing units in the county, nearly 40%, were built prior to 1940 (Allamakee County GIS Coordinator, 2017). Figure 17 identifies the age of housing units for each jurisdiction.

Figure 17: Age of Housing Units



	Allamakee County	Harpers Ferry	Lansing	New Albin	Postville	Waterville	Waukon
Built 2014 or later	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Built 2010-2013	0.9%	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%
Built 2000-2009	12.5%	16.1%	8.5%	11.1%	7.2%	3.3%	8.0%
Built 1980-1999	16.7%	38.5%	16.3%	8.8%	15.1%	6.7%	12.5%
Built 1960-1979	19.9%	17.2%	15.4%	34.6%	19.6%	3.3%	27.2%
Built 1940-1959	11.5%	11.5%	0.6%	23.2%	18.9%	21.7%	14.8%
Built 1939 or earlier	38.6%	13.2%	53.2%	22.2%	39.2%	65.0%	37.5%

Source: (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Table 10 compares the percentage of owner occupied housing units in each community, the county and state. Overall, county homeownership has increased by 4% since 2000 and as of the 2010 Census, 77% of the county's housing units were owner occupied.

Table 10: Percentage of Owner Occupied Units

Community	2000	2010
Harpers Ferry	90%	88%

Lansing	73%	73%
New Albin	85%	85%
Postville	67%	57%
Waterville	83%	86%
Waukon	71%	71%
Allamakee County	76%	78%

Source: (U.S. Census Bureau, 2010 Census, 2017)

Public and Private Infrastructure

Highways and Roads

Allamakee County roads consist of approximately 975 total miles of roadway. The Allamakee County Road Department is responsible for the maintenance of all county roads with the exception of state highways and roads and streets (95 miles) within the boundaries of incorporated cities in the county, this is approximately 880 miles (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017). There are 175 bridges within the county, with 9 categorizes as deficient. All bridges are located within a floodplain. As of 2014, 23 of the bridge structures are posted with weight restrictions and zero are closed to traffic (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017). There are 10,485 licensed drivers in the county, with an additional 43,483 licensed drivers in the adjacent Iowa counties. Between the years of 2007 and 2011, the county experienced 698 crashes, 30 of them major crashes resulting in 16 fatalities (Iowa Department of Transportation, 2017). The greatest number of crashes were caused by animal-vehicle collisions with over 30% (Allamakee County Emergency Manager, 2017); (Allamakee County Emergency Manager, 2017).

Rural roads are labeled, and jurisdiction is determined, by the following classifications: local roads, minor collectors, major collectors, minor arterials, other principal arterials and interstates. Federal aid money is available to maintain major collectors, minor arterials and principal arterials. Table 11 indicates the classifications and jurisdictions of the county's "federal aid" roadways and provides a description of each classification as defined by the Federal Highway Administration.

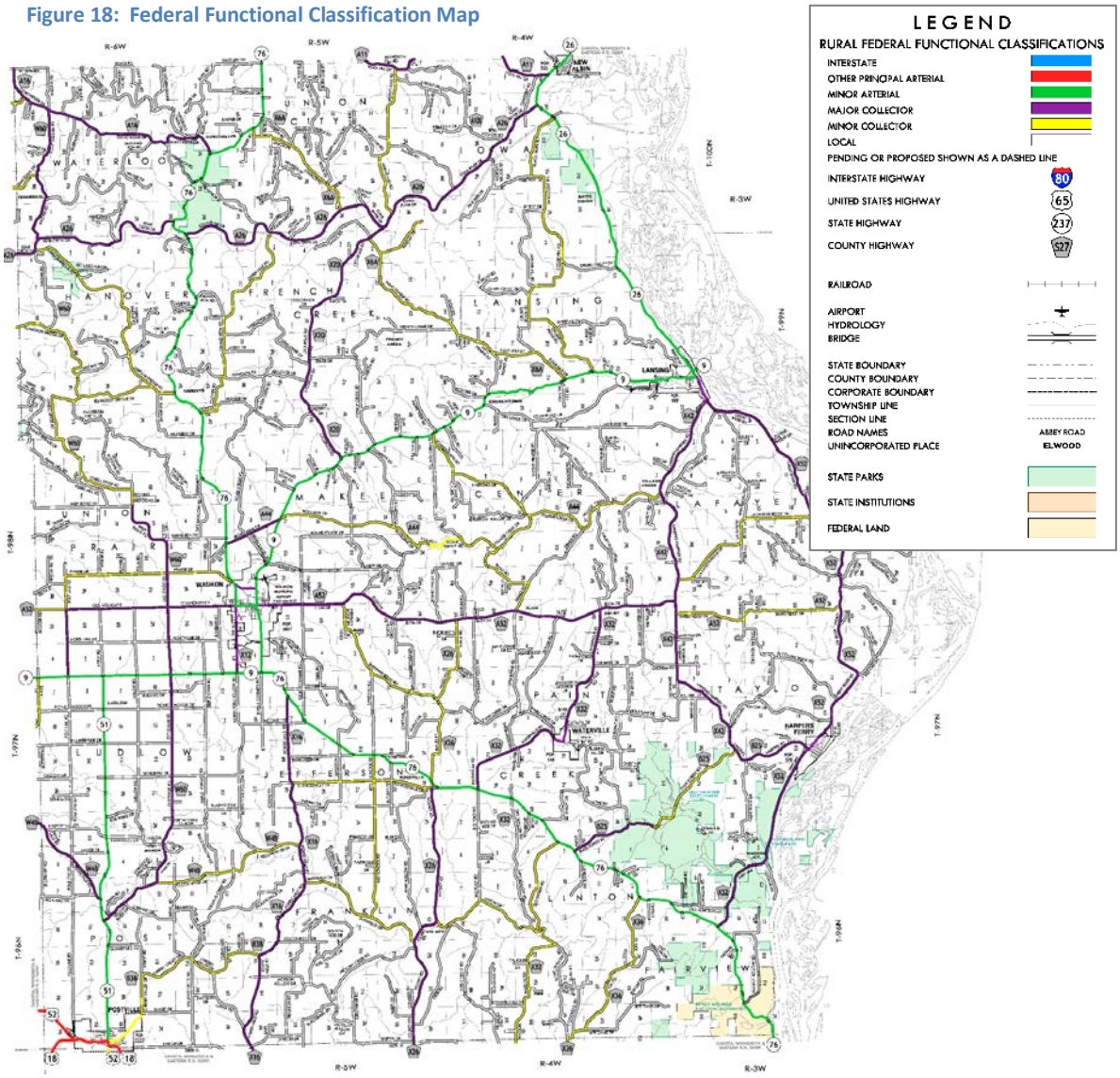
Table 11: Federal Functional Classifications, Allamakee County

Roadway	Classification	Jurisdiction	Classification Description
US Hwy 52	Principal Arterial	State	Consists of a connected network of continuous routes that have substantial trip length and travel density for statewide or interstate travel.
US Hwy 18	Principal Arterial	State	
State Hwy 9	Minor Arterial	State	With the principal arterials, form rural networks that link cities and larger towns and provide interstate and inter-county service. These roads are spaced so that all developed areas of the State are within a reasonable distance of an arterial highway.
State Hwy 76	Minor Arterial	State	
State Hwy 26	Minor Arterial	State	
State Hwy 51	Minor Arterial	State	
X52	Major Collector	County	These routes, also known as federal aid farm to market roads, provide service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems, and to other traffic generators, such as schools, shipping points, county parks, important mining and agricultural areas and link these places with nearby larger towns or cities, or with routes of higher classification. Federal aid can be used by the county in conjunction with farm to market funds to maintain these roads.
X42	Major Collector	County	
A11	Major Collector	County	
A26	Major Collector	County	
X20	Major Collector	County	
A16	Major Collector	County	
W60	Major Collector	County	
A44	Major Collector	County	
A52	Major Collector	County	
X16	Major Collector	County	
W4B	Major Collector	County	
X26	Major Collector	County	
B25	Major Collector	County	
X32	Major Collector	County	

Source: (Iowa Department of Transportation, 2008)

There are several minor collectors throughout the county. Minor collectors are also considered farm to market only roads and are spaced at intervals, consistent with population density, to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road. They also provide service to the remaining smaller communities and link the locally important traffic generators with the rural areas. Local roads constitute the rest of the roadways in the county. The rural local road system provides access to adjacent land and provides service to travel over relatively short distances as compared to collectors or other higher systems. There are no interstates within the county boundaries. Figure 18 illustrates the Federal Functional Classification roads in the county.

Figure 18: Federal Functional Classification Map



Source: (Iowa Department of Transportation, 2008)

Trails

Allamakee County has walking and biking trails as well as snowmobile trails as options for non-vehicular transportation. The City of Waukon has a trail located within its City Park. The City of Postville also has a trail within city limits. The County is also home to a portion of the Mississippi River Trail, a bike and pedestrian trail that extends the length of the Mississippi River along roadways and multi-use trails. All county communities have sidewalk infrastructure to some degree that supports walking and biking as a form of transportation.

Canoe and Kayak water trails are promoted on the Yellow River, Mississippi River and the Upper Iowa River. Snowshoeing and cross-country skiing trails are promoted at Yellow River State Forest. Snowmobilers enjoy miles of groomed and marked trails within the county.

Railway

There is a total of 45 miles of railway within the county (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017). The Canadian Pacific Railroad, owner of Dakota, Minnesota & Eastern Railroad Corporation, operates two lines through Allamakee County. The railroad operates track running parallel to the Mississippi River through Harpers Ferry, Lansing and New Albin. It also operates track running through Postville on the south edge of the County. The main products handled by the rail include chemical and allied products (29%), coal (20%), food and kindred products (19%), wasted scrap materials (11%), primary metal products (7%), non-metallic minerals (6%) and farm products (4%) (Iowa Department of Transportation, 2017). Harpers Ferry, Lansing and New Albin experience 6-8 trains per day; Postville experiences 2-4 trains per day (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017). From 2007 through 2016 there were three railway accidents or incidents reported. Two of them were highway-rail incidents that resulted in no injuries (Federal Railroad Administration, 2017).

Airports

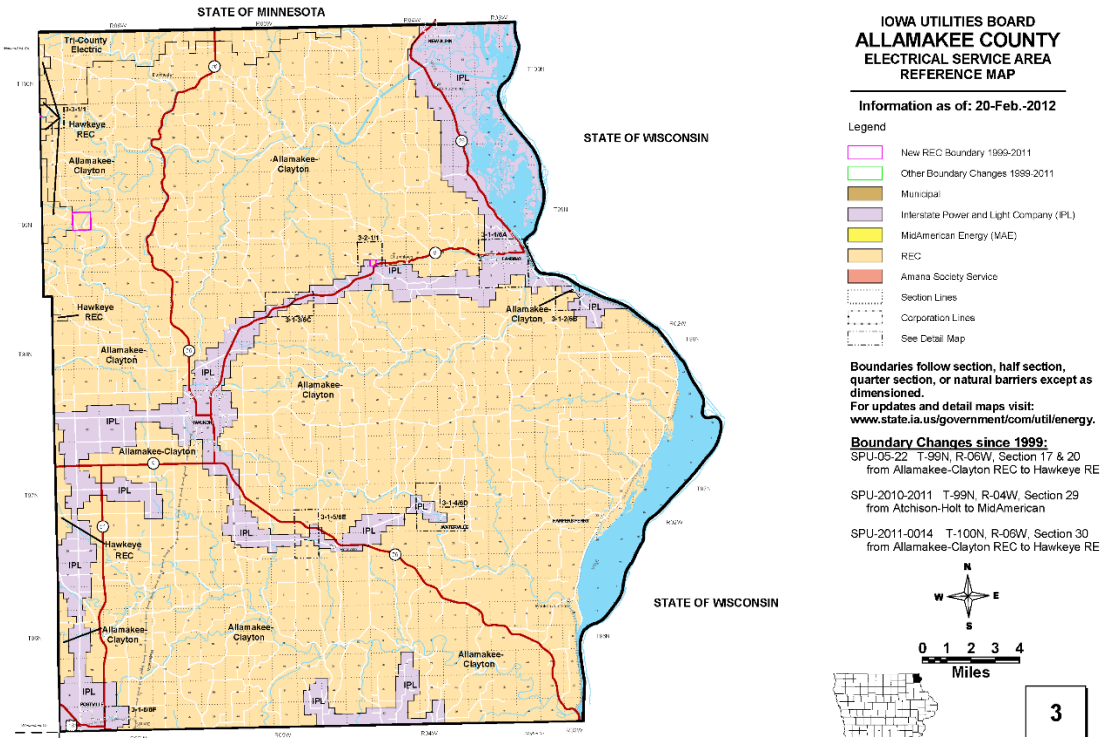
Allamakee County has one publicly owned general aviation airport, the Waukon Municipal Airport, located one mile northeast of the city The Airport runway is approximately 2,500 feet asphalt runway . The airport has 4 single engine aircrafts based on the field. The airport averages around 83 operations per month, 75% of which are local general aviation and 25% transient general aviation (AirNav, LLC, 2017).

Allamakee County has one heliport located at Veteran's Memorial Hospital in Waukon (Iowa Department of Transportation, 2017).

Utilities and Pipelines

Residents in the county are provided electrical service from a mixture of investor-owned utilities (IOU) and rural electric cooperatives (REC). The largest power suppliers for the county are Hawkeye Rural Electric Cooperative and Interstate Power and Light (Alliant Energy). Figure 19 delineates the electrical service area for the county and indicates the provider responsible for that area.

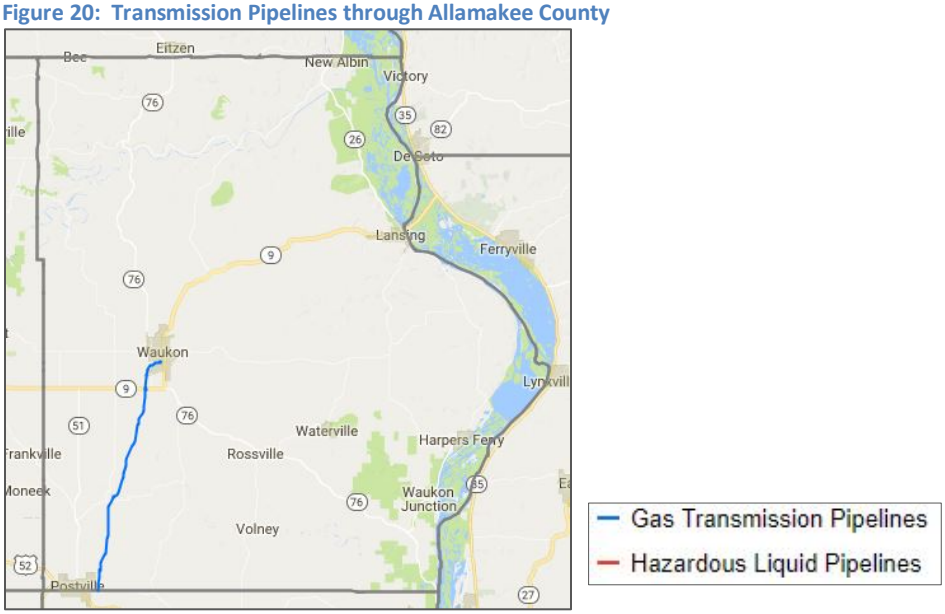
Figure 19: Electrical Service Area Map by Provider



Source: (Iowa Utilities Board, 2012)

Natural gas is not available in all parts of the county. Black Hills Energy provides natural gas service to the communities. Residents also have access to LP gas from a variety of private providers. There is one pipeline through the county, operated by Northern Natural Gas Company (Pipeline and Hazardous Materials Safety Administration, 2017). Figure 20 illustrates the location of this line within the county.

Figure 20: Transmission Pipelines through Allamakee County



Source: (Pipeline and Hazardous Materials Safety Administration, 2017)

Dams

There are 16 dams within Allamakee County with a low hazard potential. There are also three dams with a moderate hazard level located on the Mississippi River near Allamakee County: Lock and Dam #7 near LaCrescent, MN; Lock and Dam #8 near Genoa Wisconsin; and Lock and Dam #9 near Lynxville, WI. There are no known dam failures in Allamakee County. The primary purposes of the dams within the county are flood control, recreational or for small fish ponds (U.S. Army Corps of Engineers, n.d.).

Source Water

The water supply for Allamakee County residents comes from two sources, public or private systems, depending on the location. Both public and private systems operate on groundwater wells located throughout the county and draw from several aquifers, depending on the depth of the well. For the most part, water is drawn from the Cambrian, Ordovician and Cambrian-Ordovician Aquifers. Municipal water systems provide water to over 7,600 residents and include the following systems (Iowa Department of Natural Resources, 2017):

Lansing Water Supply
New Albin Water Supply
Postville Water Department
Waukon Water Department

Several rural locations that serve the public outside of municipal service areas operate water systems regulated by the DNR as well. They include:

Allamakee County Public Safety Center
Harpers Ferry City Complex
Blumenthal Lansing Company
Lansing Valley Mobile Home Park
DOT-2 Fish Farm New Albin
Kingdom Hall (Waukon)
Waterville Elementary School
Waukon Junction Store

Wastewater

Allamakee County household wastewater is treated by either public sanitary systems or a private sewage disposal system such as a septic system. The Iowa Department of Natural Resources is responsible for the regulation of public sewer systems to ensure compliance with the state's minimum standards for wastewater treatment and disposal. The Allamakee County Board of Health is responsible for regulating sewer systems that serve no more than four homes or no more than 15 people. The department requires residents to file for permits before installation and enforces the minimum standards as adopted by the county. The following communities maintain public sewer systems (Iowa Department of Natural Resources, 2017):

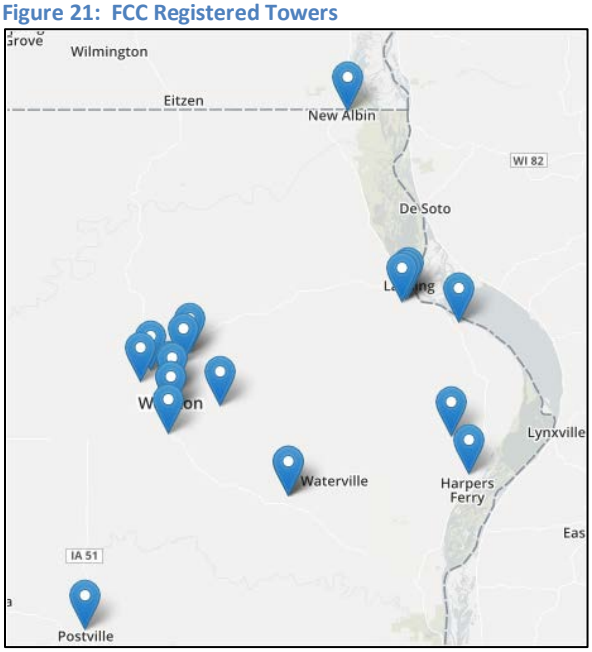
City of Harpers Ferry
City of Lansing
City of New Albin
City of Postville
City of Waterville
City of Waukon

Communications

Landline telephone service is provided throughout the county by a variety of telecommunications companies depending on location, ensuring that residents and businesses have acceptable telephone service, as well as access to high speed internet and cell phone coverage is an issue that impacts economic development and quality of life. Landline telephone service has decreased from 99.1% of

households in 2000 to 98.6% in 2011 (U.S. Census Bureau, 2010 Census, 2011). According to the FCC, there are 20 cellular towers within the county. Internet service is available at some level throughout most of the county. Connect Iowa reports that, depending on location, the county is served by fiber broadband, cable broadband, DSL broadband, fixed wireless broadband and mobile wireless broadband. County residents also have access to local radio, newspaper and website resources for communications. Not all providers reach all areas. Figure 21 maps out all FCC registered towers in the county. Table 12 provides a list of county communication providers.

Figure 21: FCC Registered Towers



Source: (Federal Communications Commission, 2017)

Table 12: Communications Provider List

Provider:	Website:
Ace Telephone Association	Acentek.net
Allamakee-Clayton Electric Coop	Acrec.com
Alpine Long Distance, LC	Alpinecom.net
Cellco Partnerships/Verizon Wireless	Verizonwireless.com
CenturyTel, Inc./Century Link	Centurylink.com
Community Digital Wireless, LLC	Cdwwireless.com
Hughes Network Systems, LLC	Hughes.com
MCC Iowa LLC/Mediacom	Mediacomcc.com
NEIT Services, LLC	Neitel.com
Skycasters	Skycasters.com
Spacenet, Inc.	Starband.com
Spring Grove Communications	Yourlocal.coop
US Cellular Corporation	Uscellular.com
K256CS 99.1 FM/KMRV 1160 AM[1]	Kmrvradio.com
KNEI 103.5 FM	Kneiradio.com
Postville Herald Newspaper	Fayettecountynewspapers.com
The Waukon Standard Newspaper	Fayettecountynewspapers.com

(Connect Iowa, 2017) ; (Radio Locator, 2017)

In addition to these local communication systems, several regional television stations from Iowa and Minnesota broadcast to the county. Most commonly watched local channels are broadcast from Cedar Rapids, Waterloo, Mason City, Iowa Public Television, Rochester, MN and La Crosse, WI.

Care Facilities

Medical and Hospital Facilities

One hospital and several clinics serve the residents of Allamakee County. The hospital is located in Waukon. Clinics can be accessed in Lansing, Postville and Waukon.

The Veterans Memorial Hospital is a Critical Access Hospital located in Waukon. The Hospital offers many services and programs including emergency services, weekend clinics, maternity serves, rehabilitation and sports medicine, surgery, radiology and home health care among many others.

Table 13 lists the clinics, home health agencies and specialty care available to county residents within the county:

Table 13: Health Care Entities in Allamakee County

Facility Name	Facility Type	City
Gundersen Lansing Clinic	Rural health clinic	Lansing
Gundersen Palmer Lutheran Hospital & Clinics	Rural health clinic	Postville
Mayo Clinic Health System - Waukon	Rural health clinic	Waukon
Veterans Memorial Hospital	Critical access hospital	Waukon

Source: (Iowa Department of Inspections and Appeals, Health Facilities Division, 2017)

Child and Senior Care Facilities

Allamakee County has 19 registered home care and child care centers within the county. Table 14 lists the licensed child care centers, their locations and licensed capacities.

Table 14: Child Care Providers, Allamakee County

Community	Provider Name	Provider Capacity
Waukon	Growing Bear Preschool & Daycare	81
Postville	NEICAC-Postville Head Start & CDC	59
Waukon	NEICAC-Waukon Head Start	59
Postville	Postville Child Care Services Inc-YMCA Site	25
Postville	Postville Childcare Services Inc	75
Waukon	St. Patrick's Clover Patch Preschool	50

Source: (Iowa Department of Human Services, 2017)

Senior care within the county includes assisted living facilities, skilled nursing facilities and home health agencies. Table 15 lists the senior care facilities which are located in three of the county's communities.

Table 15: Senior Care Facilities, Allamakee County

Facility Name	Facility Type	City
Good Samaritan Society - Postville	Free Standing Nursing Facility/Skilled Nursing Facility	Postville
Good Samaritan Society - Waukon	Free Standing Nursing Facility/Skilled Nursing Facility	Waukon

Northgate Care Center	Free Standing Nursing Facility/Skilled Nursing Facility	Waukon
Southcrest Manor II	Assisted living programs	Waukon
Thornton Heights Assisted Living	Assisted living programs	Lansing
Thornton Manor Care Center	Free Standing Nursing Facility/Skilled Nursing Facility	Lansing
VMH Community & Home Care	Home Health Agency	Waukon

Source: (Iowa Department of Inspections and Appeals, Health Facilities Division, 2017)

Economy

The two leading employment industries in the county are "Educational services, health care and social services", "Manufacturing" and "Retail trade", together employing over 50% of the employed labor force. Table 16 compares the leading industries in the county to the state. Table 17 classifies employees into categories by occupation for the county and state. Occupations describe the type of work in which an employee is engaged, regardless of the industry.

Table 16: Economic Base of Allamakee County and the State of Iowa in 2015

Industry Category	Allamakee County		State of Iowa	
	Number	Percent	Number	Percent
Agriculture, forestry, fishing, mining	723	10.5%	62,188	4.0%
Construction	549	8.0%	95,581	6.1%
Manufacturing	1,063	15.4%	229,557	14.7%
Wholesale trade	224	3.2%	46,372	3.0%
Retail trade	888	12.9%	181,666	11.7%
Transportation, warehousing and utilities	359	5.2%	73,661	4.7%
Information	33	0.5%	30,862	2.0%
Finance and insurance, real estate, rental and leasing	207	3.0%	119,357	7.7%
Professional, scientific, management, admin and waste services	295	4.3%	106,174	6.8%
Educational services, health care and social assistance	1,625	23.5%	372,756	23.9%
Arts, entertainment, recreation, accommodation and food	362	5.2%	118,557	7.6%
Other services, except public administration	348	5%	68,747	4.4%
Public administration	228	3.3%	51,853	3.3%
Total Employed Persons	**6,904**	**100.0**	**1,557,331**	**100.0**

Source: (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Table 17: Occupation Classification of Allamakee County Workers

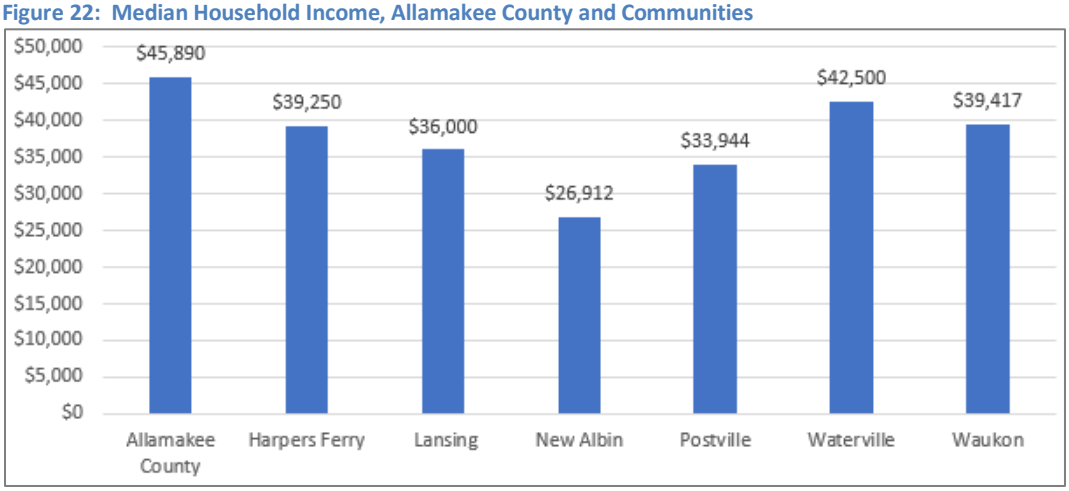
Occupation Description	Winneshiek County		State of Iowa	
	Number	Percent	Number	Percent
Management, business, science, arts	2,055	29.8%	524,386	33.7%
Service	1,046	15.2%	258,756	16.6%
Sales and office	1,350	19.6%	374,917	24.1%
Natural resources, construction, maintenance	1,042	15.1%	148,358	9.5%
Production, transportation, material moving	1,411	20.4%	250,914	16.1%
Total Employed Persons	**6,904**	**100.0**	**1,557,331**	**100.0**

Source: (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

The median household income in Allamakee County is $45,890. This compares to a state average of $53,182 and a national average of $53,889 (U.S. Census Bureau, 2011-2015 American Community Survey 5-year Estimates, 2017). Figure 22 compares the median household incomes for each of the

incorporated communities and the county. In this comparison, Waterville stands out as having the highest median income, while New Albin has the lowest.

Figure 22: Median Household Income, Allamakee County and Communities



Source: (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Jurisdictional Descriptions and Capabilities

Requirement §201.6(c)(3):

[The plan shall] 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(d)(3):

[The plan shall] be revised to reflect changes in development, progress in local mitigation efforts and changes in priorities

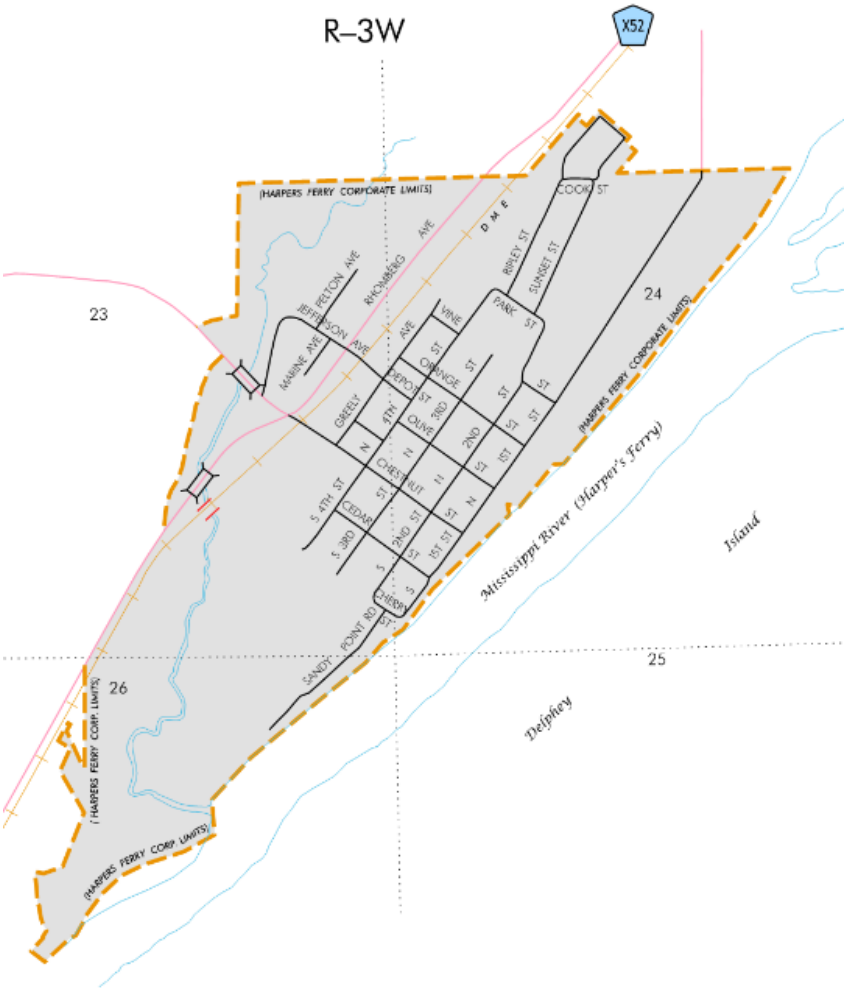
The mitigation capabilities for each city jurisdiction are profiled in the section that follows. This profile includes an overview of the jurisdictions and their organizational structure; a description of staff, fiscal, and technical resources; and information regarding existing hazard mitigation capabilities such as adopted plan policies and regulations, if any. The descriptions and capabilities assessments are based on available and applicable data, including information provided by the jurisdictions collected during the planning process.

City of Harpers Ferry

History and Overview

Harpers Ferry is located in eastern Allamakee County, situated primarily east of the Great River Road (County Route X52) and west of the Mississippi River. The total land area of city limits is .61 square miles (City-data.com, 2017) and is laid out as shown in Figure 23.

Figure 23: Harpers Ferry Street Map



Source: (Iowa Department of Transportation, 2016)

Harpers Ferry is located on a level plateau which extends back nearly a mile to the bluffs and three miles along the river. In the days of the steamboats, this town site was an important landing located on Harpers Slough, a secondary channel of the Mississippi which permitted large steamers to land here except in very low water.

Platted as the village of Winfield in 1852, Harpers Ferry, Iowa is one of the oldest settlements in Allamakee County. Once known as Vailsville, it was changed to Harpers Ferry in 1860 by an act of the Legislature. At that time, David Harper, for whom the town was named, was an influential man in the county and leading spirit in the development of the town. He did a large merchandising business, bought and shipped produce, and operated a ferry to McGregor and Prairie du Chien, Wisconsin. The town was incorporated December 24, 1901. As of the 2010 Census the population of Harpers Ferry was 328.

For City of Harpers Ferry, the National Register of Historic Places notes no sites within city limits (National Park Service, 2015).

Natural Resource Inventory

The City of Harpers Ferry lies on a plateau of land adjacent to the Mississippi River. Land area within the corporate boundaries falls in the Federal Emergency Management Agency (FEMA) identified floodplains as shown on Digital Flood Insurance Rate (DFIRM) maps. Primarily undeveloped areas, but portions of developed parcels on the east side of the community abutting the river fall within the flood zone as well. Figure 24 illustrates the Mississippi River to the east, Cota Creek running along the south and west boundaries of the community, and the FEMA identified 100-yr. floodplain.

Figure 24: Floodplain, City of Harpers Ferry

Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one mayor, one mayor pro-tem, and five council members.

City employees include:

- City Administrator/City Clerk
- Assistant City Clerk
- Public Works Official
- Public Works Assistant
- Water/Wastewater Superintendent

Buildings and infrastructure in Harpers Ferry are as follows:

- An active railroad. The City has two marked railroad crossings (one flashing signal and one sign).
- One government building - City Hall (built in 2001).
- Harpers Ferry has no dam or levees within city limits.

- As of 2017, the value of all residential structures in the City of Harpers Ferry was over $28.7 million. In addition, commercial structures were valued at over $1 million (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

Harpers Ferry has a volunteer fire department made up of 3 volunteers. The Allamakee County Sheriff's Office is the County's 911 dispatch center, and is also contracted to provide law enforcement for Harpers Ferry. Emergency services are provided by the Harpers Ferry Rescue Squad and Allamakee County Emergency Management. The Harpers Ferry Rescue Squad includes 14 volunteers fully trained as EMS members. The EMS and ambulance are housed within the fire station. The City's ISO rating is: 9.

Installed in 2001, the City has one warning siren in use, manually activated during emergencies from the Harpers Ferry Fire Station; tested yearly and other times, as needed. The community has three generators: one gasoline-powered generator at the City Shop, and two portable generators for city hall. There is a substation for electricity generation within city limits. St. Ann's Church on Orange Street serves as the community emergency shelter location.

Utilities in Harpers Ferry are as follows:

- The City provides municipal sewer for property owners. Sewer infrastructure includes three lift stations installed in 1998. The three-celled lagoon was built in 1998 and meets Iowa DNR requirements.
- The City does not offer municipal water services.

Public service providers for the City of Harpers Ferry are as follows:

- Electric: Allamakee/Clayton Rural Electric Cooperative (REC)
- Internet: Ace Telephone
- Land Line Telephone: Ace Telephone
- Food Supplies: Donahue's One Stop
- Cultural and Recreational: Effigy Mounds National Monument, Yellow River, and Mississippi River
- Other Infrastructure Includes: Trails (snowmobile, horse and walking), ball diamond, parks, marinas, and boat landings

The City of Harpers Ferry is included in the Allamakee Community School District. No district buildings are located within city limits.

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities

- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

City of Harpers Ferry is mapped for flood utilizing Digital Flood Insurance Rate Map (DFIRM) technology. With the State of Iowa re-map, Allamakee County DFIRM's became effective on September 25, 2009.

Existing Plans and Policies

Updated via Iowa Codification 2011, Harpers Ferry ordinances in place include: building code, subdivision, tree trimming, nuisance, site plan review requirements and floodplain management. The City of Harpers Ferry is compliant with the National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All city response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Infrastructure Failure - There is a substation for electricity generation within city limits. Concern for loss of electricity in extreme weather events. Otherwise, concern would be with transportation infrastructure.
- River Floods – The Mississippi River abuts the east side of the town. Up to 9% of community residential or commercial structures are within Special Flood Hazard Areas, including many along 1st St. near the river.
- Flash Floods - There has been flooding in the community in recent years in proximity to Cota Creek, located on the north end of town and running southwest through town.
- Landslides – Harpers Ferry abuts the Mississippi River and is bordered to the west by steep terrain. Development on tops and heavy rains could make bluffs more susceptible to landslides.
- Hazardous Materials - The railroad runs through the community and is in close proximity to residential development. Rail cars may carry materials that could pose a HAZMAT risk.
- Transportation Incident - The proximity of the rail line to city development means that a train derailment could cause physical damage to nearby structures, people or property.
- Hailstorm – unpredictable, potentially damaging weather event
- Severe Winter Storms – Can cause treacherous travel, strain to city budget when frequent and severe
- Thunderstorms and Lightning – Unpredictable, potentially dangerous weather event.
- Tornadoes - possible, potentially dangerous, and unavoidable
- Windstorms – Unpredictable, potentially damaging weather event.
- Hailstorm – unpredictable, potentially damaging weather event

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. The City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
3. The City utilizes the Allamakee County Emergency Support Function (ESF) Plan

4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City is a part of the Iowa Mutual Aid Compact (IMAC)
7. City contracts with rural fire district for fire response and EMS
8. City utilizes two generators
9. The entire County utilizes Code Red services

Status and Progress on Previous Mitigation Actions

1. New/enhanced fire district facility and response equipment, including fire pumper and additional training
   - Completed. A new rural fire district building was purchased and the fire facility has undergone expansion. There is a new pumper, and the city also acquired a new ambulance.
2. New or enhanced water distribution system
   - Not Completed. The city does not have city water, just private wells, and doesn't have plans for city water in the near future.
3. Additional City well(s)
   - Not Completed. The city does not have city water, just private wells, and doesn't have plans for city water in the near future.
4. Additional generator(s), including one for fire station
   - Completed/Not completed. The city has acquired a portable generator for the city hall, but would still like to attain a generator for the fire station.
5. Improved/enhanced infrastructure sought, including new lagoon liners
   - Not completed. Lagoon liners are no longer sought, and the city will not do a city waste water system for at least 10 years.
6. Backup power supply for community needs
   - Completed/Not Completed. A 2nd generator is attained; a new generator for the fire station is still sought.
7. Additional safety measures regarding local hazards
   - Not completed.

Mitigation Actions to Pursue Through MJ-7 Implementation

- Participate in Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations and prioritize needs for shelters, including back-up power supplies
- Support Allamakee County EMA initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
- Participate in Allamakee County EMA effort to create a Rail Response Plan to prepare for the possibility of a rail accident. Participation from the cities will include:
  - Host the Allamakee County Emergency Management Coordinator at a city council meeting to discuss planning and implementation of the Rail Response Plan.
  - Work with county public health to identify vulnerable or low-mobility populations in the ½ mile potential impact, or "band of influence" area, around a railroad.
  - Table top exercise to review and test rail accident response steps given accident scenarios.

- Assist in identifying community evacuation routes and locations
- Other tasks or projects as deemed necessary by the Allamakee County EMA Coordinator to better prepare rail communities for a potential rail disaster.

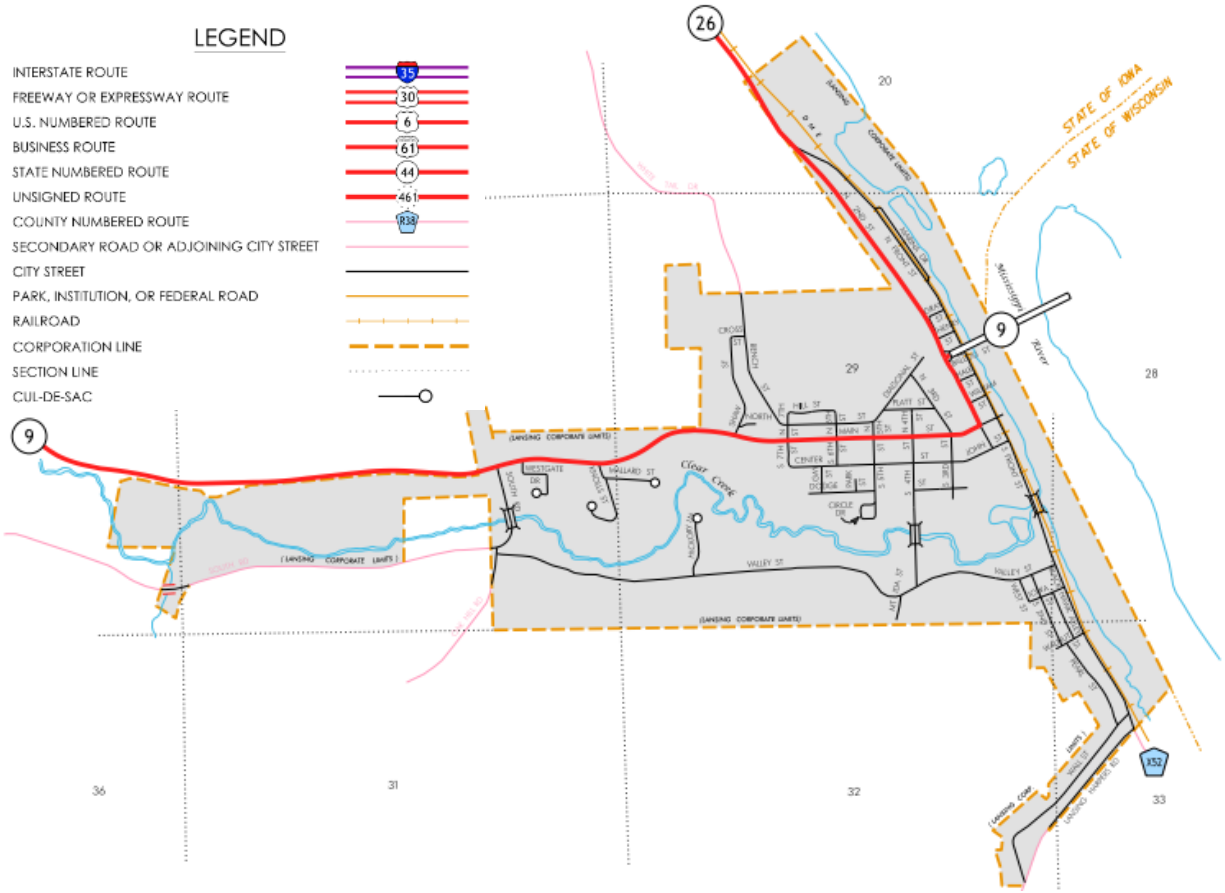
- Attain a new generator for the fire station; consider options for making it a warming center.
- Support stormwater management in the community as needed, including infiltration, retention basins, bioswales, rain gardens, and siltation removal projects.
- Maintain and improve rural fire district and emergency response equipment.

City of Lansing

History and Overview

Lansing is located in eastern Allamakee County, situated just west of the Mississippi River. The total land area of city limits is 1.08 square miles (City-data.com, 2017) and is laid out as shown in Figure 25.

Figure 25: Lansing Street Map



Source: (Iowa Department of Transportation, 2016)

Lansing was the second Allamakee County village to be surveyed and platted in 1851. The town was known to have one of the best steamboat landings on the river with its sprawling and available access to the Mississippi River. Lansing became a supply point for a large part of northeastern Iowa and southern Minnesota.

William Garrison, the first arrival in 1848, laid claim to some 14,000 acres of land in the valley and surrounding countryside. He was later joined the same year by John Haney Sr., his son, James, and H.H. Houghton of Galena, IL. Haney and Houghton purchased Garrison's land rights and laid out the new community in 1851, naming it after the original proprietor's native city in Michigan.

The new community was incorporated as a town in 1864 and S.V. Shaw became the first mayor. From its beginning, the community was a booming one, providing a port for steamboats shipping grain, merchandise and passengers on the Mississippi. In the early 1850's, farmers brought their grain to the top-notch Lansing mills and returned home with wares purchased or bartered from its merchants. The lumber mills were fed by large logs floated down river and they ran 24 hours a day. The Blackhawk Bridge that links the state of Iowa and Wisconsin at Lansing was dedicated on June 17, 1931.

Today, Lansing has become popular as a resort area, with many people having their summer homes along the Mississippi River dotting the Lansing perimeter. The boat harbors are often full of boats. Park and recreation opportunities in and around the community also draw visitors to the location.

For the City of Lansing, the National Register of Historic Places notes the following sites:

- Kerndt G., and Brothers Elevator and Warehouses, No. 11, No. 12 and No. 13
- Kerndt, G., & Brothers Office Block
- Lansing Fisheries Building (AKA: Lansing Fish Hatchery; Lansing Fish Rescue Station)
- Lansing Main Street Historic District
- Lansing Stone School
- Old Allamakee County Courthouse

The City of Lansing lies at the base of steep limestone bluffs on land adjacent to the main channel of the Mississippi River. Mount Hosmer is located in north Lansing near the river. Significant land area falls in the Federal Emergency Management Agency (FEMA) identified floodplains as shown on Digital Flood Insurance Rate (DFIRM) maps. Figure 26 shows the river along the east boundary of Lansing, Clear Creek running through the south half of the community, and FEMA identified floodplains.

Figure 26: Floodplain, City of Lansing

Source: Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one Mayor, one Mayor Pro-Tem and five council members. City employees include:

- Nine full-time staff: City Clerk, Deputy City Clerk, Police Department staff (3), Public Works staff (2), Water/Sewer staff (2)
- Four part-time staff: Library staff (2) and Police Department staff (2)
- Four seasonal staff

Buildings and infrastructure in Lansing are as follows:

- There is an active railroad within Lansing city limits with four public crossings and several private crossings.
- The City has one government building, City Hall (built in 1933).
- Lansing has no dam or levees within city limits.
- As of 2017, the actual value of all residential structures in the City of Lansing was over $38.3 million. In addition, commercial structures were valued at over $5.5 million (Allamakee County

GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

The Lansing Police Department includes three full time staff and two part-time staff.

The Lansing Fire Department supports the community for fire protection needs. Lansing Emergency Services has 30 volunteers fully trained as members for fire department city and rural response. In addition, 13 volunteers are fully trained as EMS members of the Lansing Emergency Medical Systems Inc. team. The City's ISO rating is: 7.

City of Lansing Ambulance provides ambulance services. The Allamakee County Sheriff's office located outside of Waukon is the County's 911 dispatch center. Allamakee County Emergency Management provides services to the City of Lansing.

Installed in approximately 1950 on Little Hill by North Alley, the City has one warning siren in use, manually activated daily at noon and during emergencies from the Lansing Emergency Services. City utilizes three generators.

Public service providers for City of Lansing are as follows:

- Electric: Alliant Energy
- LP Gas: AgVantage FS, Fauser Oil, New Horizon, Amerigas
- Fuel Oil: Innovative Energy
- Internet: Mediacom, Qwest, Rconnect
- Land-Line Telephone: Qwest
- Ambulance: Lansing First Responders/EMS
- Hospital, Clinic: Gundersen Lutheran Clinic (Lansing)
- Senior Care/Living Facilities: Thornton Manor
- Food Supplies: Moore's Foods, Kwik Trip, Expresso, et al.
- Cultural and Recreational: Mt. Hosmer Park, city swimming pool/park complex, Mississippi River, Driftless Area Education and Visitor Center, Mississippi River Trail, Commercial Fishing Museum
- Other Infrastructure Includes: Trails, public ball diamond, Lansing Marina

Utilities in Lansing are as follows:

- The City provides municipal sewer for property owners. Sewer infrastructure includes five lift stations. There are approximately 12 private septic systems in service.
- City of Lansing participates in the Iowa Rural Water Association (IRWA). The City's municipal ID for water is 0354054. Built in 1977, the City has one elevated water storage unit on Mt. Ida Road entitled "Mt. Ida Reservoir" which has capacity for 200,000 gallons of water. Since 2006, the City further provides water storage through a below ground storage 172,000 gallon reservoir on Mt. Hosmer Road entitled "Mt Hosmer Reservoir". In recent years, the City has added a new 400,000 gallon water storage unit. Current water main infrastructure includes 4", 6", and 8" ductile iron mains with some 4" and 8" PVC mains.

City of Lansing is included in the Eastern Allamakee Community School District. Kee High School and Lansing Middle School are located within city limits.

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities
- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

Existing Plans and Policies

City of Lansing ordinances in place include: parking, snow removal, mobile home, restricted residence district, water, sewer connections, floodplain, subdivision, tree trimming, nuisance, debris management. Planning documents in place include Comprehensive Plan (2010) and Community Builder Plan (1990). The City of Lansing is compliant with the National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All city response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Infrastructure Failure – The Interstate Power and Light power plant is approximately 2 miles south of town.
- Hazardous Materials – The railroad runs through the community within a block to the downtown area, and immediately adjacent to commercial and residential development. Rail cars regularly carry ethanol and crude oil materials, which pose a HAZMAT risk. Also, the proximity of the rail line to city development means that a train derailment could cause physical damage to nearby structures, people or property. Also, there was concern regarding anhydrous ammonia safety on farms, and potential water quality issues from runoff associated with farms.
- Transportation Incident - Rail related concerns, as described under hazardous materials. Danger of large barges along Mississippi River east of town colliding with bridge infrastructure, and potential resulting damage and loss of bridge use. And the possibility of potential farm machinery or vehicle related accidents on roads surrounding town.
- Landslides - The community is in proximity to bluff areas with geology prone to landslides, according to the hazard profile analysis. Residents report recent incidents of landslides in the community within the last 5 years.
- Tornados: Though not common in the community, the magnitude of potential damage to the community is significant, and the community has some work to do in establishing official community shelters to serve residents in a tornado disaster.

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
3. City utilizes the Allamakee County Emergency Support Function (ESF) Plan
4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City is a part of the Iowa Mutual Aid Compact (IMAC)
7. City maintains own fire station and ambulance service
8. City utilizes three generators
9. The entire County utilizes Code Red services

Status and Progress on Previous Mitigation Actions

1. New/enhanced fire district facility and response equipment, including air packs and new in-house compressor:
    - Completed. New air packs, gear and compressor attained.
2. New or enhanced water distribution system:
    - Completed. City attained new 400,000 gallon water storage structure.
3. Additional City well(s):
    - Not Completed.
4. Additional generator(s):
    - Not Completed. City has fewer generators since previous plan update.
5. Improved/enhanced infrastructure sought, including extending water and sewer mains throughout entirety of city limits:
    - Not Completed.
6. Additional safety measures regarding local hazards:
    - Completed:
        i. City recently complete a study of radon in city wells, which they will use as a guide in taking corrective action.
        ii. City fire and emergency response representatives participated in a countywide train derailment safety training.

Mitigation Actions to Pursue Through MJ-7 Implementation

1. Participate in Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations, and to prioritize needs for shelters, including back-up power supplies
2. Participate in Allamakee County Emergency Management Agency (EMA) effort to create a Rail Response Plan to prepare for the possibility of a rail accident. Participation will include:
    a. Host the EMA Coordinator at a city council meeting to discuss planning and implementation of the Rail Response Plan.
    b. Work with county public health to identify vulnerable or low-mobility populations in the ½ mile potential impact, or "band of influence" area, around a railroad.
    c. A table top exercise to review and test rail accident response steps given accident scenarios.
    d. Assisting in identifying community evacuation routes and locations in the case of a rail accident.

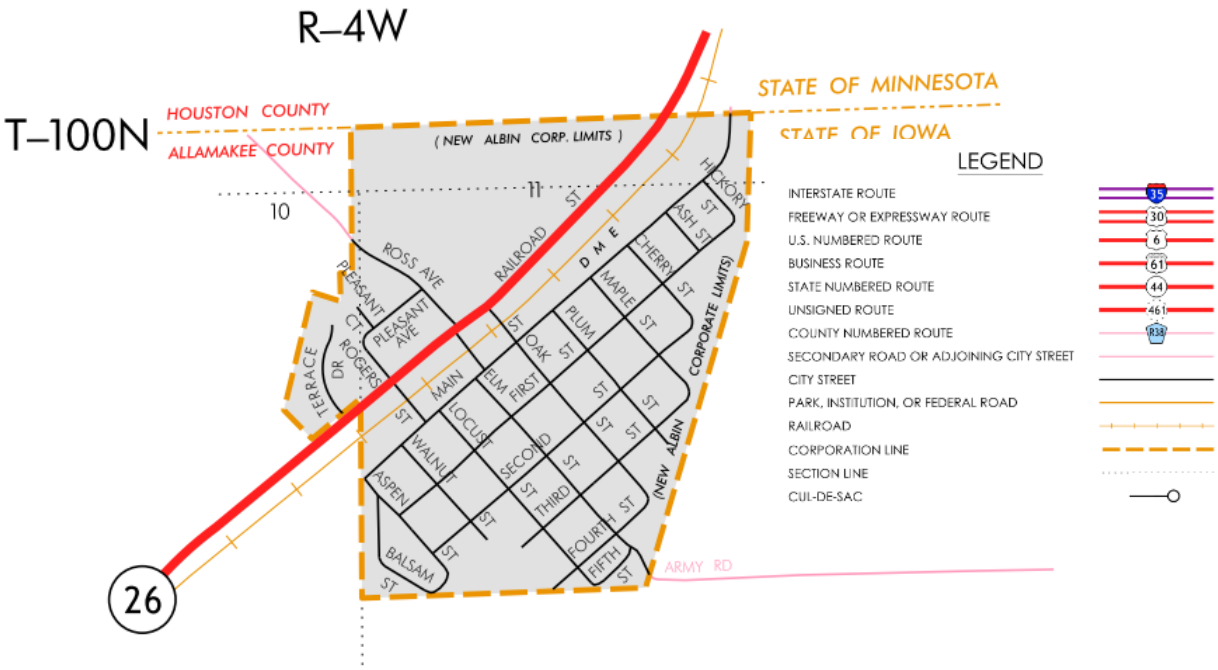
3. Other tasks or projects as deemed necessary by the Allamakee County Emergency Management Coordinator to better prepare rail communities for a potential rail disaster.
4. Support Allamakee County Emergency Management Agency (EMA) initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
5. Identify landslide prone areas, and consider creation of an overlay district or other zoning requirements to better protect against landslides
6. Maintain/improve emergency responder equipment and training
7. Educate public about landslide potential, and building and development precautions to avoid landslide incidents in landslide-prone zones. Outreach may be in the form of a community newsletter, public meeting, or other.
8. NFIP participation/consideration

City of New Albin

History and Overview

New Albin is located in very northeastern Allamakee County, situated primarily along Highway 26 west of the Mississippi River. The total land area of city limits is 0.22 square miles (City-data.com, 2017) and is laid out as shown in Figure 27.

Figure 27: New Albin Street Map



Source: (Iowa Department of Transportation, 2016)

The history of this town dates from the 1872 construction of the river railroad, the Chicago-Dubuque-Minnesota Railroad, by the Ross family. The farthest most northeastern city in Iowa, New Albin was surveyed and platted in November, 1872. From the very beginning, the Village of New Albin was a

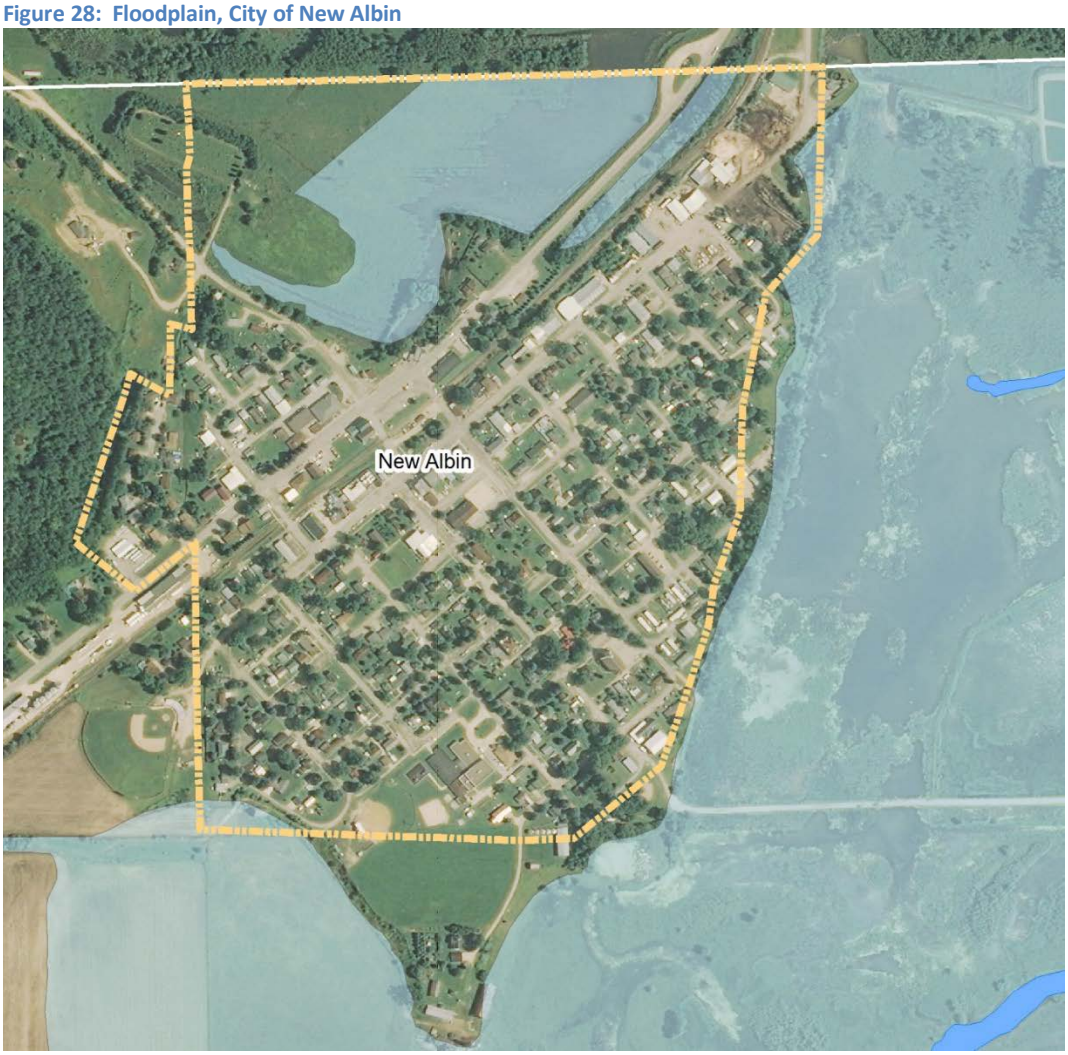
rapidly growing community, where many stores built along with elevators, warehouses for the handling of grain, churches, schools, post office and newspapers.

For City of New Albin, the National Register of Historic Places notes the following sites (National Park Service, 2015):

- Fish Farm Mound Group
- Iron Post
- Thomas Reburn Polygonal Barn

The City of New Albin lies at the base of steep bluffs on a low plateau of land adjacent to the Mississippi River. Winnebago Creek runs to the river just north of the city limit, and the Pool Slough Wildlife Management Area lies to the east at the river. Land area in the north of the city and portions of parcels extending towards the river fall in Federal Emergency Management Agency (FEMA) floodplains as shown on Digital Flood Insurance Rate (DFIRM) maps. Figure 28 illustrates the Mississippi River to the east and FEMA identified floodplains.

Figure 28: Floodplain, City of New Albin



Source: Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one Mayor, one Mayor Pro-Tem, and a five-member City Council. Key city employees include:

- Three full-time staff: one Public Works Superintendent, one Public Works employee and one Police Chief
- Seven part-time staff: one City Clerk, one Fire Chief, three Police Officers, one Library Director and one Library staff member

Buildings and infrastructure in New Albin are as follows:

- There is an active railroad within New Albin city limits, with 1 marked crossing.
- The City has one government building, City Hall (built in 1969).
- New Albin has no dam or levees within city limits.
- As of 2017, the actual value of all residential structures in the City of New Albin was over $13.7 million. In addition, commercial structures were valued at over $1.9 million (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

City of New Albin Police Department office provides law enforcement. There is one full-time employee and three part-time employees.

The City of New Albin Fire Department supports the community for fire protection needs. The City has 32 fire hydrants and 22 volunteers fully trained as members of the New Albin Fire Department for city and rural response. There are no official community shelters, but several unofficial/potential shelters including the community center, local school and local catholic church. New Albin's ISO rating is 6.

The New Albin First Responders provides ambulance services. 10 fire department volunteers are fully trained as EMS members of the New Albin Ambulance team. The Allamakee County Sheriff's office located outside of Waukon is the County's 911 dispatch center. Allamakee County Emergency Management provides services to the City of New Albin.

Purchased and installed in 2003, the City has one warning siren in use, located outside the fire station. The siren is manually activated daily at noon and during emergencies from the New Albin Fire Station. City utilizes two generators as follows: one stationary located at the well and one portable located at the sewer plant.

Utilities in New Albin are as follows:

- The City provides municipal sewer for property owners. Sewer infrastructure includes one lift station originally installed in 1956, refurbished in 1998. The City utilizes a one celled lagoon built in 1956 with the sewer plant built in 1969. Floodwaters breached the sewer plant in 2001;

flood waters decimated the sewer dike in 2000 and 2008. City meets Iowa DNR wastewater requirements.

- The City of New Albin participates in the Iowa Rural Water Association (IRWA). The City's municipal ID for water is 1010655. Built in 1925, the City's below ground water tower was installed in 1991. The current water main infrastructure through 90% of city limits includes 4" and 6" water mains.

Public service providers for City of New Albin are as follows:

- Electric: Alliant Energy
- LP Gas: Hovden Oil
- Internet: Ace Communications, Mediacom
- Land-Line Telephone: Ace Communications, Mediacom
- Ambulance: New Albin First Responders
- Senior Care/Living Facilities: New Albin Senior Manor
- Food Supplies: City Meat Market
- Cultural and Recreational: Iron Post Monument, Thomas Reburn Polygonal Barn, Fish Farm Mounds, Army Road, and Army Road Park
- Other Infrastructure Includes: Public ball diamonds, Tourist Park, City Park, Conservation Commission Park/Rest Area, Historic City Hall/Fire Station, veterans memorial located in City Park

City of New Albin is included in the Eastern Allamakee Community School District. The district's elementary school is located within city limits.

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities
- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

City of New Albin is mapped for flood utilizing Digital Flood Insurance Rate Map (DFIRM) technology. With the State of Iowa re-map, Allamakee County DFIRM's became effective on September 25, 2009.

Existing Plans and Policies

Updated in 2005, City of New Albin ordinances in place include: sidewalk snow removal, sanitation pick-up, and flood plain management. The City of New Albin is compliant with the National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All city response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Hazardous Materials/Transportation Accident - The railroad runs through the community, and rail cars regularly carry ethanol and crude oil materials, which pose a HAZMAT risk. Also, the proximity of the rail line to city development means that a train derailment could cause physical damage to nearby structures, people or property. A rail incident could pose different problems based on seasonal concerns (winter cold or summer heat, and needs for evacuating or housing people); variables which need to be better understood.
- Tornados - Though not common in the community, the magnitude of potential damage to the community is significant, and the community can work on establishing official community shelters to serve residents in a tornado disaster.

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
3. City utilizes the Allamakee County Emergency Support Function (ESF) Plan
4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City is a part of the Iowa Mutual Aid Compact (IMAC)
7. City is a part of the Minnesota Mutual Aid Compact
8. City maintains own fire station and ambulance service
9. City utilizes two generators
10. The entire County utilizes Code Red services

Status and Progress on Previous Mitigation Actions (UPDATE)

1. New/enhanced fire district facility and response equipment, including updated tanker (automatic transmission, diesel fuel) and addition on fire station to accommodate additional equipment (including hose drying area)
    a. Completed - acquired new tanker. Not Completed - expand fire station.
2. Larger training/meeting room at the fire station
    a. Not Completed.
3. New or enhanced water distribution system
    a. Not Completed.
4. Improved/enhanced infrastructure sought including new/enhanced sewer plant
    a. Not Completed.
5. Improved awareness of community shelter location
    a. Not Completed.
6. Backup power supply for community needs/generators
    a. Not Completed. City has fewer generators since previous plan update.
7. Additional safety measures regarding local hazards
    a. Not Completed.

8. Additional full-time police officer and surveillance equipment
    a. Not Completed.

Mitigation Actions to Pursue Through MJ-7 Implementation

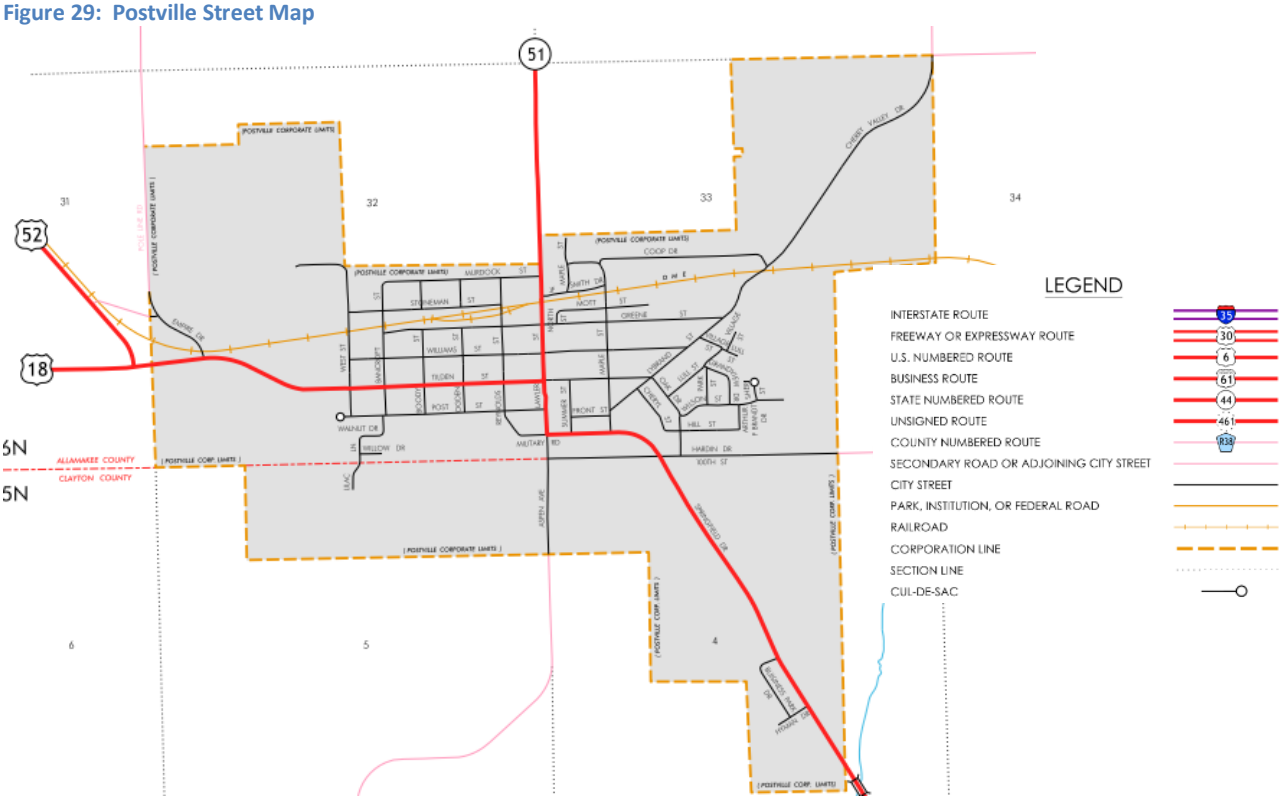
1. Participate in an Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations, and to prioritize needs for shelters, including back-up power supplies
2. Participate in Allamakee County Emergency Management Agency (EMA) effort to create a Rail Response Plan to prepare for the possibility of a rail accident. Participation will include:
    a. Host the EMA Coordinator at a city council meeting to discuss planning and implementation of the Rail Response Plan.
    b. Work with county public health to identify vulnerable or low-mobility populations in the ½ mile potential impact, or "band of influence" area, around a railroad.
    c. Table top exercise to review and test rail accident response steps accident scenarios.
    d. Assist in identifying community evacuation routes & locations
3. Support Allamakee County Emergency Management Agency (EMA) initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
4. Expand/enhance fire district facility to accommodate additional equipment (hose drying area) and to create a larger training / meeting room
5. Maintain/improve emergency responder equipment and training
6. Additional full-time police officer and surveillance equipment
7. New or enhanced water distribution system (new well, water mains, etc.)
8. Improved/enhanced infrastructure sought including new/enhanced lagoonless sewer plant
9. City government and staff and/or schools to organize and participate in ALICE or other active shooter trainings through local contracted law enforcement
10. NFIP participation/consideration

City of Postville

History and Overview

Postville is located at the junction of Highway 18 and Highway 51 in the very southwestern corner of Allamakee County. The total land area of city limits is 2.08 square miles (City-data.com, 2017) and is laid out as shown in Figure 29.

Figure 29: Postville Street Map



Source: (Iowa Department of Transportation, 2016)

With rapid growth and development, the town of Postville was incorporated in 1873. When the "Old Military Road" and the new fort at Fort Atkinson were being built, it took two days to make the trip from Prairie du Chien, WI to the fort. In order to provide shelter for the night for the teamsters and others that might travel the road, the government built stables and a "half-way house" in 1840.

In 1841, Joel Post was granted permission to occupy the half-way house in return for his and his wife's labor in operating the house as an inn/tavern. By 1849, Mr. Post had passed away. Following his passing the surveying of Post Township was conducted – completed in 1850. In 1850, Mrs. Post filed legal claims to two adjoining quarter sections of land in southwest Allamakee County. The entire town of Postville is now located on land originally purchased by Mrs. Post. For City of Postville, the National Register of Historic Places notes the following sites (National Park Service, 2015):

- Red Bridge
- Turner Hall

Present day, the City of Postville host's a highly diverse ethnic population. Jewish, Hispanic, Russian, Ukrainian, Filipino, Norwegian, and many more cultures are reflected in local businesses, industries, and neighborhoods. There are several religious congregations within the city and county area of Postville including Protestant, Catholic, Jewish and many other faiths.

Williams Creek terminates just inside the northeast city limits of Postville, and branches of Roberts Creek enter the south portion of the city. Minimal land area falls in the Federal Emergency Management Agency (FEMA) floodplains as shown on Digital Flood Insurance Rate (DFIRM) maps. Figure 30 illustrates the extent of Williams Creek and the FEMA identified floodplains.

Figure 30: Floodplain, City of Postville

Source: Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one Mayor, one Mayor Pro-Tem, and a five-member City Council. Key city employees include:

- 11 full-time staff: Administrative staff, Deputy Clerk, Administrator/Clerk, Police Officers, and Public Works staff
- Four part-time staff: Library staff
- 13 seasonal employees: Public Works and Lifeguard/city pool needs

Buildings and infrastructure in Postville are as follows:

- There is an active railroad within Postville city limits. There are four crossings; three are gated and one uses only lights.
- There is one government building, City Hall (built in 2005).
- Postville has no dam or levees within city limits.
- As of 2017, the actual value of all residential structures in the City of Postville was over $33.3 million. In addition, commercial structures were valued at over $8 million (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

The Postville Police Department provides law enforcement. The Postville Police Department (station built 2005) includes four full time staff and four part time staff.

Built in 2005, the City of Postville Fire Department supports the community for fire protection needs. The City has 82 fire hydrants and 38 volunteers fully trained as members of the Postville Fire Department for city response; rural response includes 15 fully trained volunteers.

The Postville First Responders/EMS provides ambulance services. 3 fire department volunteers are fully trained as first responder members of the City of Postville First Responders/EMS team; six additional volunteers are fully trained as EMS. The Allamakee County Sheriff's office located outside of Waukon is the county's 911 dispatch center. Allamakee County Emergency Management provides services to the City of Postville.

The City utilizes Turner Hall (119 E. Turner St.) as their community shelter location. The city has three warning siren in use, manually activated from Postville Fire Station which are tested weekly in addition to daily at 6:00 P.M. Postville has zero dam or levees within city limits. City utilizes three generator as follows: one at Fire Station (portable generator powered by PTO), one at Turner Hall and one at Water Works.

Utilities in Postville are as follows:

- The city provides municipal sewer for property owners. Sewer infrastructure includes eight lift stations.
- The City of Postville participates in the Iowa Rural Water Association (IRWA). The city's municipal ID for water is 375053. Built in 1973, the city's elevated water tower is located at the water treatment plant (485 Coop Drive) and has capacity for 500,000 gallons of water. Since 2005, the city further provides water storage through an above ground storage 1,000,000 gallon reservoir, also at the water treatment plant. AgriStar also has a water tower.

City of Postville is included in the Postville Community School District. The community has a total of five educational institutions: the two schools that make up the Postville Community School District, the Postville Alternative High School, Bais Chaya Muschka and Bais Sholom. The City also has three licensed child care centers within city limits.

Public service providers for City of Postville are as follows:

- Electric: Black Hills Energy; Alliant Energy; Allamakee- Clayton Rural Electric Cooperative (REC)
- Natural Gas: Alliance Pipeline
- LP Gas: Black Hills Energy; Alliant Energy
- Internet: NEIT
- Land-Line Telephone: NEIT
- Ambulance: Postville First Responders/EMS
- Clinic: Gunderson Lutheran Clinic; Family Medical Clinic
- Senior Care/Living Facilities: Good Samaritan Center
- Food Supplies: Quillins; La Canista; Casey's; Pit Stop; Tienda Tonitas; Glatt Market Deli; Somalian Grocery

- Cultural and Recreational: Postville Pool; Lull's Park; Meyer Park; Heritage Trail; Hall Robert's Park; YMCA; Big Four Fairgrounds; Big Four Campground
- Other Infrastructure Includes: Trails; public ball diamonds; Postville Industrial Park; Postville Business Park; Postville Pool

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities
- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

City of Postville is mapped for flood utilizing Digital Flood Insurance Rate Map (DFIRM) technology. With the State of Iowa re-map, Allamakee County DFIRM's became effective on September 25, 2009.

Existing Plans and Policies

Postville ordinances in place include: zoning, tree trimming, subdivision ordinance, and others. The City completed a Comprehensive Plan (2008), a Capital Improvement Plan (2015), a Transportation Plan (2008), a Watershed Plan (2006), and others. Postville has a Flood Insurance Study (FIS) accomplished. The City of Postville is compliant with National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All city response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Hazardous Materials - The railroad goes through town in close proximity to residential, commercial and industrial development. There was discussion around whether threats were present due to HAZMAT products (petro and ethanol) carried on the trains. Also, Postville has several large industrial facilities operating with potential HAZMAT materials, including up to 6 Tier II Chemical Storage sites. Many of these sites are north of the railroad and raise the additional concern of increased danger from potential railroad/HAZMAT facility accidents.
- Windstorms / Tornadoes - Meeting attendees rated potential impacts to properties from windstorms / tornadoes as a high concern.

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances

3. City utilizes the Allamakee County Emergency Support Function (ESF) Plan
4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City maintains own fire station and ambulance service
7. The entire County utilizes Code Red services
8. City of Postville utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
9. City has one warning siren in use
10. City actively participates in the Iowa Mutual Aid Compact (IMAC)
11. City has one backup generator in use

Status and Progress on Previous Mitigation Actions (UPDATE)

1. New/enhanced fire district facility and response equipment
    a. Completed. The fire department has new air packs and HAZMAT tents, and are in the process of getting a new truck. The city is not pursuing a new fire district facility at this time, but will continue to update fire response equipment and undergo trainings.
2. New or enhanced water distribution system, including new distribution system
    a. Completed. The city has done some improvements, and will continue to pursue updates to the water distribution system.
3. Additional City well(s)
    a. Not Completed. The city no longer has plans to add additional wells.
4. Additional generator(s), including at well site(s) and at life station(s)/backup power supplies
    a. Completed. The city has a permanent generator at Turner Hall, and will have a generator for the new wastewater plant when finished. They also have/want generators for the water plant and fire station.
5. Improved/enhanced infrastructure sought
    a. Completed. The city is currently undergoing wastewater treatment improvements, including cleaning waste water infrastructure in the vicinity of Lawler St. and constructing a new wastewater plant. Also, the city received FEMA funds in 2007 to enlarge the storm sewer system near Coop Dr.
6. Additional training for law enforcement professionals
    a. Completed. The city has done ALICE trainings and will continue to arrange trainings.
7. Additional safety measures regarding local hazards
    a. Completed. Trainings, etc.
8. Improved reliability for city utility payment receipts sought
    a. Completed. No longer a concern for the city.

Mitigation Actions to Pursue Through MJ-7 Implementation

1. Participate in an Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations, and to prioritize needs for shelters, including back-up power supplies
2. "Participate in Allamakee County Emergency Management Agency (EMA) effort to create a Rail Response Plan to prepare for the possibility of a rail accident. Participation will include:
    a. Host the EMA Coordinator at a city council meeting to discuss planning and implementation of the Rail Response Plan.
    b. Work with county public health to identify vulnerable or low-mobility populations in the ½ mile potential impact, or “band of influence” area, around a railroad.
    c. A table top exercise to review and test rail accident response steps given accident scenarios.

d. Assisting in identifying community evacuation routes and locations in the case of a rail accident."

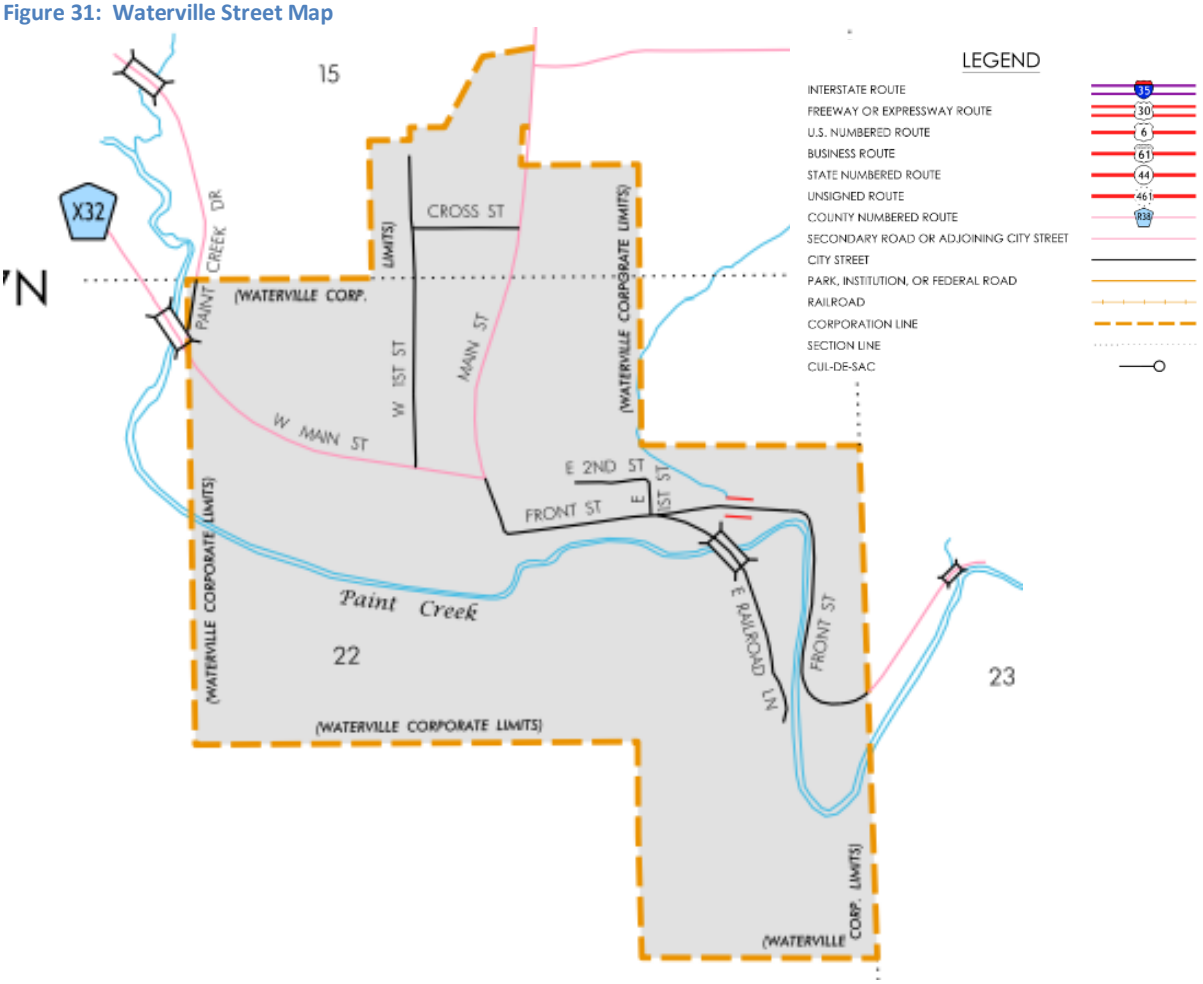
3. Support Allamakee County Emergency Management Agency (EMA) initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
4. Additional/enhanced fire department training and equipment/supplies
5. Additional generator(s), including at the water plant and fire station
6. Maintain/enhance water distribution system
7. City government and staff and/or schools to continue to organize and participate in ALICE or other active shooter trainings through the local law enforcement department
8. Acquire and demolish damaged/nuisance structures
9. Participate in the Allamakee County Emergency Management Dept. planning effort to update the HAZMAT Response Plan included in the county's Emergency Support Function plan
10. NFIP participation

City of Waterville

History and Overview

Waterville is located in central Allamakee County, situated north of Highway 76. The total land area of city limits is 0.43 square miles (City-data.com, 2017) and is laid out as shown in Figure 31.

Figure 31: Waterville Street Map



Source: (Iowa Department of Transportation, 2016)

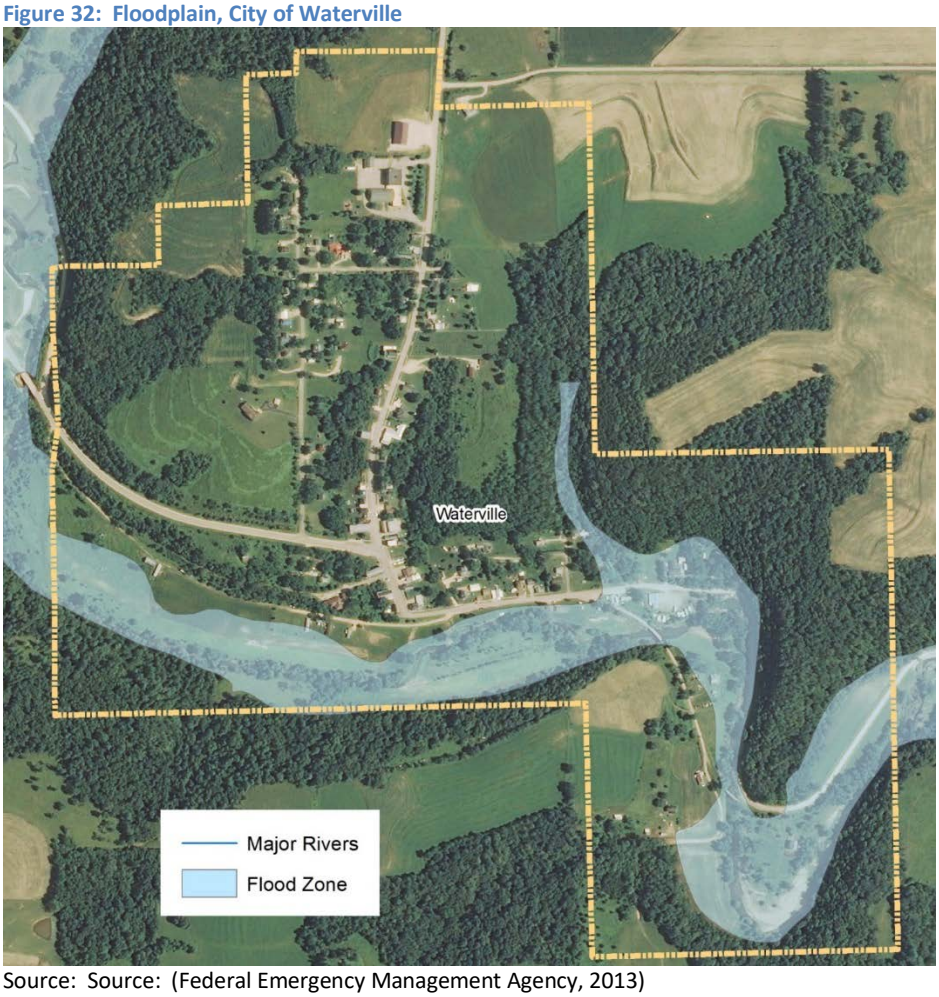
The town of Waterville was incorporated in early 1912. In unique fashion, the town itself was never surveyed and platted. Instead, the lots were sold off by the owners one at a time to prospective buyers as needed. These lots were platted as land plots, instead of town lots of varying size and irregular shape according to the requirements of the purchasers and the contour of the land. With the advent of the Waukon and Mississippi Railroad in 1877, Waterville took on a new life with many new stores, a warehouse, modeling works, banks, and other stores.

For City of Waterville, the National Register of Historic Places notes the following sites (National Park Service, 2015):

- Monsrud Bridge
- Old East Paint Creek Lutheran Church (as shown to the right)

Paint Creek runs through the south and central portions of the City of Waterville. Ferry lies at the base of steep bluffs on a low plateau of land adjacent to the Mississippi River. The creek flows to the Yellow River State Forest just southeast of Waterville. Waterville Pines Park abuts the community to the east. Significant land area within the corporate boundaries falls in the Federal Emergency Management Agency (FEMA) identified floodplains as shown on Digital Flood Insurance Rate (DFIRM) maps. Figure 32 illustrates the creek and FEMA identified floodplains.

Figure 32: Floodplain, City of Waterville



Source: Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one Mayor, one Mayor Pro-Tem, and a five-member City Council. Key city employees include:

- Part-time staff: one City Clerk/Treasurer, one Waste Water Superintendent, two Sewer Operators, and one Librarian
- Seasonal employees: one staff person for lawn mowing and two for snow removal needs.

Buildings and infrastructure in Waterville are as follows:

- There are no active railroads within Waterville city limits.
- The City has three government building: City Hall (built 1963), Fire Station (built in 2012) and Library (built in 2013)
- Waterville has no dam or levees within city limits.
- As of 2017, the actual value of all residential structures in the City of Waterville was over $1.8 million. In addition, commercial structures were valued at over $108,200 (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

Law enforcement for the community is provided by the Allamakee County Sheriff's office.

The Waterville Rural Fire Protection District supports the community for fire protection needs. The Waterville Fire Station was established 1916. The city has 25 volunteers fully trained as members of the Waterville Rural Fire Protection District. An additional 11 volunteers are fully trained as members of the Waterville Ambulance team. For Waterville Rural Fire Protection District usage, there is one underground water storage tank available. The City's ISO rating is: 9.

The Waterville Ambulance provides ambulance services. The Allamakee County Sheriff's office located outside of Waukon is the county's 911 dispatch center. Allamakee County Emergency Management provides services to the City of Waterville.

The city has one warning siren in use, manually activated during emergencies from Waterville City Hall. The City has one portable generator. The City is currently looking into establishing suitable community shelter locations, including the local church.

Utilities in Waterville are as follows:

- The City of Waterville participates in the Iowa Rural Water Association (IRWA). The City does not have municipal water. The City has offered municipal sewer services since 1982. Sewer infrastructure includes three lift stations built in 1982 and a three cell lagoon.
- The City does not have municipal water. However, there is a public water supply location at a local business.

Public service providers for City of Waterville are as follows:

- Electric: Alliant Energy
- LP Gas: AgVantage FS
- Internet: Ace Communications
- Land-Line Telephone: Ace Communications
- Ambulance: Waterville Ambulance
- Food Supplies: The Old Waterville Store
- Cultural and Recreational: Effigy Mounds

City of Waterville is included in the Allamakee Community School District, with the Waterville

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities
- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

City of Waterville is mapped for flood utilizing Digital Flood Insurance Rate Map (DFIRM) technology. With the State of Iowa re-map, Allamakee County DFIRM's became effective on September 25, 2009.

Existing Plans and Policies

Updated via Iowa Codification 2011, Waterville ordinances in place include: zoning, floodplain management, and others. During May 2011, the City implemented a floodplain management ordinance and subsequently made application to the Iowa DNR to become a compliant member of the National Flood Insurance Program (NFIP). A Flood Insurance Study (FIS) of Waterville was conducted in 1977. The City of Waterville is currently compliant with the National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All city response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Flooding – Flash flooding events in 2013 and 2015 resulted in significant damage in the community. In 2013 flooding caused damage to the sewer lift systems and local roads. Also, the bridge and culvert on the south end of town were impacted. Flooding was less in recent years, partially as a result of stormwater management improvements upstream in the city of Waukon, and also because of local flood protection improvements implemented by Waterville recently.

- Storms and associated hazards – The city would like to better prepare for potential impacts to residents or property from storm events (windstorm/tornado/thunderstorm/lightning) by working on a better warning system for the community, including acquiring a new siren.

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
3. City utilizes the Allamakee County Emergency Support Function (ESF) Plan
4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City is a part of the Iowa Mutual Aid Compact (IMAC)
7. City maintains partnership with rural fire district for fire/emergency response
8. City utilizes one generator
9. The entire County utilizes Code Red services

Status and Progress on Previous Mitigation Actions (UPDATE)

1. New/enhanced fire district facility and response equipment
    a. Completed. There is a new shared fire district facility. No other fire equipment will be added by the city in the near future.
2. New or enhanced water distribution system
    a. Not completed. The city has no immediate plans for a city water system.
3. Additional City well(s)
    a. Not completed. There is no city water, and the city doesn't have plans for pursuing city wells at this time.
4. Additional generator(s)/backup power supply
    a. Not completed. The city has a portable generator at the city shed and also has portable generators for the sewer lift stations. The city would like to acquire a new generator for the emergency warning center out of the fire station.
5. Improved/enhanced infrastructure sought
    a. Not completed. The city has no immediate plans for significant expansion of infrastructure at this time.
6. Additional safety measures regarding local hazards
    a. Completed. After the 2013 & 2015 flash flood events the city made flood management /stormwater management improvements, including rip rap along roads susceptible to flooding, enlarging culverts and constructing a protected/contained sewer lift system.

Mitigation Actions to Pursue Through MJ-7 Implementation

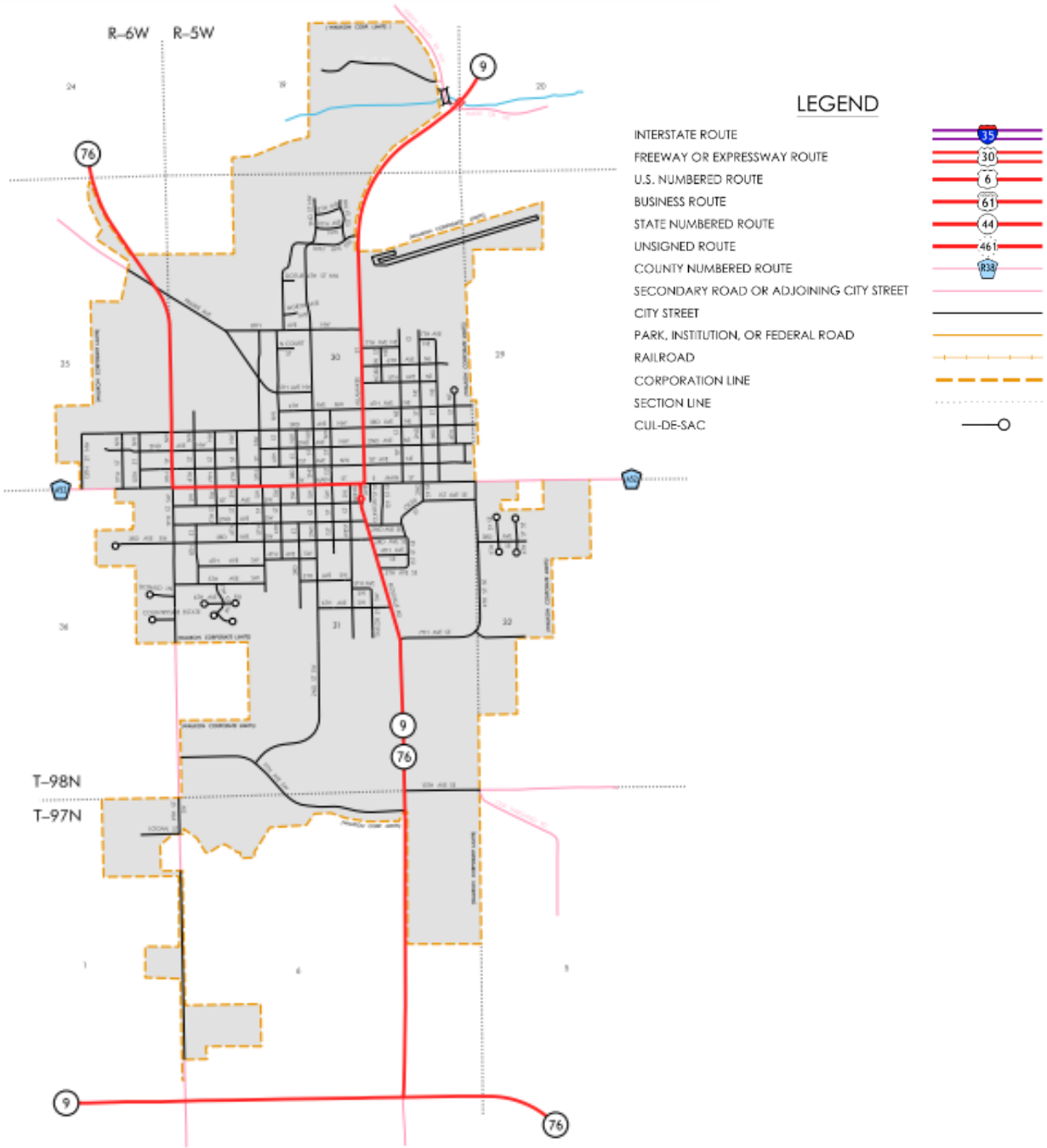
1. Participate in an Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations, and to prioritize needs for shelters, including back-up power supplies
2. Support Allamakee County Emergency Management Agency (EMA) initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
3. New generator for the emergency warning siren located at the fire station
4. New/enhanced emergency warning system
5. Maintain partnerships for effective and prompt emergency response
6. Continue NFIP participation

City of Waukon

History and Overview

Waukon is located in central Allamakee County at the convergence of Highway 9 and Highway 76. The total land area of city limits is 2.94 square miles (City-data.com, 2017) and is laid out as shown in Figure 33.

Figure 33: Waukon Street Map



Source: (Iowa Department of Transportation, 2016)

The original town plat for City of Waukon was filed for record December 3, 1853. The name Waukon comes from the name of the chief of the Ho-Chunk (Winnebago) Tribe, Chief John Waukon. Chief John Waukon (b. 1780 – d. 1868) was the grandson of Glory of the Morning (youngest son of The Buzzard) and he helped a band of the Ho-Chunk to relocate across the Mississippi in the mid-19th century.

In June of 1849 Geo C. Shattuck came to Allamakee County and built himself a hay shanty to shelter his family. This was the beginning of the town of Waukon, which was served by a branch of the Chicago, Milwaukee, St. Paul and Pacific Railroad (The Milwaukee Road). It ran as a branch line from Waukon Junction on the Mississippi River northwest to Waukon. It was was abandoned in the late 1960's. Waukon became the county seat. A courthouse was completed in 1861. For City of Waukon, the National Register of Historic Places notes the following sites (National Park Service, 2015):

- Allamakee County Court House
- Allamakee County Historical Museum
- Otto J. Hager House

Paint Creek extends along the south boundary of the City of Waukon, and Village Creek cuts through the north portion. Figure 34 illustrates the extent of the two creeks and the FEMA DFIRM flood zones.

Figure 34: Floodplain, City of Waukon

Source: Source: (Federal Emergency Management Agency, 2013)

As available, additional details regarding the Special Flood Hazard Area (SFHA) and valuation data are located within the Vulnerability Assessment portion of the plan.

Governance, Facilities and Services

The governing body includes one Mayor, one Mayor Pro-Tem, and a five-member City Council. Key city employees include:

- 22 full-time staff: Police staff, Water/Sewer staff, Street staff, Librarian, City Clerk/Treasurer, and Wellness/Park and Recreation Director
- 22 part-time staff: Library staff, Wellness Center staff, Reserve Police staff, and Zoning Administrator
- 56 Seasonal employees: park/recreation/pool needs

Buildings and infrastructure in Harpers Ferry are as follows:

- There are no active railroads within Waukon city limits.
- The City has one government building, City Hall (built in 1902).
- Waukon has no dam or levees within city limits.
- As of 2017, the actual value of all residential structures in the City of Waukon was over $127.9 million. In addition, commercial structures were valued at over $34.8 million (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017).

Law enforcement for the community is provided by the Waukon Police Department. The Waukon Police Department (station built 1950) includes seven full time staff and two part time staff.

The Waukon Area Fire Protection District supports the community for fire protection needs. The City has 208 fire hydrants and 45 volunteers fully trained as members of the Waukon Area Fire Protection District (station built 1974) for city and rural response. The City's ISO rating is: 4.

Veterans Memorial Hospital Ambulance provides ambulance services. The Allamakee County Sheriff's office located outside of Waukon is the county's 911 dispatch center. Allamakee County Emergency Management provides services to the City of Waukon.

The City has four warning sirens in use, automatically activated during emergencies from the Allamakee County Dispatch office; tested first Thursday of each month at 10:00 A.M. The siren locations include:

- City Park
- 101 Allamakee Street
- 819 Allamakee Street
- 1020 3rd Avenue SW

City utilizes eleven generators (plus additional units) as follows:

- Two located at the lift stations (one at each)
- Two located at the nursing homes (one at each)

- One located at the school
- One at law enforcement site (powered by gasoline fuel)
- One at hospital site
- One at the courthouse
- One new portable generator
- Numerous additional units (portable generators powered by gasoline fuel)

No designated community shelter has been established for the City.

Utilities in Waukon are as follows:

- The City provides municipal sewer for property owners. Sewer infrastructure includes seven lift stations.
- The City of Waukon participates in the Iowa Rural Water Association (IRWA). The City offers municipal water for the community, including two water storage units, one built in 1963 (620 W. St. SW; capacity 250,000 gallons) and one built from 1900-1902 (819 Allamakee St.).

Public service providers for City of Waukon are as follows:

- Electric: Alliant Energy; Allamakee/Clayton Rural Electric Cooperative (REC)
- Natural Gas: Black Hills Energy
- Internet: Mediacom, NEIT
- Land-Line Telephone: Qwest
- Ambulance: Waukon Ambulance
- Hospital, Clinic: Veterans Memorial Hospital
- Senior Care/Living Facilities: Good Samaritan Center Nursing Home; Northgate Care Center
- Food Supplies: Quillens Food Ranch; Fareway Stores; Kwik Star; Casey's General Store; Hubba Hubba; Shopko; Dollar General
- Cultural and Recreational: Allamakee Historical Society (Museum); Waukon Wellness Center
- Other Infrastructure Includes: Waukon Industrial Park; Public Ball Diamonds; City Park

City of Waukon is included in the Allamakee Community School District, with the district's East Elementary, West Elementary, Middle School and High School all located within city limits. Additionally, St. Patrick Catholic School is located within Waukon. The City also has three licensed child care centers

Fiscal and Technical Resources

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Fees for utility services
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through private activities
- Community Development Block Grants (CDBG)

The entire County utilizes Code Red services for their emergency communication notifications, with home, business and/or mobile phone voice capabilities. Code Red services are TTD/TTY compatible.

City of Waukon is mapped for flood utilizing Digital Flood Insurance Rate Map (DFIRM) technology. With the State of Iowa re-map, Allamakee County DFIRM's became effective on September 25, 2009.

Existing Plans and Policies

Updated via Iowa Codification 2010, Waukon ordinances in place include: zoning, subdivision, floodplain management and tree trimming. Planning documents in place include Comprehensive Plan (2015) and Land Use Plan. The City of Waukon is compliant with the National Flood Insurance Program (NFIP).

The City utilizes the Allamakee County Emergency Support Function (ESF) Plan. All City response personnel follow appropriate protocol and guidance. Allamakee County contracts with the Northeast Iowa Response Group, a specialized HAZMAT Team out of Black Hawk County (Waterloo, Iowa). Waterloo is located approximately 80 miles south of Allamakee County, Iowa.

Key Issues

- Infrastructure Failure - Stormwater Infrastructure Failure – The city's stormwater infrastructure is very old (from the 1930s) and in immediate need of updating. Looking at the countywide CPRI hazard scoring, Waukon identified stormwater infrastructure failure as 4 (highly probable).
- Transportation Incidents - Traffic Accidents – Waukon is the county seat and has a higher population than many other communities in the county. Review of Iowa DOT crash data shows a concentration of traffic accidents around Waukon, and the city affirmed that these are quite common so were identified as highly probably for the CPRI hazard risk scoring.
- Windstorms / Tornadoes - NOAA recorded thunderstorm wind events were common for Waukon over a 16-year period (2000 – 2016), with 17 out of 30 total events in the county occurring in the community. The city is concerned about the danger of windstorms/tornadoes for trailer courts in Waukon, which may be more susceptible given that basements and other shelters are typically not available for trailer/mobile home residents.
- Sinkholes – Data on existing and potential sinkholes from the Iowa DNR illustrated that the City of Waukon is surrounded by sinkholes, and that a number have occurred right inside city limits as well. They would increase the probability of sinkholes occurring in their community significantly above what the HMPC had discussed for the county as a whole.

Mitigation Activities

Mitigation Activities Already in Place

1. The entire County participates in emergency response exercises on a regular basis
2. City utilizes local ordinances, defaulting to the State of Iowa for all other ordinances
3. City utilizes the Allamakee County Emergency Support Function (ESF) Plan
4. All City Response Personnel follow appropriate protocol and guidance
5. Allamakee County contracts with the Northeast Iowa Response Group for HAZMAT response
6. City is a part of the Iowa Mutual Aid Compact (IMAC)
7. City maintains own fire station and ambulance service
8. City utilizes eleven generators
9. The entire County utilizes Code Red services

Status and Progress on Previous Mitigation Actions (UPDATE)

1. New/enhanced fire district facility and response equipment
    a. Completed. The City did a water looping project for fire protection needs and constructed a new fire station facility.
2. New or enhanced water distribution system
    a. Not Completed. The city no longer wishes to initiate new wells, but would still like to work on updating/enhancing their water distribution system
3. Additional City well(s)
    a. Not Completed. The city no longer had plans to add additional wells.
4. Additional generator(s)
    a. The city has acquired the number of generators it needs for now, so this action is completed.
5. Improved/enhanced infrastructure sought, including street repairs 3rd Street outside Waukon Community School District facilities
    a. Northeast storm water basin was completed.
    b. 3 storm sewers were updated.
6. Backup power supply for community needs
    a. Completed/Not Completed. The city would remove this action, and instead propose creating/implementing a Community Operations Plan.
7. Additional safety measures regarding local hazards
    a. Not Completed

Mitigation Actions to Pursue Through MJ-7 Implementation

1. Participate in an Allamakee County Emergency Management Agency (EMA) effort to create countywide Community Shelter Plan to identify storm, community or evacuation shelter locations, and to prioritize needs for shelters, including back-up power supplies
2. Support Allamakee County Emergency Management Agency (EMA) initiative to form countywide volunteer group to serve residents with various needs during storm or emergency events
3. Participate in an Allamakee County Emergency Management Dept. lead effort to update the HAZMAT Response Plan for the county's Emergency Support Function (ESF) plan
4. Complete new sewer treatment plant by 2020
5. Continue to update/enhance the water distribution system
6. Create and implement a Continuity of Operations Plan (COOP) for the community
7. Maintain/improve emergency responder equipment and training
8. Improved/enhanced storm sewer infrastructure sought, including replacing outdated storm sewer lines
9. Complete an Infiltration/Inflow study for the city's collection systems
10. Support stormwater management in the community as needed, including infiltration, retention basins, bioswales, rain gardens, and siltation removal projects
11. New/enhanced police station
12. Upgrade city's four emergency sirens
13. Create and implement a Wellhead Protection Plan for rural areas, including an inventory of existing wells, analysis of potential pollution sources, etc. Work with DNR to identify management strategies for eliminating threats to local drinking water resources.
14. Continue NFIP participation
15. Improved/enhanced street infrastructure

Chapter 3- Risk Assessment

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

The risk assessment for the County followed the methodology described in FEMA publication 386-2, Understanding Your Risks: Identifying Hazards and Estimating Losses (2001), which includes a four-step process:

1. Identify Hazards
2. Profile Hazards
3. Inventory Assets
4. Estimate Losses

This section is divided into four parts:

- **Hazard Identification** – Identifies the types of natural hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Hazard Profiles** – Describes the location and extent of each natural hazard that can affect the planning area and describes previous occurrences of hazard events and the probability of future occurrences.
- **Vulnerability Assessment** – Assesses the County's vulnerability to hazards, considering the impact of each identified hazard on the communities' critical facilities and other identified assets.
- **Repetitive Loss** – Addresses the NFIP insured structures within each jurisdiction that have been repetitively damaged by floods.

Multi-Jurisdictional Risk Assessment

For this county-wide, multi-jurisdictional plan, the risk assessment assesses the entire geographic area of the planning area's risks. Should the risks deviate for a participating jurisdiction; the location-specific information will be included in each identified hazard's profile. The participating jurisdictions are all located within Allamakee County; Allamakee County is not a large county geographically 639 square miles (U.S. Census Bureau, 2010) and is fairly uniform in terms of climate. Accordingly, overall hazards and vulnerability do not vary greatly across the planning area for most hazards. Weather-related hazards, such as drought, extreme heat, hailstorm, lightning, severe winter storm, tornado, and windstorm affect the entire planning area. Hazards that do vary across the planning area include flooding, dam or levee failure and landslides.

Hazard Identification

Requirement §201.6(c)(2)(i):

[The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdictions…

Selection Process

The county-wide Hazard Mitigation Planning Committee (HMPC) and other meeting attendees reviewed data and discussed the impacts of the hazards listed alphabetically below as suggested by Iowa Homeland Security and Emergency Management Division (HSEMD), hazards included in the statewide plan, and FEMA.

- Animal/Plant/Crop Disease
- Avalanche
- Coastal Erosion
- Coastal Storm
- Dam Failures
- Debris Flow
- Drought
- Earthquakes
- Expansive Soils
- Extreme Heat
- Fires
- Flash Floods
- Grass or Wild Land Fire
- Hailstorms
- Hazardous Material Events
- Human Disease
- Hurricane/Tropical Cyclones
- Infrastructure Failure
- Land Subsidence
- Landslides
- Levee Failure
- Nuclear/Radiological Accidents
- River Flooding
- Severe Winter Storms
- Sink Holes
- Terrorism
- Thunderstorms and Lightning
- Tornadoes
- Transportation Incident
- Tsunami
- Volcano
- Windstorms

Data on the past occurrences, impacts and future probability of these hazards in the planning area was collected from several sources including the following:

- Iowa Hazard Mitigation Plan, September 2013
- Information on past extreme weather and climate events from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC)
- Federal Disaster Declarations from the Federal Emergency Management Agency (FEMA)
- USDA Farm Service Agency (FSA) Disaster Declarations
- Various websites, articles and publications (sources are referenced where data is cited)

The HMPC eliminated certain hazards from further profiling due to no known history of occurrence in the planning area and/or their impacts were not considered significant in relation to other hazards. Table 18 lists alphabetically the hazards not profiled in the plan and provides the explanation for their omission.

Table 18: Hazards Considered, But Not Profiled in the Plan

Hazard	Explanation for Omission
Avalanche	There are no mountains in the planning area
Coastal Erosion	Planning area is not near coastal areas
Coastal Storm/Tsunami	Planning area is not near coastal areas
Debris Flow	Will be covered through river flooding
Expansive Soils	There are no known expansive soils in the planning area and no known historical occurrences of this hazard
Fires	Will be covered through infrastructure failure
Hurricane/Tropical Cyclones	Planning area is not near coastal areas
Land Subsidence	There are no known subsurface void spaces in the planning area and no known historical occurrences of this hazard
Volcano	There are no volcanic mountains in the planning area

Nuclear/Radiological Accidents	Duane Arnold Energy Center (DAEC) is located near Palo in Linn County is the nearest nuclear power plant, more than 50 miles away.
Terrorism	Few identified incidents in the county
Human Disease	Few identified incidents in the county

After review of the existing data on the remaining hazards, the HMPC considered and agreed upon the hazards to be included in the county list of identified hazards. Several hazards discussed in previous meetings were consolidated into general categories for the purpose of the risk assessment. The hazards of human disease incident and pandemic human disease were combined into human disease. Fixed hazardous materials incidents, pipeline incidents, and transportation hazardous materials incidents were combined into hazardous material events. Communication failures, massive power of energy failures, structural failures, and structural fires were combined into infrastructure failure. Roadway transportation incidents and railway transportation incidents were combined into transportation incident. Biological terrorism, agricultural terrorism, domestic terrorism and active shooting incidents were combined into terrorism. The following 19 hazards were identified by the HMPC as significant to the planning area.

- Animal/Plant/Crop Disease
- Dam Failures
- Drought
- Earthquakes
- Extreme Heat
- Flash Floods
- Grass or Wild Land Fire
- Hailstorms
- Hazardous Material Events
- Infrastructure Failure
- Landslides
- Levee Failure
- River Flooding
- Severe Winter Storms
- Sink Holes
- Thunderstorms and Lightning
- Tornadoes
- Transportation Incident
- Windstorms

The State of Iowa Hazard Mitigation Plan covers all natural and human caused/combination hazards identified for the State of Iowa. Accordingly, the State of Iowa hazard information, details, and risk assessment prevails for hazards not discussed for the County.

Disaster Declaration History

One method used by the county to identify hazards was to examine events that triggered federal and/or state disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded; a federal emergency or disaster declaration may be issued, allowing for the provision of federal assistance for affected areas.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on the scale and type of damages, and institutions or industrial sectors affected.

A USDA disaster declaration certifies that the affected county has suffered at least a 30 percent loss in one or more crop or livestock areas and provides affected producers with access to low-interest loans and other programs to help mitigate disaster impacts. In accordance with the Consolidated Farm and Rural Development Act, counties neighboring those receiving disaster declarations are named as contiguous disaster counties and are eligible for the same assistance.

Table 19 reflects FEMA presidentially declared disasters received by multiple counties in Iowa including Fayette County, and the Participating Jurisdictions from 2013 to present.

Table 19: Presidential Disaster Declarations Including Allamakee County, 2013 to Present

Declaration Number	Declaration Date	Disaster Description	Counties Included
DR-4334	8/27/17	Severe Storms, Tornadoes, Straight Line Winds, Flooding	**Allamakee**, Bremer, Buchanan, Chickasaw, Clayton, Dubuque, Fayette, Mitchell, Winneshiek
DR-4289	11/1/2016	Severe Storms, Flooding	**Allamakee**, Benton, Black Hawk, Bremer, Buchanan, Butler, Cerro Gordo, Chickasaw, Clayton, Delaware, Des Moines, Fayette, Floyd, Franklin, Howard, Linn, Mitchell, Winneshiek, Wright
DR-4281	9/30/2016	Severe Storms, Straight Line Winds, Flooding	**Allamakee**, Chickasaw, Clayton, Fayette, Floyd, Howard, Mitchell, Winneshiek
DR-4234	7/31/15	Severe Storms, Tornadoes, Straight Line Winds, Flooding	**Allamakee**, Appanoose, Butler, Clayton, Dallas, Davis, Des Moines, Guthrie, Howard, Jefferson, Lee, Lucas, Marion, Mitchell, Monroe, Warren, Wayne, Winneshiek, Wright
DR-4184	7/24/2014	Severe Storms, Tornadoes, Straight Line Winds, Flooding	**Allamakee**, Buchanan, Buena Vista, Butler, Cherokee, Chickasaw, Clayton, Dickinson, Emmet, Fayette, Franklin, Hancock, Humboldt, Ida, Kossuth, Lyon, Osceola, Palo Alto, Plymouth, Pocahontas, Sac, Sioux, Winnebago, Winneshiek, Woodbury, Wright
DR-4135	7/31/2013	Severe Storms, Tornadoes and Flooding	**Allamakee**, Audubon, Benton, Buchanan, Butler, Cedar, Clayton, Delaware, Grundy, Howard, Jones, Winneshiek

Source: (Iowa Homeland Security and Emergency Management, 2017)

The State of Iowa can also declare disaster for counties, which is reflected in Table 20 from 2013 to present.

Table 20: State of Iowa Governor Disaster Declarations Including Allamakee County, 2013 to Present

Declaration Number	Declaration Date	Disaster Description	Counties Included
2017-06	7/20/17	Severe Storms, Flash Flooding, Tornadoes	**Allamakee**, Clayton, Fayette, Winneshiek (State Resources and Individual Assistance)

2016-7/12	9/29/16	Severe Storms, Flooding, Tornadoes	**Allamakee**, Benton, Black Hawk, Bremer, Buchanan, Butler, Cedar, Cerro Gordo, Chickasaw, Clayton, Delaware, Fayette, Floyd, Franklin, Hancock, Howard, Jones, Linn, Louisa, Mitchell, Muscatine, Story, Winneshiek, Worth, Wright (State Resources and Individual Assistance)
2016-04	8/25/16	Severe Storms, Flash Flooding	**Allamakee**, Clayton, Fayette, Howard, Winneshiek (State Resources and Individual Assistance)
2015-09	6/30/2015	Severe Storms, Damaging Winds, Straight Line Winds, Flash Flooding, Flooding, Tornadoes, Hail	**Allamakee**, Butler, Clayton, Des Moines, Howard, Lee, Mitchell, Winneshiek (State Resources); Adair, Appanoose, Dallas, Guthrie, Henry, Lucas, Marion, Polk, Wapello, Warren (State Resources and Individual Assistance)
2014-07	6/25/14	Severe Storms, Straight Line Winds, Flash Flooding, Flooding, Tornadoes	**Allamakee**, Buchanan, Butler, Chickasaw, Emmet, Fayette, Humboldt, Winnebago, Winneshiek (State Resources); Buena Vista, Cherokee, Franklin, Lyon, Palo Alto, Plymouth, Sioux (Individual Assistance)
2013-15	6/24/2013	Severe Storms, Heavy Rains, Thunderstorms, Flash Flooding, Flooding	**Allamakee** (State Resources); **Allamakee**, Clayton (Individual Assistance)

Source: (Iowa Homeland Security and Emergency Management, 2017)

Table 21 reflects U.S. Department of Agriculture disaster declarations and their related causes for Allamakee County, which includes the Participating Jurisdictions, from 2012 to the present.

Table 21: USDA Declared Disasters, 2012 to Present

USDA Disaster Number	Start Date	Causes							
		Floods	Excessive Moisture	High Winds	Drought	Frost Freezes	Heat	Wild Fire	Insects
S3605	4/1/2013	X	X						
S3553	1/1/2013		X			X			
S3264	4/6/2012					X			
S3305-S3392	7/17/2012			X	X		X	X	X

Source: (United States Department of Agriculture, 2017)

Hazard Profiles-

Requirement §201.6(c)(2)(i):

[The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Each hazard that can affect the jurisdiction is profiled individually in this section. The level of information presented in the profiles varies by hazard based on the information available. This plan update has incorporated new information to provide for better evaluation and prioritization of the hazards that affect the county. Detailed profiles for each of the identified hazards include information on the following characteristics of the hazard:

Hazard Description

This section consists of a general description of the hazard and the types of impacts it may have on a community.

Geographic Location

This section describes the geographic extent or location of the hazard in the Planning Area. When applicable, a specific jurisdiction's risks are noted if it varies from the risks facing the entire Planning Area. Where available, maps are utilized to indicate the areas of the Planning Area that are vulnerable to the subject hazard.

Previous Occurrences

This section includes information on historic incidents and their impacts to the affected area.

Probability of Future Occurrence

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

Magnitude

The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property and the environment it affects. This is a function of when the event occurs, the location in which it occurs, the resiliency of the community and the effectiveness of the emergency response and disaster recovery efforts.

Warning Time

The warning time of the impact of a hazard event (past and perceived) is related directly to the amount of notice a community has before an event will occur.

Duration

The duration of the hazard consists of the typical amount of time the affected areas is impacted by the hazard.

Spatial Extent

The spatial extent of the impact of a hazard event (past and perceived) is related directly to the geographic extent of jurisdiction(s) impacted and is another measure of severity.

Hazard Summary

To maintain a consistent reporting format, a mathematical methodology was used to prioritize the hazards. This prioritization was based on a Calculated Priority Risk Index (CPRI) that considered five elements of risk: probability, magnitude, warning time, duration, and spatial extent. Table 22 identifies the scoring criteria for each element of risk.

Table 22: Calculated Priority Risk Index (CPRI) Criteria Chart

Probability: Reflects the likelihood of the hazard occurring 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	Event is probable within the next 10 years Event has up to 1 in 10 year chance of occurring (1/10=10%) History of events is less than or equal to 10% likely per year
2	Occasional	Event is probable within the next five years Event has up to 1 in 5 year chance of occurring (1/5=20%) History of events is greater than 10% but less than or equal to 20% likely per year
3	Likely	Event is probable within the next three years Event has up to 1 in 3 year chance of occurring (1/3=33%) History of events is greater than 20% but less than or equal to 33% likely per year
4	Highly Likely	Event is probable within the calendar year Event has up to 1 in 1 year chance of occurring (1/1=100%) History of events is greater than 33% likely per year
Magnitude: An assessment of severity in terms of injuries and fatalities, personal property, and infrastructure		
Score:	**Description:**	
1	Negligible	Injuries and/or illnesses are treatable with first aid Minor quality of life lost Shutdown of critical facilities and services for 24 hours or less Less than 10% of property is severely damaged
2	Limited	Injuries and/or illnesses do not result in permanent disability Complete shutdown of critical facilities for more than one week 10-25% of property is severely damaged
3	Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least two weeks 25-50% of property is severely damaged
4	Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50% of property is severely damaged

Warning Time: The potential amount of warning time that is available before the hazard occurs		
Score:	**Description:**	
1	24+ Hours	
2	12-24 Hours	
3	6-12 Hours	
4	Less Than 6 Hours	
Duration: How long the hazard will affect the planning area		
Score:	**Description:**	
1	Less Than 6 Hours	
2	Less Than 1 Day	
3	Less Than 1 Week	
4	More Than 1 Week	
Spatial Extent: How much of the jurisdiction will be affected		
Score:	**Description:**	
1	Negligible	Less than 10% of the jurisdiction to be impacted
2	Limited	10 – 25% of the jurisdiction to be impacted
3	Critical	25 – 50% of the jurisdiction to be impacted
4	Catastrophic	More than 50% of the jurisdiction to be impacted

Using the ranking described in CPRI Criteria Table, a formula that includes weighting factors is used to determine each hazard's CPRI. This plan uses the same weighting criteria that the State of Iowa in order to be consistent with the state's priorities and allow for a higher priority to be placed on hazards that have a higher occurrence in the state and have a high potential for adverse impact. The formula is:

$$\mathbf{CPRI} = (\boldsymbol{Probability} \times .\mathbf{45}) + (\boldsymbol{Magnitude} \times .\mathbf{25}) + (\boldsymbol{Warning\ Time} \times .\mathbf{15}) + (\boldsymbol{Duration} \times .\mathbf{10}) + (\boldsymbol{Spatial\ Extent} \times .\mathbf{05})$$

Based on the calculated CPRI scores, the Participating Jurisdictions' hazards were separated into three categories of planning significance:

- High (3.00-4.00)
- Moderate (2.00-2.99)
- Low (1.00-1.99)

These terms relate to the level of planning analysis to be given to the particular hazard in the risk assessment process and are not meant to suggest that a hazard would have only limited impact. In order to focus on the most critical hazards, those assigned a level of significance as high or moderate were given more extensive attention in the remainder of this document, while those with a low planning significance were addressed in more general or qualitative ways. Table 23 summarizes the completed county-wide Hazard Profiles results, based on planning significance.

Table 23: Allamakee County Hazard Profile Summary

Hazard	Probability	Magnitude	Warning Time	Duration	Spatial Extent	CPRI	Planning Significance
Hazardous Materials	4	3	4	3	2	3.55	High
Flash Floods	4	3	4	3	2	3.50	High
Levee Failure	4	2	4	4	1	3.35	High
Hailstorm	4	2	4	1	2	3.10	High
River Floods	4	1	2	4	2	2.85	Moderate
Severe Winter Storms	4	1	2	3	4	2.85	Moderate
Thunderstorms and Lightning	4	1	3	2	3	2.85	Moderate
Transportation Incident	3	2	4	3	1	2.80	Moderate
Animal/Plant/Crop Disease	1	4	4	4	1	2.50	Moderate
Droughts	2	3	1	4	4	2.40	Moderate
Landslides	2	1	4	3	1	2.10	Moderate
Infrastructure Failure	1	2	4	4	2	2.05	Moderate
Sinkholes	2	1	4	1	1	1.90	Low
Dam Failures	1	1	4	4	1	1.75	Low
Tornadoes	1	2	4	1	1	1.70	Low
Windstorms	2	1	2	1	2	1.65	Low
Earthquakes	1	1	4	1	4	1.60	Low
Extreme Heat	1	1	1	4	4	1.45	Low
Grass or Wildfire	1	1	4	1	1	1.45	Low

Note: City CPRI Scores included separately

Hazard Information

Hazardous Materials

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Hazardous Materials	4	3	4	3	2

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
3.55	High

Description

The 2013 State of Iowa Hazard Mitigation Plan incorporates the following hazards: Fixed Hazardous Materials Incident, Pipeline Transportation Incident and Hazardous Materials Transportation Incident. This includes the accidental release of flammable or combustible, explosive, toxic, noxious, corrosive, oxidizable, irritant or radioactive substances or mixtures that can pose a risk to life, health or property possibly requiring evacuation.

A Fixed Hazardous Materials (HAZMAT) Incident is the accidental release of chemical substances or mixtures, which presents a danger to the public health or safety, during production or handling at a fixed facility. A hazardous substance is one that may cause damage to persons, property, or the

environment when released to soil, water, or air. Chemicals are manufactured and used in ever-increasing types and quantities, each year, over 1,000 new synthetic chemicals are introduced, and as many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous material incidents generally affect a localized area and the use of planning and zoning can minimize the area of impact.

A HAZMAT Transportation Incident is the accidental release of chemical substances or mixtures, which presents a danger to the public health or safety, during transport via air, roadway, railway, or waterway.

Geographic Location

A HAZMAT accident can occur almost anywhere, so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to facilities producing, storing, or transporting hazardous substances are at higher risk. There are 20 miles of transmission pipelines for gas and 0 miles of transmission pipelines for hazardous liquids in Allamakee County (Allamakee County Engineer, 2017).

In the event of a HAZMAT incident, most are localized and are quickly contained or stabilized by the highly trained fire departments and HAZMAT teams. Depending on the characteristic of the HAZMAT or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.

Previous Occurrences

Since 2000, the Iowa Department Natural Resources (DNR) reports 81 hazardous spills in Allamakee County (Iowa Department of Natural Resources, 2017). During the period 2000-2010, fixed facilities in Iowa experienced 4,972 incidents according to the Iowa Department Natural Resources. Fixed facility releases accounted for 57.6% of total releases.

There are 4,263 sites in Iowa that because of the volume or toxicity of the materials on site are designated as Tier Two facilities under the Superfund Amendments and Reauthorization Act. 30 of those sites are within Allamakee County (Iowa Department of Natural Resources, 2017). Private and public facilities are required by federal law to provide an inventory of potentially dangerous chemicals stored on their properties. Tier II reports are filed with the Iowa Department of Natural Resources, county emergency managers and local fire departments. Knowing where large stores of chemicals are located can help first responders be more prepared for fires, spills and other situations.

According to the U.S. DOT Pipeline and Hazardous Materials Safety Administration, there have been 1,286 hazardous materials transportation incident reports in Iowa since 2007. This includes four reported hazmat transportation incidents in Allamakee County (U.S. Department of Transportation-Pipeline and Hazardous Materials Safety Administration, 2017):

- **April 2, 2008. Postville.** While driver was using a "T" pump to pump diesel fuel into an above ground tank, the other side cap came off of the "T" pump causing a spill of 10 gallons of diesel fuel. Total cost of clean-up was less than $500.

- **July 30, 2009. Waukon.** Highway was under construction. Front right tired dropped off pavement, where there was no shoulder. Driver lost control, rolled over causing a slight leak where a gauge broke off. Plugged hole with golf tee. Leak was contained within 1 hour. Fire Dept. was on the scene to hose it down if necessary, but hosing was not necessary. Total cost of clean-up less was than $500.
- **April 9, 2012. Dorchester.** Tank carrying liquid ammonia slid off roadway and over turned. Both withdraw valves were broken off. Excess flow values did not completely seal. Vapor was dischared into the air under fire and EMS supervision. This was a no fault accident per sheriff's report. No charges were filed. Total cost of clean-up was $19,575.
- **January 7, 2013.** Postville. The hazardous material of a viscous expoxy resin solution containing 10-30% acetone was shipped above ambient temperatures. Resin was loaded into CTMV below required delivery temperature. Driver stopped at service facility and the CTWV was steam heated until resin was 170 degrees Fahrenheit, within acceptable delivery range. CTMV arrived at consignee with temperatures about 150 degrees. Driver opened vent to bleed off pressure and was concerned at the slow speed. Driver contacted dispatch, who advised them to continue with unloading. Shortly after bleeding pressure and pumping resin, driver noticed resin boiling out of DTMV opening. Consignee cleaned up released material. Report was not required, but was completed because consignee did not anticipate spill because no spill container was placed around CTMV. Report also completed because consignee report clean-up effort. Total clean-up costs were $52,186.

Probability of Future Occurrences

Despite increasing safeguards, more and more potentially hazardous materials are being used in commercial, agricultural, and domestic uses and are being transported on Iowa roads and railways. Given the history of previous occurrences in Allamakee County and the increase in hazardous material moving through the county, the HMPC set the probability of future occurrences as "highly likely."

Highly Likely: Event is probable within the calendar year; event has up to 1 in 1 year chance of occurring (1/1=100%); history of events is greater than 33% likely per year

Magnitude

Most hazmat incidents are localized and are quickly contained or stabilized by the highly trained hazmat teams. Depending on the characteristics of the hazmat or the volume of the product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. The occurrence of a hazmat incident many times shuts down transportation corridors for hours at a time while the scene is stabilized, the product is off-loaded, and reloaded on a replacement container.

Immediate dangers from hazardous materials include fires and explosions. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, or inhaled. Some chemicals cause painful and damaging burns if they come in direct contact with skin. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time.

Critical: Injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for at least two week; 25-50% of property is severely damaged

Warning Time
Less than 6 hours

Duration
Less than 1 week

Spatial Extent
Limited: 10-25% of the jurisdiction to be impacted

Flash Flood

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Flash Flood	4	3	4	3	2

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
3.50	High

Description
A flash flood is an event that occurs with little or no warning where water levels rise at an extremely fast rate. Flash flooding results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding which can reach full peak in only a few minutes and allows little or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower developing river and stream flooding.

Except fire, floods are the most common and widespread of all-natural disasters. In Iowa, as much as 21 inches of rain has fallen in a 24 hour period. The latest significant event to affect Iowa occurred in August of 2016. This event resulted in a Presidential Disaster Declaration due to widespread personal and physical property losses. Between 2000 and 2016 there have been one death and four injuries related to flash flooding in the State of Iowa. Major historical floods and flash floods for the county occurred in: 1880, 1965, 1969, 1993, 1997, 2001, 2008 and 2016 (National Oceanic and Atmospheric Administration, 2010).

The onset of flooding varies depending on the cause and type. Flash flooding typically occurs with little or no warning. The duration of flash flood conditions is generally less than one day, but in exceptional cases can extend for much longer periods.

Geographic Location

The Participating Jurisdictions of Postville and Waukon are not near a major river or creek and are relatively flat communities so the threat of flash flooding is minimal, yet can occur. However, the Participating Jurisdictions of Harpers Ferry, Lansing, New Albin and Waterville as well as the Unincorporated Areas have many low-lying areas; the Yellow River, Upper Iowa River, and small creeks and streams weave throughout the planning area while the Mississippi river lines the eastern boarder of the county. Lower elevations and property near the rivers, creeks and streams are most at risk to flash flooding.

All flood hazard boundary maps effective in Allamakee County are found in the Planning Area Profile and Capabilities section.

Previous Occurrences

The NCDC reports 25 flash flooding events in Allamakee County between 2000 and 2016. The flash floods caused a reported $11,006,000 in property damages and $2,039,000 in crop damages.

Details available from NCDC of the flash flood events that affected the County include:

- **June 1, 2000.** Thunderstorms dumped heavy rain during the night of May 31 into the morning hours of June 1. Rainfall totals of 3 to 6 inches were common, with highest amounts near the Minnesota/Iowa border. Flash flooding caused mudslides near New Albin.
- **August 8, 2007.** A nearly stationary front across the region was the focus for thunderstorms across northeast Iowa during the late afternoon and evening of August 19. Excessive rainfall amounts of 2 to 5 inches in two to three hours caused flash flooding. This resulted in mudslides and damage mainly to infrastructure. Allamakee County was included in a Presidential Disaster declaration.
- **June 22. 2013.** For the second night in a row, thunderstorms with very heavy rain rolled across northeast Iowa, producing widespread flash flooding during the evening of June 22. At least three rounds of thunderstorms moved across the area dumping another 3 to 4 inches of rain on ground that was already saturated. Numerous mudslides occurred across Allamakee County. Officials had to evacuate around 80 people from a campground south of Harpers Ferry. The Governor of the State of Iowa declared disaster proclamations for the region. FEMA declared a federal disaster for a few of counties as well- Allamakee, Clayton and Winneshiek.
- **August 24, 2016.** Runoff from heavy rain caused flooding to occur in Lansing along Clear Creek. Two people had to be rescued when the cabin they were sleeping in was moved off its foundation. The cabin became lodged against some trees allowing rescuers to reach them with a boat. 5.2 inches of rain was reported. A mudslide also occurred north or Lansing.
- **September 21, 2016.** Thunderstorms with high winds and extremely heavy rain moved across northeast Iowa during the evening of September 21st into the early morning of the 22nd. Flash flooding caused mudslides across Allamakee County. The Governor of Iowa signed a disaster proclamation because of all the flooding in September for the region. A federal disaster declaration was made for the same counties as well.

Probability of Future Occurrences

Previous occurrences would indicate a highly likely probability of a flash flood occurring in any given year. Flash flooding occurs on close to an annual basis over the span of Allamakee County in its low-lying areas and locations close to rivers, creeks and streams. Based on this level of frequency,

probability of future flash flooding with significant impacts in the Participating Jurisdictions is considered highly likely. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff 2 to 6 times over what would occur on natural terrain. As more development occurs in watersheds, the amount of runoff produced also increases.

Highly Likely: Event is probable within the calendar year; event has up to 1 in 1 year chance of occurring (1/1=100%); history of events is greater than 33% likely per year

Magnitude

Factors that directly affect the amount of flood runoff include precipitation, intensity and distribution, the amount of soil surface areas due to urbanization. The term "flash flood" describes localized floods of great volume and short duration.

There have been 3 deaths and 5 injuries in the State of Iowa related to flash flooding between 1998 and 2012; no deaths and 3 injuries have occurred related to flash flooding in Allamakee County since 1998.

Flash floods can quickly inundate areas thought to be out of flood-prone areas. Loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and loss and interruption of business are common impacts from flash flooding.

Critical: Injuries and/or illnesses result in permanent disability; Complete shutdown of critical facilities for at least two weeks; 25-50% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 1 week

Spatial Extent

Limited: 10-25% of the jurisdiction would be impacted

Levee Failure

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Levee Failure	4	2	4	4	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
3.35	High

Description

A levee is any artificial barrier together with appurtenant works that will divert or restrain the flow of a stream or other body of water for the purpose of protecting an area from inundation by flood waters.

The failure of a levee can be attributed to the loss of structural integrity of a wall, dike, berms, or elevated soil by erosion, piping, saturation, or under seepage causing water to inundate normally dry areas.

Geographic Location

Previous Occurrences

Probability of Future Occurrences

Previous occurrences would indicate minimal probable chance of a levee failure occurring in any given year. The rate of failure of a levee or floodwall is difficult to predict, and sudden failure is a possibility. Proper design and construction can limit the probability of a levee failure. The HMPC determined the probability of future occurrence to be "high likely."

Highly Likely: Event is probable within the calendar year; event has up to 1 in 1 year chance of occurring (1/1=100%); history of events is greater than 33% likely per year

Magnitude

Residents behind levees often have a false sense of security. If the actual risk is not communicated to the residents, the impacts of a failure could be devastating. In an urban setting the severity and duration may be important for life safety and health reasons, but in an agricultural area for economic reasons.

Water bursting through a narrow levee breach is moving much faster than the floodwaters in the main channel. The breaking out of this front water and its fast flow can cause more destruction to structures behind the levee than floodwaters in the main channel would have caused. A failed levee continues to cause damage long after it breaks. The breach allows large volumes of water to enter formerly dry areas, forming temporary lakes. Such lakes do not go away immediately, because the lake is blocked from returning to the main channel by levee segments that were not destroyed. Consequently, the water level drops along the main river days before it drops behind breached levees. Often, pumps behind the levees are needed to remove floodwaters that breach the levees. This alleviates some of the impacts associated with levee failures.

Limited: 25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability

Warning Time

Less than 6 hours

Duration

More than 1 week

Spatial Extent

Negligible: Less than 10% of the jurisdiction to be impacted

Hailstorm

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Hailstorm	4	2	4	1	2

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
3.10	High

Description

Hailstorms in Iowa cause damage to property, crops, and the environment, and harm livestock. Because of the large agricultural industry in Iowa, crop damage and livestock losses due to hail are of great concern to the state. Even relatively small hail can cause serious damage to crops and trees. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury and the occasional fatality to humans, often associated with traffic accidents.

Hail is associated with thunderstorms that can also bring powerful winds and tornadoes. A hailstorm forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they condense and freeze. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. The onset of hailstorms is generally rapid. Duration is less than 6 hours and warning time is generally less than 6 hours. Table 3.7 describes typical damage impacts due to various sizes of hail.

Table 3.7: Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-.06	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 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 > Softball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: (The Tornado and Storm Research Organization, 2017)

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

Geographic Location

The entire planning area is at risk to hailstorms.

Previous Occurrences

The NCDC reports 70 hail events in Allamakee County from 2000-2016. Table 3.8 shows, by the size of hail, the number of hail reports in Allamakee County from 2000-2016.

Table 3.8: Reports of Allamakee County Hail, 2000-2016

Hail Size (inches)	Number of Reports, 2000-2016
0.75	19
0.88	17
1.00	23
1.25	1
1.50	1
1.75	5
2.00	2
2.25	0
2.50	1
2.75	0
3.00	0
4.25	0

Source: (National Climatic Data Center, 2017)

Note: There can be multiple reports of hail within the same storm

Notable hailstorm event details affecting Allamakee County provided by the NCDC are summarized below:

- **May 11, 2000.** Hail ranging in size from dimes to golf balls was reported by spotters and law enforcement. At least $35,000 in property damage occurred in the county.
- **August 1, 2000.** Hail ranging in size from dimes to as large as ping-pong balls was reported by spotters near New Albin. In addition, wind gusts of 60 to 65 mph knocked down numerous trees and power lines.
- **October 4, 2006.** A supercell moved across Northeast Iowa during the early morning hours of October 4th, producing large hail up to the size of baseballs in rural Allamakee County.
- **April 12, 2014.** Several rounds of thunderstorms moved across the county on April 12th. These storms developed along a very slow moving cold front and primarily produced large hail, although some occasional high winds also were reported. Quarter-size hail was reported in Waukon.
- **June 29, 2015.** Large hail fell over portions of northeast Iowa during the late afternoon of June 29th. The storms moved south out of Minnesota and dropped hail over the northeast half of Allamakee County before moving in Wisconsin. The largest hail reported was quarter-sized near Lansing and Harpers Ferry.

Probability of Future Occurrences

Based on NCDC data, there were 70 hail reports in Allamakee County between 2000 and 2016, an average of 4.1 each year. However, it is important to note that there can be multiple reports of hail

within the same storm. Hail reports indicating hail 1.75 inches and larger occurred eight times over the same 17 year period. There were three reports during this period of hail two inches or larger.

Allamakee County is located where the probability of a hailstorm with hail two inches or more is between 0.50 and 0.75 days per year. Data is unclear as to the number of storms that produced "reports" of hail. Given the information at hand, the probability of a hailstorm is highly likely.

Highly Likely: Event is probable within the calendar year, event has up to 1 in 1 year chance of occurring (1/1=100%), history of events is greater than 33% likely per year

Magnitude

In addition to concerns for public safety, assets that are vulnerable to hail damage include crops and built structures. Of these, crop damage from hailstorms is the most common and the most costly. Large hail can devastate crops that are at vulnerable stages in the plant/harvest cycle, and it is possible for a great percentage of crop yields to be lost as a result of even a single hail event. Structure damage due to hail is usually covered under private insurance. Information on specific structural damage costs in the planning area as a result of hail damage was not available.

Limited: Injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; 10-25% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 6 hours

Spatial Extent

Limited: 10-25% of the jurisdiction to be impacted

River Flood

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
River Flood	4	1	2	4	2

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.85	Moderate

Description

River flooding is defined as when a watercourse exceeds its "bank-full" capacity and is the most common type of flood event. River flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with solids already saturated from previous rain events. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a 1 percent chance in any given year of being equaled or exceeded. The 1 percent annual flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP).

Floods are the most common and widespread of all-natural disasters except fire. Floodwaters can be extremely dangerous. The force of six inches of swiftly moving water can knock people off their feet and two feet of water can float a car. Floods can be slow-, or fast-rising. River flooding is a natural and expected phenomenon that occurs annually, usually restricted to specific streams, rivers or watershed areas.

Geographic Location

The Mississippi River flows alongside the cities of Harpers Ferry, Lansing and New Albin; and Paint Creek flows near the city of Waterville. Additionally, rivers and other surface waters transverse throughout the county's countryside. The low-lying areas along these water sources are most vulnerable to damage from river flooding. Many structures, homes, main roadways, and agricultural areas are threatened by river flooding.

Previous Occurrences

In Allamakee County, there have been fi,ve federal disaster declarations involved with flooding since 2000, and one USDA declared disasters involved with flooding since 2012. Major historical floods and flash floods for the county occurred in: 1880, 1965, 1969, 1993, 1997, 2001, 2008 and 2016 (National Oceanic and Atmospheric Administration, 2010).

The NCDC reports 20 river flooding events in Allamakee County between 2000 and 2016. Selected details available from the NCDC of river flood events that affected Allamakee County are:

- **May 1, 2001.** During April 2001, the Mississippi River crested at levels second only to the all-time flood on record, which occurred in April 1965. Flooding continued until the middle of May, at which time water levels dropped below flood stage for the first time in several weeks. Considerable damaged was done to homes and businesses. Allamakee County received federal disaster relief funds.
- **June 7, 2008.** A warm front extended east to west across the Upper Mississippi Valley, where thunderstorms produced excessive rainfalls of 1 to 2 inches per hour. Many roads were closed due to rainfall, flooding, mudslides or partial washouts occurring over several days. Conditions only worsened, leading to more road closures, sandbagging and some evacuations. Rivers rose very quickly during this time frame, some as much as one foot per hour. Others exceeded their river gauges ability to record the river level, as many gauge were under water themselves. All time record crests were set at a few locations, with top 5 records at many others. Damages to infrastructure and crops was preliminarily estimated at 70 to 80 million dollars.
- **June 22, 2015.** An early morning squall line moved across Northeast Iowa producing winds of 60 to 70 miles an hour and at least one tornado. Locally heavy rains caused Waterloo Creek near Dorchester to come out of its banks. Locally heavy rain caused some street flooding in Waukon.
- **September 9, 2016.** Rainfall amounts of 2 to 4 inches were common across Northeast Iowa during the afternoon of September 9th. This rain fell fast enough and on soils that were already saturated, leading to more flash flooding. Water covered roads were apparent across the region. Runoff from heavy rains caused the Upper Iowa River near Dorchester to go out of its banks. The river crested 3 feet about flood stage, the second time in two days that flooding occurred at this site.

Probability of Future Occurrences

Damaging river floods of varying extent can occur on an annual basis, and often multiple flood events may be recorded in the same year. This places the probability of an occurrence as highly likely.

Highly Likely: Event is probable within the calendar year, event has up to 1 in 1 year chance of occurring (1/1=100%), history of events is greater than 33% likely per year

Magnitude

River flooding impacts include property damage and destruction; damage and disruption of communications, transportation, energy service, community services, water treatment and wastewaters treatment facilities, crop and livestock damage. Facilities and infrastructure can be scoured around and degrading its structural integrity. Past flood events in Allamakee County have caused fairly significant damage to property and agriculture, endangered lives and critical facilities. Additional information on the potential impact of flooding on properties can be found in the Vulnerability Assessment Section. Some communities participate in the National Flood Insurance Program, also noted in the Vulnerability Assessment Section.

Negligible: Injuries and/or illnesses are treatable with first aid, minor quality of life lost, shutdown of critical facilities and services for 24 hours or less, less than 10% of property is severely damaged

Warning Time

12-24 hours

Duration

More than 1 week

Spatial Extent

Limited: 10-25% of the jurisdiction to be impacted

Severe Winter Storm

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Severe Winter Storm	4	1	2	3	4

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.85	Moderate

Description

Winter storms in Iowa typically involve snow, extreme cold, and/or freezing rain (ice storms). These conditions pose a serious threat to public safety, disrupt commerce and transportation, and can damage utilities and communications infrastructure. Winter storms can also disrupt emergency and medical services, hamper the flow of supplies, and isolate homes and farms.

Heavy snow can collapse roofs and down trees onto power lines. Extreme cold conditions can stress or kill unprotected livestock and freeze water sources. Direct and indirect economic impacts of winter

storms include cost of snow removal, damage repair, increased heating bills, business and crop losses, power failures and frozen or burst water lines.

For humans, extreme cold can cause hypothermia (an extreme lowering of the body's temperature) and permanent loss of limbs due to frostbite. Infants and the elderly are particularly at risk, but anyone can be affected. During 2006–2010, about 2,000 U.S. residents died each year from weather-related causes of death, with 63% being attributed to exposure to excessive natural cold, hypothermia, or both (National Center for Health Statistics, 2014), with elderly being most at risk. Also at risk are those without shelter or live in a home that is poorly insulated or without heat. Other potential health and safety threats include toxic fumes from emergency heaters, household fires caused by fireplaces or emergency heaters, and driving in treacherous conditions.

The National Weather Service describes different types of winter storm conditions as follows:

- **Blizzard** – Winds of 35 mph or more with snow and blowing snow reducing visibility to less than 1/4 mile for at least three hours.
- **Blowing Snow** – Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls** – Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers** – Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain** – Measurable rain that falls onto a surface whose temperature is below freezing. This causes the rain to freeze on surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet** – Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

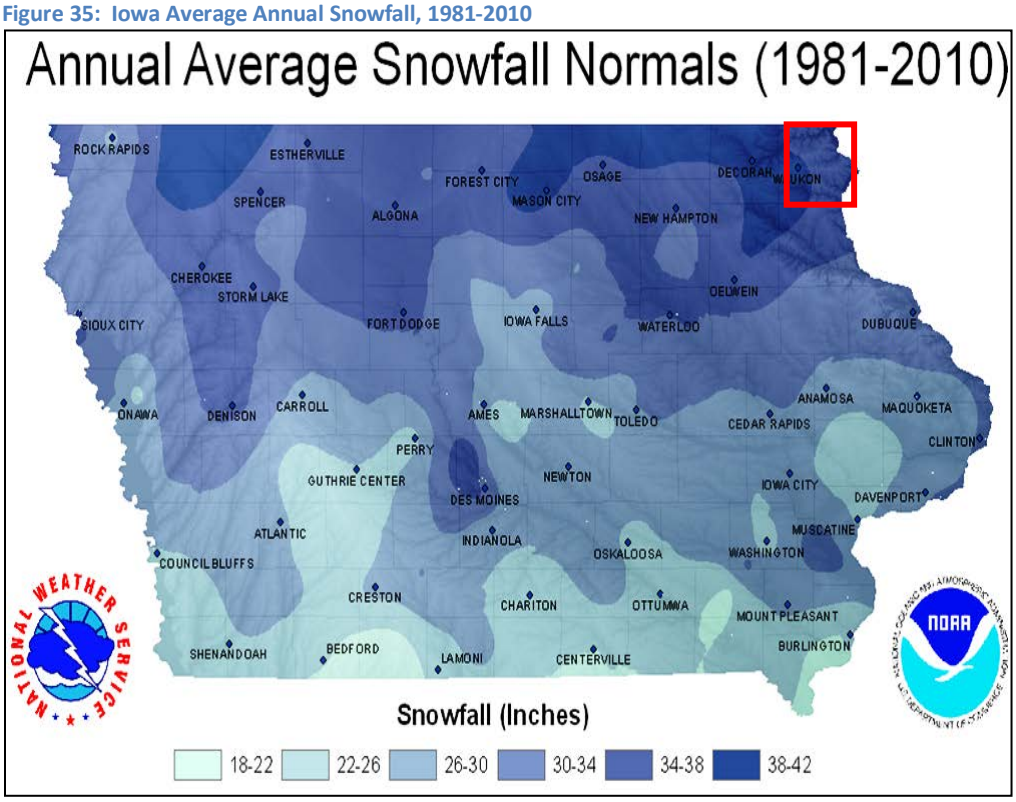
Wind can greatly amplify the impact of cold ambient air temperatures and accordingly, the severity of winter storms.

Duration of the most severe impacts of winter storms is generally less than one week, though dangerous cold, snow, and ice conditions can remain present for longer periods in certain cases. Weather forecasts commonly predict the most severe winter storms at least 24 hours in advance, leaving adequate time to warn the public.

Geographic Location

The entire State of Iowa is vulnerable to heavy snow and freezing rain. The far northern portion of Iowa, near the Minnesota border, receives the greatest average annual snowfall in Iowa with upwards of 38 inches per year. The southwestern portion of Allamakee County is among the region that receives the greatest average annual snowfall, but the remaining portion of Allamakee County receives an average annual snowfall of 34 to 38 inches per year. Figure 35 reflects the State of Iowa average annual snowfall from 1981 to 2010.

Figure 35: Iowa Average Annual Snowfall, 1981-2010



Source: (National Weather Service, 2012)

Previous Occurrences

The NCDC Storm Events Database states that 34 events were reported between 2000 and 2016, only two of which resulted in damage. None resulted in injury or death. Summaries of selected winter storm events available from the NCDC are listed below:

- **March 1, 2002.** A winter storm produced snow accumulations of 6 to 8 inches across Northeast Iowa. The storm was accompanied by strong north winds of 15 to 25 mph, which caused blowing and drifting.
- **March 17, 2005**. A slow moving area of low pressure tracked across Iowa, bringing a prolonged period of heavy snow to portions of Northeast Iowa. Storm total accumulations of 6 to 12 inches were common, with the locally higher amounts of around 18 inches near the Iowa-Minnesota border. Thunder was heard at times on Friday March 18, when snowfall rates were as much as 2 to 3 inches per hour. In addition to the heavy snow, strong easterly winds caused drifting problems, with snow drifts in some locations as deep as 3 to 4 feet.
- **February 20, 2011.** Freezing rain developed across the county during the early morning hours of the 20th with ice accumulations up to a quarter of an inch on exposed surfaces. The freezing rain then changed over to snow with storm total accumulations of 1 to 4 inches through the 21st. The ice accumulations caused power outages, downed power and telephone lines, a few vehicle accidents and school cancellations.
- **March 23, 2016.** Freezing rain fell across Allamakee County during the afternoon and evening of March 23rd before ending as light snow early on the 24th. Around a half inch of ice accumulation

was reported which brought down trees and power lines in Waukon. Power outages occurred across the county because of ice accumulations.

Probability of Future Occurrence

Previous occurrences would indicate a high likelihood of a winter storm occurring in any given year. During the 17-year period from 2000-2016, there were 34 recorded winter storm or blizzard events affecting Allamakee County. No storm was severe enough to warrant a Presidential Disaster Declaration. Heavy snow and winter weather occurs annually and the ramifications of such weather are considered a normal part of life in Allamakee County. The probability of a severe winter storm is highly likely.

Highly Likely: Event is probable within the calendar year, event has up to 1 in 1 year chance of occurring (1/1=100%), history of events is greater than 33% likely per year

Magnitude

Injury or even death is possible when proper shelter is not available to protect against severely cold temperatures. Severe winter storms increase the probability of automobile accidents which can also result in serious injury or death. Response personnel are exposed to cold temperatures and traffic accidents when responding to the victims' needs. Operations can be limited or halted when critical services are not available. Workers may not be able to make it to their place of work, limiting the continuity of operations.

Fire during winter storms presents a great danger as water supplies can freeze and firefighting equipment may not function effectively, or personnel and equipment may be unable to get to the fire. If power is out, interiors of homes become very cold and lead to pipes freezing and possibly bursting. Rivers and lakes freeze and subsequent ice jams can create flooding problems as temperatures begin to rise. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outages.

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

12-24 hours

Duration

Less than 1 week

Spatial Extent

Catastrophic: More than 50% of the jurisdiction would be impacted

Thunderstorms and Lightning

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent

Thunderstorms and Lightning	4	1	3	2	3

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.85	Moderate

Description

Atmospheric imbalance and turbulence may result in thunder, heavy rains (which may cause flooding), strong winds, microbursts, high straight-line winds (often mistaken for tornadoes), tornadoes, surface hail or lightning. Most thunderstorms produce only thunder, lightning and rain; thunderstorms can occur alone, in clusters or in lines. The National Weather Service considers a thunderstorm severe if it produces hail at least one inch in diameter, wind 58 mph or higher, or tornadoes.

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. It is sudden, extremely destructive and potentially deadly. The National Weather Service reports that lightning caused 39 fatalities nationwide in 2016. The 10-year average is 31 fatalities per year (National Weather Service, 2017).

The National Fire Protection Association reports that between 2007 and 2011, local fire departments across the nation responded to an estimated average of 22,600 fires per year that were started by lightning. These fires caused an average of nine deaths, 53 injuries, and $451 million in direct property damage per year (Ahrens, 2012).

Due to its nature as a powerful electrical phenomenon, lightning causes extensive damage to electronic systems that it contacts. A particular concern in Iowa is the protection of facilities and communications systems that are critical for maintaining emergency response systems, protecting public health, and maintaining the state's economy.

Average duration of each lightning stroke is 30 microseconds and duration of thunderstorm events is usually less than six hours. Thunderstorm forecasting and warning time for lightning occurrence is generally less than six hours.

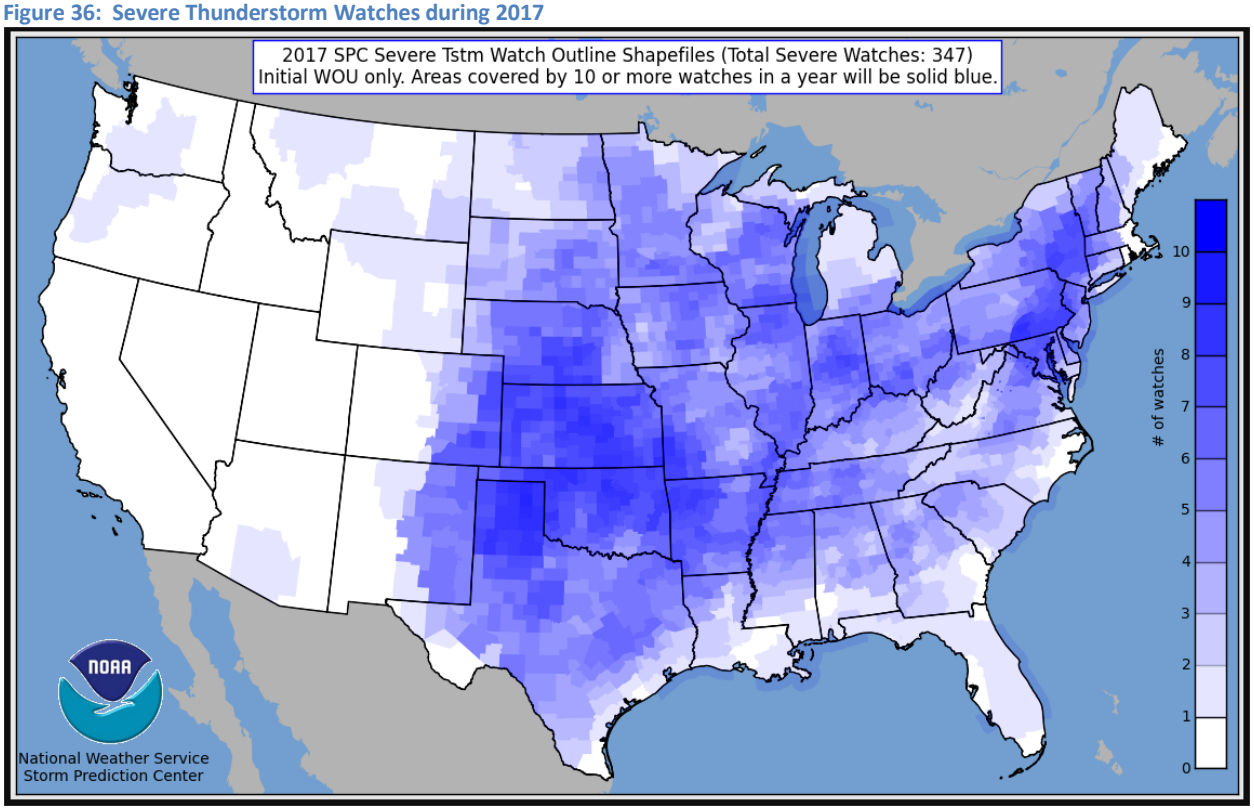
Geographic Location

Lightning affects broad regions. The county is similar to the surrounding area and the entire state of Iowa with the frequency of thunderstorms and lightning flashes. The region that includes Allamakee County averages:

- 30-50 days with thunderstorms per year per 10,000 square miles and
- 9 - 12 lightning strikes per square mile per year

Figure 36 reflects severe thunderstorm watches throughout the United States in 2017.

Figure 36: Severe Thunderstorm Watches during 2017



Source: (National Oceanic and Atmospheric Administration, 2017)

Previous Occurrences

Thunderstorms are common in Iowa, with 45 to 65 experienced annually in the state. Of these, about 85% occur between April and September with the peak month being June. Because thunderstorms may occur singularly, in clusters, or in lines, it is possible that several thunderstorms may affect the area in the course of a few hours. One system may spawn multiple events. There have been eleven presidential declarations in Allamakee County since 2000 related to severe storms. The NCDC Storm Events Database reports that there were 43 days with thunderstorm wind events, all but three of which resulted in property and/or crop damage, and one report of damaging lightning during the span of 2000 to 2016.

Probability of Future Occurrences

Previous occurrences would indicate a high probability that a severe thunderstorm might occur in any given year. With Iowa's location in the interior of the U.S., the ingredients of a severe storm are often present (moisture, warm and unstable air, and a lifting mechanism). As climate patterns change, there is a very high likelihood that a few of these summer storms will become severe and cause damage. According to National Weather Service data, the County receives 9 to 12 lightning strikes per square mile per year. The HMPC rated the probability of future occurrence of damage due to thunderstorms and lightning as "highly likely" in any given year.

Highly Likely: Event is probable within the calendar year; event has up to 1 in 1 year chance of occurring (1/1=100%); history of events is greater than 33% likely per year

Magnitude

Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures. Thunderstorms can also bring large hail that can damage homes and businesses, break glass, destroy vehicles, and cause bodily injury to people, pets, and livestock. Although the frequency of lightning events is high, the magnitude is negligible. Generally damages are limited to single buildings and in most cases, personal hazard insurance covers any losses.

Negligible: Injuries and/or illnesses are treatable with first aid; Minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

6-12 hours

Duration

Less than 1 day

Spatial Extent

Critical: 25 – 50% of the jurisdiction would be impacted

Transportation Incident

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Transportation Incident	3	2	4	3	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.80	Moderate

Description

This hazard includes incidents in air, roadway and rail transportation, any transportation accident involving any mode that directly threatens life and which results in property damage, death, injury and/or adversely impacts a community's capabilities to provide emergency services.

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, health and recreation as well as freight. Mechanical failure, pilot error, weather conditions are among a variety of circumstances that can result in an air transportation incident.

A roadway transportation incident can be single or multi-vehicle requiring responses exceeding normal day-to-day capabilities. There are approximately 975 total miles of roadway in the county (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017); local residents, travelers, business, and industry rely on this network on a daily basis. Weather conditions play a major factor in

the ability of traffic to flow safely in and through the state as does the time of day and day of week. Numerous traffic accidents occur in the county and can result in property damage and injury; major accidents involving multiple vehicles and serious injury are not uncommon.

A rail transportation incident is a train accident that directly threatens life and/or property, or adversely impacts a community's capabilities ability to provide emergency services. Railway incidents may include derailments, collisions, and highway/rail crossing accidents. Train incidents can result from a variety of causes; human error, mechanical failure, faulty signals, and/or problems with the track. Results of an incident can range from minor "track hops" to catastrophic hazardous material incidents and even human/animal casualties.

Geographic Location

Allamakee County has one airport, but airspace usage is not limited to traffic from that facility. A transportation incident can occur anywhere within the planning area. The Canadian Pacific Railroad, owner of Dakota, Minnesota & Eastern Railroad Corporation, operates two lines through Allamakee County. The railroad operates track running parallel to the Mississippi River through Harpers Ferry, Lansing and New Albin. It also operates track running through Postville on the south edge of the County. The main products handled by the rail include chemical and allied products, coal, food and kindred products, wasted scrap materials, primary metal products, non-metallic minerals and farm products (Iowa Department of Transportation, 2017). Harpers Ferry, Lansing and New Albin experience 6-8 trains per day; Postville experiences 2-4 trains per day (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017).

Previous Occurrences

The National Transportation Safety Board reports 149 air transportation incidents in Iowa since 2000, with zero occurring in Allamakee County (National Transportation Safety Board, 2017). According to the Iowa DOT, there have been 698 crashes in the county from 2007-2011, resulting in 16 fatalities and 295 injuries (Iowa Department of Transportation, 2012). From 2007 through 2016 there were three railway accidents or incidents reported. Two of them were highway-rail incidents that resulted in no injuries (Federal Railroad Administration, 2017).

Probability of Future Occurrences

The HMPC determined the probability of a transportation incident of some type occurring within the county to be likely.

Likely: Event is probable within the next three years; event has up to 1 in 3 year chance of occurring (1/3=33%); history of events is greater than 20% but less than or equal to 33% likely per year

Magnitude

The magnitude of a transportation incident is dependent upon the transportation mode. The HMPC determined that the magnitude would generally be limited in scope.

Limited: Injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; 10-25% of property is severely damaged

Warning Time
Less than 6 hours

Duration
Less than 1 week

Spatial Extent
Negligible: Less than 10% of the jurisdiction to be impacted

Animal/Plant/Crop Disease

Hazard Type:	Probability:	Magnitude:	Warning Time:	Duration:	Spatial Extent:
Animal/Plant/Crop Disease	1	4	4	4	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.50	Moderate

Description
Any outbreak of disease that can be transmitted from animal to animal or plant to plant is an animal/crop/plant disease. An animal or plant disease outbreak could have serious economic implications or public health impact. Plant disease, insects and mycotoxins are three of the top 20 causes of crop loss. Avian influenza, BSE and Bovine TB are threats to the county's livestock. The HMPC included invasive species, pests and noxious weeds within this hazard element.

A new, significant threat to the urban and rural forests of Iowa is the Emerald Ash Borer (EAB). Since first being identified in Michigan in 2002, this exotic beetle has destroyed millions of ash trees in North America. This destruction indicates man-assisted movement of this pest and has led to federal quarantines for several entire states (IL, IN, OH, PA, VA and WV) as well as for portions of other states (CT, **IA**, KS, KY, MD, MI, MN, MO, NY, TN, and WI). Aggressive containment efforts are necessary for new outbreaks outside the core infestations, with chemical and biological control options under review. According to the Iowa Department of Natural Resources, approximately 15-20% of public trees in Iowa cities are green ash, with some communities having as much as 60% of their public tree inventory classified as ash (Iowa State University Extension and Outreach, 2013).

Another significant threat emerging in recent years is the highly pathogenic avian influenza (HPAI) outbreak. HPAI appears to have a relatively high species-specific transmission barrier, it is potentially zoonotic and can be fatal for humans. United States experiences its most serious animal health disease incident in history with the HPAI outbreak occurring between December 2014 and June 2015, and the focal points of the outbreak were in Iowa and Minnesota. The outbreak impacted over 200 commercial facilities in the Midwest, with turkeys and layer-type chickens being affected the most (United States Department of Agriculture, 2017).

Geographic Location
Animal, plant or crop disease can occur anywhere within the planning area.

Previous Occurrences
There have been isolated occurrences of animal, plant or crop disease within the county. The emerald ash borer can now be linked to 53 counties in Iowa, which includes Allamakee County. Allamakee County was in fact the first county in Iowa were Emerald Ash Borer was discovered, which occurred in 2010 (Boshart, 2017). During the 2014-2015 avian influenza outbreak, no cases were confirmed in Allamakee County (Iowa Department of Agriculture and Land Stewardship, 2015). However, due to the highly pathogenic nature of the disease, biosecurity measures were put in place across the county and neighboring regions to prevent a catastrophic spread of the disease (Deback, 2016).

Probability of Future Occurrences
Previous occurrences would indicate a probability of a 10% chance of an animal/plant/crop disease occurring in any given year, putting the probability of future occurrence as "unlikely." The HMPC noted concern over the increasing encroachment of invasive insects and plants into Iowa and the growing resistance of some animal, plant or crop diseases to the current chemical control efforts.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year

Magnitude
Given the ability of the state and local jurisdictions to respond, control and contain this type of hazard, the HMPC rated the magnitude as catastrophic.

Catastrophic: Multiple deaths; complete shutdown for 30 or more days; more than 50% of property is severely damaged

Warning Time
Less than 6 hours

Duration
Greater than one week

Spatial Extent
Negligible: Less than 10% of the jurisdiction to be impacted

Drought

Hazard Type:	Probability:	Magnitude:	Warning Time:	Duration:	Spatial Extent:
Drought	2	3	1	4	4

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.40	Moderate

Description

Drought is generally defined as a period of prolonged lack of precipitation for weeks at a time producing severe dry conditions. There are three types of drought conditions that are relevant to Iowa: Meteorological drought, which refers to precipitation deficiency; hydrological drought, which refers to declining surface water and ground water supplies; and agricultural drought, which refers to soil moisture deficiencies. A prolonged drought can have serious economic impact on a community. Increased demand for water and electricity may result in shortage of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. In 2016, drought caused $7.9 million in property damage and $6.16 in crop damage in the United States (National Weather Service, 2017).

Periods of drought are normal occurrences in all parts of Iowa. Drought in Iowa is caused by severely inadequate amounts of precipitation that adversely affect farming, surface and ground water supplies, and uses of surface waters for navigation and recreation. Drought can cause significant economic and environmental impacts and also create favorable conditions for wildfires and wind erosion. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months. Drought can lead to shortages in municipal water supplies due to deficiency of the raw water supply and greatly increased customer water demand. In other cases the raw water supply may remain adequate, but problems can be encountered due to limited treatment or distribution capacity.

Geographic Location

Drought can occur in any part of the planning area.

Previous Occurrences

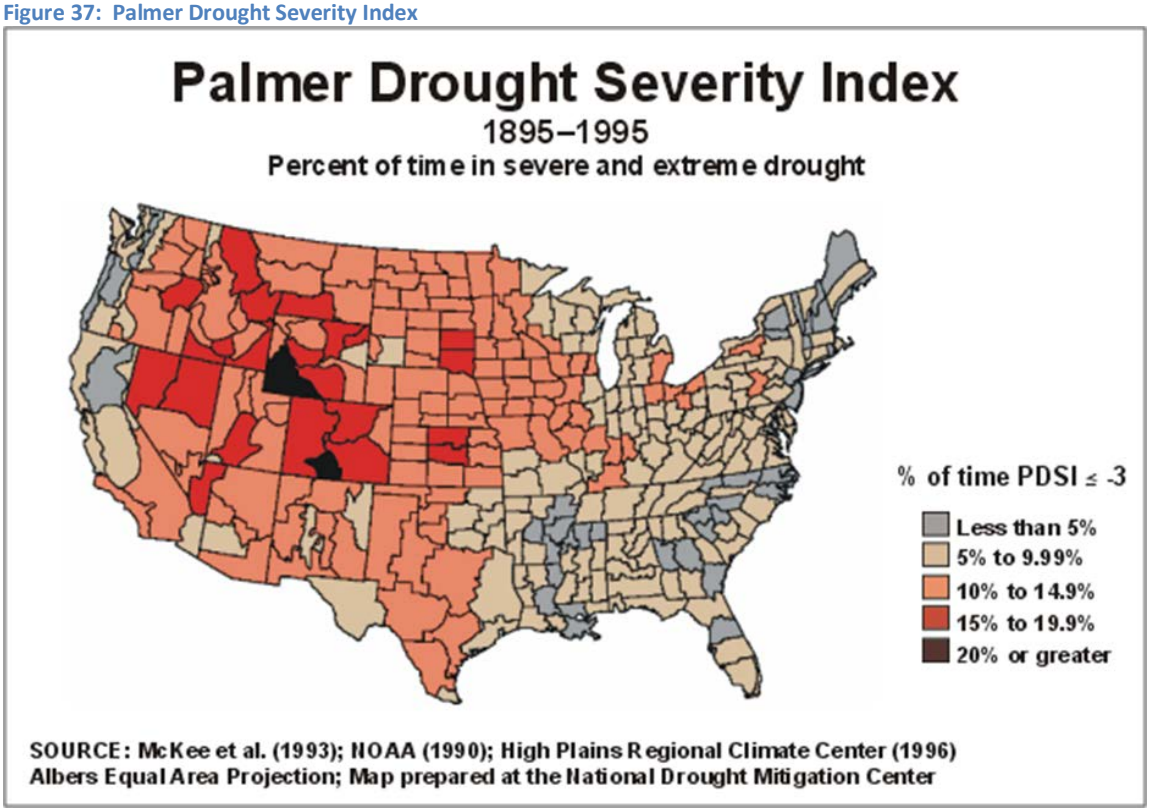
According to the National Climatic Data Center (NCDC), Iowa has had 22 periods of drought from 2000-2017. The most common trend was the consistency of drought periods during the month of August. While some may have been more severe than others, agricultural areas were impacted much more than urbanized areas were impacted.

The NCDC indicates that four of these events directly impacted Allamakee County, all in 2012, and provides the following details:

- **July 17, 2012 – July 31, 2012.** Persistent below normal precipitation allowed severe drought conditions to develop across all of Northeast Iowa. Effects of the drought include damaged crops, pastures that have stopped growing, river flows that were less than 20 percent of normal, falling ground water levers and burning bans.
- **September 1 – September 30, 2012.** Severe drought conditions continued across Allamakee County because of a persistent lack of precipitation. Effects of drought include damaged crops, pastures that have stopped growing, river flows that were less than 20 percent of normal on the Upper Iowa River and falling ground water levers. In mid-September, the USDA declared Allamakee County a federal disaster area due to the drought.

Figure 37 shows the Palmer Drought Severity Index.

Figure 37: Palmer Drought Severity Index



Probability of Future Occurrences

According to the Palmer Drought Severity Index 1895-1995, Allamakee County experienced severe and extreme drought 10-14.9 percent of the time during that 100-year period. Using either source, the probability of future occurrence falls within the definition of "occasional."

Occasional: Event is probable within the next five years; event has up to 1 in 5 year chance of occurring (1/5=20%); history of events is greater than 10% but less than or equal to 20% likely per year

Magnitude

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Iowa are those related to agriculture. The agricultural industry provides an economic base for Allamakee County, which includes the Participating Jurisdictions. A prolonged drought could have severe economic impacts.

Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. An ongoing drought may also leave an area more prone to wildfires. Water supply can also be of concern during periods of prolonged drought. Drought impacts increase with the length of a drought.

Critical: 25-50% of the jurisdiction to be impacted

Warning Time

Over 24 hours

Duration
More than 1 week

Spatial Extent
Catastrophic: More than 50% of the jurisdiction could be impacted

Landslide

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Landslide	2	1	4	3	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.10	Moderate

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

There have been numerous small-scale landslide events in Iowa, none resulting in injury or death. The geographic extent of the historic events has been limited to less than a city block in size and has "run out" over the stretch of less than 100 yards. A portion of the state is moderately susceptible to landslides; in northeastern Iowa, along the Silurian Escarpment you can find blocks of dolomite slumped onto the underlying Maquoketa Shale which creates situations vulnerable to landsides.

Geographic Location
Northeast Iowa is one of two places in the state identified by the Iowa Hazard Mitigation Plan as vulnerable due to areas with layering of dolomite over shale, which is prone to landslides.

Figure 38: Planning Area Landslide Incidence and Susceptibility (PLACE HOLDER)

Previous Occurrences
No known agency documents historical data on landslides. The best available data was personal knowledge of the HMPC and HMMP. It was noted that some landslides have occurred in the past, but not on a common basis.

Probability of Future Occurrences
The HMPC evaluated the probability of a significant landslide event in the County and determined that probability of such an occurrence was "occasional," noting that probability is highest when heavy rains occur in the area.

Occasional: Event is probable within the next five years; event has up to 1 in 5 year chance of occurring (1/5=20%); history of events is greater than 10% but less than or equal to 20% likely per year

Magnitude

In Iowa, landslides occur on a localized scale. Injuries and deaths are very unlikely except in the case of undetected slope failure warning signs in structures overlooking steep slopes. Property damage would be limited to a very small percentage of structures. Infrastructure damages would be more significant. Utilities such as pipelines, cables, power poles, etc. are often vulnerable to downward movements of the soil. Transportation routes can be disrupted.

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 1 week

Spatial Extent

Negligible: Less than 10% of the jurisdiction would be impacted

Infrastructure Failure

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Infrastructure Failure	**1**	**2**	**4**	**4**	**2**

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
2.05	Moderate

Description

This hazard incorporates the following hazards: 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.

Communication failure is the widespread breakdown or disruption of normal communication capabilities. Mechanical failure, traffic accidents, power failure, line severance, and weather can affect communication systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term. If switching stations are affected, the outage could be more widespread.

Energy failure is an extended interruption of service of either electric, petroleum or natural gas, which by an actual or impending acute shortage of usable energy. Disruptions and failures 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 collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. A road, bridge, or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may cause the roof of a building to collapse (under the weight of snow). Heavy rains and flooding can undercut and washout a road or bridge. The age of the structure is sometimes independent of the cause of the failure.

An uncontrolled structural fire in populated areas that threatens life and property may be beyond normal day-to-day response capability. Structural fires present a far greater threat to life and property and the potential for much larger economic losses.

Geographic Location

The entire planning area is susceptible to infrastructure failure

Previous Occurrence

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. Some areas in Allamakee County, especially those located in valleys, experience communication disruptions frequently.

There are 175 bridges within the county, with 9 categorizes as deficient. All bridges are located within a floodplain. As of 2014, 23 of the bridge structures are posted with weight restrictions and zero are closed to traffic (Allamakee County Engineer, 2017); (Allamakee County Emergency Manager, 2017).

Probability of Future Occurrence

Previous occurrences would indicate no probability of a major communications failure occurring in any given year. Localized incidents of communication failure due to weather, etc. are likely to occur on a yearly basis, but it is unlikely that these incidents would last long-term. Widespread communication losses are unlikely due to backup systems and redundant system designs.

The State of Iowa and the federal government have strategies to limit the likelihood of an energy shortage or failure and keep energy supply and demand in check. Natural events, human destruction, price escalation, and national security energy emergencies can cause unavoidable energy shortages. Because the distribution systems are very developed, local shortages can quickly be covered.

There may be a higher probability of road or bridge failure. The cause of failure is often found in deficiencies of design, material, or inspection. Efforts to continue to inspect and maintain these structures will lessen the probability of a failure.

Both residential and nonresidential fires will continue to occur. Structural fires with the potential to exceed local fire department response resources and their mutual aid partners are unlikely in any given year.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year

Magnitude

Communication failure 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.

Because Iowa is almost entirely dependent on out-of-state resources for energy, world and regional fuel disruptions are felt in Iowa. It is likely that increasing prices will occur as market mechanisms are used to manage supply disruptions. This will disproportionately affect the low-income population. Agricultural, industrial, and transportation sectors are also vulnerable to supply, consumption, and price fluctuations. Individual consumers such as commuters are also vulnerable.

The impacts of the failed structure would be contained to the immediate area and adjacent properties. This could be as small as a house with a fallen chimney, or the area could be relatively extensive if the structure that failed was a multi-story building or bridge. Dam and levee failures would affect a much larger area and are discussed as separate hazards.

Limited: Injuries and/or illnesses do not result in permanent disability; Complete shutdown of critical facilities for more than one week; 10-25% of property is severely damaged

Warning Time

Less than 6 hours

Duration

More than one week

Spatial Extent

Limited: 10-25% of the jurisdiction to be impacted

Sinkholes

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Sinkhole	2	1	4	1	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.30	Low

Description

Sinkholes are common where the rock below the land surface is limestone, carbonate, salt beds, or rocks that can naturally be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces get too big. If there is not enough support for the land above

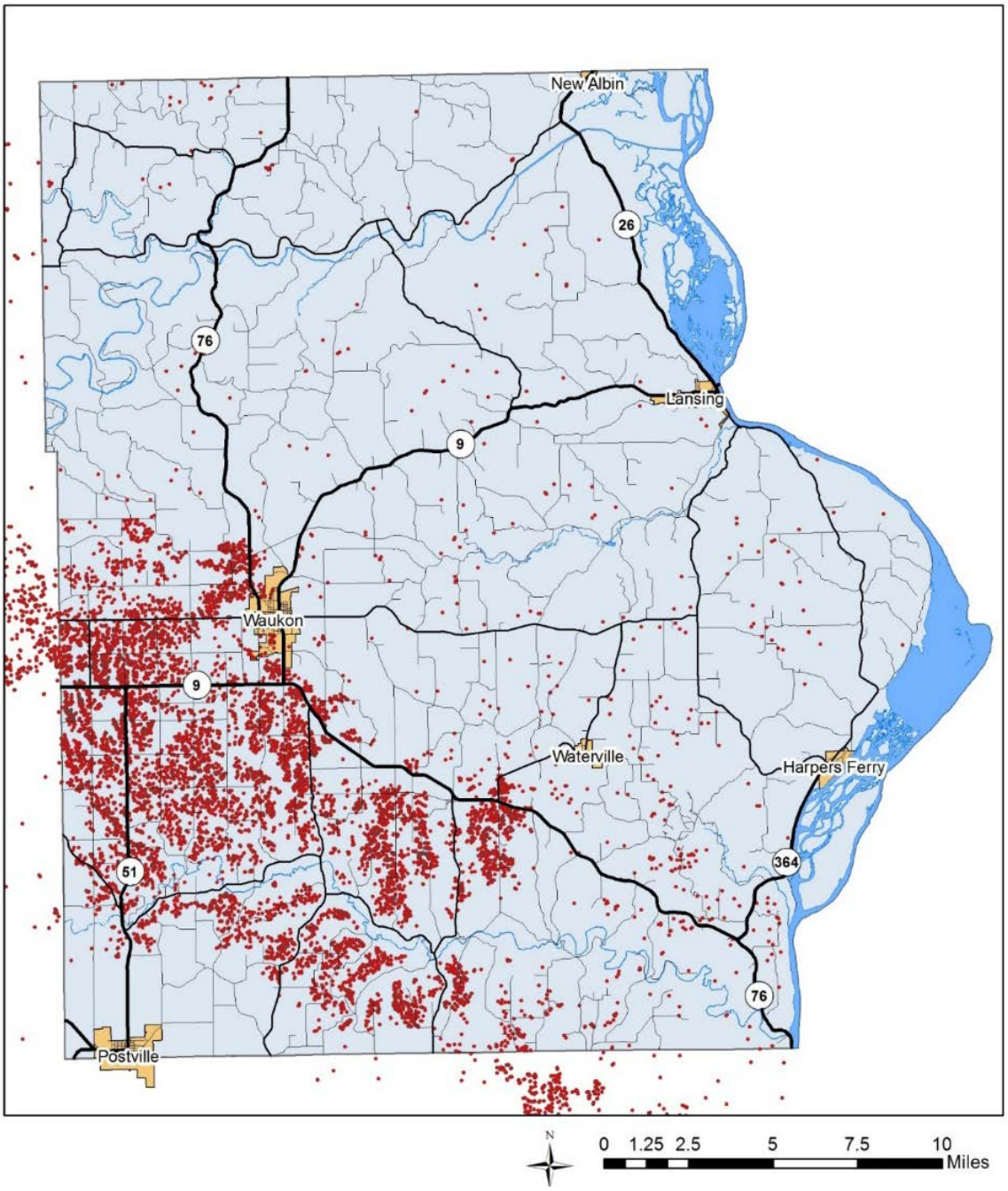
the spaces then a sudden collapse of the land surface can occur. Sinkholes range from broad, regional lowering of the land surface to localized collapse. The primary causes of most sinkholes are human activities: Underground mining of coal, groundwater or petroleum withdraw, and drainage of organic soils. In addition, this is due to the erosion of limestone of the subsurface. Sinkholes can aggravate flooding potential, collapses such as the sudden formation of sinkholes or the collapse of an abandoned mine may destroy buildings, roads, and utilities.

Karst is a landscape formed from the dissolution of soluble rocks including limestone, dolomite and gypsum. Sinkholes are a common indication of karst; caves and underground drainage systems are other indicators. With limestone commonly found in northeast Iowa, sinkholes have the potential to occur.

Geographic Location

The Iowa Department of Natural Resources estimates 10,170 sinkholes are located within Allamakee County (Iowa Department of Natural Resources, 2009). Figure 39 below highlights these areas.

Figure 39: Sinkholes in Allamakee County



Source: (Iowa Department of Natural Resources, 2009)

Previous Occurrences

The HMPC noted there have been occurrences of sinkholes in the County.

Probability of Future Occurrence

Previous occurrences would indicate a low probability of a major sinkhole occurring in any given year. The HMPC determined the probability of future occurrence as "occasional."

Occasional: Event is probable within the next five years; event has up to 1 in 5 year chance of occurring (1/5=20%); history of events is greater than 10% but less than or equal to 20% likely per year

Magnitude

Damage consists primarily of direct structural damage and property loss and depreciation of land values, and also includes business and personal losses that accrue during periods of repair. Damage to property, facilities, and infrastructure would only occur if the event undermined foundations.

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 6 hours

Spatial Extent

Negligible: Less than 10% of the jurisdiction w

Dam Failure

Hazard Type:	Probability:	Magnitude:	Warning Time:	Duration:	Spatial Extent:
Dam Failure	1	1	4	4	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.75	Low

Description

Dam failure is the uncontrolled release of impounded water that can result in flooding. Dams are built for a variety of reasons such as flood control, erosion control, water supply storage, power generation, and recreation. There are sixteen low hazard dams and three moderate hazard dam within Allamakee County. Planning District 2 (encompassing Fayette County) has lowest number of high and significant hazard dams in state. The primary purposes of the dams within the county are flood control, recreational or for small fish ponds (U.S. Army Corps of Engineers, n.d.).

Dam failures can be caused by several events including flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation and poor construction, vandalism, or terrorism. Failure of earthen dams occurs through three scenarios: overtopping, seepage, and/or structural issues. Overtopping failures result from the erosive action of water on the embankment. Erosion is due to uncontrolled flow of water over, around and adjacent to the dam. Earth embankments are not designed to be overtopped and therefore are particularly susceptible to erosion. Once erosion has begun during overtopping, it is almost impossible to stop. A well vegetated earth embankment may withstand limited overtopping if its

crest is level and water flows over the crest and down the face as an evenly distributed sheet without becoming concentrated.

All earth dams have seepage resulting from water permeating slowly through the dam and its foundation. Seepage must be controlled in both velocity and quantity. If uncontrolled, it can progressively erode soil from the embankment or its foundation, resulting in rapid failure of the dam. Erosion of the soil begins at the downstream side of the embankment, either in the dam proper or the foundation, progressively works toward the reservoir, and eventually develops a direct connection to the reservoir. This phenomenon is known as "piping." Piping action can be recognized by an increased seepage flow rate, the discharge of muddy or discolored water, sinkholes on or near the embankment or a whirlpool in the reservoir. Once a whirlpool (eddy) is observed on the reservoir surface, complete failure of the dam will probably follow in a matter of minutes. As with overtopping, fully developed piping is virtually impossible to control and will likely cause failure. Seepage can cause slope failure by creating high pressures in the soil pores or by saturating the slope. The pressure of seepage within an embankment is difficult to determine without proper instrumentation. A slope which becomes saturated and develops slides may be showing signs of excessive seepage pressure.

Structural failures can occur in either the embankment or the appurtenances (Structures associated with dams such as spillways, gates, outlet works, ramps, docks, etc. that are built to allow proper operation of dams). Structural failure of a spillway, lake drain or other appurtenance may lead to failure of the embankment. Cracking, settlement, and slides are the more common signs of structural failure of embankments. Large cracks in either of an appurtenance or the embankment, major settlement and major slides will require emergency measures to ensure safety, especially if these problems occur suddenly.

The three types of failure previously described are often interrelated in a complex manner. For example, uncontrolled seepage may weaken the soil and lead to a structural failure. A structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may result in structural failure.

Geographic Location

Figure 40 illustrates the approximate location of dams within the county.

Figure 40: Allamakee County Dam Sites

Previous Occurrences

There has never been a dam failure within the county and all of the dams have a low or moderate hazard potential.

Probability of Future Occurrences

Previous occurrences would indicate a probability of a 0% chance of a dam failure occurring in any given year. The HMPC determined the probability of future occurrence is "unlikely"

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year.

Magnitude

No inundation maps were available to planners for the dams in Allamakee County.

Negligible: Injuries and/or illnesses are treatable with first aid; Minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time
Less than 6 hours

Duration
Less than 1 week

Spatial Extent
Negligible: Less than 10% of the jurisdiction would be impacted

Tornado

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Tornado	1	2	4	1	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.70	Low

Description
The National Weather Service defines a tornado as a "violently rotating column of air extending from a thunderstorm to the ground." Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 mph, and damage paths can be more than one mile wide and 50 miles long Based on a 20-year average, more than 1,253 tornadoes are reported in the United States annually, more than any other country in the world (National Oceanic and Atmospheric Administration, n.d.). Although tornadoes have been documented on every continent, they most frequently occur in the United States east of the Rocky Mountains.

According to the National Oceanic and Atmospheric Administration (National Oceanic and Atmospheric Administration, n.d.), Tornado Alley is a nickname for an area in the southern plains of the central United States that consistently experiences a high frequency of tornadoes each year. The region from central Texas, northward to northern Iowa, and from central Kansas and Nebraska east to western Ohio is often collectively known as Tornado Alley. Meteorologically, the region known as Tornado Alley is ideally situated for the formation of supercell thunderstorms, often the producers of violent (EF-2 or greater) tornadoes. Northeast Iowa sits on the edge of Tornado Alley.

In Iowa, most tornadoes occur during the months of April, May, and June. However, tornadoes can strike in any of the 12 months. Similarly, while most tornadoes occur between 4:00 and 9:00 p.m., a tornado can strike at any time.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now referred to as the Enhanced Fujita Scale (EF). Both scales are sets of wind estimates (not

measurements) based on damage. The new scale uses more damage indicators and associated degrees of damage, allowing for more detailed and accurate analysis. The tornado intensity scale update was the result of advanced research by meteorologists and wind engineers. Table 24 compares the tornado intensity F-scale to the EF-scale.

Table 24: F- and EF-Scale for Tornado Damage

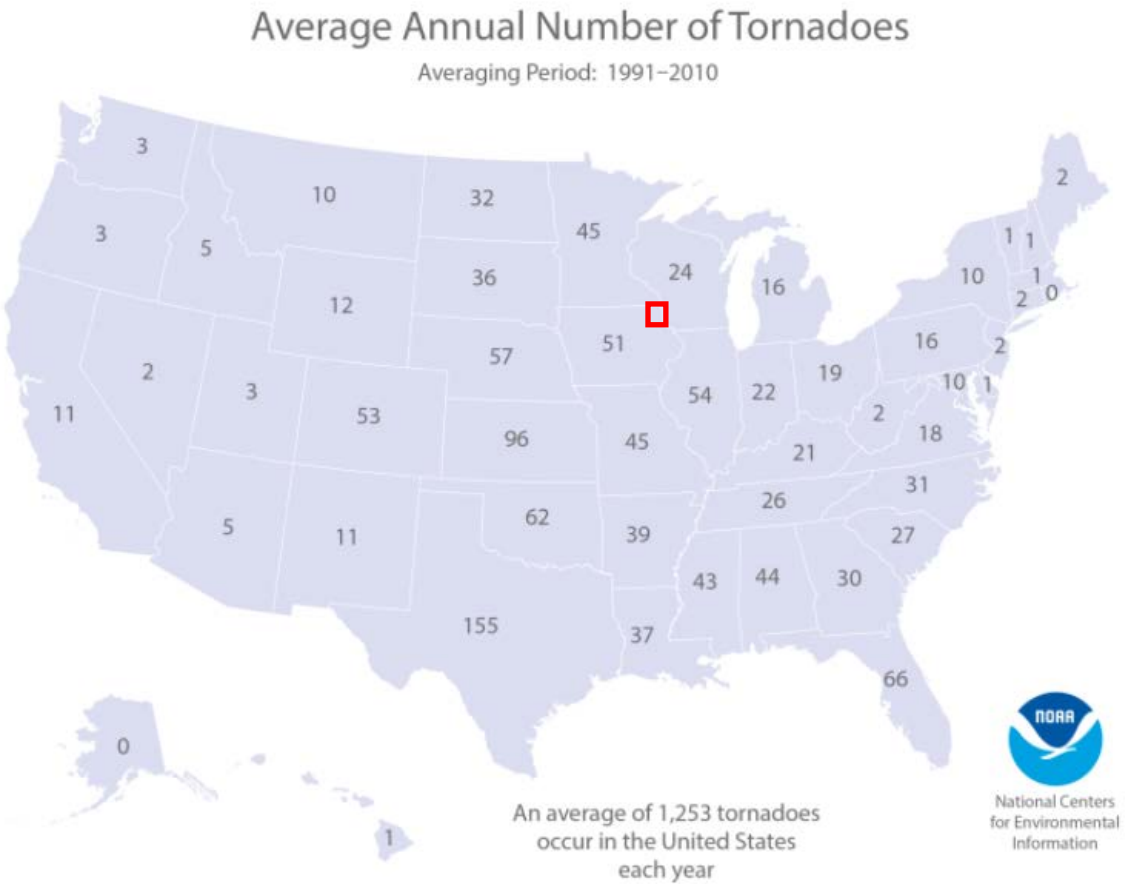
Fujita (F) Scale (Previous)		Enhanced Fujita (EF) Scale (Current)	
F Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	45-78	0	65-85
1	79-117	1	86-109
2	118-161	2	110-137
3	162-209	3	138-167
4	210-261	4	168-199
5	262-317	5	200-234

Source: (National Weather Service, 2011)

Geographic Location

Based on a 10-year average, Iowa experiences 57 tornadoes annually, resulting in an average of 2 deaths per year. While tornadoes can occur in all areas of the State of Iowa, historically, some areas of the state have been more susceptible to this type of damaging storm. Figure 41 illustrates the average annual number of tornadoes from 1991-2010.

Figure 41: Average Annual Number of Tornadoes, 1991-2010



Source: (National Oceanic and Atmospheric Administration, n.d.)

Previous Occurrences

According to the NCDC database, there have been 2 tornadoes in Allamakee County from 2000-2016. There were no injuries or deaths reported. Neither of these tornadoes was rated above an F0. Table 25 reflects details of recorded Allamakee County tornadoes from 1964 to 2016.

Table 25: Recorded Tornadoes in Allamakee County, 1964-2016

Date	Time	Magnitude	Injuries	Estimated Damages ($)
May 4, 1964	6:10 PM	F2	0	$250,000
October 14, 1966	2:00 PM	F0	0	$2,500
November 9, 1975	7:00 PM	F1	0	$25,000
July 29, 1987	6:16 PM	F2	0	$2,500,000
July 6, 1994	3:50 PM	F0	0	0
July 19, 1994	9:40 PM	F1	0	$500,000
July 2, 2000	3:35 PM	F0	0	0
May 8, 2002	7:10 PM	F0	0	$10,000
Total:				**$3,288,000**

Source: (National Climatic Data Center, 2017)

The NCDC provided the following details on the two tornadoes that occurred in the past 17-year period:

- **July 2, 2000.** Law enforcement officials reported a tornado touched down briefly in rural Allamakee County, but only damaged some corn fields. Elsewhere across Northeast Iowa, several trees were knocked down by thunderstorm wind gusts of 60 to 65 mph and hail the size of dimes and quarters was also reported.
- **May 8, 2002.** Straight-line winds of 80 to 100 mph damaged several buildings in a lumberyard on the south side of Waukon, with sections of the roof thrown downwind to the southeast. Some sheds and supplies in the lumberyard were also shifted to the east or southeast. Along Highway 76, just southeast of Waukon, a small tornado hit a farm, damaging part of the house and at least one outbuildings. A nearby church was damaged by the same tornado. In fact, a family who had taken shelter inside the church reported a stain glass window was completely gone following the storm, with no evidence of the glass anywhere near the church.

Probability of Future Occurrence

Previous occurrences would indicate a low probability that an F1 or larger tornado would occur in any given year. Significant tornadoes show a common peak in probability in late spring while violent tornadoes have an overall less probability, they do not have a distinct time of probability for them to occur from early spring through mid-autumn.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year

Magnitude

Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; to complete destruction and disintegration of well-constructed structures, infrastructure and trees. Generally, the destructive path of a tornado is only a couple hundred feet in width, but stronger tornadoes can leave a path of devastation up to a mile wide. Injury or death related to tornadoes most often occur when buildings collapse, people are hit by flying objects, or are caught trying to escape the tornado in a vehicle.

Limited: Injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; 10-25% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 6 hours

Spatial Extent

Negligible: Less than 10% of the jurisdiction would be impacted

Windstorm

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent

Windstorm	2	1	2	1	2

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.65	Low

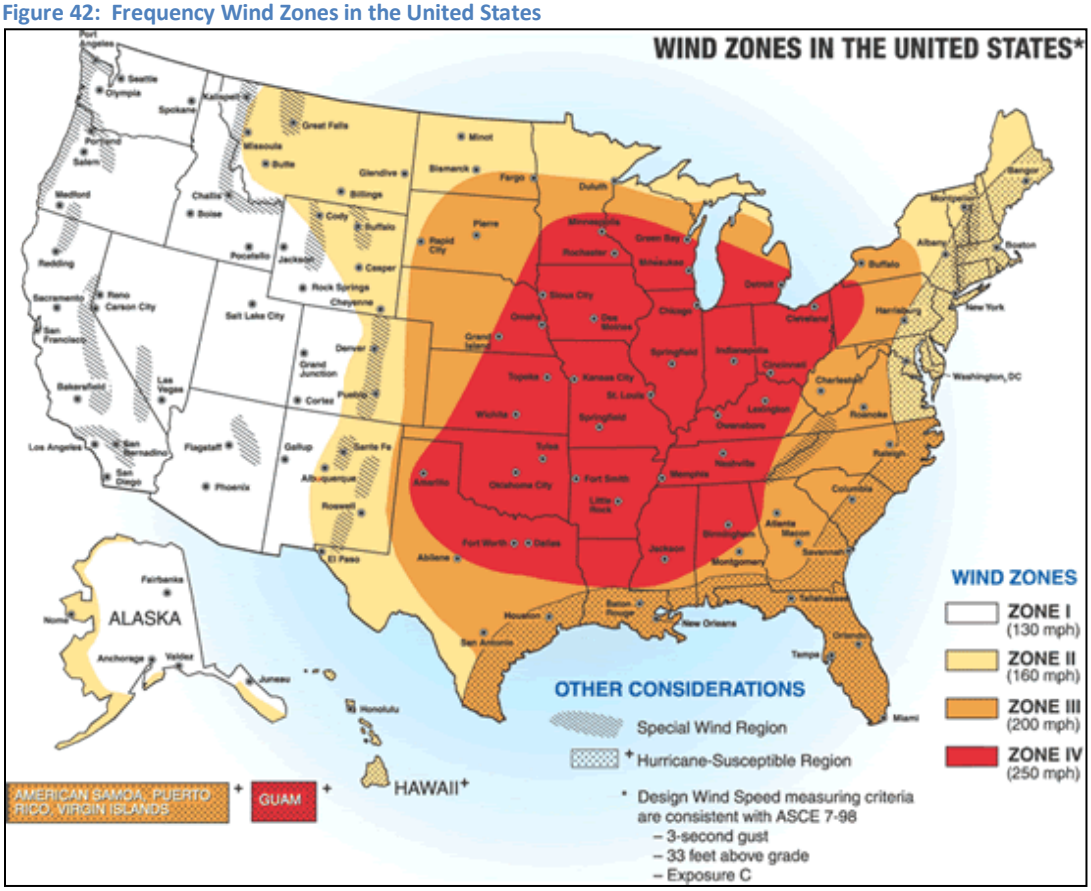
Description

Windstorms are extreme straight-line winds associated with severe winter storms, severe thunderstorms, downbursts, and very strong pressure gradients. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., not a tornado). These winds, which can exceed 100 mph, represent the most common type of severe weather and are the most common cause of thunderstorm damage. Since windstorms do not have a narrow track like a tornado, associated damage can be extensive and affect broad regions including multiple counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. One type of straight-line wind is the downburst, which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation. Windstorms in Iowa typically happen between late April and early September, but given the right conditions, can develop as early as March. They are usually produced by super cell thunderstorms or a line of thunderstorms that typically develop on hot and humid days.

Geographic Location

The county is susceptible to high wind events. Allamakee County is located in Wind Zone IV, which is susceptible to winds up to 250 mph. The State of Iowa is located in Wind Zone IV, the highest inland category. Figure 42 reflects the United States Wind Zones based on maximum wind speeds.

Figure 42: Frequency Wind Zones in the United States



Source: (Federal Emergency Management Agency, 2012)

Previous Occurrences

According to the NCDC database, there have been 43 high wind events in Allamakee County from 2000-2016. During this time period there were no reported deaths or injuries as a result of windstorm events, and 27 resulted in property damage.

Summaries of selected known windstorm events are listed below:

- **August 1, 2000.** Hail ranging in size from dimes to as large as ping-pong balls was reported by spotters, ham radio operators and law enforcement officials. In addition, wind gusts of 60 to 65 mph knocked down numerous trees and power lines.
- **May 8, 2002.** Straight-line winds of 80 to 100 mph damaged several buildings in a lumberyard on the south side of Waukon, with sections of the roof thrown downwind to the southeast. Some sheds and supplies in the lumberyard were also shifted to the east or southeast. Along Highway 76, just southeast of Waukon, a small tornado hit a farm, damaging part of the house and at least one outbuildings. A nearby church was damaged by the same tornado. In fact, a family who had taken shelter inside the church reported a stain glass window was completely gone following the storm, with no evidence of the glass anywhere near the church.
- **June 11, 2012.** A cold front triggered a line of severe thunderstorms across parts of Northeast Iowa during the early morning hours of June 11th. The severe thunderstorms knocked down

trees and power lines near Waukon. Trees were blow down on Old Stage Road three miles west-northwest of Waukon.

- **July 23, 2016.** Thunderstorms with locally heavy rain moved across portions of Northeast Iowa throughout the day on July 23rd. Trees and branches were blown down in Lansing. Boat docks were damaged when the wind pushed some boats several feet upstream and onto the shore.

Probability of Future Occurrences

Based on the frequency of previous occurrences, the HMPC determined the probability of future damaging windstorm occurrences to be "occasional."

Occasional: Event is probable within the next five years; event has up to 1 in 5 year chance of occurring (1/5=20%); history of events is greater than 10% but less than or equal to 20% likely per year

Magnitude

Injury or death related to windstorms is possible; and most often occur from building failure or people struck by airborne debris. Windstorms can effects electrical power with system components above ground.

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

12-24 hours

Duration

Less than 6 hours

Spatial Extent

Limited: 10 – 25% of the jurisdiction to be impacted

Earthquake

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Earthquake	1	1	4	1	4

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.60	Low

Description

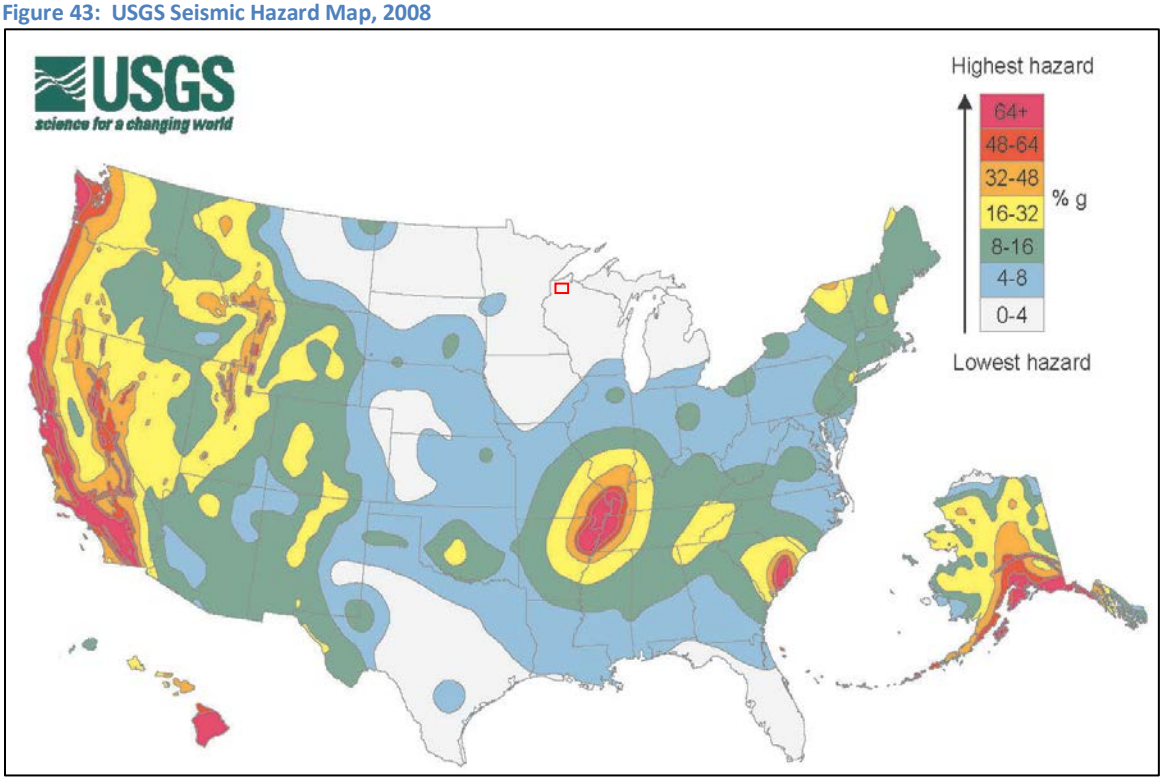
An earthquake is sudden motion of trembling of the ground caused by shifting tectonic plates. Earthquakes are potentially catastrophic, capable of causing multiple fatalities and major structural and infrastructure damage including disruption of utilities, communications, and transportation systems. Secondary affects can include landslides, seiches, liquefaction, fires, and dam failure. Earthquakes occur

very abruptly with little or no warning. However, seismic monitoring in certain cases can detect increases in the geologic and seismic activity that precedes an earthquake event. Duration typically ranges from a few seconds to a minute or two, but aftershocks can occur during the hours and weeks after the quake, usually with diminishing frequency and intensity.

Geographic Location

Overall, the County is in an area of relatively low seismic activity. The following U.S. Geological Survey (USGS) National Seismic Hazard Map, Figure 43, displays earthquake ground motions for various probability levels across the United States and is used to develop building codes, insurance rate structures, risk assessments, and other public policy. Allamakee County lies in an area with the lowest hazard. The closest fault zone is the New Madrid Seismic Zone which follows the Mississippi River valley from southeastern Missouri to northwestern Mississippi, noted in red on the map, roughly 530 miles south of the County.

Figure 43: USGS Seismic Hazard Map, 2008



Source: (U.S. Geological Survey, 2008)

Previous Occurrences

Iowa has experienced 13 earthquakes with epicenters located in the state over its history. Geologically, the epicenter of an earthquake is the point of the earth's surface directly above the focus of an earthquake. The first known earthquake occurred in Southwest Iowa in 1876, near Sidney. The latest earthquake to shake the state also happened in Southwest Iowa in 2004, near Shenandoah. The largest earthquake, of a Mercalli magnitude VI, occurred in Southeast Iowa in 1934, near Davenport. Only the most recent of these events was instrumentally recorded.

Probability of Future Occurrences

Previous occurrences would indicate a probability of a 0% chance of an earthquake occurring in any given year. Allamakee County's probability of a magnitude 4.75+ earthquake over a 100 year time period is estimated to be 0.5 to 1.0 percent (see Figure 3.9). Similar probabilities equate this to roughly a 10,000 year recurrence interval. Based on these estimates the probability of a significant earthquake in any given year is unlikely.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year.

Magnitude

Allamakee County is located in Seismic Zone 0, the lowest risk zone in the United States. Most structures are not built to earthquake standards, but because of the relatively low magnitude of the possible quake, property damage would likely be minor foundational damage. The amount of energy released during an earthquake is most commonly expressed on the moment magnitude scale and is measured directly from energy released from the fault or epicenter as recorded on seismographs. Another measure of earthquake magnitude is intensity. Intensity is an expression of the amount of shaking at any given location on the surface as felt by humans and defined by the Modified Mercalli Intensity Scale. It is typically the greatest cause of losses to structures during earthquakes and is determined by many factors including distance from epicenter and soil types. Table 26 features abbreviated descriptions of the 12 levels of earthquake intensity.

Table 26: Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by very few people under special condition. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of building. Suspended objects may swing.
III	Felt noticeably indoors, by a few outdoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable damage in buildings of poor construction
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: (United States Geological Survey, 2008)

Typically, significant earthquake damage occurs when accelerations are greater than 30 percent 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 magnitude 4 effects in Iowa resulting in little or no damage (Iowa Department of Natural Resources, n.d.).

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; Shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time
Less Than 6 Hours

Duration
Less Than 6 Hours

Spatial Extent
Catastrophic: More than 50% of the jurisdiction to be impacted

Extreme Heat

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Extreme Heat	1	1	1	4	4

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.45	Low

Description
Extreme temperature events, both hot and cold, can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors. Conditions for extreme heat are defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. This includes temperatures (including heat index) in excess of 100 degrees Fahrenheit (°F) or at least three (3) successive days of 90+ °F. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature, often referred to as the heat index.

Heat is one of the leading weather-related causes of death in the United States, resulting in more deaths each year than hurricanes, lightning, tornadoes, floods and earthquakes combined. From 1999 to 2010, a total of 7,415 people died of heat-related deaths, an average of about 618 fatalities each year. Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications (Centers for Disease Control and Prevention, 2012). However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas,

the exposure of farm workers, as well as livestock, to extreme temperatures is a major concern. Table 27 lists typical symptoms and health impacts of exposure to extreme heat.

Table 27: Typical Health Impacts of Extreme Heat

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

Source: (National Weather Service, 2005)

The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105°F for two or more consecutive days.

Geographic Location

The entire planning area is subject to extreme heat.

Previous Occurrences

During the period from 2000-2016, the NCDC database lists one incidents of extreme heat that include Allamakee County. Details were provided for the following events:

- **July 17, 2011.** Warm and humid air invaded Northeast Iowa on July 17th and remained in place for the next three days. During this stretch, afternoon heart indices routinely topped out between 110 and 120. Little relief occurred at night, as overnight lows remained in the 70s. The heat caused four people to visit the emergency room in Allamakee County.

Probability of Future Occurrences

Although periods of high heat generally occur on an annual basis, events that cause significant health impacts occur less frequently. Based on past occurrences, the probability of future extreme heat is minimal.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year

Magnitude

Due to the potential for fatalities and the possibility for the loss of electric power, periods of extreme heat can severely affect the planning area. In addition, accompanying drought may compound the problem exacerbating agricultural and economic losses.

Limited: Injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; 10-25% of property is severely damaged

Warning Time
Over 24 hours

Duration
More than 1 week

Spatial Extent
Catastrophic: More than 50% of the jurisdiction would be impacted

Grass and Wild Land Fire

Hazard Type	Probability	Magnitude	Warning Time	Duration	Spatial Extent
Grass or Wild Land Fire	1	1	4	1	1

Hazard Summary

Calculated Priority Risk Index (CPRI)	Planning Significance
1.45	Low

Description
Since protecting people and structures takes priority, a wildfire's cost to natural resources, crops, and pastured livestock can be ecologically and economically devastating. In addition to the health and safety impacts to those directly affected by fires, the state is also concerned about the health effects of smoke emissions to surrounding areas.

Grass and wild land fires in Iowa are frequently associated with lightning and drought conditions, as dry conditions make vegetation more flammable. As new development encroaches into the wild land-urban interface (areas where development occurs within or immediately adjacent to wild lands, near fire-prone trees, brush, and/or other vegetation), more and more structures and people are at risk. On occasion, farmers intentionally ignite vegetation to restore soil nutrients or alter the existing vegetation growth. These fires have the potential to erupt into wild land fires.

Geographic Location
The Participating Jurisdictions consist of and/or are surrounded by rural area which is vulnerable to grass and wild land fire given the supporting conditions.

Previous Occurrence
The State of Iowa's Hazard Mitigation Plan reports Iowa experienced 1,817 wildfires spanning 33,122 acres from 2002 until 2012. No previous occurrences specific to Allamakee County were identified. According to the National Interagency Fire Center, no historically significant wildfires have occurred in the State of Iowa.

Probability of Future Occurrence

Previous occurrences would indicate a probability of little chance of a grass and wild land fire occurring in any given year. The county's ability to respond and the control provided for prescribed fires led the HMPC to rate the probability of grass or wildfire hazards to be unlikely.

Unlikely: Event is probable within the next 10 years; event has up to 1 in 10 year chance of occurring (1/10=10%); history of events is less than or equal to 10% likely per year

Magnitude

High winds can turn a small flame into a multi-acre grassfire within a matter of minutes. The extent is dependent upon conditions such as land use/land cover, moisture, and wind. Property damage is usually limited to grass, small trees, agricultural fields, etc. Wildfires occur on an annual basis in every county in Iowa; however, most do not result in significant threat to life or property.

Negligible: Injuries and/or illnesses are treatable with first aid; minor quality of life lost; shutdown of critical facilities and services for 24 hours or less; less than 10% of property is severely damaged

Warning Time

Less than 6 hours

Duration

Less than 6 hours

Spatial Extent

Negligible: Less than 10% of the jurisdiction would be impacted

Chapter 4- Vulnerability Assessment

Methodology

Requirement §201.6(c)(2)(ii):
[The risk assessment shall include 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; and address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods.

The vulnerability assessment further defines the County's risk to high and moderate significance hazards as addressed in the Hazard Profiles. High planning significance indicates a CPRI score of 3.00 – 4.00. Moderate planning significance indicates a CPRI score of 2.00 – 2.99. CPRI scores were used to help determine priority levels for hazards that have a higher occurrence probability and have a higher potential for adverse impact.

The vulnerability assessment was conducted based on the best available data and the significance of the hazard. Data to support the vulnerability assessment was collected from the following sources:

- County Auditor
- County Assessor
- County GIS data (base layers and assessor's data)
- Written descriptions of assets and risks provided by the Participating Jurisdictions
- Existing plans and reports
- Personal interviews with HMPC members and other stakeholders

The Vulnerability Assessment is presented in three parts:

- Community Assets – Describes the assets at risk in the Participating Jurisdictions
- Vulnerability by Hazard – Describes the vulnerability to each hazard identified and profiled previously in this plan. The vulnerability analysis includes a vulnerability overview for each hazard of high and moderate significance, and where available, the vulnerability analysis includes evaluation of vulnerable buildings, infrastructure and critical facilities in hazard-prone areas.
- Summary of Key Issues – Summarizes the key issues and conclusions identified in the risk assessment process.

Community Assets

This section describes overall hazard vulnerability and buildings, infrastructure, and critical facilities located in identified hazard areas. A critical facility is defined as one that provides essential public safety or mitigation functions during response or recovery operations. Table 28 provides the building count and value of structures in the Participating Jurisdictions.

Table 28: Jurisdictional Total Structure Counts and Valuations, 2017

Structure Type	Structure Count	Building Valuations	Structure Type	Structure Count	Building Valuations
City of Harpers Ferry – Population 291			**City of Lansing – Population 953**		
Residential	373	$28,781,200	Residential	452	$38,388,100
Multi-Residential	17	$722,284	Multi-Residential	12	$1,836,230
Commercial	18	$1,048,916	Commercial	80	$5,518,370
Industrial	0	0	Industrial	4	$1,561,800
Agricultural	Unknown	$27,600	Agricultural	Unknown	$33,500
Religious/Nonprofit	3	$62,200	Religious/Nonprofit	9	$1,616,300
Government/Schools	14	$740,300	Government/Schools	14	$1,119,200
City of New Albin – Population 646			**City of Postville – Population 2,281**		
Residential	206	$13,774,300	Residential	634	$33,341,400
Multi-Residential	4	$442,644	Multi-Residential	7	$1,170,133
Commercial	39	$1,993,756	Commercial	110	$8,071,867
Industrial	3	$197,200	Industrial	7	$8,649,000
Agricultural	Unknown	0	Agricultural	Unknown	$4,000
Religious/Nonprofit	9	$1,398,100	Religious/Nonprofit	13	$2,886,000
Government	4	$284,200	Government	27	$4,202,700
City of Waterville – Population 137			**City of Waukon – Population 3,818**		
Residential	61	$1,847,700	Residential	1,430	$127,988,800
Multi-Residential	0	$7,100	Multi-Residential	22	$5,065,037
Commercial	9	$108,200	Commercial	222	$34,827,463
Industrial	0	0	Industrial	12	$5,039,500
Agricultural	Unknown	$7,300	Agricultural	Unknown	$182,400
Religious/Nonprofit	0	0	Religious/Nonprofit	42	$8,575,500
Government/Schools	3	$236,900	Government/Schools	30	$192,716,600
Unincorporated Areas – Population 5,934			**Totals – Population 14,060**		
Residential	3,353	$284,652,000	Residential	6,509	$528,773,500
Multi-Residential	6	$1,101,428	Multi-Residential	68	$10,344,856
Commercial	102	$16,005,492	Commercial	580	$67,574,064
Industrial	10	$7,126,980	Industrial	36	$22,574,480
Agricultural	Unknown	$45,167,180	Agricultural	Unknown	$45,421,980
Religious/Nonprofit	66	$5,393,600	Religious/Nonprofit	142	$19,431,700
Government/Schools	42	$4,285,800	Government/Schools	134	$21,907,000

Source: (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

The counts and values for religious/non-profit and government structures are identified, as available, for jurisdictions with a Special Flood Hazard Area. Some data discrepancies between assessor structure counts, the GIS counts and Census data are likely due to the way the county classifies properties. For example, there may be some parcels classified as agricultural which include dwellings, so were not counted as residential structures. Also, some apartments are classed as commercial rather than residential. The County's GIS data is not parsed to that level creating difficulties in determining individual structure classifications. These data limitations prevent closer analysis at this time. Table 29 provides the participating jurisdictions' railroad and utility infrastructure valuations.

Table 29: Railroad and Utility Valuations, FY 2016/2017

Jurisdiction:	Railroad Valuations	Utilities without Gas & Electric	Gas & Electric Utility Valuation
City of Harpers Ferry	$153,048	$44,781	$295,671
City of Lansing	$265,583	$194,031	$2,098,093
City of New Albin	$85,527	$39,008	$734,118
City of Postville	$226,571	$101,002	$2,795,968
City of Waterville	$0	$7,168	$127,816
City of Waukon	$0	$493,285	$4,473,958
Unincorporated Areas[1]	$5,295,150	$11,018,240	$212,283,936

Source: (Iowa Department of Management, 2017)

[1]Values for Unincorporated areas was determined by subtracting the total values of the cities combined from the total of the County.

As previously noted, a critical facility is defined, for the purposes of this plan, as a facility that provides essential public safety or mitigation functions during response or recovery operations. Table 30 offers examples of critical facilities separated by categories of essential, high loss potential and infrastructure.

Table 30: Critical Facility Examples by Type

Essential Facilities	High Potential Loss Facilities	Transportation and Lifelines
Police Stations	Dams and levees	Highways, bridges and tunnels
Fire Stations	Military installations	Railroads and facilities
Emergency Operations Centers	Hazardous material sites	Airports
Hospitals and other medical facilities	Elder Care Facilities/Long Term Care Facilities	Natural gas pipelines and distribution stations
	Schools	Water and wastewater treatment facilities
	Storm Shelters	Petroleum pipelines and distribution stations
	Child care centers	Communications facilities
	Main government buildings	Power plants, transmission lines and distribution stations

Critical facilities by participating geographic jurisdiction are inventoried in **Error! Reference source not found.**. Table 32 provides information on school district buildings throughout the county and highlights the location of each building and other information pertinent to assessing vulnerability.

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Table 31: Critical Facilities by Jurisdiction

Facility	Harpers Ferry	Lansing	New Albin	Postville	Waterville	Waukon	Uninc. Areas
Police Stations	0	1	1	1	0	1	1
Fire Stations	1	1	1	1	1	1	0
Emergency Operations Centers	0	1	0	0	0	0	1
Hospitals and other medical facilities	0		0	2	0	1	0
Dams and levees	0	0	0	0	0	0	Levees on Upper Iowa River
Military installations	0	0	0	0	0	0	0
Tier II Chemical Storage - Hazardous material sites	0	4	3	7	0	8	8
Elder Care Facilities/Long Term Care Facilities	0	2	1	2	0	4	0
Schools	0	2	1	4	1	6	0
Storm Shelters	1	0	0	1	0	3	0
Child care centers	0	0	2	3	0	3	0
Main government buildings	1	1	1	1	1	1	0
Railroad/loading facilities	1	1	1	1	0	0	
Airports/Heliports	0	0	0	0	0	2	0
Natural gas pipelines and distribution stations	0	0	0	0	0	0	1
Water Systems/wastewater treatment facilities	0	1	1	2	0	1	
Petroleum pipelines and distribution stations	0	0	0	1	0	0	0
Communications facilities[1]	1	5	1	6	1	13	
Power plants and distribution stations	1	1	0	0	0	0	

Source: (Iowa Department of Natural Resources, 2017); (U.S. Energy Information Administration, 2017); (Radio-Locator, 2017); (Iowa Department of Transportation, 2017); (Iowa Department of Transportation, 2017); (Federal Communications Commission, 2017)

[1] Includes radio stations, newspapers and cell phone towers

Table 32: School Enrollment by Building and Community, 2017-2018

School District: Building	Location	Enroll-ment	Staff on Site	In Flood Plain?	Mitigation Measures in Place

Allamakee County Community School District: East Elementary School	Waukon	187	30	N	Weather radio, emergency warning systems/sirens, fire suppression system (in kitchen), emergency binders and response kits in each classroom, regular evacuation and tornado drills, staff training on school safety
Allamakee Community School District: West Elementary School	Waukon	202	37	N	Weather radio, emergency warning systems/sirens, fire suppression system (in kitchen), emergency binders and response kits in each classroom, regular evacuation and tornado drills, staff training on school safety
Allamakee Community School District: Waterville Elementary School	Waterville	63	14	N	Weather radio, emergency warning systems, fire suppression system in kitchen, regular lock-down, evacuation and tornado drills, emergency information binders and response kits in each classroom, regular staff safety training
Allamakee Community School District: Middle School	Waukon	232	55	N	weather radio, emergency buckets in each room, fire suppression and warning systems, multiple safety trainings and full evacuation drills
Allamakee Community School District: High School	Waukon	370	56	N	Planning & Drills, Building Fire suppression system, regular lockdown, evacuation and tornado drills, emergency information binders and emergency response kits in each classroom, staff training on school safety
Eastern Allamakee Community School District: New Albin Elementary	New Albin	110	22	N	Emergency kits in classrooms, fire and tornado drills, weather radio, fire extinguishers
Eastern Allamakee Community School District: Middle/High School	Lansing	210	40	N	Emergency kits in classrooms, fire and tornado drills, weather radio, fire extinguishers
Postville Community School District: Cora B. Darling Elementary School	Postville	420	84	N	Emergency kits in staff room, fire/tornado drills, weather radios (but not able to get reception at the present time), fire extinguishers
Postville Community School District: Middle/High School	Postville	310	39	N	Emergency kits in staff room, fire/tornado drills, weather radios (but not able to get reception at the present time), fire extinguishers
St. Patrick School	Waukon	182	35	N	Staff safety trainings during faculty meetings, fire drills, working on lock-down protocol, emergency kits in each

					classroom, weather radios, identified storm shelter area
Bais Chaya Muschka	Postville	Unknown	Unknown	N	Unknown
Bais Sholom	Postville	Unknown	Unknown		Unknown
Postville Alternative High School	Postville	Unknown	Unknown	N	Unknown
TOTAL:		2,286	412		
Northeast Iowa Community College	Waukon	Unknown	Unknown	N	Unknown
TOTAL ALL STUDENTS:		**2,286**	**412**		

Source: (Iowa Department of Education, 2017); (Allamakee County Emergency Manager, 2017); (Community School Districts, 2017)

Vulnerability by Hazard

This vulnerability assessment is limited to the hazards that received high or moderate planning significance scores with HMPC and jurisdictional input. Planning significance scores are based on the results of the CPRI Index (Chapter 3). Detailed vulnerability assessments are not provided for hazards with low planning significance scores. Hazard vulnerabilities are presented in order based on planning significance, from highest to lowest.

In 2013, the updated State of Iowa Hazard Mitigation plan utilized a series of equations to develop a consistent loss estimation model. Whenever available data allowed, the resulting loss estimates were developed and broken into categories or types of damage. At the state level, the specific loss numbers as reported by the NCDC have been separated and/or averaged by each county when specific events were reported across county jurisdictions. These equations and subsequent county loss estimates are included as available for the hazards assessed in this section.

Hazardous Materials Vulnerability

Planning Significance: High. The fixed hazmat cites are filled by highway tankers, so hazardous materials are frequently on Allamakee County roadways. There are peak periods for certain agricultural chemicals and heating products, but hazardous materials are a risk year round. The Participating Jurisdictions are located along U.S., State, or County Highways and the transportation of hazmat will often stay on these main roads for travel efficiency as much as possible. The impacted area could be very small or very large, depending on the magnitude of the incident. Additionally, there are 20 miles of transmission pipelines for gas and 0 miles of transmission pipelines for hazardous liquids in Allamakee County (Allamakee County Emergency Manager, 2017) (Allamakee County Engineer, 2017). All structures and infrastructure within the impacted area are at risk for contamination. Roadways may also shut down while response and proper clean-up is being performed.

The Canadian Pacific Railroad, owner of Dakota, Minnesota & Eastern Railroad Corporation, operates two lines through Allamakee County. The railroad operates track running parallel to the Mississippi River through Harpers Ferry, Lansing and New Albin. It also operates track running through Postville on the south edge of the County. Hazardous commodities make up nearly a quarter of products hauled by

the trains. Derailments and collisions with vehicles can cause spills of these products. There are 20 vehicle crossings in the county; 7 have lights and arms, 3 only have light and 10 just have railroad crossing signage (Allamakee County Emergency Manager, 2017); (Allamakee County Engineer, 2017). Depending on where accidents might occur, an incident could impact communities anywhere from 328 people in Harper's Ferry to 2,227 people in Postville. In addition, there is one school building within a quarter mile of the rail line in New Albin (Allamakee County Emergency Manager, 2017). Table 33 indicates the number of children, pre-K through 12th grade potentially at risk in the community.

Table 33: Potential Student Exposure to Railway Incidents

Community:	School District(s):	Enrollment in Community:
New Albin	Eastern Allamakee Community School District: New Albin Elementary	110

Source: (Iowa Department of Education, 2017)

Flash Flood Vulnerability

Planning Significance: High. Flash flooding has the potential to impact much of the planning area for a variety of reasons. The impact of flash flooding can range from loss of life to closed roads or bridges. Beyond the immediate effects of flash flooding, the resulting damage can lead to limited access to homes and businesses, including critical services, as well as the unexpected costs incurred by the county and communities. When incidents do occur, structures, infrastructure and roadways located in low-lying areas are most at risk. Table 34 reflects the building exposure for flooding events based on an estimate of the Special Flood Hazard Areas of each jurisdiction.

Table 34: Flood Vulnerability by Jurisdiction, FY 2017

City of Harpers Ferry						
	Number of Structures			Value of Structures		
Structure Type:	In Community	In Hazard Area	% In Hazard Area	$ Value in Community	$ Value in Hazard Area	% In Hazard Area
Residential[1]	373	26	7%	$28,781,200	$2,765,100	10%
Multi-residential[2]	17	3	18%	$722,284	$40,100	6%
Commercial	18	7	39%	$1,048,916	$177,500	17%
Industrial	0	NA	NA	0	$0	0%
Agricultural[3]	Unknown	NA	NA	$27,600	$0	0%
Religious/Non-Profit	3	0	0%	$62,200	$0	0%
Government/Schools	14	4	28%	$740,300	$0	0%
TOTAL	425	40	9%	$31,382,500	$2,982,700	10%
City of Lansing						
	Number of Structures			Value of Structures		
Structure Type:	In Community	In Hazard Area	% In Hazard Area	$ Value in Community	$ Value in Hazard Area	% In Hazard Area
Residential[1]	452	25	6%	$38,388,100	$1,405,100	4%
Multi-residential[2]	12	1	8%	$1,836,230	$28,800	2%
Commercial	80	12	15%	$5,518,800	$529,900	10%
Industrial	4	2	50%	$1,561,800	$173,600	11%
Agricultural[3]	Unknown	NA	NA	$33,500	$0	0%
Religious/Non-Profit	9	0	0%	$1,616,300	$0	0%
Government/Schools	14	1	7%	$1,119,200	$900	1%

TOTAL	571	41	7%	$50,073,930	$2,138,300	4%
City of New Albin						
	Number of Structures			**Value of Structures**		
Structure Type:	**In Community**	**In Hazard Area**	**% In Hazard Area**	**$ Value in Community**	**$ Value in Hazard Area**	**% In Hazard Area**
Residential[1]	206	2	1%	$13,774,300	$72,700	.5%
Multi-Residential[2]	4	0	0	$442,644	$0	0%
Commercial	39	0	0	$1,993,756	$0	0%
Industrial	3	0	0	$197,200	$0	0%
Agricultural[2]	Unknown	NA	NA	NA	NA	NA
Religious/ Non-Profit	9	0	0%	$1,398,100	$0	0%
Government/Schools	4	0	0%	$284,200	$0	0%
TOTAL	265	2	.7%	$18,090,200	$72,700	.4%
City of Postville						
	Number of Structures			**Value of Structures**		
Structure Type:	**In Community**	**In Hazard Area**	**% In Hazard Area**	**$ Value in Community**	**$ Value in Hazard Area**	**% In Hazard Area**
Residential[1]	634	0	0%	$33,341,400	$0	0%
Multi-Residential[2]	7	0	0%	$1,170,133	$0	0%
Commercial	110	0	0%	$8,071,867	$0	0%
Industrial	7	0	0%	$8,649,000	$0	0%
Agricultural[3]	Unknown	NA	NA	$4,000	$0	0%
Religious/ Non-Profit	13	0	0%	$2,386,000	$0	0%
Government/Schools	27	1	4%	$4,202,700	$0	0%
TOTAL	798	1	.1%	$57,825,100	$0	0%

City of Waterville						
	Number of Structures			**Value of Structures**		
Structure Type:	**In Community**	**In Hazard Area**	**% In Hazard Area**	**$ Value in Community**	**$ Value in Hazard Area**	**% In Hazard Area**
Residential[1]	61	4	7%	$1,847,700	$120,200	7%
Multi-Residential[2]	0	NA	NA	NA	NA	NA
Commercial	9	1	11%	$108,200	$28,700	27%
Industrial	0	NA	NA	NA	NA	NA
Agricultural[3]	Unknown	NA	NA	$7,300	$0	0%
Religious/ Non-Profit	0	NA	NA	NA	NA	NA
Government/Schools	3	0	0%	$236,900	$0	0%
TOTAL	73	5	7%	$2,200,100	$148,900	7%
City of Waukon						
	Number of Structures			**Value of Structures**		
Structure Type:	**In Community**	**In Hazard Area**	**% In Hazard Area**	**$ Value in Community**	**$ Value in Hazard Area**	**% In Hazard Area**
Residential[1]	1,430	0	0%	$127,988,800	$0	0%
Multi-Residential[2]	22	0	0%	$5,065,037	$0	0%
Commercial	222	3	1%	$34,827,463	$94,800	0.3%
Industrial	12	2	17%	$5,039,500	$121,100	2.4%
Agricultural[3]	Unknown	NA	NA	$182,400	$0	0%

Religious/ Non-Profit	42	0	0%	$8,575,500	$0	0%
Government/Schools	30	3	10%	$11,037,900	$93,100	1%
TOTAL	1,758	8	.5%	$192,716,600	$309,000	0.2%
Unincorporated Areas						
	Number of Structures			**Value of Structures**		
Structure Type:	**In Community**	**In Hazard Area**	**% In Hazard Area**	**$ Value in Community**	**$ Value in Hazard Area**	**% In Hazard Area**
Residential[1]	3,353	236	7%	$284,652,000	$160,439,000	56%
Multi-Residential[2]	6	4	67%	$1,101,428	$294,600	27%
Commercial	102	25	25%	$16,005,492	$1,298,100	8%
Industrial	10	4	40%	$7,126,980	$1,492,200	21%
Agricultural[3]	Unknown	NA	NA	$45,167,180	Unknown	Unknown
Religious/ Non-Profit	66	4	6%	$5,393,600	$837,700	16%
Government/Schools	42	21	50%	$4,285,800	$173,400	4%
TOTAL	3,579	294	8%	$363,732,480	$164,535,000	45%

Source: (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)
Notes:
[1] The residential structure category incorporates residential structures on agricultural parcels
[2]The multi-residential structure category for unincorporated areas is comprised entirely of mobile home parks. While individual mobile homes were incorporated in the structure totals under the residential structure category.
[3]The agricultural structure category excludes residential structures on agricultural parcels

There are 175 bridges/culverts in the flood plain.

The loss estimation equation for flash flood, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Flash Flood Record for County
- Annual Countywide Flash Flood Damage History

Resulting in the following equation:

$$Annual\ Countywide\ Flash\ Flood\ Damage\ History\ (\$11.006M \\ /\ Number\ of\ Years\ of\ Recorded\ Loss\ (8\ years) \\ =\ Average\ Annual\ Countywide\ \ Flash\ Flood\ Loss\ Estimate$$

In Allamakee County, the annual countywide loss estimate due to flood events in total is $1,375,750 (National Oceanic and Atmospheric Administration, 2017). It is not known how that total is distributed by flash or river flooding.

Table 35 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 35: Allamakee County Estimated Flash Flood Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$1,375,750	0.219%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$66,773.72	
Lansing	548	$47,338,430.00	$103,460.39	
New Albin	252	$16,407,900.00	$35,860.25	
Postville	758	$51,232,400.00	$111,970.85	
Waterville	70	$1,955,900.00	$4,274.71	
Waukon	1,686	$173,103,200.00	$378,325.27	
Unincorporated Areas	3,471	$308,885,900.00	$675,084.82	

Source: (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017); (Allamakee County Assessor, 2017)

Levee Vulnerability

Planning Significance: High. The failure of a levee can be attributed to the loss of structural integrity of a wall, dike, berms, or elevated soil by erosion, piping, saturation, or under seepage causing water to inundate normally dry areas. The rate of failure of a levee or floodwall is difficult to predict, and sudden failure is a possibility. Proper design and construction can limit the probability of a levee failure.

Hail Vulnerability

Planning Significance: High. In general, assets in the planning area that are vulnerable to hail damage include crops and built structures. If hail size is large enough in diameter and crops are at a vulnerable stage in the plant/harvest cycle, it is possible for a great percentage of crop yields to be lost as result of even a single hail event. Structural damage to roofs, siding and windows occurs frequently with hail and is usually covered under private insurance. Specific structural damages in the planning area as a result of hail damage are not available. Personal injury, although rare, can also occur as a result of very large hail if individuals are outdoors during a hail event.

The loss estimation equation for hail, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Hail Record for County
- Annual Countywide Hail Damage History

Resulting in the following equation:

- $Total\ Hail\ Damage\ History\ (\$119.5K)\ /\ Number\ of\ Years\ of\ Recorded\ Loss\ (5\ years) = Average\ Annual\ Countywide\ Hail\ Loss\ Estimate$

Using this calculation, the estimated annual loss for Allamakee County due to hail events is $23,900 (Homeland Security and Emergency Management Division, 2010)

Table 36 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 36: Allamakee County Estimated Hail Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$23,900	0.004%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$1,160.02	
Lansing	548	$47,338,430.00	$1,797.35	
New Albin	252	$16,407,900.00	$622.98	
Postville	758	$51,232,400.00	$1,945.20	
Waterville	70	$1,955,900.00	$74.26	
Waukon	1,686	$173,103,200.00	$6,572.40	
Unincorporated Areas	3,471	$308,885,900.00	$11,727.80	

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Flood Vulnerability

Planning Significance: Moderate. Major river flooding has the potential to impact the entire planning area at some level, ranging from potential loss of life and long term health concerns to closed roads or bridges. People affected by flooding can face immediate safety concerns, post-flood isolation, limited access to food and critical facilities, as well as long-term health consequences. Closed roads and bridges can limit access to homes and businesses and create unexpected costs that directly impact communities. Structures, infrastructure and agricultural land located in low-lying areas along water sources are particularly at risk for damages. The loss estimation equation for flood, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Flood Record for County
- Annual Countywide Flood Damage History

$$\begin{aligned} &Annual\ Countywide\ Flood\ Damage\ History\ (\$6.59M) \\ &\quad / \ Number\ of\ Years\ of\ Recorded\ Loss\ (5\ Years) \\ &\quad = \ Average\ Annual\ Countywide\ Flood\ Loss\ Estimate \end{aligned}$$

In Allamakee County, the annual countywide loss estimate due to flood events in total is $1,318,000 (National Oceanic and Atmospheric Administration, 2017). It is not known how that total is distributed by flash or river flooding.

Table 37 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 37: Allamakee County Estimated Flood Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$1,300,000	0.207%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$63,097.10	
Lansing	548	$47,338,430.00	$97,763.77	
New Albin	252	$16,407,900.00	$33,885.75	
Postville	758	$51,232,400.00	$105,805.63	
Waterville	70	$1,955,900.00	$4,039.34	
Waukon	1,686	$173,103,200.00	$357,494.35	
Unincorporated Areas	3,471	$308,885,900.00	$637,914.05	

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

In Allamakee County, the annual countywide loss estimate due to flood events in total is $1,300,000 (National Oceanic and Atmospheric Administration, 2017). It is not known how that total is distributed by flash or river flooding. Table 38 reflects the National Flood Insurance Program (NFIP) status and Repetitive Loss (RL) Flood Property counts for eligible communities within the Planning Area. The County is currently participating in the NFIP.

Table 38: NFIP and RL Information, through 2017

Participating Jurisdiction	Community Identification (CID) Number	NFIP Status	Repetitive Loss (RL) Properties
Allamakee County	190005	Participating	0
City of Harpers Ferry	190316	Participating	0
City of Lansing	190006	Participating	0
City of New Albin	190942	Participating	0
City of Postville	190641	Participating	0
City of Waterville	190317	Participating	0
City of Waukon	190008	Participating	0

Source: (Federal Emergency Management Agency, 2016);

Table 39 reflects the National Flood Insurance Program (NFIP) policy statistics within those eligible communities participating in the NFIP.

Table 39: Allamakee County NFIP Policy Statistics, March 2017

Participating Jurisdiction	Policies in Force	Insurance In-Force Whole ($)	Written Premium In-Force ($) (Annual)
Allamakee County	31	$5,398,700	$25,301
City of Harpers Ferry	4	$660,000	$5,383
City of Lansing	10	$1,707,600	$5,889
City of Waterville	1	$55,000	$554
City of Waukon	3	$1,150,000	$4,361

Source: (Federal Emergency Management Agency, 2013)

Severe Winter Storm Vulnerability

Planning Significance: Moderate. During periods of icing and/or heavy snow fall, transportation can be treacherous. The most significant damage during winter storm events occur when freezing rain and drizzle accumulate on utility poles and power lines causing widespread power outages. Since the power outages associated with winter storms occur during cold weather, the population is at risk to cold temperature exposures. As with extreme heat events, the elderly and poverty populations are considered to be more vulnerable. The loss estimation equation for severe winter storm, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Winter Storm Record for County
- Annual Countywide Winter Storm Damage History

Resulting in the following equation:

$$Total\ Winter\ Storm\ Damage\ History\ (\$20K)\ /\ Number\ of\ Years\ of\ Recorded\ Loss\ (2\ Years) = Average\ Annual\ Countywide\ Winter\ Storm\ Loss\ Estimate$$

The estimated annual loss for Allamakee County due to severe winter storms is $10,000 (National Oceanic and Atmospheric Administration, 2017).

Table 40 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 40: Allamakee County Estimated Severe Winter Storm Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$10,000	0.002%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$485.36	
Lansing	548	$47,338,430.00	$752.03	
New Albin	252	$16,407,900.00	$260.66	

Postville	758	$51,232,400.00	$813.89
Waterville	70	$1,955,900.00	$31.07
Waukon	1,686	$173,103,200.00	$2,749.96
Unincorporated Areas	3,471	$308,885,900.00	$4,907.03

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Table 41 reflects the percentage of persons over age 65 and the percentage of persons below the federal poverty level in the Participating Jurisdictions compared to the state and national averages.

Table 41: Selected Demographic and Economic Characteristics

Jurisdiction	2010 Population	65 Years and Over (%)	Persons Below Poverty (%)
Harpers Ferry	328	34%	7.6%
Lansing	999	27%	11.3%
New Albin	522	22%	3.4%
Postville	2,227	15%	24.4%
Waterville	144	13%	26.7%
Waukon	3,897	24%	11.8%
Allamakee County	14,330	20%	10.9%
Iowa	3,046,355	14.9%	11.9%
United States	308,745,538	13.0%	14.9%

Source: (U.S. Census Bureau, 2010 Census, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Thunderstorms and Lightning Vulnerability

Planning Significance: Moderate. National Weather Service data indicates that the planning area is located in an area that averages 9 - 12 lightning strikes per square mile per year. Most of these lightning strikes do not result in damages, but electronic equipment located inside buildings is vulnerable. Communications equipment and warning transmitters and receivers could be knocked out by lightning strikes. Secondary hazards resulting from a thunderstorm, such as hail, high straight-line winds, and microbursts also bring risk for property damage and injury.

The loss estimation equation for lightning events and thunderstorms, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Lightning Event Record for County
- Annual Countywide Lightning Event Damage History

Resulting in the following equation:

$$Annual\ Lightning\ Damage\ History\ (\$3K)\ /\ Number\ of\ Years\ of\ Recorded\ Loss\ (1\ Year) = Annual\ Countywide\ Lightning\ Loss\ Estimate$$

Using this equation, the estimated annual loss for Allamakee County due to lightning events is $3,000 due to lightning events (National Oceanic and Atmospheric Administration, 2017).

Table 42 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 42: Allamakee County Estimated Lightning Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$3,000	0.00048%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$145.61	
Lansing	548	$47,338,430.00	$225.61	
New Albin	252	$16,407,900.00	$78.20	
Postville	758	$51,232,400.00	$244.17	
Waterville	70	$1,955,900.00	$9.32	
Waukon	1,686	$173,103,200.00	$824.99	
Unincorporated Areas	3,471	$308,885,900.00	$1,472.11	

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

The calculation for estimating loss due to thunderstorms considers the following factors:

- 17 Year Thunderstorm Record for County
- Countywide Annual Thunderstorm Damage History

And results in the following equation:

$$Annual\ Thunderstorm\ Damage\ History\ (\$176.1K) \\ /\ Number\ of\ Years\ of\ Recorded\ Loss\ (15\ Years) \\ =\ Annual\ Countywide\ Thunderstorm\ Loss\ Estimate\ (TSLE)$$

Using this equation, the estimated annual loss for Allamakee County due to thunderstorm events is $11,700 (National Oceanic and Atmospheric Administration, 2017).

Table 43 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then, this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 43: Allamakee County Estimated Thunderstorm Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$11,700	0.002%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$567.87	
Lansing	548	$47,338,430.00	$879.87	
New Albin	252	$16,407,900.00	$304.97	
Postville	758	$51,232,400.00	$952.25	
Waterville	70	$1,955,900.00	$36.35	
Waukon	1,686	$173,103,200.00	$3,217.45	
Unincorporated Areas	3,471	$308,885,900.00	$5,741.23	

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Transportation Incident Vulnerability

Planning Significance: Moderate. Transportation incidents can occur anywhere on the 975 miles of roads or 45 miles of railway. In addition, air incidents involving planes or helicopters are possible with an airport in the community of Waukon. Approximately 31% of all vehicle crashes over the past five years were caused by animal encounters (Allamakee County Emergency Manager, 2017) (Allamakee County Engineer, 2017). Concern was also raised over the increasing volume and size of agricultural vehicles and oversized loads hauling wind turbines, towers, blades and large industrial or agricultural equipment. Transportation by bicycle and ATV often conflicts with the general traveling public when they are expected to share the same roadway.

Animal/Plant/Crop Disease Vulnerability

Planning Significance: Moderate. Any outbreak of disease that can be transmitted from animal to animal or plant to plant is an animal/crop/plant disease. An animal or plant disease outbreak could have serious economic implications or public health impact. Plant disease, insects and mycotoxins are three of the top 20 causes of crop loss. Avian influenza, BSE and Bovine TB are threats to the county's livestock. The HMPC included invasive species, pests and noxious weeds within this hazard element.

There have been isolated occurrences of animal, plant or crop disease within the county. The emerald ash borer can now be linked to 53 counties in Iowa, which includes Allamakee County. Allamakee County was in fact the first county in Iowa were Emerald Ash Borer was discovered, which occurred in 2010 (Boshart, 2017). During the 2014-2015 avian influenza outbreak, no cases were confirmed in Allamakee County (Iowa Department of Agriculture and Land Stewardship, 2015). However, due to the highly pathogenic nature of the disease, biosecurity measures were put in place across the county and neighboring regions to prevent a catastrophic spread of the disease ((Fayette County Union, 2016).

Drought Vulnerability

Planning Significance: Moderate. Drought can impact the planning area in localized sections or be widespread. The duration of a drought can last from weeks to years. A prolonged drought can have serious economic impact on a community. Drought triggers an increased demand for water and electricity which can result in shortages. In extreme cases, food shortages can occur if agricultural production suffers a loss of crops or livestock. Droughts are generally associated with extreme heat, but can occur during cooler months. The economic impact of a drought would depend on the severity and length of the occurrence. Droughts that carry over from year to year can impact the health of the subsoil. A severe drought would have the greatest impact, but any reduction in agricultural income would affect revenues in the agricultural, retail and service sectors. Droughts rarely result in the loss of life, although high heats that contribute to droughts may also contribute to heat related illnesses and even death. Property damage is not a direct impact of droughts, but drought conditions may increase the likelihood of fires. The loss estimation equation for drought, based off the equation used in the Iowa Hazard Mitigation Plan, considers the following factors:

- 17 Year Drought Record for County
- Annual Countywide Drought Damage History

Resulting in the following equation:

$$\begin{aligned} &Annual\ Countywide\ Drought\ Damage\ History\ (\$0) \\ &\quad /Number\ of\ Years\ of\ Recorded\ Loss\ (0\ years) \\ &\quad = Annual\ Countywide\ Drought\ Loss\ Estimate \end{aligned}$$

In Allamakee County, the annual countywide loss estimate from drought is $0 (National Oceanic and Atmospheric Administration, 2017).

Table 44 below shows the estimated damage by jurisdiction. To determine this figure, the average annual loss estimate based on property damage (shown above) was divided by the total number of structures within the county to get an average countywide damage percentage by hazard type. Then,

this calculation was multiplied by the valuation of structures in each city to determine a loss estimate for structures by hazard for each jurisdiction.

Table 44: Allamakee County Estimated Drought Damage by Jurisdiction

Jurisdiction	Number of Structures	Total Assessed Value	Estimated Annual Damage	Estimated Damage %
Allamakee County	7,193	$629,476,130.00	$0	0.000%
Jurisdiction	**Number of Structures**	**Total Assessed Value**	**Estimated Annual Damage**	
Harpers Ferry	408	$30,552,400.00	$ -	
Lansing	548	$47,338,430.00	$ -	
New Albin	252	$16,407,900.00	$ -	
Postville	758	$51,232,400.00	$ -	
Waterville	70	$1,955,900.00	$ -	
Waukon	1,686	$173,103,200.00	$ -	
Unincorporated Areas	3,471	$308,885,900.00	$ -	

Source: (National Oceanic and Atmospheric Administration, 2017); (Allamakee County GIS Coordinator, 2017); (U.S. Census Bureau, American Community Survey 2011-2015, 2017)

Landslide Vulnerability

Planning Significance: Moderate. Landslides occur when susceptible rock, earth, or debris moves down a slope under the force of gravity and water. Landslides may be very small or very large, and can move at slow to very high speeds. A natural phenomenon, small scale landslides have been occurring in slide-prone areas of Iowa long before human occupation. New landslides can occur because of rainstorms, fires, earthquakes, and various human activities that modify slope and drainage.

There have been numerous small-scale landslide events in Iowa, none resulting in injury or death. The geographic extent of the historic events has been limited to less than a city block in size and has "run out" over the stretch of less than 100 yards. A portion of the state is moderately susceptible to landslides; in northeastern Iowa, along the Silurian Escarpment you can find blocks of dolomite slumped onto the underlying Maquoketa Shale which creates situations vulnerable to landsides.

Infrastructure Failure Vulnerability

Planning Significance: Moderate. Communications, energy and structural failures, as well as fires can occur in any area of the county for a variety of reasons. Communication failure is the widespread breakdown or disruption of normal communication capabilities. Equipment failure, traffic accidents, power outages, line severance, and weather can affect communication systems and disrupt service. The impacts of communication disruptions could include the loss of local government radio facilities, long-term interruption of electronic broadcast services, the inability to contact emergency services, and inoperable emergency warning systems. Business and industry rely on continuous communications to conduct business.

Energy failures such as an extended interruption of electric, petroleum or natural gas service, could create a potential safety and health problems for county residents. Energy interruptions can be caused by weather, equipment failure and fuel shortages. International events have the potential to disrupt

supplies of raw materials while local conditions could impair the distribution of electricity, petroleum or natural gas. The effects of such an energy shortage would be felt throughout the state. 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. Structural failure can occur in any area of the county and includes the failure of roads, bridges, buildings and towers. Table 45 summarizes the amount of each type of structure in the county.

Table 45: Structure Inventory

Structure Type:	Amount:
Roads	975 miles
Bridges/Box Culverts	175
Buildings	7,469 (does not include agricultural buildings)
Towers	25

Source: (Allamakee County Engineer, 2017) (Allamakee County Emergency Manager, 2017) (Federal Communications Commission, 2017)

Nearly 40% of the dwellings in the county were built prior to 1940. Older homes are at increased risk of structural failure. Bridges are a concern as all are located within the floodplain and 19 are ranked as deficient (Allamakee County Engineer, 2017) (Allamakee County Emergency Manager, 2017).

Structural fires can and do occur in the county. Rural areas are especially susceptible to total losses given the distance a fire department might need to travel to respond. ISO (Insurance Services Office) maintains information regarding property/casualty risk that includes ratings for municipal fire protection efforts in communities throughout the United States. In these communities, ISO analyzes relevant data such as the community's alarm system, engine companies and water supply, and assigns a Public Protection Classification (PPC™) — a number from 1 to 10. Class 1 generally represents superior property fire protection, and Class 10 indicates that the area's fire suppression program does not meet ISO's minimum criteria. Fire Insurance Ratings are listed in Table 46. The protection class is for homes in the community, properties out of town or in communities without fire departments will have varying ratings depending on how far away they are from the servicing fire department.

Table 46: ISO Public Protection Classification

Jurisdiction	Fire Suppression Rating/Public Protection Classification
Harpers Ferry	9
Lansing	
New Albin	6
Postville	
Waterville	
Waukon	4
Allamakee County	

Source: (Allamakee County Emergency Manager, 2017)

Summary of Key Issues

Table 47 reflects the results of the Hazard Ranking for the County in order of High to Low Planning Significance based on the methodology described in the Hazard Summary in Chapter 3.

Table 47: Allamakee County Hazard Profile Summary

Hazard	Probability	Magnitude	Warning Time	Duration	Spatial Extent	CPRI	Planning Significance
Hazardous Materials	4	3	4	3	2	3.55	High
Flash Floods	4	3	4	3	2	3.50	High
Levee Failure	4	2	4	4	1	3.35	High
Hailstorm	4	2	4	1	2	3.10	High
River Floods	4	1	2	4	2	2.85	Moderate
Severe Winter Storms	4	1	2	3	4	2.85	Moderate
Thunderstorms and Lightning	4	1	3	2	3	2.85	Moderate
Transportation Incident	3	2	4	3	1	2.80	Moderate
Animal/Plant/Crop Disease	1	4	4	4	1	2.50	Moderate
Droughts	2	3	1	4	4	2.40	Moderate
Landslides	2	1	4	3	1	2.10	Moderate
Infrastructure Failure	1	2	4	4	2	2.05	Moderate
Sinkholes	2	1	4	1	1	1.90	Low
Dam Failure	1	1	4	4	1	1.75	Low
Tornadoes	1	2	4	1	1	1.70	Low
Windstorms	2	1	2	1	2	1.65	Low
Earthquakes	1	1	4	1	4	1.60	Low
Extreme Heat	1	1	1	4	4	1.45	Low
Grass or Wildfire	1	1	4	1	1	1.45	Low

The following section summarizes key issues brought out by the risk assessment from the hazards of moderate and high planning significance, arranged alphabetically by hazard.

Hazardous Materials

- Entire planning area and beyond could be affected depending on the amount of hazmat released and its potency
- Hazardous materials, in both liquid and gas form, are transported on the county's roadways, railways and through pipelines year round

Flash Floods

- Individuals can get caught unexpectedly in flash flooding
- There is no adequate warning for flash flooding
- Driveways, roads, bridges, etc. can get washed out, leaving no access in case of an emergency
- Low-lying areas and the foundations of structures are vulnerable with heavy rains
- When flood waters saturate the ground, ground water can become contaminated
- Private wells can become contaminated
- Flash floods have had and can have severe impacts to areas with structures and infrastructure damaged routinely, especially in the unincorporated areas in the low-lying areas adjacent to the water source

Levee Failure

Hailstorm

- 70 hail events in the past 17 years in Allamakee County, including the Participating Jurisdictions
- Crops, structures, and vehicles are damaged by large hail events
- Hail events have become more prevalent in recent years
- The associated thunderstorms can generate damaging winds

River Floods

- Initial public safety and long term health concerns
- When flood waters saturate the ground, ground water can become contaminated
- Private wells can become contaminated
- River floods have had and can have severe impacts to areas with structures and infrastructure damaged routinely, especially in the low-lying areas adjacent to the water source

Severe Winter Storms

- Closure of schools and business impact economic productivity
- Access to people and livestock limited
- Unsafe driving conditions

Thunderstorms and Lightning

- Associated winds and hail can cause damage to power infrastructure, structures, and vehicles
- Wind events can frequently cause damage to power lines
- Unsecured mobile homes, campers, barns, and sheds and their occupants are specifically vulnerable to high-winds
- Human safety and wellbeing
- Trees and tree limb debris damage power lines, power infrastructure, structures, and automobiles
- Storefront windows are vulnerable to damage from high-winds
- Roofs are frequently damaged from high-winds
- Direct lightning strikes can cause major damage to the power infrastructure or structures, start a fire or cause death
- 11 presidential disasters have been declared in Allamakee County as part of severe storms since 2000
- Agricultural production and financial return can be severely impacted

Transportation Incident

- Highway Transportation Incidents can range in severity to minor injuries and damage to the vehicles to loss of life
- Over 31% of crashes in the past five were caused by animal collisions or avoidance
- Increased size and volume of agricultural and oversized-load vehicles
- Roadways could be blocked off while the involved vehicles and/or response personnel are on scene

Animal/Plant/Crop Disease

- Emerald Ash Borer
- Avian Influenza
- Livestock disease

Droughts

- Economic impact of crop loss
- Economic impact of higher livestock feed costs
- Fires at certain times of year

Landslides

- Northeast Iowa vulnerable due to areas with layering of dolomite over shale, which is prone to landslides

Infrastructure Failure

- Bridge collapse
- Communications failure through interrupted cellular service