Poweshiek County, Iowa Hazard Mitigation Plan 2011 - 2016

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Plan Prepared By:
Region 6 Planning Commission
903 E Main Street
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This is a multi-jurisdictional multi-hazard plan written in accordance with the Code of Federal Regulation, Title 44, Part 201 pending FEMA approval.

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Special Thanks

A special thanks goes out to all those involved in the creation of the Poweshiek County Multi-Jurisdictional Hazard Mitigation Plan. These participants include:

Poweshiek County Planning Team; Poweshiek County Emergency Management Coordinator, Karen Meek; and Staff of the Region 6 Planning Commission.

Without the hard work and dedication of these people's time and effort, this plan would not be a reality. It now serves as evidence of the will of the people of Poweshiek County to protect the lives and physical assets in their area.

Executive Summary

This multi-jurisdictional hazard mitigation grant is being submitted to FEMA by the Region 6 Planning Commission in Marshalltown, Iowa on behalf of one of its four jurisdictional counties, Poweshiek County.

This plan defines hazards - "any source of danger that threatens humans, property, and the environment" (FEMA 385-2/August 2001, Page iii) - and hazard mitigation planning - a proactive approach to prepare individual Poweshiek County jurisdictions for hazards that could affect them. The entire mitigation process is outlined including the steps of, organizing community resources, risk assessment and mitigation strategy, writing the plan, community comment period, submitting the plan, plan approval and adoption, and finally plan implementation by jurisdictions and counties.

One of the most important steps is the risk assessment and mitigation strategy in which countywide meetings attended by each participating jurisdiction were held. Asset mapping, identifying critical facilities and vulnerable populations, as well as establishing goals and prioritizing mitigation actions are all exercises the participants completed to help Region 6 have a better idea as to the need of each jurisdiction.

Background work and research was completed to produce a profile of the entire planning area, Poweshiek County. Information including location, demographics, housing, transportation, and economic conditions gives a statistically detailed depiction of the planning area. Similar data is presented for the individual jurisdictions of Poweshiek County, along with even more detailed information of the area including, local government, services provided, resources employed, and previous mitigation efforts taken at the city level. Three school districts are also included in the planning area; profiles include enrollment and school building locations.

In the Risk Assessment chapter, every hazard that could possibly affect Poweshiek County is identified and profiled with the information of its description, historical occurrence, probability, vulnerability of the county, the maximum extent of its possible destruction, severity and speed of onset included. Based on the frequency and/or impact of each of these descriptors, the hazards are ranked with the highest, hailstorm, being the biggest threat to Poweshiek County.

The individual jurisdiction's assets and vulnerable populations (identified at the countywide meetings) are displayed in the plan in order to gauge what/who needs priority when a hazard strikes. City facilities, grocery stores, and elderly and disabled populations are the most frequently identified as critical facilities and vulnerable populations.

With these elements, along with the severity of the different hazards gauged, the vulnerability across all individual jurisdictions is calculated; the highest rated hazard being, the hailstorm.

Though all jurisdictions of Poweshiek County are affected by several hazards, none are of particular priority in the plan. None of the jurisdictions have repetitive loss properties, identified by Iowa Homeland Security.

The mitigation strategy, produced by each jurisdiction takes into account their risk assessment and vulnerability to hazards to create goals with subsequent projects to help reach those goals. Some of the most popular goals include protecting the health and safety of residents, minimizing losses to structures, educating citizens of the dangers of hazards and continuity of operations of the jurisdictions and county. Projects identified to help achieve those goals include the installation of safe rooms, purchase of generators, elevation of roads, and the creation of emergency contact sheets and procedures. Projects are evaluated and ranked to set their priority to each community using the STAPLEE evaluation method.

It is of the utmost importance that the maintenance and update of this plan continues in order to carry on proactive efforts in all jurisdictions of the planning area when it comes to hazards. Incorporating the plan and its ideals into everyday legislation, decisions and planning will ensure that hazards are considered in the future development and operations of cities. The opportunities of annual meetings to monitor and evaluate the plan, as well as publicizing success stories of projects will keep the public involved and informed of what hazard mitigation can and is doing for their city.

Recommendations made by the plan authors give final input and advice on the smooth running and implementation of the goals set forth by each jurisdiction.

Prerequisites

44 CFR Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.*

Note to reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region VII, the adoption resolutions will be signed by the participating jurisdictions and added to Appendix A.

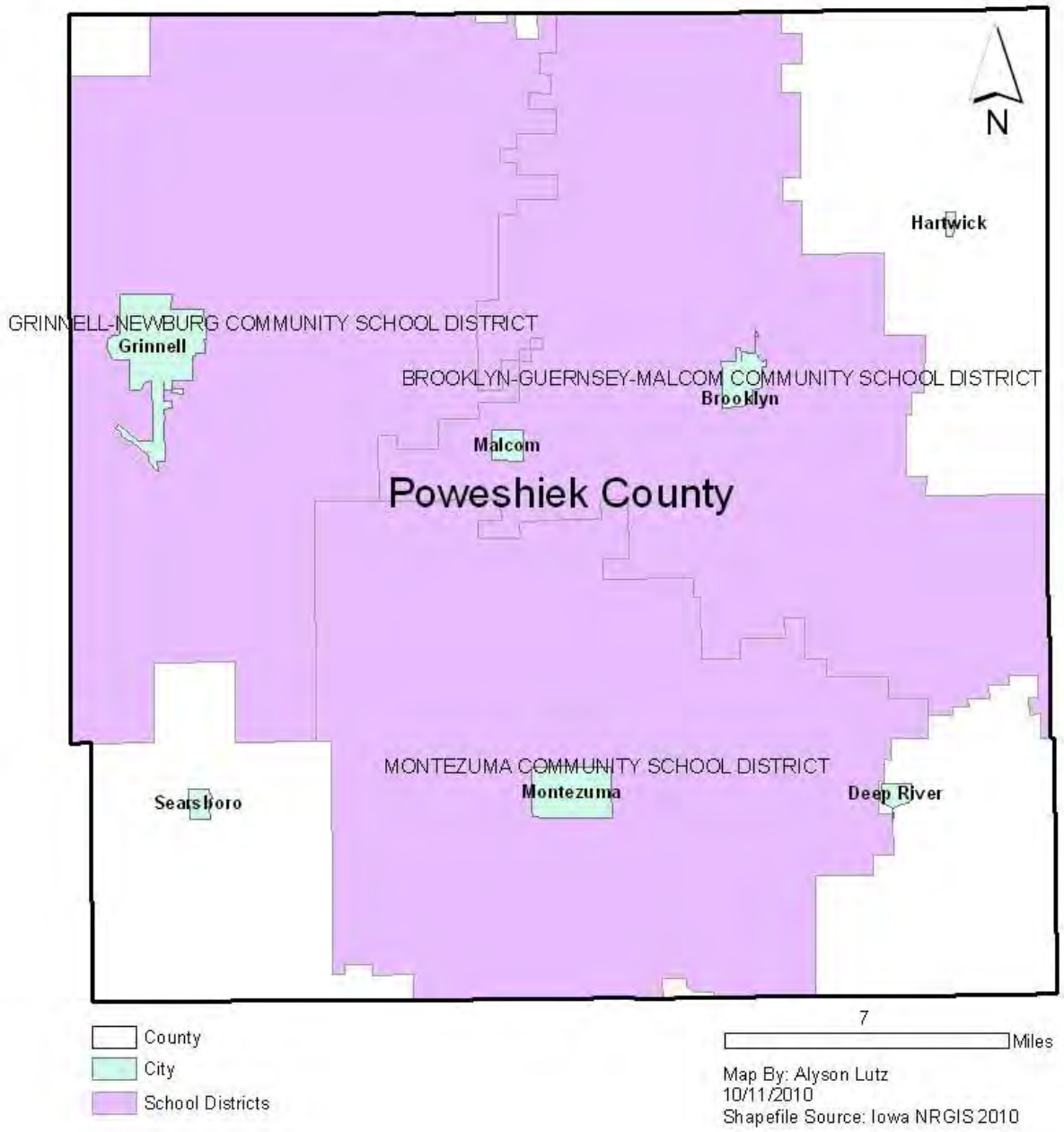
The following 11 jurisdictions participated in the creation of this plan and have adopted the multi-jurisdictional plan. Refer to Figure 1 for a map of the jurisdictions included in this plan.

- City of Brooklyn
- City of Deep River
- City of Grinnell
- City of Hartwick
- City of Malcom
- City of Montezuma
- City of Searsboro
- Poweshiek County (Unincorporated)
- Brooklyn-Guernsey-Malcom Community School District
- Grinnell-Newburg Community School District
- Montezuma Community School District

Also, the City of Guernsey was invited to participate in this plan process but did not respond to the invitation.

The planning boundary for this multi-jurisdictional hazard mitigation plan includes all of the incorporated and unincorporated areas of Poweshiek County, Iowa, except the City of Guernsey. Also, all of the school districts and associated buildings that are located in Poweshiek County are included in the planning boundary. Refer to Figure 1 on the next page.

Figure 1: Poweshiek County Participating Jurisdictions



44 CFR §201.6(a) (4): *Multi-jurisdictional plan may be accepted, as appropriate, as long as each jurisdiction has participated in the process.*

In order to be included in the plan and eligible for Hazard Mitigation Grant Program funding, each jurisdiction had to fulfill certain planning participation requirements. In order to be considered a full participant eligible for inclusion and funding, each jurisdiction must do the following:

1. Complete a community assessment (optional)
2. Host a hazard mitigation kick-off meeting (optional)
3. Appoint jurisdiction representative(s) (see Table 1)
4. Representative(s) of the jurisdiction attend two countywide hazard mitigation meetings (see Table 1)
5. Collaborate with the Region 6 Planning Commission to complete all required plan-related tasks and research (information is incorporated throughout plan)
6. Host a public comment period for plan revisions
7. Adopt the Poweshiek County Multi-Jurisdictional Hazard Mitigation Plan (pending approval)

Refer to Table 1 for meeting attendance and representatives for each jurisdiction. Some jurisdictions had multiple representatives in order to ensure that someone was always available for plan development meetings and information gathering.

All jurisdictions included in this plan participated in the entirety of the planning process. Each jurisdiction was represented by an official, staff member, or resident. Refer to Table 1 below.

Table 1: Poweshiek County Strategic Planning Team Members and Meeting Attendance

Jurisdiction	Representative	Kick-Off Meeting	County Meeting #1	Make-up Meeting 1	County Meeting #2	Make-up Meeting 2
City of Brooklyn	Lavern Bartachek	X	X	N/A	---	N/A
	Tammy Kriegel	---	X	N/A	X	N/A
	Dennis Solem	X	---	N/A	X	N/A
City of Deep River	Trampus Cook	X	---	X	---	---
	Brandon Wanders	---	---	---	---	X
City of Grinnell	Jody Matherly	X	X	N/A	---	N/A
	Theresa Petersen	X	X	N/A	---	N/A
	Kristy Reedy	---	X	N/A	X	N/A
	Scott Van Meter	---	X	N/A	X	N/A
	Dave Thompson	X	---	N/A	X	N/A
	Kary Kinmonth	---	---	N/A	X	N/A
	Chad Nath	---	---	N/A	X	N/A
City of Hartwick	Lynn Sleeuwenhoek	N/A	X	N/A	---	N/A
	Kathy woodman	N/A	---	N/A	X	N/A
	Derik Parker	N/A	---	N/A	X	N/A
	Karla Robison	N/A	---	N/A	X	N/A
	Allen Waterbeck	N/A	---	N/A	X	N/A
	Audrey Waterbeck	N/A	---	N/A	X	N/A
	Larry Neuhaus	N/A	---	N/A	X	N/A
	Teri Neuhaus	N/A	---	N/A	X	N/A
City of Malcom	Dann Hayes	X	X	N/A	---	N/A
	Lyle Tinkle	X	---	N/A	X	N/A
City of Montezuma	Meryll Hicks	X	X	N/A	X	N/A
City of Searsboro	Dwight Triplett	X	X	N/A	X	N/A
	Verlan Vos	X	X	N/A	---	N/A
Unincorporated Poweshiek County	Diana Dawley	N/A	X	N/A	---	N/A
	Ellie Snook	N/A	X	N/A	---	N/A
Poweshiek County Emergency Management	Karen Meek	X	X	X	X	X
Marshall County Emergency Mgmt.	Kim Elder	N/A	X	N/A	X	N/A
Poweshiek County Board of Supervisors	Doug Shutts	N/A	---	N/A	X	N/A
Poweshiek County Sherriff	Tom Sheets	N/A	X	N/A	---	N/A
	Dawn Disney	N/A	---	N/A	---	N/A
South Central Iowa Solid Waste	Randy Ives	N/A	X	N/A	---	N/A
	Sara Bixby	N/A	---	N/A	X	N/A
Brooklyn-Guernsey-Malcom School District	Brad Hohensee	N/A	X	N/A	X	N/A
Grinnell-Newberg Community School District	Edie Eckles	N/A	X	N/A	X	N/A
Montezuma Community School District	Dave Versteeg	X	---	X	X	N/A

**N/A – no kick off meeting required for these jurisdictions, but representative may have attended a city kick-off meeting

1 Introduction

Hazards

Quite simply, a hazard is any source of danger that threatens humans, property, and the environment (FEMA 385-2/August 2001, Page iii). In the context of hazard mitigation planning, though, there are two types of hazards. The first type of hazard is a natural hazard, which is one that occurs in nature often due to climate and geographic location. There are 16 main natural hazards identified by the State of Iowa. The other hazard type is a man-made or technological hazard, which is caused by some sort of human activity. Table 1.1 lists both natural and man-made hazards.

Table 1.1: All Hazards

Natural Hazards	Man-made Hazards
Dam Failure	Agro-Terrorism
Drought	Air Transportation Incident
Earthquake	Animal/Crop/Plant Disease
Expansive Soils	Biological Terrorism
Extreme Heat	Chemical Terrorism
Flash Flood	Communications Failure
Grass or Wildland Fire	Conventional Terrorism
Hailstorm	Cyber Terrorism
Landslide	Enemy Attack
Levee Failure	Energy Failure
River Flood	Fixed Hazardous Materials Incident
Sinkholes	Fixed Radiological Incident
Severe Winter Storm	Highway Transportation Incident
Thunderstorms and Lightning	Human Disease Epidemic
Tornado	Pandemic Human Disease
Windstorm	Pipeline Transportation Incident
	Public Disorder
	Radiological Terrorism
	Railway Transportation Incident
	Structural Failure
	Structural Fire
	Transportation Hazardous Materials Incident
	Transportation Radiological Incident
	Waterway Incident

Note that dam and levee failure are included under natural hazards. These are normally considered man-made, but FEMA requires the inclusion of these two hazards so they are considered a natural hazard in this plan. The natural hazards listed are identified by both FEMA and the 2007 Iowa Hazard Mitigation Plan while the man-made hazards were only identified in Iowa's state hazard mitigation plan. Currently (2010), the Iowa Hazard Mitigation Plan is being updated so the list of hazards will be reduced. Both natural and man-made hazards will be considered in this plan.

Hazard Mitigation Planning

To better structure the way in which communities in the United States respond to disasters, the "four phases of emergency management" were introduced in the early 1980s after the similarities between natural disasters and civil defense became clear. This approach can be applied to all disasters. The "four phases of emergency management" are described below.

1. **Mitigation** is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. Mitigation, also known as prevention, encourages long-term reduction of hazard vulnerability. The goal of mitigation is to save lives and reduce property damage. Mitigation can accomplish this, and should be cost-effective and environmentally sound. This, in turn, can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities, reduce exposure to liability, and minimize community disruption. Examples include land use planning, adoption of building codes, elevation, acquisition, or relocation of homes away from floodplains.

2. **Preparedness** includes plans and preparations made to save lives and property and to facilitate response operations.

3. **Response** includes actions taken to provide emergency assistance, save lives, minimize property damage, and speed recovery immediately following a disaster.

4. **Recovery** includes actions taken to return to normal or improved operating condition following a disaster. (FEMA 386-1/September 2002, Page v)

Hazard mitigation planning involves both phases one and two of emergency management, mitigation and preparedness. So a proactive rather than reactive approach to emergency management is used for hazard mitigation planning.

As defined by FEMA, planning is the act or process of making or carrying out plans; specifically the establishment of goals, policies, and procedures for a social or economic unit (FEMA 386-1/September 2002, Page i). **In essence, planning, coupled with hazard mitigation, results in a process that involves determining what actions a community can take to reduce or eliminate the long-term risks to human life and property from natural and man-made hazards.**

Hazard Mitigation Planning Enabling Legislation

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve this planning process and was put into motion on October 20, 2000, when the President, George W. Bush, signed the Act (Public Law 106-390). The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this Act establishes a pre-disaster hazard mitigation program and requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of the Act specifically addresses mitigation planning at the state and local levels. It identifies requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

State governments have certain responsibilities for implementing Section 322, including:

- Preparing and submitting a standard or enhanced state mitigation plan;
- Reviewing and updating the state mitigation plan every three years;
- Providing technical assistance and training to local governments to assist them in applying for HMGP grants and in developing local mitigation plans; and
- Reviewing and approving local plans if the state is designated a managing state and has an approved enhanced plan.

DMA 2000 is intended to facilitate cooperation between state and local authorities, prompting them to work together. It encourages and rewards local and state pre-disaster planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

To implement the DMA 2000 requirements, FEMA prepared an Interim Final Rule, published in the Code of Federal Registration (CFR) on February 26, 2002, at 44 CFR Parts 201 and 206, which establishes planning and funding criteria for states and local communities. (FEMA 386-1/September 2002, Page i)

Multi-jurisdictional Hazard Mitigation Plan

The agreement for this plan indicates that it is a multi-jurisdictional hazard mitigation plan, which is a plan that is jointly prepared by more than one jurisdiction. The term "jurisdiction" in this context means "local government." Title 44 Part 201 Mitigation Planning in the CFR defines a "local government" as "any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity."

In this specific case, the Region 6 Planning Commission is under contract with Poweshiek County Emergency Management to write the Poweshiek County Multi-Jurisdiction Hazard Mitigation Plan. Operating as a non-profit, council of government, Region VI maintains planning staff who has the knowledge and expertise to facilitate the hazard mitigation planning process and write the final plan.

Local jurisdictions have the option of preparing a multi-jurisdictional hazard mitigation plan under DMA 2000. Jurisdictions can benefit in several ways when they choose to participate in a multi-jurisdictional planning process. Among such benefits, this process:

- enables comprehensive approaches to mitigation of hazards that affect multiple jurisdictions;
- allows economies of scale by leveraging individual capabilities and sharing costs and resources;
- avoids duplication of efforts; and
- imposes an external discipline on the process

A multi-jurisdictional planning approach may also have certain complications. Some potential challenges include:

- less individual control over the process;
- needing strong, centralized leadership and organizational skills;
- conflict that may arise among participants; and
- requiring consistent participation by each jurisdiction throughout the planning process so that the plan stays on schedule.

(FEMA 386-8/August 2006, Page 1)

Each jurisdiction considered whether the advantages in participating in a joint planning effort outweighed the disadvantages for its particular situation. Jurisdictions understood that when opting to participate in a multijurisdictional plan, they still must meet all planning requirements in the Rule, including formal adoption of the plan. It was noted that failure to meet requirements would disqualify the noncompliant jurisdictions from adopting the plan, getting it approved by FEMA, and consequently being eligible for project grants.

2 Hazard Mitigation Planning Process

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

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and human-made hazards. According to FEMA, four basic phases comprise the basic hazard mitigation planning process.

1. **Organize resources:** involves organizing resources, mobilizing the community, and getting started with the planning process.
    a. Assess community support
    b. Build the planning team
    c. Engage the public

2. **Assess risks:** identifies hazards and estimates the losses associated with these hazards.
    a. Identify hazards
    b. Profile hazard events
    c. Inventory assets
    d. Estimate losses

3. **Develop mitigation plan:** describes how to identify, plan, and initiate cost-effective actions.
    a. Develop mitigation goals and objectives
    b. Identify and prioritize mitigation actions
    c. Prepare an implementation strategy
    d. Document the mitigation planning process

4. **Implementation and monitoring progress:** leads communities and states through the formal adoption of the plan and discusses how to implement, monitor, and evaluate the results of the mitigation actions to keep the mitigation plan relevant over time.
    a. Adopt the mitigation plan
    b. Implement the plan recommendations
    c. Evaluate planning results
    d. Revise the plan

(FEMA 386-1/September 2002)

This is a general outline of the planning process that was used to create the hazard mitigation plans for Poweshiek County. Since this plan is specifically a multi-jurisdictional hazard mitigation plan, modifications had to be made throughout the planning process to better reflect each participating community's values and capabilities. The detailed process used for creating this plan is outlined and narrated in the following pages.

Poweshiek County Hazard Mitigation Planning Process

1. **Organize Community Resources**
    A. Region 6 meets with Poweshiek County Emergency Management Coordinator
    B. Complete community inventory in each jurisdiction with Region 6
    C. Region 6 completes county and community profiles, determine local capabilities, research existing regulations
    D. Hazard mitigation planning kick-off meeting in jurisdictions facilitated by Region 6
    E. Poweshiek County Emergency Management assists Region 6 with forming county-wide strategic planning team

2. **Risk Assessment and Mitigation Strategy**
    A. Poweshiek County Strategic Planning Team Meeting #1 and Make-up Work Session facilitated by Region 6
        i. Identify hazards for Poweshiek County
        ii. Profile all possible hazards
        iii. Rank hazards
        iv. Identify hazard boundaries
        v. Inventory assets through concept mapping
        vi. Identify potential mitigation actions based on assets and hazard boundaries
    B. Poweshiek County Strategic Planning Team Meeting #2 and Make-up Work Session facilitated by Region 6
        i. Identify critical facilities and vulnerable populations
        ii. Vulnerability assessment
        iii. Determine overall goals
        iv. Determine potential mitigation actions
        v. Evaluate mitigation actions
    C. Region 6 follows-up with the county and each jurisdiction
        i. Finish determining goals, mitigation actions, and evaluations
        ii. Create work plans for mitigation actions
        iii. Prioritize mitigation actions based on evaluations and work plans
        iv. Create implementation plan

3. **Write Plan** (primary plan authors are Alyson Lutz and Alicia Rosman at Region 6)

4. **Community Comment Period** with plan posted 30 days

5. **Submit Plan** for comment and approval

6. **Plan Approval and Adoption** by resolution in each jurisdiction and the county

7. **Plan Implementation by Jurisdictions and County**

1. Organize Community Resources

A. Meeting with Poweshiek County Emergency Management Coordinator

In February 2009, Region 6 met with the Emergency Management Coordinator (EMC) for Poweshiek County. We discussed the EMC's role in the hazard mitigation process in terms of the information she can provide, involvement in kick-off and planning team meetings, and the main hazards affecting Poweshiek County. Throughout the hazard mitigation planning process, the Poweshiek County EMC was a valuable resource for both information and establishing contacts within each jurisdiction.

Also, an interest in meeting with other emergency management coordinators from surrounding counties was expressed. Meeting annually to discuss common issues is a feasible option. During the hazard mitigation process, getting regional participation from the other counties belonging to the Region 6 Planning Commission proved to be difficult so having these meetings may help to incorporate regionalism into future plan updates.

B. Complete community inventory

After meeting with the Poweshiek County EMC, Region 6 created a community inventory that was optionally completed in jurisdictions that were willing to participate. The jurisdictions that participated in this assessment include:

- City of Deep River
- City of Grinnell
- City of Hartwick
- City of Montezuma

The inventory covered a wide range of topics like zoning, ordinances, transportation safety, NOAA All-Hazards Radios, warning sirens, backup power capabilities, housing, water distribution and sewer infrastructure, wastewater treatment, flooding, agriculture, and hazardous materials.

The main goal of this inventory was to gain an understanding of the broad range of issues that are being faced in each jurisdiction. Secondary goals were to introduce hazard mitigation planning and to establish a reliable contact within the jurisdiction. In most jurisdictions, the contact established was either the mayor or city clerk. Refer to Appendix B.

C. Complete county and community profiles, determine local capabilities, research existing regulations

Through extensive research and local knowledge, Region 6 completed a profile for Poweshiek County and each jurisdiction that participated in the planning process. The profiles for the county and each jurisdiction highlight a broad range of topics including geographic location, population identification and trends, housing and residential development trends, and commercial and industrial development trends. Other topics like historic structures, recreational activities, and cultural institutions are also discussed. Also, each jurisdiction's capability to administer and fund

mitigation projects, current regulations, and existing mitigation projects are included. Existing regulations in each jurisdiction were used like the city code, zoning ordinance, and Iowa Code.

D. Hazard mitigation planning kick-off meeting in each jurisdiction

With an understanding of the main issues faced by jurisdictions, Region 6 was able to facilitate a Hazard Mitigation and Community Development Meeting that served as the kick-off planning meeting for each jurisdiction. These meetings were advertised to the public with the help of our contact in the jurisdiction and the Poweshiek County EMC. The jurisdictions that participated in the kick-off process included:

- City of Brooklyn
- City of Deep River
- City of Grinnell
- City of Malcom
- City of Montezuma
- City of Searsboro
- Poweshiek County (Unincorporated)

At the kick-off meeting, Region 6 introduced the concept of hazard mitigation planning and guided attendees through a brainstorming and prioritization exercise. This exercise gave city officials, employees, and citizens a chance to share their ideas and decide which ideas are the most important. The meeting was ended with a discussion that outlines the next steps in the hazard mitigation planning process and the need for representation in the countywide planning team.

The kick-off meeting in each jurisdiction was very valuable, because it not only introduced the concept and process of hazard mitigation planning but also engaged the community in a discussion about its needs and gave the public a chance to share their ideas. Most ideas for hazard mitigation fall into the emergency services and structural projects categories. The meeting materials, correspondence, minutes, and complete list of all the mitigations ideas from these meetings are included in Appendix C.

E. Form countywide strategic planning team

Once kick-off meetings were held in jurisdictions, the Poweshiek County Strategic Planning Team was formed. This group of people is responsible for representing their particular jurisdiction, school district, or the unincorporated areas of Poweshiek County during the bulk of the hazard mitigation planning process. The public was invited to participate throughout the entire process, but the people in this particular group ensured that their jurisdiction had representation throughout the remainder of the process. These particular people were sought out for the Poweshiek County Strategic Planning Team with the help of the Poweshiek County Emergency Management Coordinator. Everyone except the Poweshiek County Emergency Management Coordinator participated as a volunteer planner who was not compensated for their time spent on hazard mitigation planning.

The Poweshiek County Strategic Planning Team is made up of almost 40 people who live in Poweshiek County, and a majority also works in Poweshiek County. The members of the Planning Team are listed in Table 1 along with the extent of their participation is also included. Throughout

the text of this plan, the Poweshiek County Strategic Planning Team will be referred to as the Planning Team.

2. Risk Assessment, Inventory Assets, and Mitigation Strategy

After establishing the Planning Team, two countywide meetings and two smaller make-up work sessions were held to complete the risk assessment, asset inventory, and develop a mitigation strategy. Some planning work was completed outside these meetings by both Region 6 and community representatives.

A. Poweshiek County Strategic Planning Team Meeting #1 and Make-up Work Session

All of the Planning Team members were invited to attend the first countywide hazard meeting by either mail or email depending on the contact information that was available. To invite the general public, a press release was sent to the Poweshiek County Chronicle Republican which serves all jurisdictions in the county. For all meeting materials, refer to Appendix D. Other counties were invited to the following meeting so they could provide input on goals, projects, and possible collaborations. The regional presence at this meeting was the Marshall County Emergency Management Coordinator.

On Thursday, July 22, 2010, the first Planning Team meeting was held in the City of Montezuma (county seat) at the Law Enforcement Center. The meeting doubled as a luncheon so the members of the Planning Team could use their lunch break to volunteer their time. The theme of this meeting was "Dine and Diagram," which involved eating, listening, discussing, and participating in diagramming exercises tailored to hazard mitigation planning.

The following steps in the hazard mitigation process were completed either before or during the first countywide hazard mitigation meeting: identify and profile countywide hazards, rank hazards, determine hazard boundaries, inventory assets, and identify potential goals and mitigation actions based on activities. The following sections outline how these steps were completed.

Poweshiek County Strategic Planning Team Meeting #1: Dine and Diagram

Meeting room in the new Law Enforcement Center

Meals provided by the correctional center kitchen

i. Identify hazards for Poweshiek County

Ultimately, the hazards chosen for the plan were determined by the Planning Team. Before the county meeting, Region 6 identified the hazards most likely to affect the county based on 2007 Iowa Hazard Mitigation Plan, research, and knowledge of the area.

At the meeting, the Planning Team was asked to agree or disagree with the list of hazards that Region 6 assumed would be chosen. The entire list of possible hazards (Table 1.1) was provided so Planning Team members could add hazards to the list. Members were also able to eliminate hazards if they could provide sufficient reasoning.

ii. Profile all Poweshiek County hazards

All hazards that were identified for Poweshiek County were profiled. This was done through review of the Iowa Hazard Mitigation Plan, past events and declared disasters, research, and reviewing data from Poweshiek County Emergency Management and the National Climatic Data Center.

The actual profiles of each possible hazard are based on the format used by Iowa's plan. The following information for hazards in Poweshiek County is addressed:

- Definition of the hazard
- General description of the hazard
- Historical occurrence of the hazard
- Probability of the hazard occurring in the future
- Vulnerability of citizens, visitors, and emergency responders during and after a hazard event
- Maximum geographic extent of the hazard
- Severity of the hazard's potential impact on human life and property
- Speed of onset or amount of warning time before the hazard occurs

iii. Rank hazards

Once the hazards for Poweshiek County were chosen and profiled, they were ranked against each other to determine which hazards can have the greatest impact on the county. The ranking was done according to the method used in the 2007 Iowa Hazard Mitigation Plan. The ranking method involves assigning a rating for historical occurrence, probability, vulnerability, maximum geographic extent, severity of impact, and speed of onset.

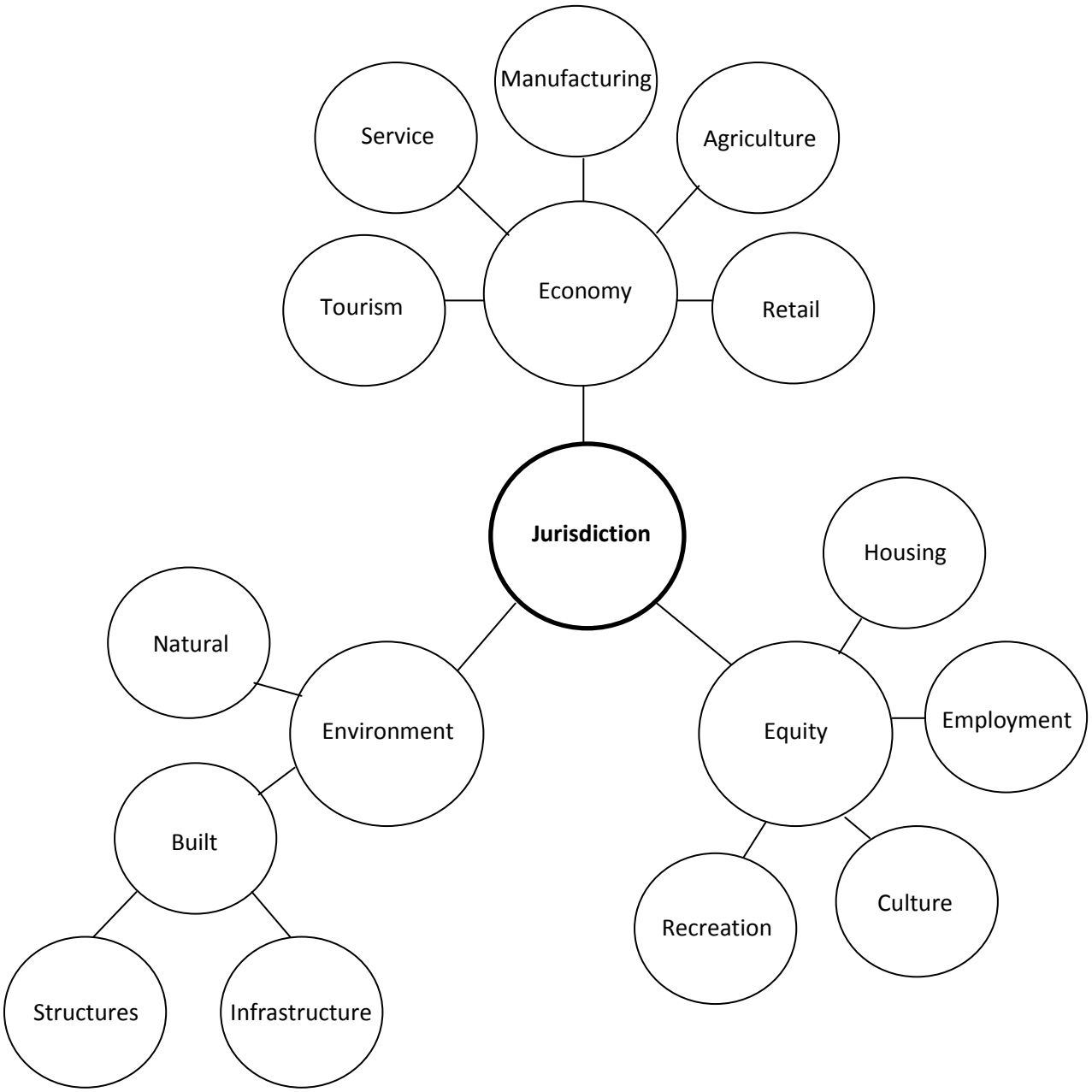
iv. Determine hazard boundaries

Many hazards are countywide or cover the entire planning boundary in terms of their potential geographic extent, but others do not affect all of Poweshiek County's jurisdictions. The hazards that are specific to a jurisdiction were identified through research and extensive discussion at the first countywide meeting. Maps were also created to easily identify hazard boundaries.

iv. Inventory community assets through concept mapping

To identify county and community assets, Region 6 developed a concept mapping activity that guided meeting participants through the asset inventory process. A diagram was developed and used to complete a comprehensive review of both assets and weaknesses. A simplified example of the diagram that was used is below in Figure 2.1.

Figure 2.1: Basic Asset Identification Diagram



The asset identification process involved adding more circles to the diagram and writing in the community's specific assets. Participants were also asked to identify community weaknesses.

A community asset diagram was completed for each individual jurisdiction and the unincorporated areas of Poweshiek County. The schools were also included in this process. Each school representative participated in the asset mapping for the community in which their buildings are located. The diagram was completed by Planning Team members who attended the meeting. The assets particular to each jurisdiction can be found in the vulnerability section of the risk assessment section of this plan. An example of a completed diagram is below in Figure 2.2.

Figure 2.2: Example Asset Identification Diagram

Image Source: Region 6 Planning Commission, November 2010

Most Planning Team members identified a wide, comprehensive range of assets in their jurisdiction along with its weaknesses. The land area, population, and culture of each jurisdiction differ so the resulting assets and weaknesses were very unique to each jurisdiction. Planning Team members were asked to use the results of their asset identification for the next meeting activity involving goal setting and identifying potential mitigation actions.

vi. Identify potential goals and mitigation action based on hazard boundaries and assets

Planning Team members were asked to think about potential goals and mitigation projects based on the community assets and weaknesses that they identified. They were also given a FEMA mitigation actions idea document to use as a reference. For this first goal setting and mitigation exercise, each jurisdiction was asked to consider the full range of hazards that could affect their respective community. At this point, goals and mitigation actions were just initial ideas. Refer to Appendix D.

B. Poweshiek County Strategic Planning Team Meeting #2 and Make-up Work Session

A second countywide meeting was held at the new Grinnell Public Safety Building on October 13, 2010 from noon to 1:30 PM. This meeting was also held at lunchtime so Planning Team members could volunteer their lunch time in order to contribute to the hazard mitigation planning process.

All of the Planning Team members plus others were invited to attend the first countywide hazard meeting by either mail or email depending on the contact information that was available. To invite the general public, a press release was sent to local newspapers: The Grinnell Herald Register and the Poweshiek County Chronicle Republican which serves all jurisdictions in the county. To encourage a regional effort, emergency management coordinators from other counties (Region 6 Counties: Hardin, Marshall, and Tama) were invited to share their ideas and also invite people from their county to participate. Once again, the Marshall County Emergency Management Coordinator attended the meeting to help give input on Poweshiek County's behalf. Refer to Appendix E for all meeting related materials.

At this meeting, the following elements of the plan process were completed: confirm community assets and identify critical facilities, identify vulnerable populations, determine goals, determine potential mitigation actions, and evaluation of mitigation actions. Not all of these activities were completed in the allowed 90 minutes so some communities had to finish certain activities outside of the meeting. The following sections detail how these activities were completed.

Attendance at this meeting was not as expected so an additional meeting was needed to ensure that all Poweshiek County jurisdictions could be included in the plan. All jurisdictions and participating school districts were represented except Deep River. Hartwick had a makeup session with the Region 6 director that evening at their local council meeting.

Grinnell Public Safety Building

Image Source: City of Grinnell, 2010

i. Identify critical facilities and vulnerable populations

The community assets and weaknesses that were identified through concept mapping at the first countywide meeting were compiled by Region 6 into jurisdiction specific worksheets that were given to each jurisdiction's representative(s). The Planning Team members who attended the meeting were asked to confirm their community's assets and weaknesses by adding or removing items from their respective list. In most cases, representatives added assets that they did not think to include at the first planning meeting.

Second, Region 6 provided Planning Team members with FEMA aerial maps of their community for the purpose of identifying critical facilities. An explanation and information sheet was provided to ensure that representatives understood the definition of a critical facility and vulnerable population. Ultimately, though, the Planning Team got to decide what structures are critical and which members of their community are most vulnerable during a disaster. This activity involved both recording the critical facilities and vulnerable populations on a worksheet and marking the location on the aerial map.

It should be noted that communities were allowed to list structures not located in their own community as a critical facility. Poweshiek County has several small, rural communities that do not contain all basic services like a grocery store, hardware store, or bank so they were allowed to identify critical facilities located in other communities that they depend on in the event of a disaster. Otherwise, the FEMA recognized definition of critical facility and vulnerable population were used in this exercise.

ii. Vulnerability assessment

The vulnerability assessment involves the identification of assets, critical facilities, and vulnerable populations, which was completed in the previous step. It also includes determining how vulnerable or open to damage jurisdictions are to each hazard. To make this determination, the Planning Team helped identify what hazards affect the entire county and what hazards affect only certain jurisdictions. This was used along with scores given to hazards during the ranking process. The sum of these scores is the score for vulnerability to determine whether a jurisdiction is at a high, medium, or low-risk for that particular hazard.

iii. Determine goals

Based on previous hazard research, information from the first countywide meeting, FEMA suggestions, and case studies, Region 6 identified four basic hazard mitigation goals for Poweshiek County. At the meeting, the county and each jurisdiction were able to accept the goals in the original form, modify them to fit their community, or create new goals.

Planning Team members were asked to record the resulting goals on a worksheet. The four basic goals provided are below:

1. Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.
2. Protect the health and safety of Poweshiek County residents and visitors.
3. Educate Poweshiek County citizens about the dangers of hazards and how they can be prepared.
4. The continuity of local operations will not be significantly disrupted by disasters in Poweshiek County.

The county as a whole accepted these goals since they are broad enough to include each jurisdiction, unincorporated areas of Poweshiek County, and all hazards. Several jurisdictions, though, chose certain goals and modified them to fit their unique community needs.

iv. Determine potential mitigation actions

Before the meeting, all of the mitigation ideas from the first countywide meeting were compiled by Region 6 into a document that separated the ideas by corresponding hazard then by the jurisdiction that proposed the idea. This document was provided to each Planning Team member to use when choosing potential mitigation projects for their community. The Planning Team could see not only their specific mitigation ideas but also other community's ideas. This way, ideas were easily shared across the county. Refer to Appendix F for the complete list.

To choose potential mitigation actions, Planning Team members were asked to narrow down their large list of mitigation ideas according to the hazard mitigation goals for their jurisdiction. The Planning Team members were informed of the mitigation action requirement: each jurisdiction needs at least one hazard mitigation action per goal while there must be a comprehensive, all-hazard inclusive set of actions for the entire county.

Region 6 encouraged each community to consider both large and small projects along with the five major projects suggested by FEMA. The suggested mitigation projects are below:

1. Construction of a safe room
2. Acquisition and elevation of structures
3. Add lift stations, detention basins, and culverts
4. Purchase generators
5. Elevate roads

Most jurisdictions included these mitigation projects along with others that fit their community's specific needs. A very broad and comprehensive range of projects were identified.

At the county level, since mitigation actions are required for each hazard, county representatives had to consider not just countywide goals but also the full list of hazards that may affect the county. Due to limited time, some jurisdictions and the county especially needed to finish this activity outside of the meeting.

v. Evaluate mitigation actions

After Planning Team members chose mitigation actions for their jurisdiction, Region 6 explained the need for a comprehensive evaluation of each mitigation action. The suggested FEMA designed evaluation method, STAPLEE, was used for this part of the plan process. The areas the evaluation covers are below:

1. Social
    a. Community acceptance
    b. Effect on segment of population
2. Technical
    a. Technical feasibility
    b. Long-term solution
    c. Secondary impacts
3. Administrative
    a. Staffing
    b. Funding allocated
    c. Maintenance/operations
4. Political
    a. Political support
    b. Local champion
    c. Public support
5. Legal
    d. State authority
    e. Existing local authority
    f. Potential legal challenge
6. Economic
    a. Benefit of action
    b. Cost of action
    c. Contributes to economic goals
    d. Outside funding required
7. Environmental
    a. Effect on land/water
    b. Effect on endangered species
    c. Effect on HAZMAT/waste
    d. Consistent with community environmental goals

Some Planning Team members did not have sufficient time to complete all of the evaluations for their jurisdiction's mitigation actions so many finished outside of the meeting and mailed their paperwork back to Region 6. All related materials for this activity can be found in Appendix G.

C. Follow-up with the county and each jurisdiction

i. Finish determining goals, mitigation actions, and evaluations

Since some representatives did not have enough time at the public meetings to finish determining the goals and mitigation actions for their jurisdiction, they took meeting materials with them to complete this part of the planning process on their own time. When representatives finished these tasks, they sent their completed materials back to Region 6 so they could be incorporated into the plan.

ii. Create work plans

The work plans for each mitigation action were largely created using the information collected in the section outlining each jurisdiction's capabilities and current regulations. Also, inherent knowledge of jurisdictions and consultation with many of the jurisdiction representatives was used to complete the work plans. The work plan for each mitigation project includes a plan for implementation and administration, lead agency, partners, potential funding, estimated total cost, benefits or loss avoided, and completion date.

iii. Prioritize mitigation actions based on evaluations and work plans

The STAPLEE evaluations that were completed for each mitigation action were used to prioritize the various projects for each jurisdiction. The projects were ranked in accordance with the score they received so the higher the score for the project the higher the priority it received. In the next five years, priorities may change due to new circumstances like loss of funding or a natural disaster so prioritization is subject to change.

iv. Create implementation plan

The implementation plan was created through case study research and discussion with Planning Team members. Along with the knowledge of local conditions provided by Planning Team members, previously approved mitigation plans served as an invaluable resource in this planning effort.

3. Write the Plan

The plan was written primarily by Alyson Lutz and Alicia Rosman who are both planners at the Region 6 Planning Commission. The main resources used to create this plan include FEMA's plan guidance known as *The Blue Book*, FEMA's how-to guides (386-1,2,3,4), information learned in hazard mitigation planning workshops and personal meetings with FEMA technical assistance planners, previously approved hazard mitigation plans, and case studies like the Neosho County, MO plan.

Along with general hazard mitigation guidance, several data sources were used for specific hazard information. These sources are cited throughout the plan. Other sources of information used include existing plans, reports, technical information, and regulations. Some of these documents include code of ordinances, zoning ordinances, floodplain maps, outdated hazard mitigation plans, soil surveys, and other relevant documents that are cited.

Above all, the public and Planning Team input is the most important contribution to development of this plan. In any planning effort, the best information and ideas often come from the people who live and work in the community that is the subject of the plan. The information and ideas provided by the participants of the planning process are incorporated throughout the entire plan.

4. Community Comment Period

The comment period for this plan began on December 8, 2010 and ended January 8, 2011. The comment period is concurrent with plan review so public comments will be incorporated into this section once the comment period expires. A notice was published in the major newspapers of Poweshiek County so residents were aware of their ability to review and comment on the written plan. Copies of the plan were located at the Poweshiek County Auditor's Office in Montezuma. An electronic copy of the plan was available by request. A copy of the notice along with public comments will be available in Appendix H once the affidavit of publications is received from each newspaper.

5. Submit Plan

The plan was submitted by email to the state plan review staff and the State Hazard Mitigation Officer on November 24, 2010. The plan must receive approval by February 25, 2011, which is the approved plan development extension date. This submittal date gives sufficient time for review and final edits before its approval deadline.

6. Plan Approval and Adoption

As mentioned in the Prerequisites section of this plan, the adoption of this plan is pending approval. Each jurisdiction will adopt this plan by resolution and the resolutions will be included in Appendix A. Information about revisions and plan approval will also be added to this section of the plan process.

7. Plan Implementation by Jurisdictions and County

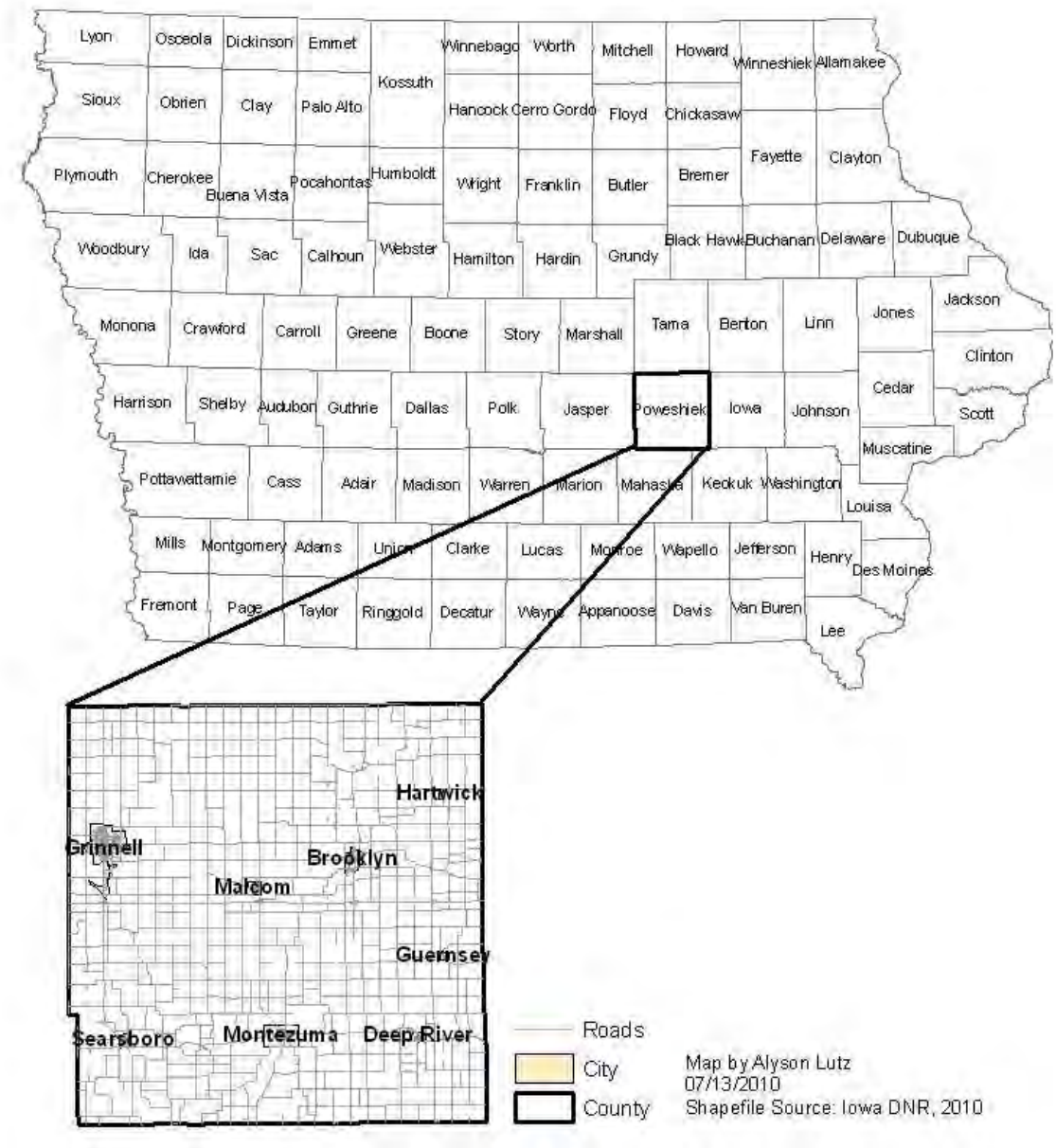
This part of the planning process is yet to be seen. In the next five years, the jurisdictions included in this plan will be expected to fulfill their goals and implement the projects they have identified to mitigate their hazards.

3.1 Planning Area Profile

Location and Size

Poweshiek County is a fifth tier county located in east central Iowa. The county is bordered on its north side by Tama County, Iowa County on the east, Mahaska and Keokuk Counties on the south side, and Jasper County on the west side. In Figure 3.1.1, Poweshiek County is in bold to show its location in relation to all Iowa counties.

Figure 3.1.1: Iowa Counties



Geography, Topography, and Hydrology

Poweshiek County has an area of 376,960 acres, or about 583 square miles. Natural drainage of the county is provided by the North Skunk River and its immediate tributaries, according to the 1981 Poweshiek County Soil Survey. The English River, a tributary for the Iowa River, originates in the west-central portion of the county, crosses the middle and runs in a southeasterly direction through the southeast corner of the county while another branch of the same river originates in the very south central part of the county. A segment of the North Skunk River, one of the main rivers in Iowa crosses through the south west corner of the county.

The highest surface elevation in the county is 1,030 feet above sea level, in the north quadrant of the county at the site of the Calvary Baptist Church. The lowest elevation is about 758 feet above sea level at the site of a Deep River stream in the south east portion of the county.

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

Figure 3.1.2: Topography and Waterways of Iowa

Map by Alyson Lutz, 10/11/2010, Shapefile Source: Iowa DNR

All of Iowa is shown in the map in Figure 3.1.2 in order to provide a reference for comparison. Poweshiek County is relatively diverse in elevation compared to some flatter north central counties in Iowa.

An excerpt from the Poweshiek County Soil Survey describes relief and drainage in the county:

> The highest part of the county is in the northwest. The main ridge extends from the west-central edge of the county and extends southeast past Montezuma. Poorly drained soils are located on the flats and in depressions on this high ridge.
>
> Poweshiek County is part of an extensive plain of glacial drift that is covered with loess. The drainage valleys are generally 150 to 200 feet lower than the top of the divides between the North Skunk River, and their major tributaries.
>
> The relief ranges from nearly level to very steep. The most nearly level slope is the broadest and most stable part of upland divides and the floor of larger drainage ways. The steepest slope is the edges of the valleys of the major drainage ways. The valley floors range in elevation generally from 850 feet to 790 feet, and the stable upland divides range in elevation from 1,010 feet to 970 feet.

Poweshiek has eight soil associations, seven of which are on uplands and one on bottom land. The one soil that takes up the most (35%) of the county is, "gently and moderately sloping, well drained and moderately well drained soils that formed in loess, on uplands." (Poweshiek County Soil Survey, 1981) This soil is called Tama-Killduff.

The farming products that come from Tama-Killduff are livestock and grain. Much of the land is used for row crops like corn and beans. There are many ways to alter the land as well, to help with produce like terracing, strip cropping, and tiling. All of these products and manipulations are great uses for soil in a heavy farming output state.

For more extensive information on the soils in Poweshiek County, refer to the Soil Survey of Poweshiek County, Iowa.

Land Use Regulation and Development

Development Patterns

Poweshiek County is settled primarily as a rural county with over half (9,700 people) of its population living in rural areas. Of these rural residents, just over 18% live on farms. So a majority of rural residents do not farm. According to the State Data Center, in 1990, more people (10,131) lived in Poweshiek County's rural areas, showing a decrease of rural living. Today, the urban population, which is about 48% (9,115 people) of the county's total population, lives in urban clusters of the county. Refer to Table 3.1.1.

Table 3.1.1: Urban Vs. Rural Population in 2000

		Urban			Rural		
Area	Total Population	Total	Inside Urbanized Areas	Inside Urban Clusters	Total	Farm	Nonfarm
State of Iowa	2,926,324	1,786,683	1,114,949	671,734	1,139,641	171,374	968,267
Poweshiek County	18,815	9,115	0	9,115	9,700	1,788	7,912
Barnes City	210	0	0	0	210	0	210
Brooklyn	1,323	0	0	0	1,323	11	1,312
Deep River	302	0	0	0	302	0	302
Grinnell	9,180	9,106	0	9,106	74	0	74
Guernsey	52	0	0	0	52	0	52
Hartwick	73	0	0	0	73	7	66
Malcom	358	0	0	0	358	0	358
Montezuma	1,437	0	0	0	1,437	4	1,433
Searsboro	153	0	0	0	153	0	153
Victor	979	0	0	0	979	0	979

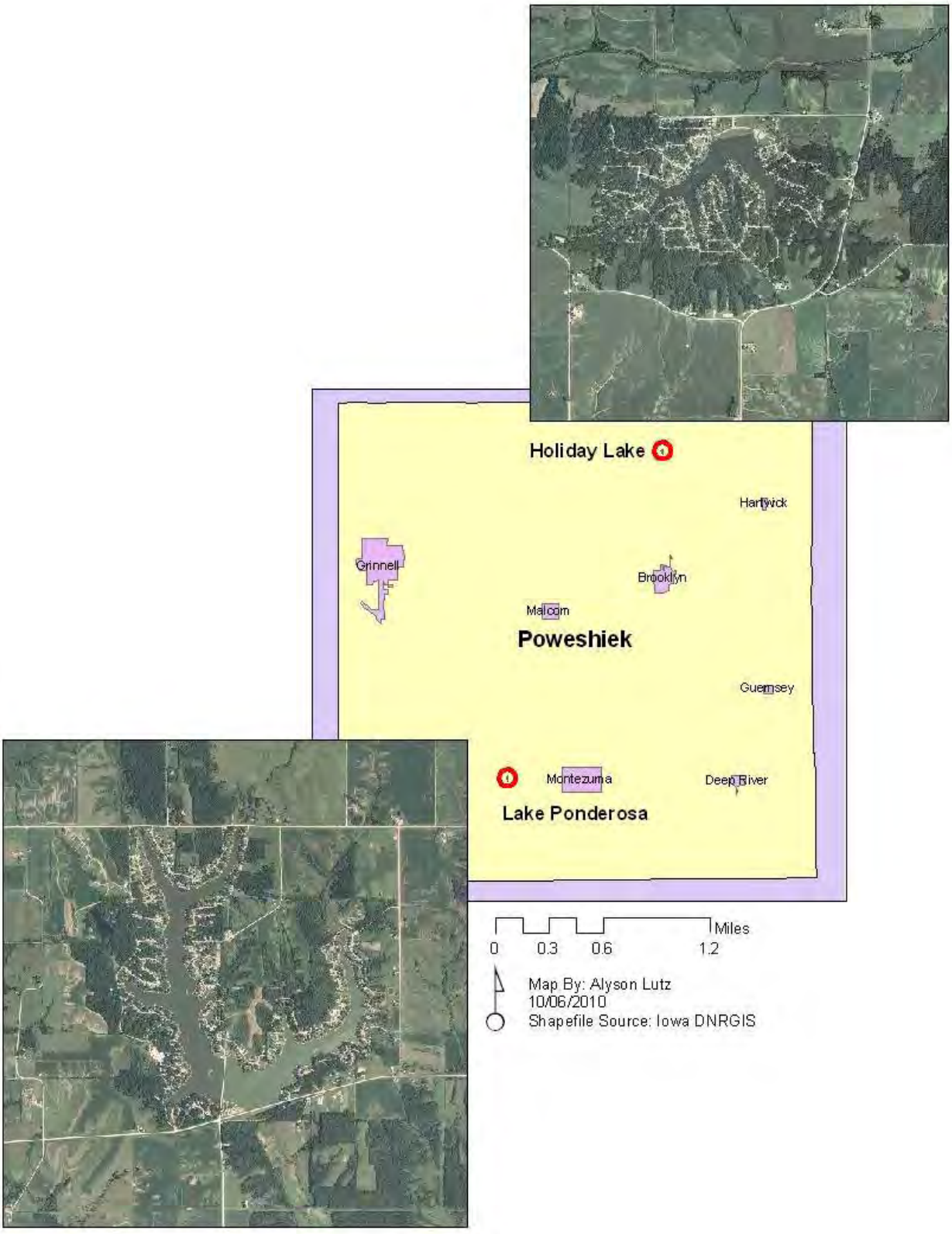
Data Source: State Data Center of Iowa, 2009

The most urban city in Poweshiek County is considered Grinnell (9,106 people). This city is located in the west central part of the county. Grinnell may have a larger urban population due to the fact that Grinnell College and the largest school district in the county (Grinnell-Newburg Community School District) are present in the City. These two educational entities, combined, populate 34% of the county with a total of 3,052 students.

Keep in mind that this data is from 2000, and more accurate data can be provided once the 2010 Census is completed. Based on Poweshiek County's history, though, the county will remain more rural than urban in terms of human settlement patterns.

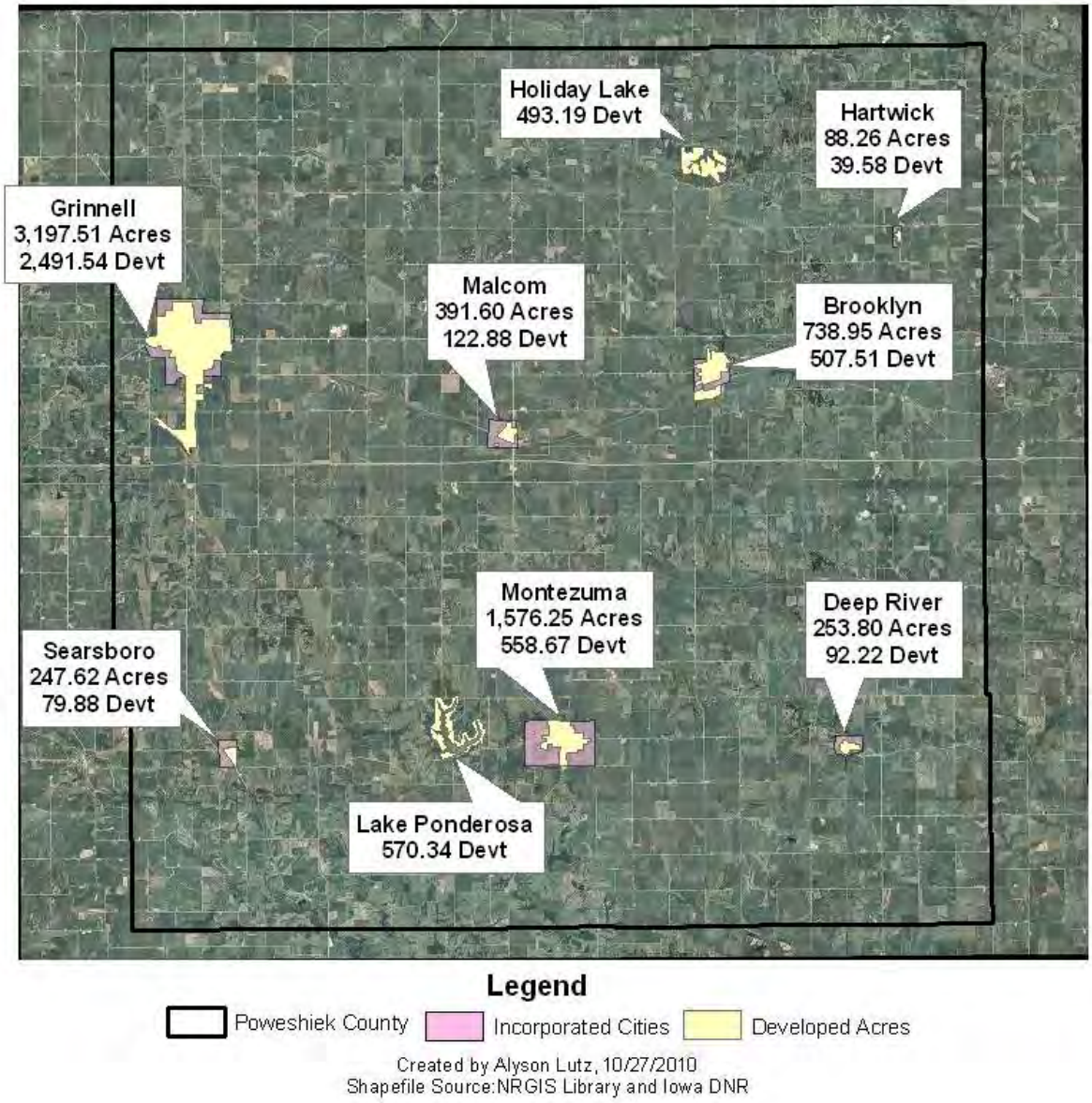
In the rural, unincorporated areas of the county, there are two residential developments: Lake Ponderosa located outside of the City of Montezuma and Holiday Lake located north of the City of Brooklyn.

Figure 3.1.3: Lake Ponderosa and Holiday Lake Developments



Overall, 65 percent (4,956 acres) of Poweshiek County is developed land according to these calculations. The majority of the development, as seen in Figure 3.1.4, is located in the center of each incorporated city. Most of the cities have at least half of their acres undeveloped. The cities are scattered around the county. Two rural developments on Lake Ponderosa and Holiday Lake are located somewhat near incorporated cities creating a getaway or alternate rural Iowa lifestyle for residents. The biggest cities in Poweshiek County, Grinnell and Montezuma, are situated in the east and south central parts of the county near or on the routes of major Iowa and US highways and interstates.

Figure 3.1.4: Current Poweshiek County Land Development



Note: This map provides a rough estimate of the development acres in the county because exact calculations are currently unavailable.

Population and Demographics

Current and Past Trends

According to the State Data Center of Iowa, the population of Poweshiek County in 2007 was estimated at 18,672. Of this total, 12,963 people live in the incorporated cities of the County leaving the remaining 5,709 people in the unincorporated areas of Poweshiek County. Refer to Table 3.1.2. This means a two-thirds of the Poweshiek County population is under regulation by county government, and the remaining third is under the regulation of the jurisdiction in which they reside.

Table 3.1.2: Population Trend 2000 to 2007

				2000 to 2007	
Area	**2007 Estimate**	**2005 Estimate**	**2000 Estimate**	**Numeric change**	**Percent change**
State of Iowa	2,983,360	2,951,775	2,926,381	56,979	1.90%
Poweshiek County	18,672	18,662	18,815	-160	-0.80%
Barnes City	0	0	0	0	0.00%
Brooklyn	1,367	1,363	1,367	0	0.00%
Deep River	275	278	288	-13	-4.50%
Grinnell	9,205	9,230	9,105	83	0.90%
Guernsey	67	67	70	-3	-4.30%
Hartwick	79	80	83	-4	-4.80%
Malcom	304	306	352	-48	-13.60%
Montezuma	1,384	1,398	1,440	-73	-5.00%
Searsboro	153	154	155	-6	-3.80%
Victor	129	130	130	-1	-0.80%

Data Source: State Data Center of Iowa, 2009

Out of all Poweshiek County jurisdictions, Grinnell is the largest city followed by Montezuma and Brooklyn. The smallest city in Poweshiek County is Guernsey with a population of 67 people.

In the past decade, Poweshiek County and all of its jurisdictions have experienced a population decrease with the exception of the City of Brooklyn which showed a 0% change, and Grinnell which experienced an increase of 0.9%. This population change does not coincide with the State of Iowa, which experienced a small, 1.9% population increase since 2000. The city with the largest population loss in terms of percentage is Malcom (-13.6%) while the other jurisdictions are all around -5.0%. The largest loss in number of people occurred in Montezuma with a loss of 73 people between 2000 and 2007. These 73 people resulted in a 5.0% population decrease. Refer to Table 3.1.2 for the population changes in each jurisdiction. It should be noted that more accurate information will be available after the completion of the 2010 U.S. Census.

Age

As a whole, Poweshiek County is aging at a steady rate. Comparing the county's change in population composition from 2000 to 2008, the amount of people aged 35 – 49 has been redistributed into the 45 – 60 range showing that population has stayed within the county. By 2008 the population over 80 has noticeably increased, especially in females. Refer to Figures 3.1.5-6.

Figure 3.1.5: Poweshiek County Population Pyramid 2000

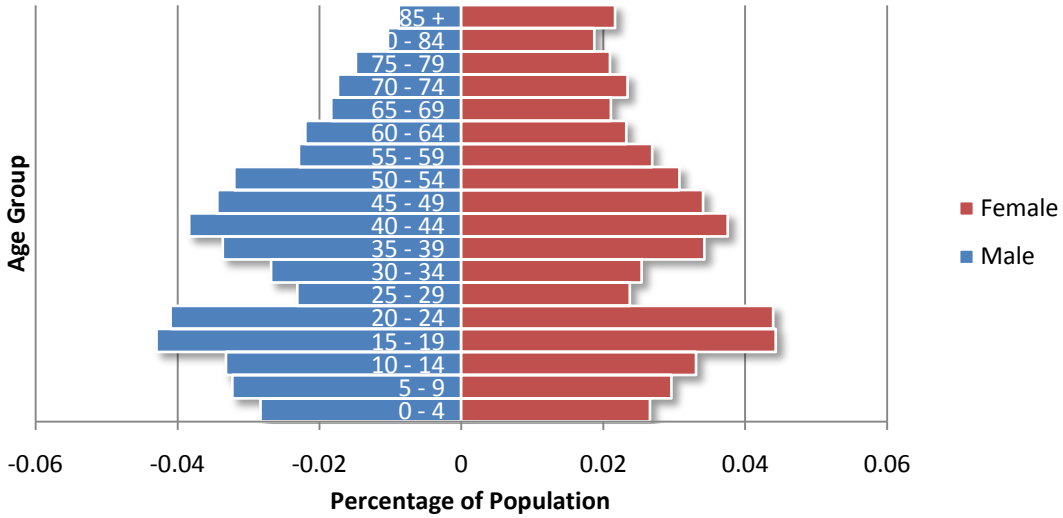
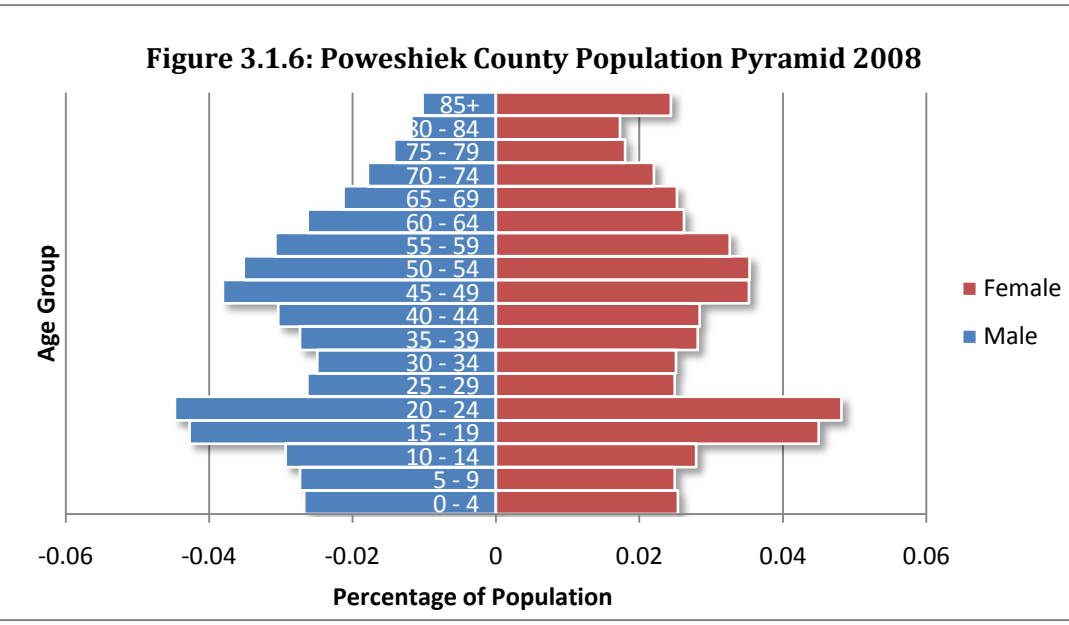


Figure 3.1.6: Poweshiek County Population Pyramid 2008



Data Source: State Data Center of Iowa, 2009

Like most counties in Iowa that are primarily rural, Poweshiek County's population distribution does not resemble the ideal pyramid shape. The main issue is retaining the young adult population. The population between the ages of 25 and 34 is small compared to the rest of the population. After graduating from high school, young adults often move away to attend college or find work elsewhere. Providing the lifestyle demanded by this segment of the population is often difficult and may need to be addressed in order to retain and attract the young adult population in Poweshiek County.

In 2000, Poweshiek County had a median age of 38.5 while the State of Iowa had a median age of 36.6. So compared to the state, the county has an older population. Refer to Table 3.1.3 for a breakdown of median age by city in Poweshiek County.

Table 3.1.3: Poweshiek County Median Age in 2000

City	Median Age
Brooklyn	40
Deep River	36.4
Grinnell	35.1
Hartwick	40.5
Malcom	40.3
Montezuma	40.1
Searsboro	41.6

Data Source: State Data Center of Iowa, 2010

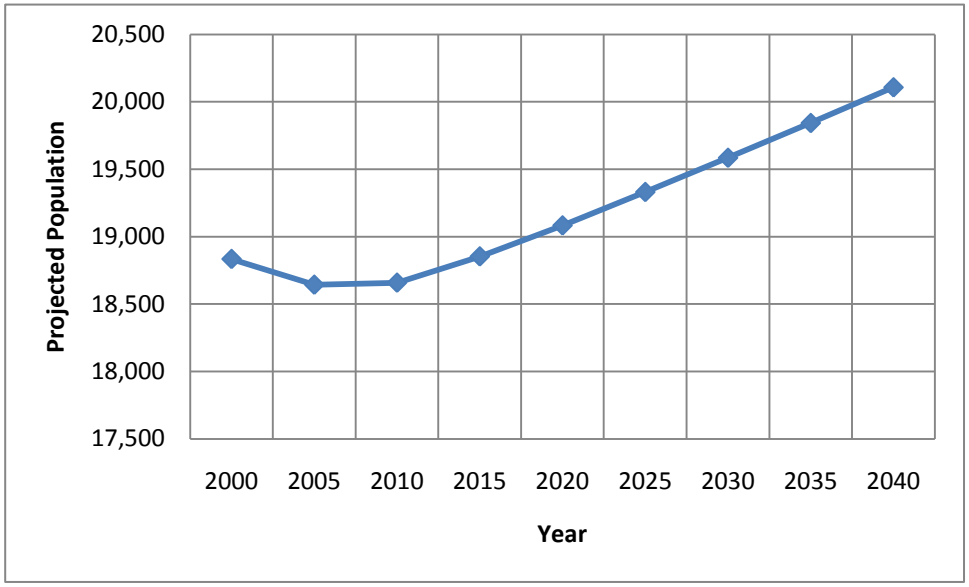
There is a range of 6.5 years in the median age in cities across Poweshiek County. Of all Poweshiek County cities, Searsboro has the highest median age of almost 42. Hartwick is close with 40.5 as the median age of residents. The City of Grinnell is the youngest with a median age that is just over 35 years of age. Deep River is the next youngest city in Poweshiek County with a median age over 36.

As the county's population becomes older, more services oriented toward adults and seniors will be needed. Past planning efforts have mentioned providing more adult and senior services such as congregate meal sites and facilities for long-term care.

Population Projection

According to a population projection completed by Woods and Poole in 2007, Poweshiek County's population will steadily increase as the year 2040 approaches. By 2040, Poweshiek County's population is predicted to be 20,108, which is an increase of 1,436 people or nearly 8%. Currently, this projection seems to be accurate, because Poweshiek County's 2007 population estimate is 18,672 people, and this coincides with the 40-year projection's population for 2007. Refer to Figure 3.1.7.

Figure 3.1.7: Poweshiek County Population Projection 2000-2040



Data Source: State Data Center of Iowa, 2009; Woods and Poole Economics, Inc., 2007

Although a 6% population increase is not an alarming population gain, there may be a lasting effect throughout the County. An increase in population can increase the amount of federal and state funding the county will receive, which can support services and infrastructure investments. This predicted population increase is most likely due to more young adults coming to the county for higher education and employment opportunities.

Looking at the population pyramids, there is a noticeable decrease from the brackets of individuals aged 15 to 24 and 25-29 year olds in both the 2000 and 2008 pyramids. Though it is obvious that the brackets 40-49 stayed in the county, Poweshiek is still losing the population brackets just beyond school age. This has other implications besides direct population loss. Refer to Figures 3.1.5-6. A small or decreasing population aged 25 to 29 means that less population growth through birth will occur in Poweshiek County so the young age cohorts may also decrease, which affects school funding and the amount and quality of youth-oriented services and activities. Retaining the young adult population in Poweshiek County will be a challenge that must be addressed in order to maintain or increase the county's population.

Housing Characteristics

Amount and Occupancy

According to the State Data Center of Iowa, Poweshiek County had 5,316 owner-occupied housing units and approximately 2,082 rental housing units in 2000. Refer to Table 3.1.4 below for the total number of housing units in each jurisdiction.

Table 3.1.4: Number of Housing Units in Poweshiek County in 2000

Jurisdiction	Number of Housing Units
Poweshiek County	8,556
Brooklyn	639
Deep River	135
Grinnell	3,725
Hartwick	40
Malcom	154
Montezuma	641
Searsboro	79

Data Source: State Data Center of Iowa, 2010

Logically, the ranking for the highest to lowest number of housing units coincides with the population ranking for the cities. Grinnell has the largest population and the largest share of Poweshiek County's housing stock while Hartwick has the smallest population and smallest share of Poweshiek County's housing stock.

Out of all housing units in Poweshiek County, 14 percent were vacant in 2000. This is somewhat lower than the state, which had 93% of its housing occupied. The homeowner vacancy rate, though, is higher in Poweshiek County than the entire State of Iowa so a higher share of Poweshiek County's housing units is vacant or for sale.

Table 3.1.5: Housing Occupancy in 2000

	Poweshiek County	State of Iowa
Percent Occupied Housing	86%	93%
Homeowner Vacancy Rate	1.8	1.7
Rental Housing Vacancy Rate	7.1	6.8

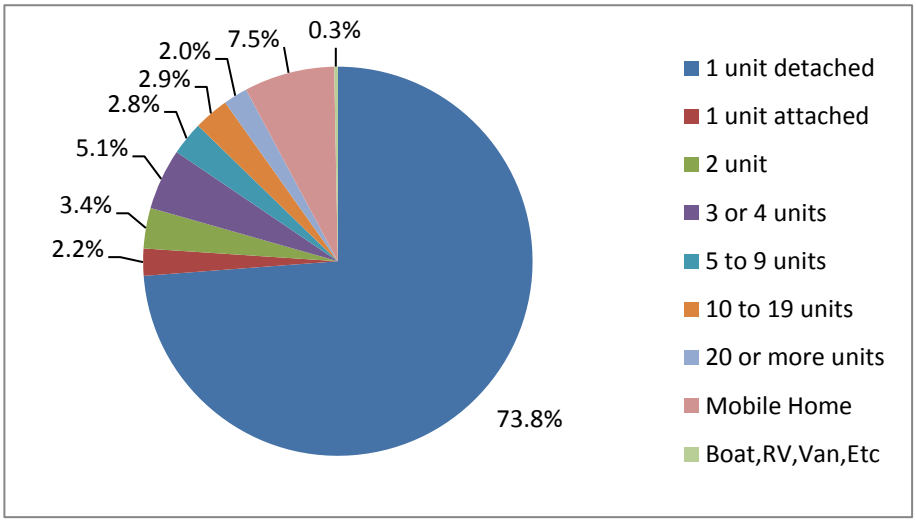
Data Source: State Data Center of Iowa, 2009

Please note that this data may not be representative of the current housing situation. The age of the data, increase in home foreclosures, and economic uncertainty makes accurate and representative data difficult to obtain. This data is only a historic view of Poweshiek County's housing.

Type of Housing Available

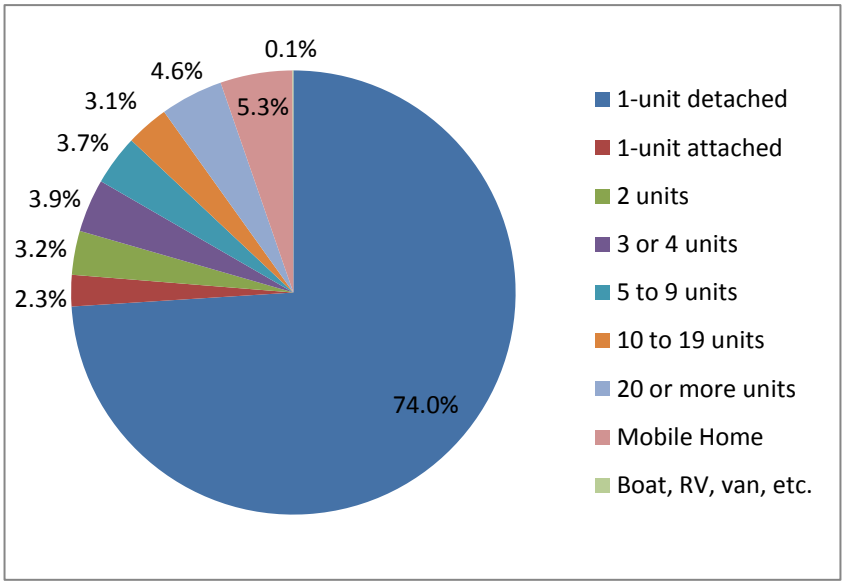
As shown in Figure 3.1.8, the type of housing in Poweshiek County is dominantly 1-unit detached homes (homes that do not share common walls) while mobile transportation like Boats, RVs, and Vans make up the smallest share of the county's housing.

Figure 3.1.8: Poweshiek County Housing by Type in 2000



Data Source: State Data Center of Iowa, 2009

Figure 3.1.9: Iowa Housing by Type in 2000



Data Source: State Data Center of Iowa, 2009

Poweshiek County has a smaller share of 1-unit detached housing units than the State of Iowa. On the other hand, Poweshiek has a larger share of multiple-unit housing structures than the state so Poweshiek County does not lack affordable multiple-unit housing options.

Often times, young adults who cannot yet afford a home or senior citizens who no longer want to care for a large home, live in multi-unit housing like apartments, condominiums or duplexes. Providing housing for young adults may not be such an issue since this segment of the population is relatively small, but this type of housing may be needed for the larger, increasing adult and senior population in Poweshiek County.

Age and Condition

According to the State Data Center of Iowa, in 2000, the median year built for Iowa's housing stock was 1959 while Poweshiek County had 1961 as the median year built. Overall, Poweshiek County has a newer housing stock.

Another indication of an aged housing stock is the percentage of housing units built in 1939 or earlier. Some Poweshiek County cities have an extremely high percentage of these aged units. Over 75% of the homes in Hartwick and 60% of homes in Deep River were built before 1940. Brooklyn and Malcom also have high percentages that account for almost half of the city's housing stock. Searsboro has the smallest percentage (33.8%) of older homes. Refer to Table 3.1.9.

Table 3.1.6: Poweshiek County Housing Units Built in 1939 as of 2000

Jurisdiction	Percentage
Poweshiek County	35.8
Brooklyn	43.2
Deep River	61.9
Grinnell	37.5
Hartwick	76.3
Malcom	47.1
Montezuma	36.3
Searsboro	33.8

Data Source: State Data Center of Iowa, 2010

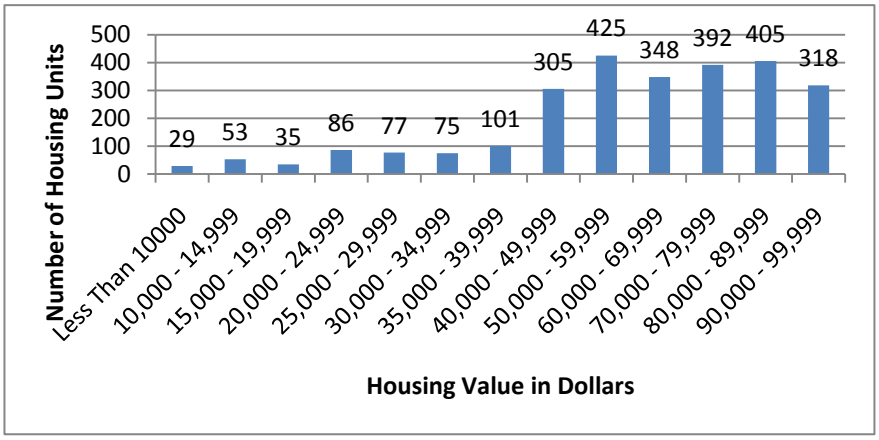
Since only about 35% of all housing units in Poweshiek County have been built in 1939 or earlier, there is a possibility of some common issues associated with an older housing stock. Anything from electrical to structural issues could be a problem in homes across the county. In terms of hazard mitigation, some older housing may not be able to withstand natural hazards such as windstorms, tornados, or severe winter weather. Quality of construction and maintenance are a big factor in how much damage older housing will sustain during severe weather events.

The condition of housing throughout Poweshiek County varies tremendously. There is housing built recently in excellent condition but also older homes that are still in excellent condition considering their age. On the other end of the spectrum, there is abandoned or extremely dilapidated housing. The majority of the housing in Poweshiek County falls between these extremes. The housing in Poweshiek County is generally older but relatively well maintained.

Housing Values

There is a trend in housing value of owner occupied units in Poweshiek County. Of the 2,649 owner occupied housing units, 82.79% have a housing value over $40,000 as illustrated in Figure 3.1.10. The range with the highest percent of housing units is the $50,000 - $59,999 range with 16% of the county's units.

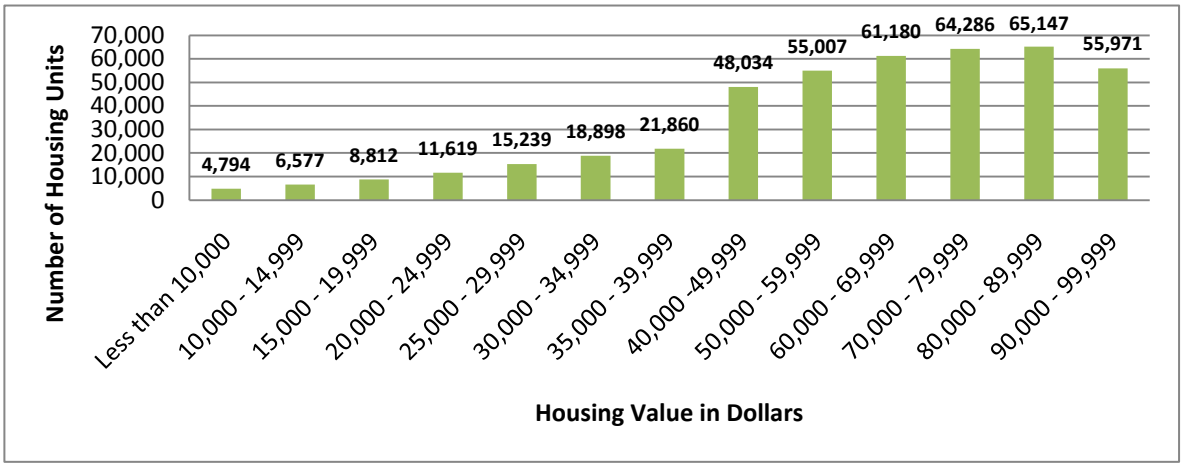
Figure 3.1.10: Poweshiek County Owner-occupied Housing Values in 2000



Data Source: State Data Center of Iowa, 2009

Compared to the state level (Figure 3.1.11), Poweshiek County has rather low majority housing value range ($50,000 - $59,999) comprising their biggest percent of owner occupied units. The state's highest percentage category is the $80,000 - $89,999 range with 9.94%.

Figure 3.1.11: Iowa Owner-occupied Housing Values in 2000



Data Source: State Data Center of Iowa, 2009

Comparing Poweshiek County to Iowa, the state shows a progressive upward trend from the Less than $10,000 range to its peak at $80,000 - $89,999. Poweshiek County, on the other hand, varies and has a concentration of housing in the $30,000 - $34,999 range and peaks much earlier in the $50,000 - $59,999 range before decreasing then increasing to a concentration in the $70,000 - $89,999 range.

When looking at the median value of owner-occupied housing in Poweshiek County, the value is somewhat low compared to Iowa, which had a median value at $82,500, according to the State Data Center of Iowa. Comparing specific jurisdictions, Searsboro and Deep River, Iowa's median housing value is about $45,000 higher than the housing in these jurisdictions. Refer to Table 3.1.7.

Table 3.1.7: Median Owner-occupied Housing Values and Gross Rent for Renter-occupied Housing in 2000

Jurisdiction	Median Housing Value	Median Gross Rent
Poweshiek County	$81,600	$432
Brooklyn	$69,400	$397
Deep River	$40,300	$267
Grinnell	$88,200	$439
Hartwick	$54,100	$425
Malcom	$55,000	$409
Montezuma	$73,800	$403
Searsboro	$37,100	$225

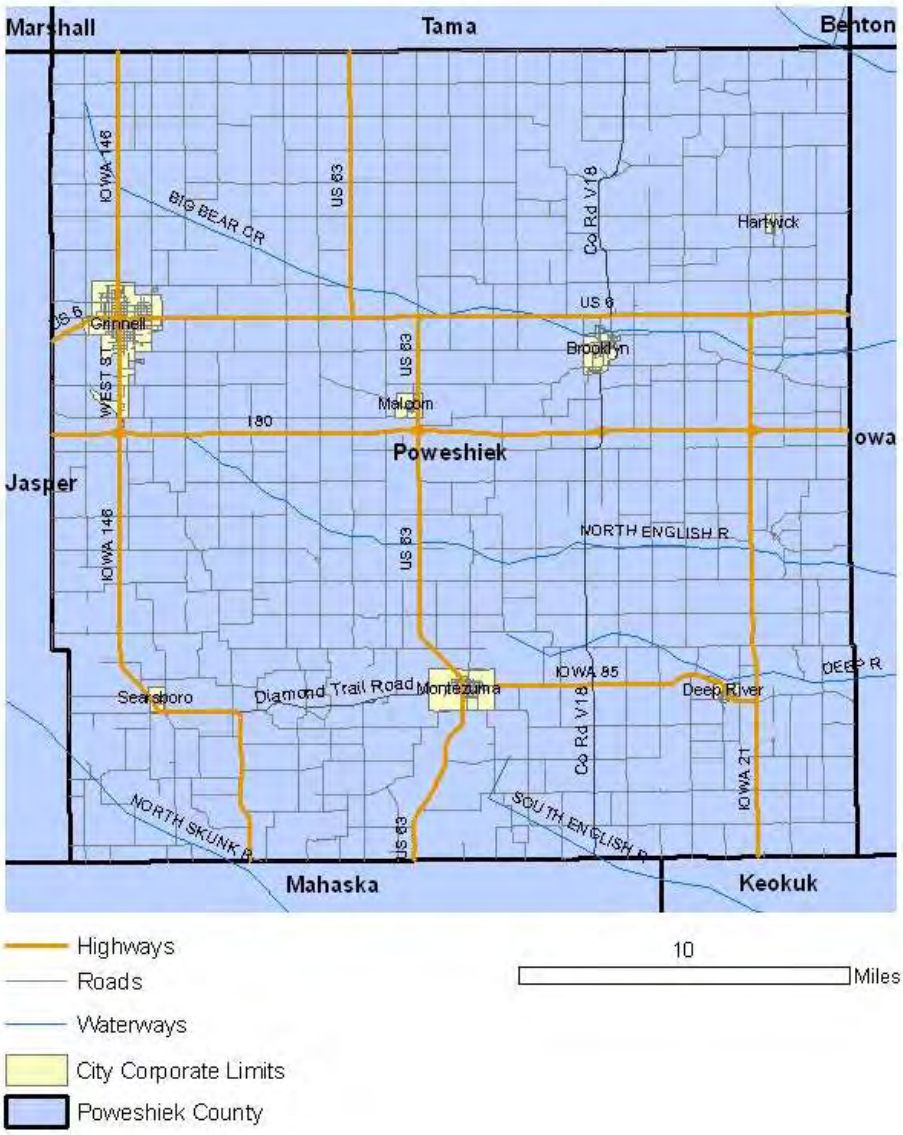
Grinnell, Montezuma, and Brooklyn (in this order) by far have the largest median housing values in Poweshiek County. The cities with the lowest housing values in Poweshiek County have less than 50% of the values found in Grinnell, Montezuma, and Brooklyn. This is a huge range of values across the county.

Looking at the median gross rent for tenants of rental properties in Poweshiek County, the lowest median rent can be found in Searsboro ($225) while the highest rents can be found in Grinnell ($439) and Hartwick ($425). This is interesting considering, Hartwick has the fifth highest median housing value but the second highest median gross rent in the county. Compared to the state, Poweshiek County's rental market is less expensive. Iowa's median gross rent in 2000 was $470 according to the State Data Center of Iowa. Across Poweshiek County, there is over a $200 range in the median gross rent paid by tenants so there is somewhat of a substantial variation in rental costs across the county.

Transportation

The automobile is the main mode of transportation in Poweshiek County. U.S. Highway 6, which runs east and west, and Iowa 146, which runs north and south, intersect at the city of Grinnell. U.S. Interstate 80, which runs east and west, and U.S. Highway 63, which runs north and south, intersect just south of Malcom and north of Montezuma. These routes are connected to all parts of the county by paved or crushed rock roads.

Figure 3.1.12: Poweshiek County Highways and Roads



Several Poweshiek County cities are located along main Union Pacific Railroad and Iowa Interstate Railroad lines. Scheduled airline transportation is available at Cedar Rapids, Des Moines, and Waterloo, all of which are within 60 to 80 miles of the county seat, Montezuma; Grinnell, Montezuma, and Brooklyn each have small municipal airports. Charter and Coach Bus transportation is available on Interstate 80 which runs through Poweshiek County and bus connections for north-south routes are available at Cedar Rapids and Des Moines.

Peoplerides, a transit service operated by the Region 6 Planning Commission, serves all of Poweshiek and three surrounding counties with both regular routes and scheduled trips. Motor freight lines serve trading centers in the county. There are fourteen trucking companies that operate in Poweshiek County.

Another mode of transportation provided in some sections of the county is a trail system for walking, jogging, and bike riding. At this point, there are several sections of trail located across the county, but are not yet connected. Although these sections of trail are mainly used for recreational purposes, a well-connected network of trails could serve both recreation and alternative transit needs in the county especially where cities are located within a reasonable biking distance.

A regional trail plan was completed by Region 6 Planning for Hardin, Marshall, Tama, and Poweshiek Counties. This plan includes a major extension of the recreation trails in Marshalltown that will run from the northeast corner of Marshalltown to the southeast corner of Tama County. This trail extension is planned for after the year 2012. Though there is no major branch of the trail in Poweshiek County, at this point, there are two separate trails located in the county, the first being the Diamond Lake Trail around Diamond Lake in Montezuma and the second being in Grinnell, extended from the Iowa Valley Community College Campus to a proposed lake.

Other transportation planning in the county includes the Passenger Transportation Plan, which is written and annually updated by the Region 6 Planning Commission. This plan covers the current public transportation services available in the region (Tama, Hardin, Marshall, and Poweshiek counties) along with the transportation needs that are not being fulfilled. The needs identified for the region include:

- Need affordable public transportation options
- Need transportation options for rural and long distance commuters
- Need attractive transportation options to reduce energy dependence
- Need transportation options for individuals who are no longer capable of driving safely
- Need affordable transportation options for evening and weekend services
- Need coordinated long distance education transportation options

These needs were identified through public meetings and a survey along with an analysis of current transportation services in relation to where grocery, medical clinics, and other essential services are located. Plans and potential projects for filling these needs are also addressed in the transportation plan.

Economic Conditions

Individual Economic Indicators

Some evidence of Poweshiek County's economic stability can be seen in its income, poverty status, crime rates and education. All of these factors can have a positive or negative effect on the county's economy depending on where the statistics lie. The per capita income for Poweshiek County in 2007 was $35,361. This is $445 higher than the State's $34,916. In 2008, the Poweshiek County median income was again, close in range to the state's median family income with $49,857 versus $49,007, only an $850 difference.

Poverty is an economic factor that has the potential to have a negative effect on people's perception of an area. According to the US Census Bureau, in 2008, 39.8 million people lived in poverty in the United States. This is a rate of 13.2%. The State Data Center of Iowa contributes that at the state level, Iowa has 331,057 people living in poverty out of its 3,002,555 residents. This is a rate of 11%. Poweshiek County makes up only 0.5% of the state's population in poverty with 1,839 people. Poweshiek County has a population of 18,672. With 1,839 people living in poverty, this means that 10% of the county is in poverty.

Crime rates have an effect on an area's economic value because people want to live and work in a place they feel will be safe for their loved ones. Poweshiek County has relatively low violent crime with 3 forcible rapes and 6 aggravated assaults in 2008. (Federal Bureau of Investigation, 2008) Property crimes including burglary, larceny theft, motor vehicle theft, and arson totaled 131 in 2008. Compared to the state of Iowa as a whole, Poweshiek accounts for .88% of violent crimes and 1.59% of property crimes. If each of Iowa's 99 counties had an equal share of crime, their percentage would each be 1.01%. This is not the case in Iowa because there are metropolitan and non-metropolitan counties, in which urban centers may experience a great amount of crime while rural areas will experience significantly less and perhaps none at all.

Educational attainment in Poweshiek County can be found in the one private Christian school, three community school districts as well as the Iowa Valley Community College and Grinnell College. The 3 state universities are all located an hour to an hour and a half from the county seat of Poweshiek County, Montezuma. A total of 2,302 children were enrolled in the Grinnell-Newburg, Montezuma, and the Brooklyn-Guernsey-Malcom Community School Districts in the 2008-2009 school year. (Iowa Department of Education, 2010) Of the Poweshiek County population that is 25 years or older, 42.5% have a high school degree or its equivalent. From this group, 18.5% received a bachelor's degree or higher education.

Economy

According to the Poweshiek Iowa Development and America's Labor Market Information System, the major government employer in Poweshiek County is the City of Grinnell Administrative Offices with about 99 employees, and the largest non-government employers in the county are the Grinnell Mutual Reinsurance Company and Manatts with about 700 employees each. Refer to Table 3.1.8 for all major employers in the county.

Table 3.1.8: Major Employers in Poweshiek County

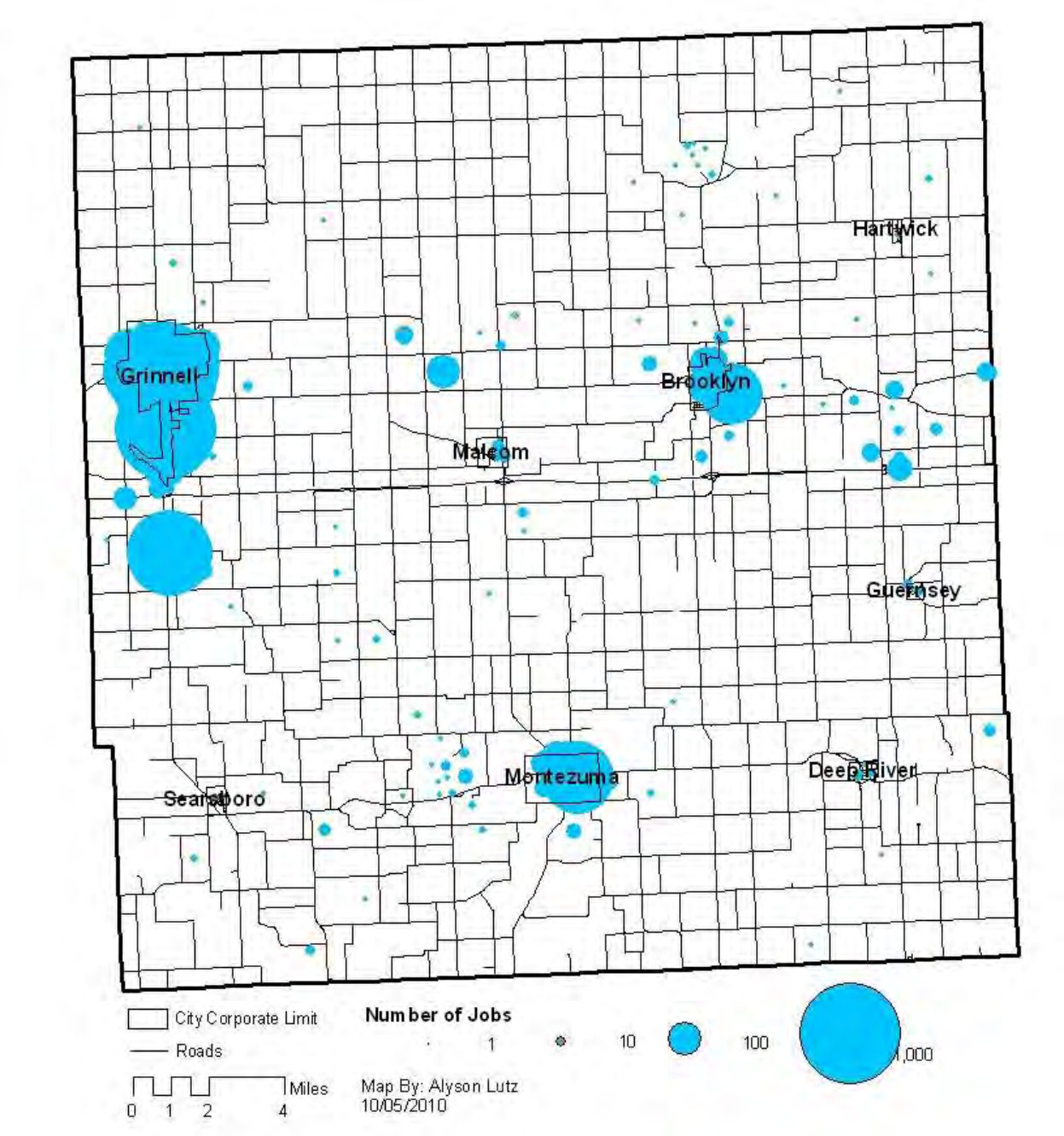
Major Employers	Employees
Grinnell Mutual Reinsurance Company	~700
Manatts	~700
Grinnell College	~650
Grinnell Regional Medical Center	~440
Major Government Employers	Employees
Grinnell Administrative Offices	~99
Poweshiek County	~96
Brooklyn Historical Society	~49
Grinnell Postal Service	~49

Data Source: America's Labor Market Information System, 2009

In Poweshiek County, non-governmental organizations provide the most jobs. The Grinnell Mutual Reinsurance Company, located in the jurisdiction's largest city, Grinnell is a major center for employment. Manatts, an Iowa-based construction company has an equal number of employees at 700, also located in Grinnell. The top ten major employers range in number of employees from about 700 to about 100. The industries represented are varied including education, healthcare, manufacturing, and services.

It should be mentioned that employment in Poweshiek County is not limited to just county residents. A recent labor shed study (2009) by Poweshiek Iowa Development, found that Poweshiek County attracts employees from outside the county as far north as Marshalltown and Garwin, as far south as Oskaloosa, as far east as Williamsburg and as far west as Ankeny. This is approximately a 50 mile radius that attracts workers. The study also found that those who are willing to change employment in the Poweshiek County labor shed area are willing to commute an average of 25 miles one way for employment. So the number of employees for the county's major employers may not include just Poweshiek County residents but also people from the neighboring counties.

Figure 3.1.13: Job Distribution in Poweshiek County in 2008



Data Source: U.S. Census Bureau, On the Map tool, 2010

The job distribution map confirms that the larger cities in Poweshiek County are also the major employment centers of the county. Grinnell, Brooklyn, and Montezuma are the cities with the highest concentrations of employment.

Economic Development

Poweshiek County is fortunate to have an organization devoted strictly to the county's economic development success, Poweshiek Iowa Development, or "Pow I-80". Poweshiek Iowa Development is an economic development non-profit whose vision is to become a dynamic regional center for diverse economic opportunities for business, industry and citizens. Pow I-80 values integrity, trust, innovation and small-town spirit with a global perspective. Their mission is as stated "Poweshiek Iowa Development seeks to promote innovative, diversified industry, an enhanced quality of life, I-80 Corridor Development as well as education and workforce, while encouraging leadership development and community involvement." (Pow I-80, 2010)

Another economic development effort in Poweshiek County is spearheaded by the Region 6 Planning Commission. The Comprehensive Economic Development Strategy (CEDS Plan), which includes Tama, Hardin, Marshall, and Poweshiek counties, is written and maintained by Region 6 along with several programs for assisting economic development in the county. As for the economic development strategy for the county, ten major economic goals are identified. These goals include:

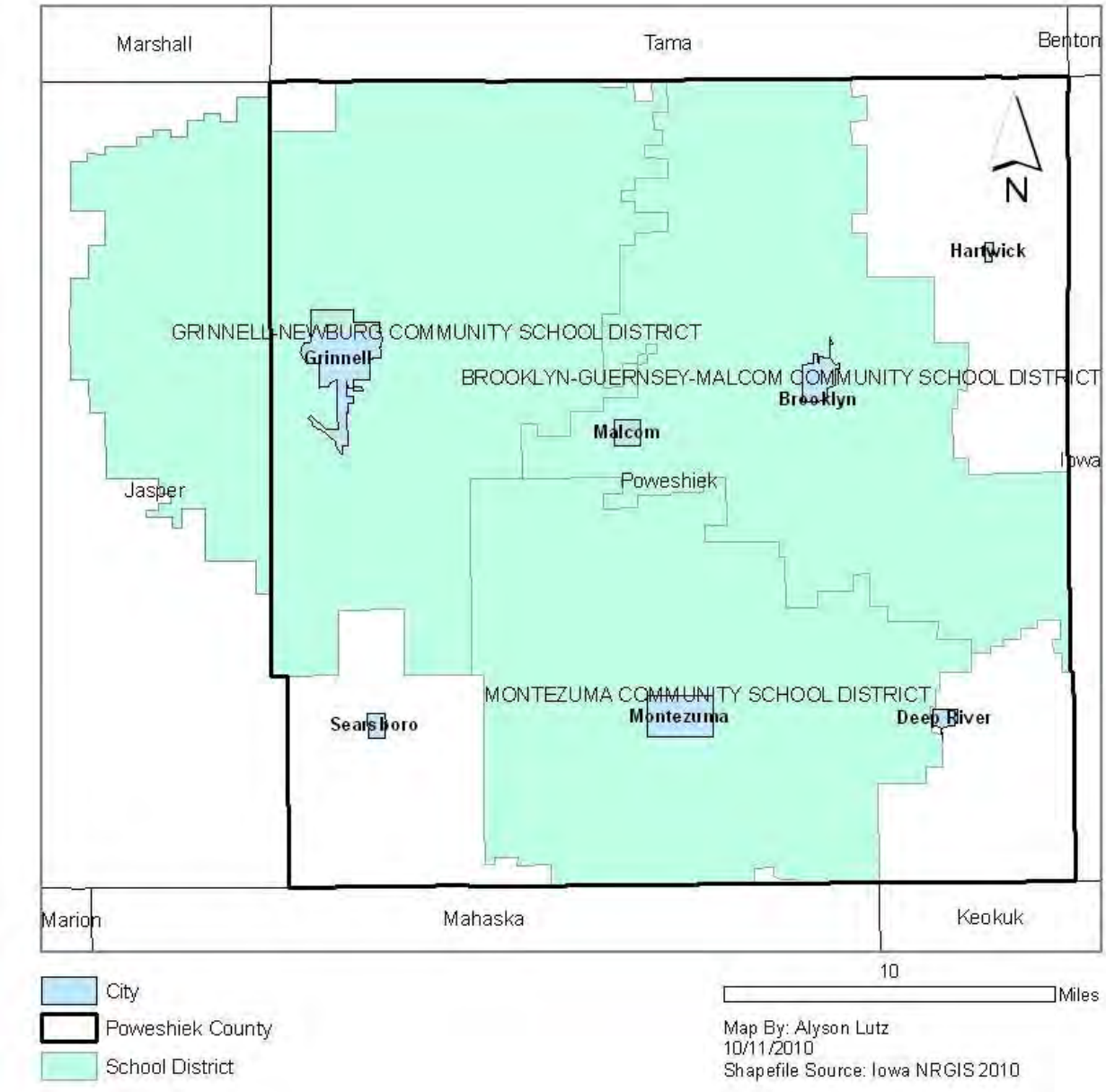
1. Preservation and restoration of natural environment
2. Create healthy, active lifestyles supported by "walkable" communities
3. Develop attractive, safe, and efficient "world class" multi-modal regional transportation system (i.e. highway, rail, pedestrian, and recreation)
4. Reduce blight and improve the appearance of communities
5. Support local food systems
6. Develop fun, vibrant, and welcoming communities
7. Assist cities and counties with "smart growth" plans, policies, and trainings
8. Promote an energy efficient region
9. Develop regional renewable clean energy sources
10. Support existing businesses, develop new businesses, and attract businesses from the outside area

Many of these goals can be tied to hazard mitigation like preservation and restoration of the natural environment, reducing blight, and supporting existing and new businesses.

Educational Opportunities

There are three public school districts in Poweshiek County: Brooklyn-Guernsey-Malcom, Grinnell-Newburg, and Montezuma. Refer to Figure 3.1.14.

Figure 3.1.14: Poweshiek County School Districts



Along with general education, college level and continuing education courses can be taken through Grinnell College and Iowa Valley Community College. Online classes are also available from any college or university. Iowa's major universities are relatively close to Poweshiek County.

Cultural Resources

Outdoor Recreation

Many parks have been established throughout the county. Rivers and creeks in rural areas of the county provide opportunities for outdoor recreational activities, such as hunting, fishing, and primitive camping.

Areas of the county have high quality woodlands where upland timber is located such as white oak, red and black oak, hickory, elm, hard maple and white ash. Because of the numerous mature white oak trees, this area is especially attractive to the eastern wild turkey, released in the county and reproduced over the last 20 years, and the white tail deer. The terrain is moderate to steeply sloping, providing excellent conditions for a diversity of shrubs and wildflowers. (Poweshiek County Preservation Board, 2010)

Poweshiek County also has many public outdoor recreation areas maintained by the Poweshiek County Conservation Board and the Iowa DNR. The County's recreation areas and basic information are listed below in Table 3.1.9.

Table 3.1.9: Outdoor Recreation Areas in Poweshiek County

Area and Location	Camping*	Picnicking	Trails	Beach	Fishing*	Boating	Hunting	Shooting
Barclay Timber Wildlife Area							x	
Cecil Rivers Timber Wildlife Area			x					
Diamond Lake Park	p,e,s	x	x		L	x	x	
Deep River Park		x						
Deep River Timber Wildlife Area								
Fleming Woods State Preserve			x					
Fox Forest Wildlife Area			x					
Hartwick Park		x						
Lincoln Wildlife Area								
Millgrove Access Wildlife Area			x					
Robertson's Access								x

* Legend

Water- d= Drinking, s= Shower house **Toilets-** f= Flush, p= Pit or composting toilet

Fishing- L= Lake, M= Marsh, S= Stream **Camping**- p= Primitive, e= with Electric

All of these outdoor recreation areas are considered in this plan regardless of what institution maintains the area, because they are located within the boundaries of Poweshiek County and emergency response from the County may be needed should a disaster occur. The two major issues in outdoor recreation areas is the park's ability to provide shelter during hazard events and how to prevent damage to property within the park and also the park's natural assets.

Although, the most important issue in outdoor recreation areas throughout Poweshiek County is shelter for park visitors during hazard events like windstorms, hail, and tornadoes. In most parks, the only refuges provided are open picnic shelters or none at all. This is not sufficient during severe weather. Shelters engineered for high winds and flying debris need to be included in park facilities to ensure the safety of park visitors.

A regional trail plan was completed by Region 6 Planning for Hardin, Marshall, Tama, and Poweshiek Counties. This plan includes a major extension of the recreation trails that will run from the northwest portion of Hardin County to the southeast corner of Tama County. This trail extension is planned for after the year 2012. Though none of the trail is located in Poweshiek County, there are two notable trail segments serving the area. The first is in the City of Grinnell which will be extended to serve the Iowa Valley Community College campus to a proposed lake. The second is the Diamond Lake Trail in Montezuma, serving the area around Diamond Lake.

Other outdoor recreation activities are available in the Poweshiek County, including; Diamond Lake Park located in Montezuma, Iowa. This park has accommodations for primitive camping, camping with electricity, and shelter reservation. Other amenities of the park include: Diamond Lake, Fishing, Fish Cleaning Station, Shelters and Picnic Areas, Grills, Camping w/Electric & Primitive, Waste Water Dumping Station, 2 Shower Facilities, Hiking Trails, Playground Area.


Photos by the Poweshiek County Conservation Board

Diamond Lake Park recently acquired 86 acres of land, some of which will fund the creation of a campground, hard surface trail, and a 7 acre pond. The Conservation Board's design for the campground will include: "constructing a new 25 site electrical campground with asphalt roads and gravel camping pads; constructing a small playground; constructing a restroom/shower house facility; constructing a small picnic area; planting several (85) trees throughout the proposed campground; and planting several acres of native grass and forbs that would surround the campground." (Poweshiek County Conservation Board)

The Deep River Park, located in Deep River, Iowa has amenities such as a playground, shelter and picnic area, grills and a ball diamond. The playground and baseball diamond are depicted below:


Hartwick Park in Hartwick, Iowa has more recreational activity based amenities in the form of tennis courts and basketball courts.

The Fleming Woods State Preserve, located three miles southwest of Montezuma, is a 38-acre state preserve. The land was donated to the Iowa Natural Heritage Foundation in 1982 by Mr. and Mrs. Wayne Fleming of Montezuma. The woodland contains a wide variety of tree species as well as wildflowers and wildlife, which visitors are welcome to observe. Activities prohibited at the preserve include: hunting, trapping, picnicking, camping, and collecting.

There are many wildlife areas in Poweshiek County, including: Barclay Timber, Cecil Rivers Timber, Deep River, Fox Forest, Lincoln, and Millgrove Wildlife Areas as well as Robertson's Access. All of these areas are over 35 acres in area feature wildlife, many tree species, and water bodies. For more information about any of these outdoor facilities visit the Poweshiek County Conservation website at http://www.poweshiekcountyparks.org/index.htm

Historic Sites

Besides outdoor recreation, Poweshiek County Iowa has many more cultural offerings in the form of historic sites. A few sites have been listed in the Poweshiek County jurisdiction on the National Register of Historic Places website at http://www.nationalregisterofhistoricplaces.com/. These include:

- Bowers and McDonald Office Building in Grinnell, added 1990. This was a significant architectural building between 1875 and 1899 functioning in commerce and trade.
- The Brooklyn Hotel in Brooklyn, added 1975. This was a significant Italian-Villa style architectural building between 1875 and 1899, functioning still, as a hotel.
- Chicago, Rock Island and Pacific Railroad-Grinnell Passenger Station, aka Grinnell Union Depot; Rock Island Lines Passenger Station in Grinnell, added 1976. This was a significant architectural station between 1875 and 1899 functioning as a rail-related transportation hub.
- Goodnow Hall on Grinnell College campus in Grinnell, added 1979. This Romanesque style building was a significant architectural hall between 1875 and 1899, functioning in college education.
- Grinnell Herald Building, aka Architectural Legacy of Proudfoot & Bird in Iowa MP in Grinnell, added 1991. This Classic Revival style architectural building was a significant communications facility in the time periods of 1990-1924 and 1925-1949 functioning in industry, processing, and extraction.
- Grinnell Historic Commercial District, aka Merchants National Bank in Grinnell, added 1991. This district was significant in the periods of 1850-1874, 1875-1899, 1900-1924 including a Department Store, Financial Institution, and Specialty Store functioning in commerce and trade. These functions are still present today.
- Grinnell, Levi P., House in Grinnell, added 1979. This Greek Revival style building was a significant architectural structure from 1850 to 1874 as a personal dwelling. Today it is used for education related housing.
- Interior Telephone Company Building in Grinnell, added 1990. This Chicago style building was significant from 1900 to 1924 as a communications facility functioning in industry, processing, and extraction.

- Manatt, William, House in Brooklyn, added 1997. This settlement was significant in the periods of 1850-1874 and 1875-1899 as a residential dwelling. Today it is used as an educational library.
- Marsh, E.A. and Rebecca (Johnson), House in Grinnell, added1999. This Queen Anne style building was significant from 1875 to 1899 as a residential dwelling. Today it is used as a hotel.
- McDowell Bridge in Montezuma, added 1998. This was a significant engineering structure between 1875 and 1899 functioning in road-related transportation. It is not in use presently.
- Mears Hall on the Grinnell College campus in Grinnell, added 1979. This architecturally significant building was important from 1875 to 1899 as education related housing, and continues in that function in the present.
- Merchants' National Bank in Grinnell, added 1976. This Late 19th And Early 20th Century American Movements style building was significant from 1900-1924 and 1975-2000 as a financial trade institution functioning in commerce and trade.
- The Montezuma Public Library in Montezuma was added in 1983 and has since become the Poweshiek County Historical Society.
- New Carroll House Hotel in Montezuma, aka Carter Hotel, added 1979. This building was significant from 1875 to 1899 as a hotel which is presently vacant.
- Poweshiek County Courthouse in Montezuma, added 1981. This Greek revival building was significant between 1850 and 1874 as a government building.
- Raymond, P. P., House in Malcom, added 1985. This Second Empire style building was significant as a residential dwelling between 1850 and 1874.
- Ricker, B. J., House in Grinnell, added 1979. This Prairie School style building was significant between 1900 and 1924 as a residential dwelling.
- Spaulding Manufacturing Company in Grinnell, added 1978. This was a significant industry building used as a manufacturing facility in the time periods of 1875-1899, 1900-1924, and 1925-1949, functioning in the areas of industry, processing, and extraction. Today the building is used as a business clubhouse for commerce, trade, and social events.
- Spencer, Charles H., House, aka First Church of Christ, Scientist, in Grinnell, added 1980. This building was significant between 1850 and 1874 as a residential dwelling which has since become a religious building.
- Stewart Library, aka Stewart Public Library, in Grinnell, added 1976. This Romanesque style building was significant in 1902 as an educational library; it has since become the Grinnell Arts Center and Gallery.

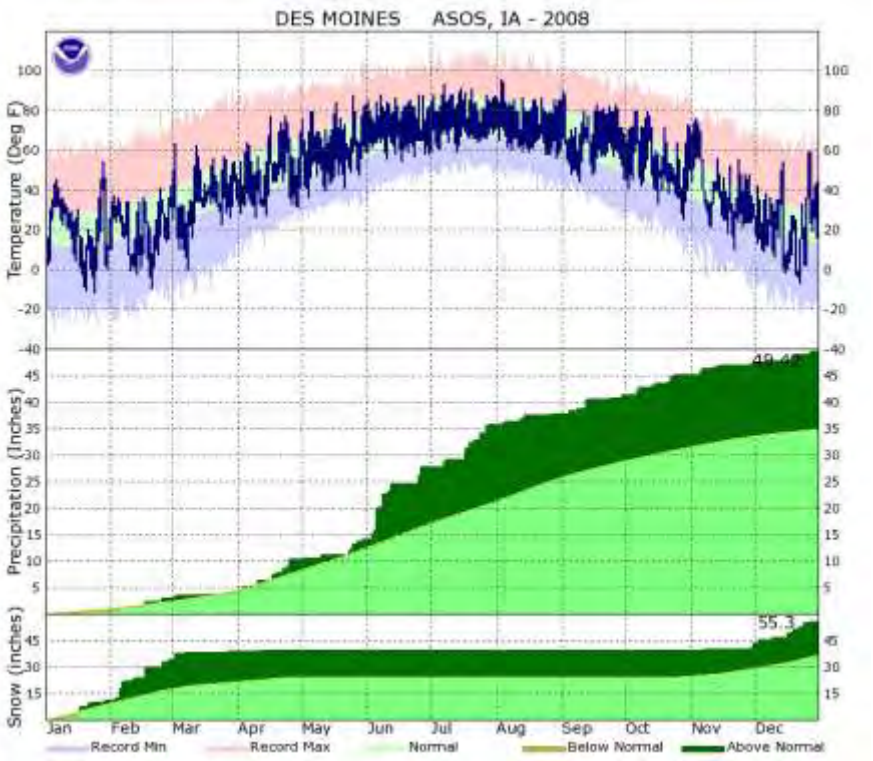
Climate

Poweshiek County is cold in winter, dropping to lows of 10 degrees in January and moderately hot with occasional cool spells in summer, reaching highs of 85 degrees in July. Precipitation during the winter frequently occurs in snowstorms. During the warm months, it is chiefly showers, which often are heavy with an average of 34.4 inches annually, and occur when warm, moist air moves in from the south. The total annual rainfall is normally adequate for corn, soybeans, and small grain.

The chart in Figure 3.1.15 graphically depicts monthly and yearly observed maximum, minimum, and precipitation recorded by the automated surface observing station (ASOS) located at the Des Moines International Airport. Additionally, it also depicts normal and record temperature only.

In 2008, the highest temperatures for the area occurred in July and August. No new record temperatures were recorded for this year. The most precipitation and largest amount of snow was received in December, and these levels exceeded what is normal for this time of year. Snow reached a level of 55.3 inches, and overall precipitation reached almost 50 inches.

Figure 3.1.15: Des Moines International Airport ASOS in 2008



Data Source: National Oceanic and Atmospheric Association, 2008

Poweshiek County frequently experiences severe weather events throughout all the seasons. In the winter, the county experiences severe winter storms while weather events like severe thunderstorms, hail, and lightning affect the county in the spring. In the summer season, tornados and extremely high temperatures prove to be dangerous while more storms and early snow can affect the county in the fall.

Agriculture

The National Agricultural Statistics Service as a part of the United States Department of Agriculture conducts "The Census of Agriculture" every five years. This survey covers practically every aspect of U.S. agriculture, some examples including: production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers.

In 2007, the Census of Agriculture counted 2,204,792 farms in the United States. Poweshiek County had 938 farms which lie on 312,853 acres of land; this accounts for 83 percent of the surface land in the county and is one percent of the 92,856 farms in the State of Iowa. Farms on average are larger in Poweshiek County, at 334 acres, than the statewide average of 311 acres. For the most part, hogs and pigs are the largest number of any animal sold on Poweshiek County farms with 199,842 hogs and pigs across 50 farms. On the crop side, corn is the biggest seller with 21,549,205 bushels coming off of 125,521 acres from 479 farms. Sales per farm in Poweshiek County were $176,636 in 2007.

According to the Iowa State Extension, "Poweshiek County agriculture provides 1,812 jobs representing 13 percent of Poweshiek County's total workforce of 13,907." (ISU Extension, 2010) These jobs are ag-related including farm owners, farm laborers, crop and livestock consultants, veterinarians, feed suppliers, food processors, farm machinery operators and fertilizer manufacturers.

3.2 Jurisdiction Descriptions and Capabilities

Unincorporated Poweshiek County

Government

The county seat for Poweshiek County is the City of Montezuma, which is located in the south central portion of the county. The Poweshiek County Board of Supervisors has three positions; there is a chairman, vice-chairman, and member, all of which serve the county at large. The county is not divided up into specific districts based on location. Regular Board of Supervisors meetings are held every Monday and Thursday morning in Montezuma.

The county government comprises several individual positions, departments, and organizations. These include both elected and appointed positions. Elected positions in the county include: the Board of Supervisors, Sheriff, County Attorney, Auditor, Treasurer, and Recorder. All other department directors and staff are by appointment including central point of coordination, conservation board, emergency management, engineer, general relief, planning and zoning, public health and home care, sanitarian and environmental health, and veteran's affairs. The Poweshiek County website— http://www.poweshiekcounty.org/index.htm —lists the current individuals filling positions as well as important notifications, events, and meeting minutes.

Poweshiek County Courthouse in Montezuma

Image Source: Poweshiek County, 2010

Land Use and Planning

In 2006, a comprehensive land use plan was written and adopted by the Planning and Zoning Commission and Board of Adjustments of Poweshiek County. The Plan presents four major considerations for land use decision-making, including; rural development, rural residential development, rural residential policies, and agricultural lands. Most of these considerations are meant to protect the agricultural interests of the county. The main recommendation is that development should be; appropriate for the area, not be allowed on prime agricultural land and should not cause soil degradation, erosion, or loss.

As for general planning in Poweshiek County, much of the planning work is contracted out to the Region 6 Planning Commission or other organizations. This particular plan was contracted between Poweshiek County Emergency Management and the Region 6 Planning Commission.

Zoning

Iowa Code, 335.2 states that agricultural uses are not subject to zoning unless located in the floodplain. Consequently, state agricultural interests are protected but special considerations must be taken if the agricultural use is located in the floodplain. Special requirements may need to be enforced in order to prevent crop and livestock loss, erosion, increased chemical run-off, or other events that may result due to being located in the floodplain.

Flood prone areas in the unincorporated portions of the county, though, may present an issue. Areas not identified as a floodplain but are prone to flooding events are not subject to zoning so little control can be exercised in regulating the use of this land.

It is also important to note that county zoning *only* applies to the unincorporated areas in the county. The zoning ordinance enforced by the county does not apply to incorporated cities so the jurisdictions included in this plan are not subject to county zoning. This is stated in Iowa Code 335.3.

Furthermore, Iowa Code Chapter 335 states that the objective of zoning regulation should encompass not just protecting the health and general welfare of the public but also "securing safety from fire, flood, panic, and other dangers" (Iowa Code 335.5). This section of the Iowa Code is important, because it requires the county to take hazards both natural and man-made into consideration when creating and enforcing zoning regulations.

To review Iowa Code Chapter 335 and all other chapters, the Code can be accessed online at http://www.legis.state.ia.us/IowaLaw.html.

Subdivision Regulation

Another land use regulation tool in Poweshiek County is the Land Subdivision Regulation, which is an ordinance that provides rules, regulations, and standards to guide land subdivision in the County's unincorporated areas. Considerations for hazard mitigation in this ordinance relate to flooding. The following statement can be found in Poweshiek County's subdivision design standards:

> No land shall be approved for subdivision which is subject to periodic flooding or which contains extremely poor drainage facilities unless the subdivider agrees to make improvements that will, in the opinion of the County Engineer, make the area completely safe for occupancy and provide adequate drainage. Land located within a flood hazard area or a floodway may be included with a plat, subject to the approval of the Board of Supervisors, if it is reserved for open space or recreation use and maintained by all owners of lots in the subdivision through an agreement, or if it is dedicated to the County as public open space for recreation or for flood control purposes.

The ordinance does not completely prevent the subdivision of land that is subject to flooding, but improvements to prevent flooding are at least required before subdivision is allowed.

Building Codes

Currently the county does not enforce any county specific building codes. Only the standard State of Iowa buildings codes are enforced. The State's building code can be found on the Iowa Department of Public Safety website (http://www.dps.state.ia.us/). Certain jurisdictions do have their own building codes, while other communities choose not to enforce building codes. These will be discussed in each jurisdiction's section to follow.

With the relatively recent (March 1, 2009) state requirement of electrical permits, there will be more oversight in building quality in Poweshiek County. A permit is required in unincorporated areas for new electrical installations in residential, commercial, and industrial properties. This requirement was cited by the county planning administrator as a major step in enforcing and maintaining building quality in Poweshiek County.

Floodplain Management

There are very few floodplains in Poweshiek County. All jurisdictions in the county have been mapped except Grinnell, Deep River, and Hartwick. The portions of jurisdictions located in a flood hazard area are very small. Montezuma is the only the jurisdiction that is compliant and active in the National Flood Insurance Program, although no residents have a policy.

Other Mitigation Activities

Other hazard mitigation activities include the CodeRED system, which is a high-speed emergency notification system that sends warning messages to certain areas in Poweshiek County or the entire county through telephone. This system is new to Poweshiek County and not all cities are registered at this time. Officials will be able to deliver hazard warnings or public safety messages. Poweshiek County residents can choose to participate in this system by registering their land line or cell phone through the link provided on the Poweshiek County Sheriff's Office website.

Another hazard mitigation activity completed by Poweshiek County was a commodity flow study which helped to determine the types of hazardous materials that are being transported in both the east (Interstate 80 and E 156) and west (Interstate 80 and Highway 21) direction on Interstate 80 and the hazardous materials passing through the intersection located at Highway 63/Highway 6. The persons gathering the information were located at each of the three intersections for 72 hours in 12 hour shifts. The number of trucks were captured by class from 1 to 9. This study is an agreement with the Waterloo Hazardous Materials Regional training center where the information has been sent and the report is currently being developed.

Utilities and Services in Unincorporated Poweshiek County

All essential and basic services are available to those who live in unincorporated Poweshiek County. A wide variety of public but mostly private organizations provide these services. Below, all of the services and providers are listed.

- **Electricity:** Alliant, Brooklyn Municipal Utilities, Grinnell Municipal Utilities, MidAmerican, Montezuma Municipal Utilities, Rural Electric Cooperative
- **Natural Gas:** Alliant Energy, Magellan Pipeline, Montezuma Natural Gas, Northern Border Pipeline, Northern Natural Gas, Nustar Pipeline, and OneOK NGL Pipeline
- **Water:** Poweshiek Rural Water, Brooklyn Water, Grinnell Water, and Montezuma Water
- **Phone Service:** Barnes City Telephone, Brooklyn Telecommunications, Iowa Telecom, Montezuma Telephone, Searsboro Telephone, and Cooperative Telephone (Guernsey, Hartwick, Victor)
- **Cable/Internet Provider:** Brooklyn Telecommunications, Direct TV, Inter-County Cable, Mediacom, and Montezuma Telephone
- **Emergency Medical Service:** Depending on where the medical emergency occurs, a predetermined emergency medical response department will respond to the emergency, including Barnes City and Victor. East Poweshiek Ambulance Service, Grinnell, Montezuma, and Midwest Ambulance are the transport.
- **Law Enforcement:** Poweshiek County Sheriff's Office and Grinnell Police Department
- **Fire Protection:** Barnes City Fire Department, Brooklyn Fire Department, Deep River Fire Department, Grinnell Fire Department, Hartwick Fire Department, Malcom Fire Department, Montezuma Fire Department, Searsboro Fire Department, and Victor Fire Department
- **Hazardous Materials Assistance:** Northeast Iowa Response Group in Waterloo
- **Fuel:** Kwik Trip, Pilot, and Kum & Go in Brooklyn, three Casey's, three Kum & Go's, Fast Stop, and Phillips 66 in Grinnell, Sinclair in Malcom, and Casey's and DJ's in Montezuma

- **Grocery Store:** Seaton's Flag Foods in Brooklyn, Fareway, HyVee, McNally's, and Wal-Mart in Grinnell, and Super Value in Montezuma
- **Solid Waste Removal:** Audus Sanitation and City of Grinnell
- **Landfill:** Mahaska County Landfill
- **Recycling:** Audus Sanitation, City of Grinnell, and the Poweshiek County Transfer Station
- **Public Transit:** Peoplerides

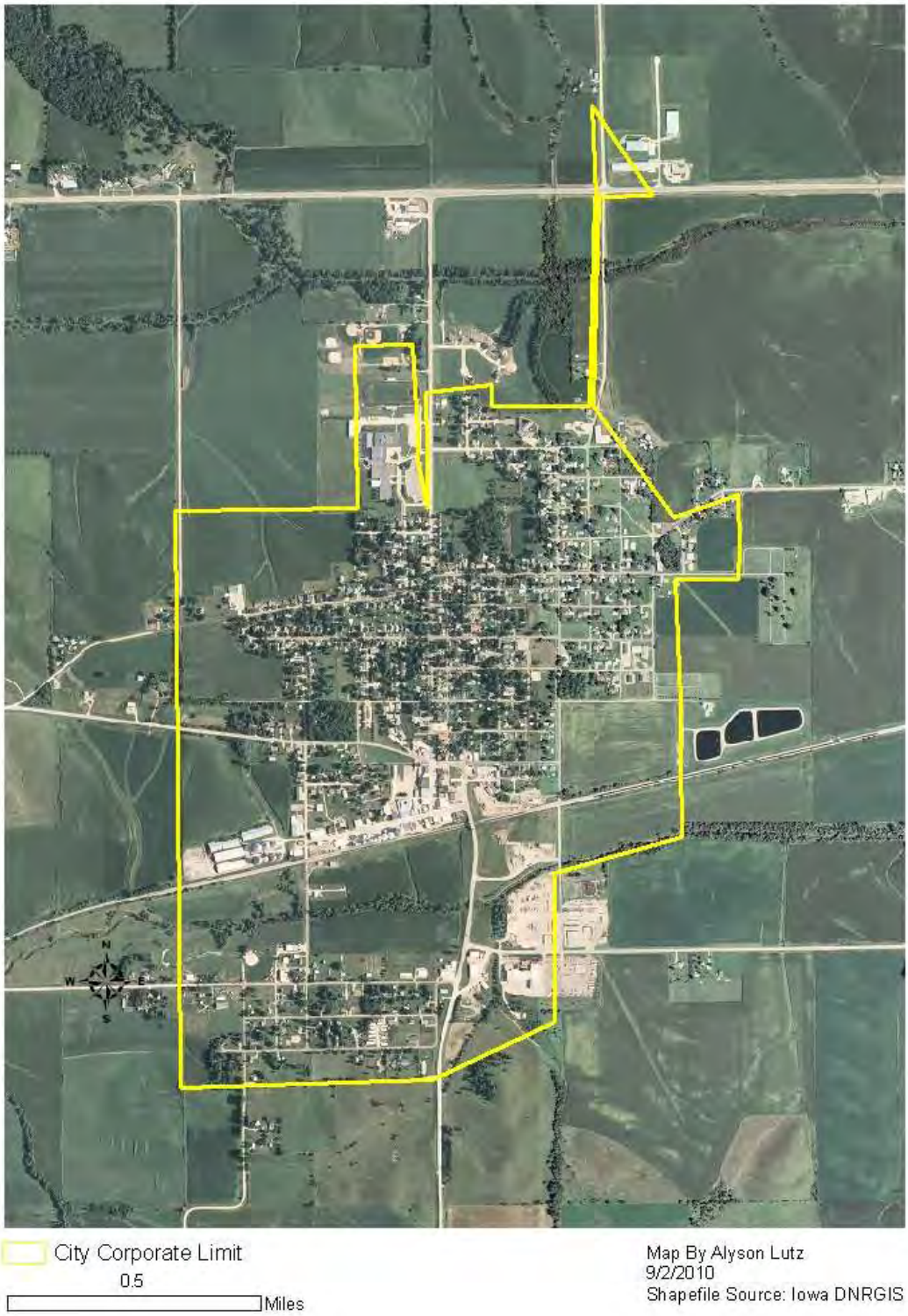
As indicated in the service list above, some services are provided to unincorporated areas by nearby cities. This is true for mainly fire protection and emergency medical services.

City of Brooklyn

Overview

The City of Brooklyn is located in northeastern Poweshiek County at the intersection of county road V18 and U.S. Highway 6. Brooklyn is also located just 2 miles north of Interstate 80.

Figure 3.2.1: Brooklyn, Iowa



According to The Brooklyn Paper; Brooklyn, Iowa, though it may come as a shock, is not named after Brooklyn, New York. The name was changed from Greenfield in 1859 when the town moved its downtown to be closer to the new railroad line. It is said that the mayor went to the highest point in town to look out over the landscape to find a name. When he saw that the town was located between two rivers, he decided upon "Brookland". The name has since been shortened to 'Brooklyn'. (Community Newspaper Group, 2008)

As luck would have it for this small Midwestern town, Brooklyn was on the main stagecoach route between Dubuque and Des Moines. Another stroke of luck brought the railroad through town meaning Brooklyn could support an opera house and the Victorian hotel downtown. As infrastructure has evolved, Interstate 80 was built through the Midwest just 2 miles south of town. This project brought visitors to the town who were curious as to its resemblance to Brooklyn, NY.

Brooklyn has made itself known as the "Community of Flags" ever since Alex Werhle, a 70 year old German immigrant, created a display of all 50 state flags and a few foreign countries' flags. He said that in America, flags are a source of pride whereas in his native Germany, flags were flown for Hitler, and since, no one wanted to see flags waving.

The major businesses, social groups, and events, located in Brooklyn are:

1. Flag Days
2. Flag Store
3. Brooklyn Economic Development
4. Brooklyn Chamber of Commerce
5. Restaurants
6. Medical Clinic
7. Pharmacy
8. Wellness center
9. BGM Community School District
10. Nursing Home
11. Bank
12. Churches
13. Businesses
14. Grain elevator
15. Cement company
16. Hardware store
17. Electronics
18. Gas station/Convenience store
19. Men's softball
20. Coed volleyball
21. Softball complex
22. Community service groups
23. Little league
24. Bear Creek
25. University extension
26. BGM Nature Center
27. MJM Community Center
28. Housing development
29. Brooklyn Museum
30. Bear Creek Addition
31. Industrial Park
32. Telephone
33. Cable
34. Brooklyn Municipal Utilities
35. 200,000 gallon water tower
36. Poweshiek Water Association
37. DOC's Auto Repair
38. NAPA
39. Trail by school
40. Walking trail in Bear Creek Addition
41. City parks
42. Brooklyn Public Library

Utilities and Services in Brooklyn

Most basic services except a grocery store are available in Brooklyn. Electricity, gas, water, fire protection and a library are provided by the City while all others are contracted to private companies or nearby communities. Services and providers are listed below in Table 3.2.1.

Table 3.2.1: Brooklyn Utilities and Services

Service	Provider
Electricity	Brooklyn Municipal Utilities
Gas	Brooklyn Municipal Utilities
Water	City of Brooklyn
Phone Services	Brooklyn Telecommunications
Cable/Internet Provider	Inter County Cable
Emergency Medical Service	East Poweshiek County Ambulance
Law Enforcement	Poweshiek County Sheriff's Dept.
Fire Protection	Brooklyn Volunteer Fire Department
Warning System	Siren with backup power operated by Fire Dept
HazMat Assistance	Northeast Iowa Response Group
Fuel Station	Kum & Go, Brooklyn Service Center
Grocery/Convenience Store	Kum & Go, Seaton's Flag Foods
Solid Waste Removal	Audas Sanitation
Landfill	South Central Iowa Solid Waste Agency and Poweshiek County Transfer Station
Library	Brooklyn Public Library
Recycling	Audas Sanitation
Public Transit	Peoplerides
Medical Clinic	Brooklyn Medical Clinic

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group (NIRG), in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

The city is governed by a mayor and 5-member city council that maintains and enforces the city's code of ordinances. Regular council meetings are held the first and third Monday of every month.

As for hazard mitigation related regulation, to attract development, the city does not enforce building codes beyond the standard Iowa building codes. By not enforcing the strict building codes,

new development in the community is more affordable than in other communities. The city also does not have a formal zoning ordinance to enforce land use aside from floodplain management.

A very popular city regulation related to hazard mitigation involves maintaining a floodplain management ordinance, which allows city residents to participate in the National Flood Insurance Program (NFIP). The floodplain management ordinance applies to the areas identified in city's floodplain map as having a 1% chance of flooding each year. Currently, Brooklyn's status is in the process of applying for NFIP.

Technical and Fiscal Resources

The City of Brooklyn operates like many small cities in Iowa. The mayor, council, city clerk, and part-time maintenance staff handle the city's daily and long-term operations. Short-term and long-term planning needs like grant writing and management and plan preparation are handled by the local council of government, the Region 6 Planning Commission. The City of Brooklyn is a member of the Commission and uses their services and expertise regularly.

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

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Brooklyn, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

In the past several years, Brooklyn has been granted money for sewer improvements and a new public safety building.

Brooklyn is very interested in participating in Poweshiek County's CodeRED system once it is fully set up. With participation in the system, Brooklyn residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered.

City of Deep River

Overview

Deep River is located in the southeastern portion of Poweshiek County. IA 85 runs through the town while IA 21 runs north/south on the east side of town. Deep River is eight miles east of U.S. Highway 63.

Figure 3.2.2: Deep River, Iowa

Deep River was established in 1884 after residents of Dresden (about a mile east of the present town of Deep River) moved to be near the Chicago and Northwestern Railroad. Deep River was incorporated in the summer of 1887 when Horace Phelps built a depot and gave the railroad $1500 to secure the location there. The citizens of Dresden then migrated and the new town of Deep River grew. Dresden was left with few inhabitants thereafter. The first town election resulted in the several following positions being established: mayor, recorder, treasurer, assessor, marshal, and councilmen. (Poweshiek County Historical and Genealogical society, 2009)

Utilities and Services

Some basic services are available in the City of Deep River except a library, medical clinic, grocery/convenience store and fuel for personal automobiles. The city does not provide any services so all are provided by either the County or private companies.

Table 3.2.2: Deep River Utilities and Services

Service	Provider
Electricity	Alliant Energy
Gas	Individual Propane Tanks by various providers
Water	Poweshiek Water Association
Phone Services	Windstream Communications (Iowa Telecom)
Cable/Internet Provider	Windstream Communications (Iowa Telecom)
Emergency Medical Service	Deep River EMT crew, Ambulance from Montezuma
Law Enforcement	Poweshiek County Sheriff
Fire Protection	Volunteer Fire Department
Warning System	Siren with backup power
HazMat Assistance	Northern Iowa Response Group
Fuel Station	None
Grocery/Convenience	None
Solid Waste Removal	Audas Sanitation
Landfill	Mahaska County Landfill
Library	None
Recycling	Audas Sanitation
Public Transit	Peoplerides
Medical Clinic	None

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group, in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

The City of Deep River is governed by a mayor and five-member city council that holds regular meetings on the first Monday of the month. As for hazard mitigation related regulation, to attract development, the city does not enforce building codes beyond the standard Iowa building codes. By not enforcing the strict building codes, new development in the community is more affordable than in other communities. The city also does not have a formal zoning ordinance to enforce land use aside from floodplain management. According to Iowa Homeland Security information, Deep River is not participating in the NFIP.

Technical and Fiscal Resources

The City of Deep River operates like many small cities in Iowa. The mayor, council, city clerk, and maintenance staff handle the city's daily and long-term operations. Short-term and long-term planning needs like grant writing and management and plan preparation are usually handled by the local council of government.

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

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Deep River, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

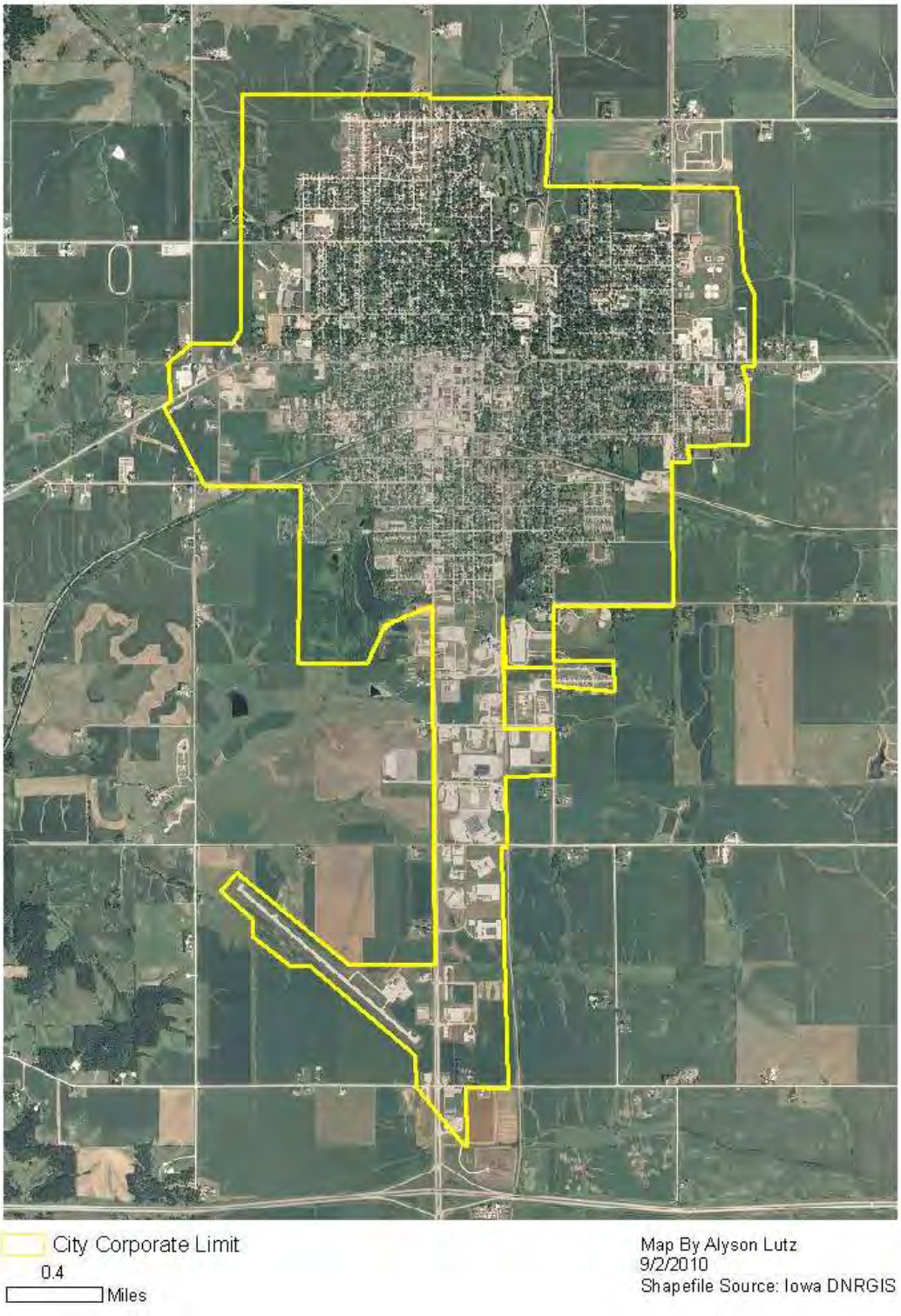
Deep River will participate in Poweshiek County's CodeRED system. With participation in the system, Deep River residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered to receive the warnings that are determined and issued by Poweshiek County officials.

City of Grinnell

Overview

Grinnell is located at the intersection of U.S. Highway 6 and Iowa Highway 146. Grinnell is 3 miles north of U.S. Interstate 80, and 7 miles west of U.S. Highway 63.

Figure 3.2.3: Grinnell, Iowa



In March 1854, J.B. Grinnell and three companions stopped in Westfield, Iowa, the first established town in Grant Township, to eat. They claimed some land north of Westfield and built a rough house. Later, they bought additional land and established the town of Grinnell. A college being a part of the community was a desire of the founders of Grinnell. Professor L.F. Parker established an academy, which merged with Iowa College and later became Grinnell College. (Poweshiek County Historical and Genealogical Society, 2009)

Grinnell is a very diverse and active community in northwest Poweshiek County. The Grinnell downtown is made up of several businesses. The city also has many cultural and recreational opportunities The Grinnell-Newburg School District, Iowa Valley Community College and Grinnell College are located in Grinnell, too.

Utilities and Services

All basic services are available in Grinnell. Grinnell is one of few cities in Poweshiek County that purchases electricity and distributes to the city. Overall, most basic services are provided by the City, which is not the case in many Poweshiek County cities.

Table 3.2.3: Grinnell Utilities and Services

Service	Provider
Electricity	Alliant Energy
Gas	Alliant Energy
Water	City of Grinnell
Phone Services	Windstream (Iowa Telecom)
Cable/Internet Provider	Mediacom, Iowa Telecom (Direct TV)
Emergency Medical Service	Midwest Ambulance
Law Enforcement	City Police Services, Poweshiek Co Sheriff
Fire Protection	5 full-time fire fighters
Warning System	3 sirens
HazMat Assistance	Northeast Iowa Response Group
Fuel Station	Kum and Go, Casey's, Almost Always Open
Grocery/Convenience	Fareway, Hy-Vee, Super Value, Wal-Mart
Solid Waste Removal	City of Grinnell
Landfill	Mahaska County Landfill
Library	City of Grinnell – Stewart Library/Drake Library
Recycling	City of Grinnell
Public Transit	Peoplerides
Medical Clinic	Grinnell Regional Medical Center

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group (NIRG), in Waterloo, because that fire department has the needed training and equipment. The

NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

The City of Grinnell is governed by a mayor and five-member city council that hold regular meetings the first and third Monday of each month. The City maintains and enforces a code of ordinances. This is the only city in Poweshiek County that has a building inspection and code enforcement department.

The zoning districts and requirements in Grinnell are traditional and regulate use, location, density, site development, and appearance. There are no requirements or restrictions dealing directly with hazard mitigation. Grinnell is one of five cities in Poweshiek County that does not currently participate in the National Flood Insurance Program.

Technical and Fiscal Resources

The mayor, council, city clerk, and maintenance staff handle the city's daily and long-term operations. Also, many people in the Grinnell community are active in organizations, city projects, and various initiatives. Grinnell is also a member of the Region 6 Planning Commission and uses their services and expertise for certain projects.

There are multiple ways the City of Grinnell could finance a hazard mitigation project. This city in particular provides most utilities except natural gas so they have more fees to backup bonds than other cities. The financing resources available to the City of Grinnell are below.

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Grinnell, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

Grinnell will participate in Poweshiek County's CodeRED system. With participation in the system, Grinnell residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered.

City of Hartwick

Overview

The City of Hartwick is located in the northeast corner of Poweshiek County at the intersection of County Highway F17 and County Road V30. Hartwick is just 3 miles north of U.S. Highway 6 and 7 miles north of U.S. Interstate 80.

Figure 3.2.4: Hartwick, Iowa

Hartwick, Iowa was surveyed in August 1884, and official platting was filed in 1885. A station on the Chicago and Northwestern Railway Company rail line was located there. Hartwick is the smallest rural community in the planning boundary.

Utilities and Services

Several utilities and basic services are available in Hartwick. Utilities are not provided by the City, but safety services including fire protection and emergency response are provided. All other services are provided by private companies or Poweshiek County. For a full grocery store, gas station or medical clinic, residents must travel to larger communities with these services.

Table 3.2.4: Hartwick Utilities and Services

Service	Provider
Electricity	Alliant
Gas	None
Water	Hartwick Water System
Phone Services	Cooperative Telephone from Victor, IA
Cable/Internet Provider	Individual preference
Emergency Medical Service	Poweshiek County Sheriff and Fire Dept
Law Enforcement	Poweshiek County Sheriff
Fire Protection	Hartwick Volunteer Fire Department
Warning System	Warning siren
HazMat Assistance	Northeast Iowa Response Group, Waterloo
Fuel Station	None
Grocery/Convenience	None
Solid Waste Removal	S&J Sanitation
Landfill	Mahaska County Landfill
Library	None
Recycling	Individual providers
Public Transit	Peoplerides
Medical Clinic	None

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group (NIRG), in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

Government and Regulation

Hartwick is governed by a mayor and five-member city council that holds regular meetings on the second Wednesday of the month. There is no information on Hartwick's status with the NFIP from Iowa Homeland Security information. The City does not use any formal land use control like zoning or have city building codes or subdivision ordinance.

Technical and Fiscal Resources

The City of Hartwick operates like many small cities in Iowa. The mayor, council and city clerk handle the city's daily and long-term operations. Short-term and long-term planning needs like grant writing and management and plan preparation are usually handled by the local council of government, the Region 6 Planning Commission. The City of Hartwick is a member of the Commission and uses their services and expertise.

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

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Hartwick, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

Hartwick will participate in Poweshiek County's CodeRED system. With participation in the system, Hartwick residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered.

City of Malcom

Overview

The City of Malcom is located just 1.5 miles west of the geographic center of the county, just north of the intersection of U.S. Highway 63 and U.S. Interstate 80.

Figure 3.2.5: Malcom, Iowa

A brief history of the founding of the town of Malcom was created by the Poweshiek County Historical and Genealogical Society. Though organized in September 1858, the town of Malcom was not platted till the Chicago, Rock Island and Pacific Railway came, and a depot was built in 1863. Malcom became known as "Little Chicago" because of the number of cattle shipped from the town. Mr. L.E. Cardell, one of the first settlers, served as the first postmaster and Justice of the Peace in Malcom. His home was the first stagecoach stop; the stage road ran from Iowa City to Des Moines, and has become US Highway 6. Several resources and structures were organized and built by the hands of Malcom citizens, including the first log cabin, sawmill, and school in Malcom Township. The Pioneer Hotel, the Green Mountain Inn, the bank, and three churches were formed and operated in Malcom, as well.

Utilities and Services

Though Malcom is one of the smaller cities in Poweshiek County, all services including full grocery store are available to residents. Only water utilities are maintained by the City while all other utilities are through private companies. Safety services are provided by the City and Poweshiek County.

Table 3.2.5: Malcom Utilities and Services

Service	Provider
Electricity	Alliant
Gas	Alliant
Water	City of Malcom
Phone Services	Iowa Telecom/personal cell phones
Cable/Internet Provider	Inter-County Cable, Mediacom, Iowa Telecom
Emergency Medical Service	1st Responders
Law Enforcement	Poweshiek County Sheriff
Fire Protection	Malcom Volunteer Fire Department
Warning System	Warning siren
HazMat Assistance	Northeast Iowa Response Group, Waterloo
Fuel Station	Malcom Mini Mart – recently closed
Grocery/Convenience	Malcom Mini Mart – recently closed
Solid Waste Removal	Audas Sanitation
Landfill	Mahaska County Landfill
Library	None
Recycling	Audas Sanitation
Public Transit	Peoplerides
Medical Clinic	None

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group

(NIRG), in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

Malcom is governed by a mayor and five-member city council that holds meetings on the first Monday of the month. The city does not enforce building codes beyond State of Iowa building code requirements. The city does enforce a code of ordinances, which includes floodplain management. According to Iowa Homeland Security information, Malcom is not participating in the National Flood Insurance Program.

Technical and Fiscal Resources

The City of Malcom operates like many small cities in Iowa. The mayor, council, city clerk, and maintenance staff handle the city's daily and long-term operations. The City of Malcom is a member of the Region 6 Planning Commission and uses their services.

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

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Malcom, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

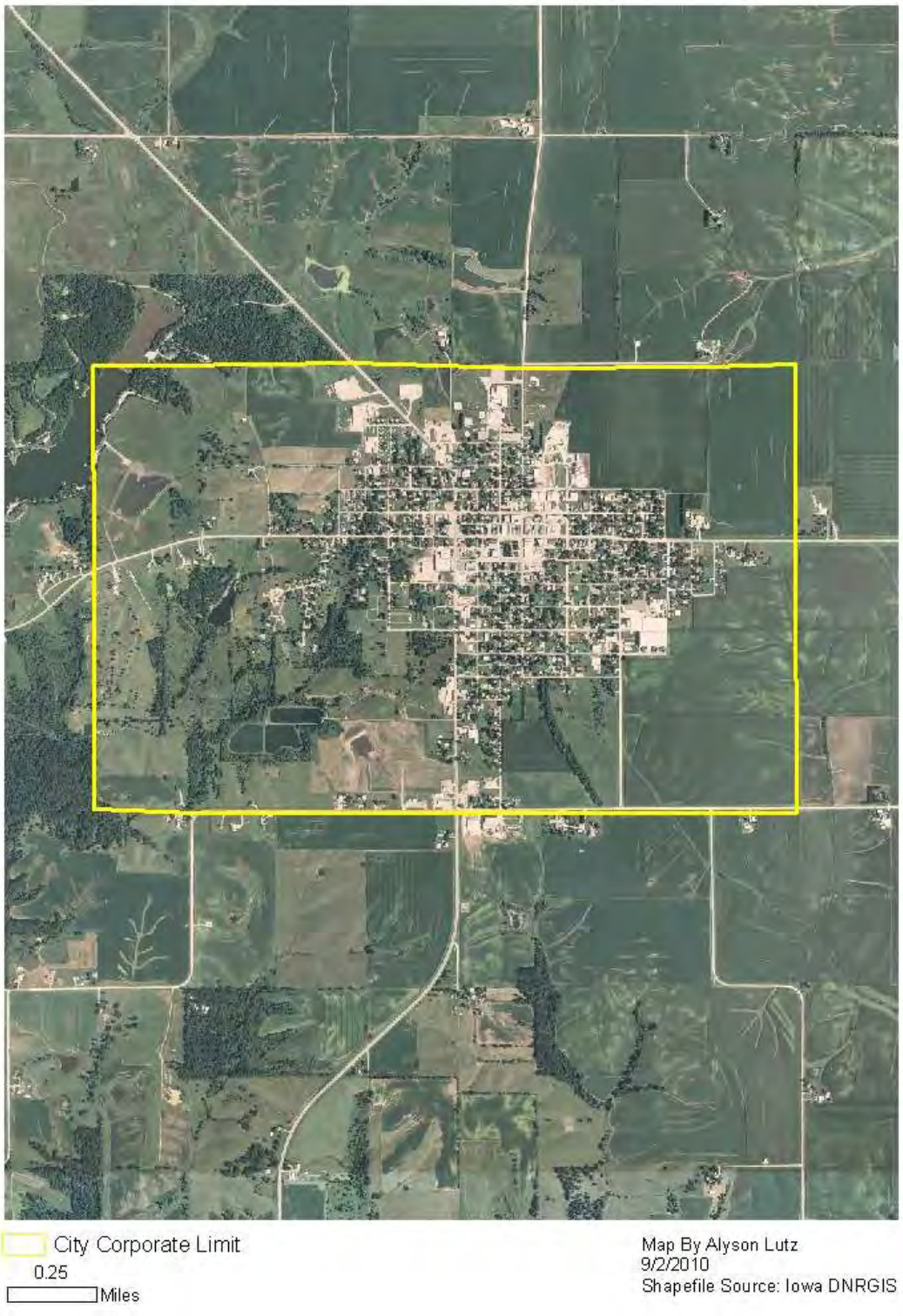
Malcom will participate in Poweshiek County's CodeRED system. With participation in the system, Malcom residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered to receive the warnings that are determined and issued by Poweshiek County officials.

City of Montezuma

Overview

Montezuma is the county seat of Poweshiek County and located at the intersection of Iowa Highway 85 and U.S. Highway 63. Montezuma is just 8 miles South of U.S. Interstate 80.

Figure 3.2.6: City of Montezuma



The town of Montezuma, named after the last ruler of the Aztec Empire by veterans of the war with Mexico, was platted and founded in 1848; it was designated as the county seat, which it remains, today. Gideon and Isaac G. Wilson were the first residents of Montezuma. A Methodist, Presbyterian and Christian Church were all organized in the county and a coal mine was established on Buck Creek. The first newspaper in the county, the Montezuma Republican, was published in 1856 and is still in publication today.

Utilities and Services

Montezuma provides all utilities while solid waste/landfill/recycling are provided by private companies or other counties, and safety services are provided by the City and Poweshiek County. All basic services are available to Montezuma residents.

Table 3.2.6: Montezuma Utilities and Services

Service	Provider
Electricity	Mid America/Montezuma Municipal Light and Power
Gas	City of Montezuma
Water	Montezuma Municipal Water Department
Phone Services	Montezuma Telephone Service (owned by Windstream)
Cable/Internet Provider	Montezuma Telephone Service (owned by Windstream)
Emergency Medical Service	Montezuma Volunteer Ambulance Service
Law Enforcement	Poweshiek County Sheriff's Office
Fire Protection	Montezuma Volunteer Fire Department
Warning System	Two warning sirens, no backup power, set of by fire dept.
HazMat Assistance	Northeast Iowa Response Group, Waterloo
Fuel Station	City of Montezuma (filled by Heartland Co-op)
Grocery/Convenience	Montezuma Super Value, DJ-C Store
Solid Waste Removal	City contract with Audas Sanitation
Landfill	Mahaska County Landfill
Library	Montezuma Public Library
Recycling	City contract with Audas Sanitation
Public Transit	Peoplerides
Medical Clinic	Montezuma Medical Clinic

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group (NIRG), in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

Montezuma is governed by a mayor and 5-member city council that maintains the city's Code of Ordinances. The mayor and council hold regular meetings on the first and third Monday of the month. The City does not use any formal land use controls like zoning. Also, Montezuma's City Code does include a floodplain management ordinance. According to information from Iowa Homeland Security, the City is a participant in the National Flood Insurance Program but they do not have any policies in force.

Technical and Fiscal Resources

The City of Montezuma operates like many small cities in Iowa. The mayor, council, city clerk, and maintenance staff handle the city's daily and long-term operations. The City of Montezuma is a member of the Region 6 Planning Commission and uses their services and expertise for certain activities like grant and plan writing.

There are multiple ways the City of Montezuma could finance a hazard mitigation project. This city in particular maintains most of its utilities so fees for these services are available to finance projects. The financing resources available to the City of Montezuma are below.

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Montezuma, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

Montezuma will participate in Poweshiek County's CodeRED system. With participation in the system, Montezuma residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered to receive the warnings that are determined and issued by Poweshiek County officials.

City of Searsboro

Overview

Searsboro is located very close to the Poweshiek/Jasper County border, in southwestern Poweshiek County at the point where Iowa Highway 146 jogs south, east, and south again. It is approximately 10 miles west of Montezuma, the Poweshiek County seat, and less than 9 miles south of U.S. Interstate 80.

Figure 3.2.7: City of Searsboro

Searsboro was platted in 1870 and had a post office; that same year, the Central Railroad was built through the township. A historic fact includes that there was a stop on the northbound Underground Railway just south of the township.

Utilities and Services

The City of Searsboro provides both phone and cable/internet to Searsboro residents. Safety services are also provided by the City except law enforcement, which is provided by Poweshiek County. As for other services, Searsboro does not have a fuel station, grocery/convenience store, or a medical clinic. Residents must travel to Montezuma or Grinnell for these services.

Table 3.2.7: Searsboro Utilities and Services

Service	Provider
Electricity	Alliant Energy
Gas	Sully or Grinnell: Key (formerly SCE), Criswell, or New Century FS
Water	Poweshiek Rural Water Association
Phone Services	Searsboro Telephone
Cable/Internet Provider	Searsboro Telephone
Emergency Medical Service	Montezuma Ambulance
Law Enforcement	Poweshiek Co Sheriff
Fire Protection	Searsboro Volunteer Fire Dept
Warning System	Set of by Poweshiek Co Sheriff's Dept, Backup power
HazMat Assistance	Searsboro Fire Department has training
Fuel Station	None
Grocery/Convenience	None
Solid Waste Removal	Audus Sanitation
Landfill	Mahaska County Landfill
Library	Awtry Family Farm
Recycling	County Pick up
Public Transit	Peoplerides
Medical Clinic	None

There are no fire departments in Poweshiek County with the capability of dealing with major hazardous materials incidents. This service is provided by the Northeast Iowa Response Group (NIRG), in Waterloo, because that fire department has the needed training and equipment. The NIRG does hold a Hazmat Operation Class for all city fire departments in Poweshiek County so they have some basic training as first response. The local fire department must decide whether or not to contact Waterloo's Fire Department for assistance.

City Government and Regulation

Searsboro is governed by a mayor and 5-member city council that maintains and enforces the City's Code of Ordinances. On the first Monday of each month, the mayor and council hold a meeting. Searsboro's Code does not include building codes, zoning, or a subdivision ordinance. The Searsboro does not participate in the NFIP according to information from Iowa Homeland Security.

Technical and Fiscal Resources

The City of Searsboro operates like many small cities in Iowa. The mayor, council, city clerk, and maintenance staff handle the city's daily and long-term operations. Short-term and long-term planning needs like grant writing and management and plan preparation are usually handled by the local council of government, the Region 6 Planning Commission. The City of Searsboro is a member of the Commission.

There are multiple ways the City of Searsboro could finance a hazard mitigation project. Searsboro purchases electricity wholesale and distributes to residents along with maintain the city's water system so fees from utilities can be used toward debt incurred for projects. The financing resources available to the City of Searsboro are below.

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

Finance tools like impact fees cannot be used to fund projects because they are considered unconstitutional in the State of Iowa. For most projects in Searsboro, grants would need to be the main funding source in order for the project to be feasible.

Other Mitigation Activities

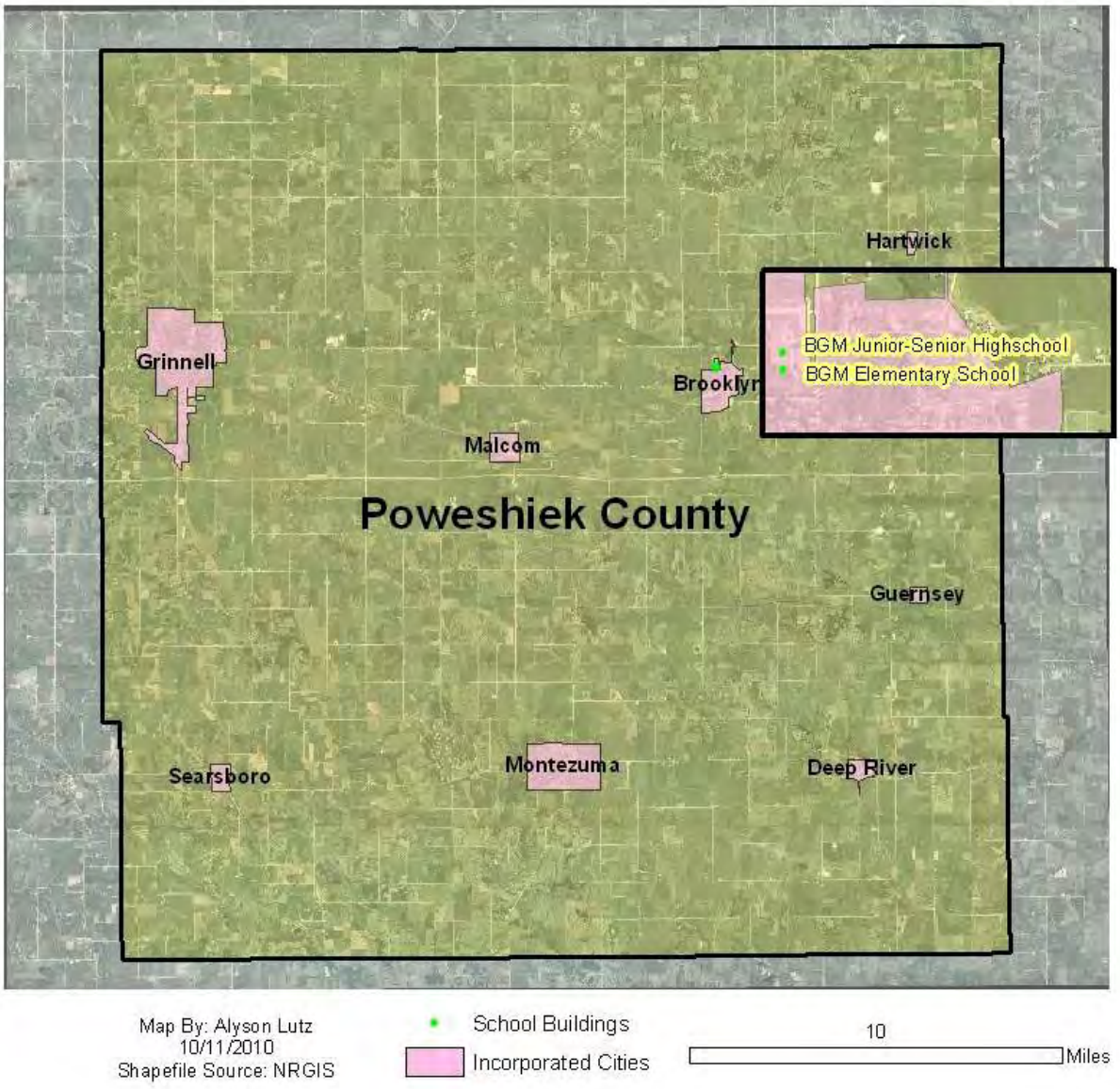
Searsboro will participate in Poweshiek County's CodeRED system. With participation in the system, Searsboro residents are notified of emergency situations in their area or across the entire county through messages by telephone. Both land lines and cell phones can be registered to receive the warnings that are determined and issued by Poweshiek County officials.

Poweshiek County School Districts

Brooklyn-Guernsey-Malcom Community School District

The Brooklyn-Guernsey-Malcom Community School District is located in Brooklyn, Iowa. Brooklyn is in the west central portion of Poweshiek County. This school district also serves the cities of Guernsey (to the south) and Malcom (to the west); each located less than 12 miles away. This district contains the Brooklyn-Guernsey-Malcom Elementary School and Brooklyn-Guernsey-Malcom Jr-Sr High School with enrollments of 301 and 282, respectively for the 2009-2010 school year. For more information, visit their website at www.brooklyn.k12.ia.us.

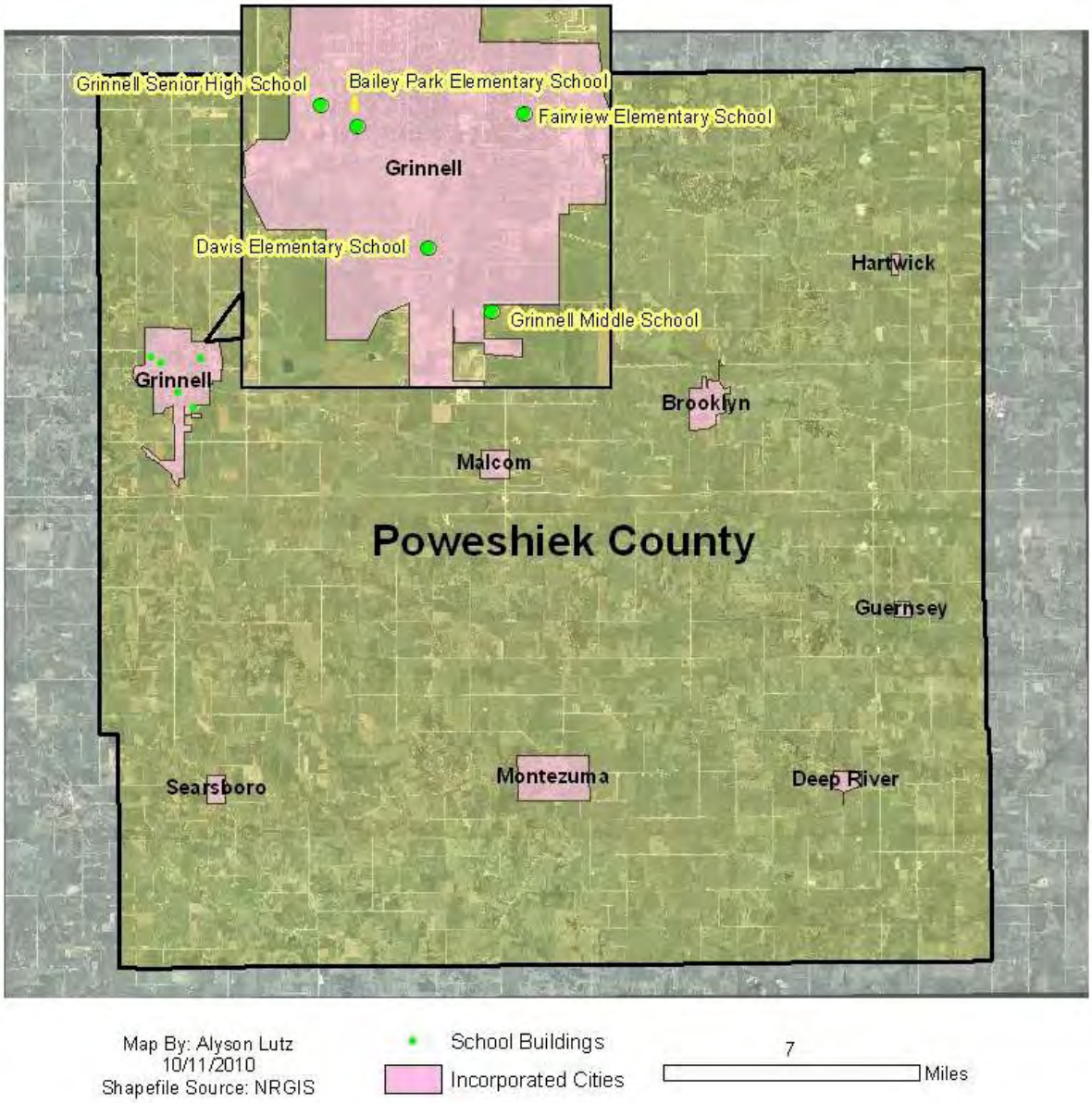
Figure 3.2.8: Brooklyn-Guernsey-Malcom Community School District Buildings



Grinnell-Newburg Community School District

The Grinnell-Newburg Community School District is located in Grinnell, Iowa. This school district also serves the city of Newburg (to the north), located less than 10 miles away. This district contains the Bailey Park Elementary School with a 189 student enrollment, Davis Elementary School with a 268 student enrollment, Fairview Elementary School with a 234 student enrollment, the Grinnell Community Middle School with a 507 student enrollment, and the Grinnell Community High School with a 558 student enrollment for the 2009-2010 school year. With a total enrollment of 1,756 students, the Grinnell-Newburg community school district is the largest in Poweshiek County. For more information, visit their website at http://www.grinnell.k12.ia.us

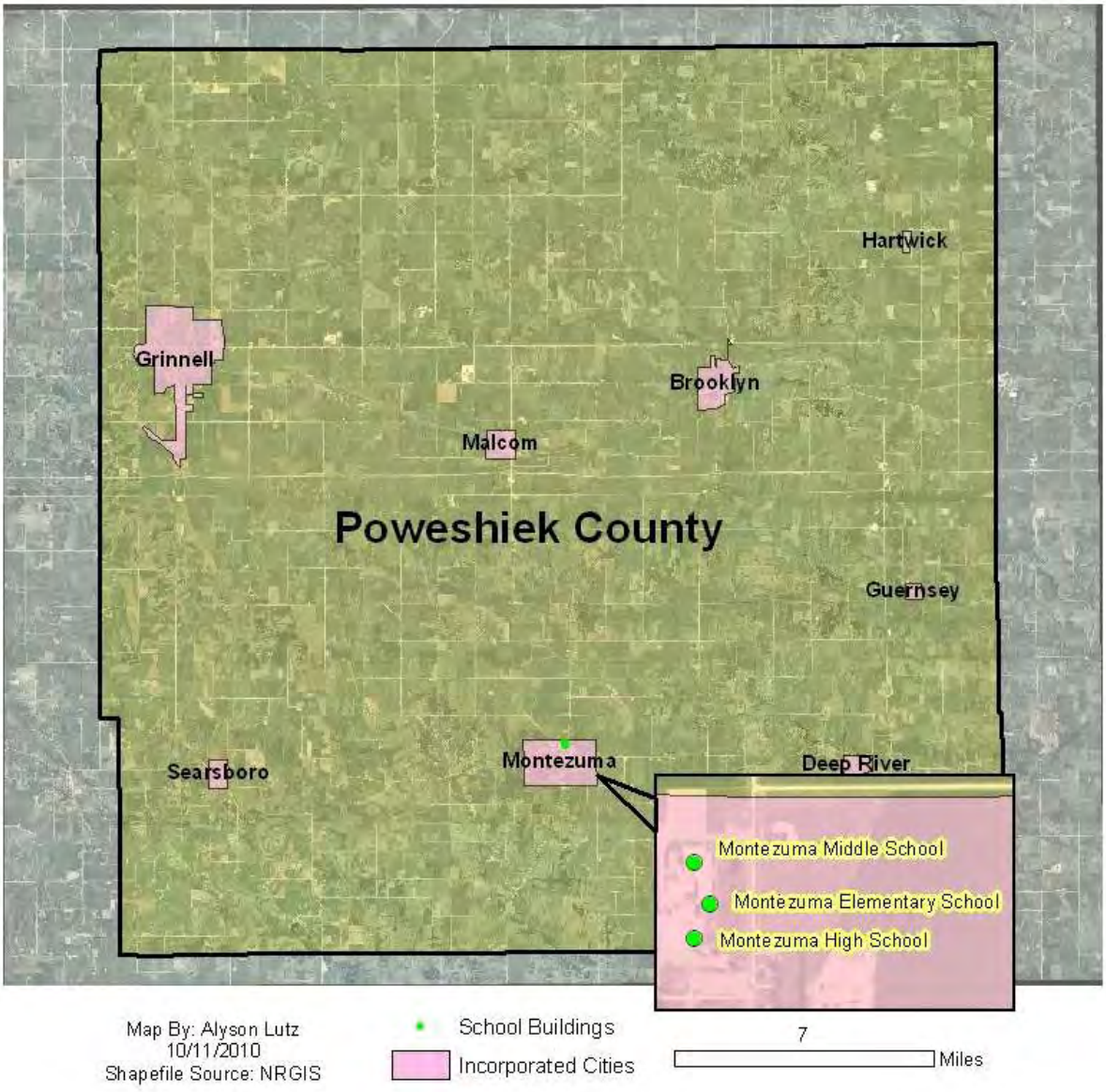
Figure 3.2.9: Grinnell-Newburg Community School District Buildings



Montezuma Community School District

The Montezuma Community School District is located in Montezuma, Iowa the county seat of Poweshiek County. Montezuma is located in the south central portion of the county. This district contains the Montezuma Elementary School with a 304 student enrollment, Montezuma Junior High School with a 74 student enrollment, and Montezuma High School with a 143 student enrollment for the 2009-2010 school year. With a total 521 students enrolled, the Montezuma community school district is the smallest school district in Poweshiek County. For more information, visit their website at www.montezuma.k12.ia.us

Figure 3.2.10: Montezuma Community School District Buildings



Government and Regulation

All of the school districts in Iowa are governed by a local school board that is elected by the public. School boards in Poweshiek County have either a five or seven-member board depending on how the district is divided. One member of the school board is chosen to be its president. Each school district's school board has several responsibilities and legal authorities. According to the Iowa Association of School Boards, some of the authorities include:

- Determine major educational goals and objectives, and implement a means of attaining the goals (mitigation through education)
- Adopt board policy which establishes the rules governing the operations of the school district (mitigation integrated into school policy)
- Utilize funds received through gifts, devises and bequests in the general or schoolhouse fund, unless limited by the terms of the grant (funding for mitigation projects)
- Insure against loss of property (major mitigation goal)
- Determine attendance centers for the district and the particular school each child will attend (determine the distance students must travel)
- Provide transportation services (transportation is extremely vulnerable to hazards)
- Incur indebtedness when authorized by the voters of the school corporation at an election (funding for mitigation projects)

This is not an exhaustive list of authority, but these are the authorities most relevant to hazard mitigation. Overall, the school board of the Poweshiek County school district can be extremely influential in the effectuation of hazard mitigation projects.

Aside from the school board, the superintendent and school district staff are extremely important to the operation of the school district. The superintendent is appointed by the school board and given the responsibility of running the daily and long-term operations of the school district. Along with each school building's principal, teachers, and staff, the superintendent is a key person in completing a hazard mitigation project.

Like all school districts in Iowa, each school building has emergency response plans in place. Emergency response activities like fire drills and student relocation during tornadoes or severe storms are practiced regularly. Many school buildings, though, do not have any prevention or mitigation measures in place.

Technical and Fiscal Resources

Each school district's school board, superintendent and staff, principals, teachers, and school staff are responsible for the district and each school building's daily and long-term operations. The public does have quite a bit of influence because it elects school board members and approves school tax levies in the community. Most planning efforts are handled within the school district and community unless recreational trails or hazard mitigation are involved. In those cases, the local council of government often gets involved.

Other Mitigation Activities

Each school district has plans and procedures for handling many hazards already like fire, tornado, severe weather, etc. The established procedures for these hazards are practiced on a regular basis through planned drills at school facilities. Also, the Grinnell-Newburg Community School District has applied in the past for Safe Routes to School money as the need arises. This program not only encourages kids to bike and walk to school, but helps school districts fund sidewalk and trail additions and improvements, which may help reduce traffic accidents involving pedestrians.

4 Risk Assessment

44 CFR Requirement §201.5(c)(2): [The plan shall include] a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential loss in Poweshiek County, including loss of life, personal injury, property damage, and economic loss from a hazard event. The risk assessment process allows communities in Poweshiek County to better understand their potential risk from natural hazards and provide a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. (Adapted from the Neosho County, MO 2009 Multi-hazard Mitigation Plan)

4.1 Hazard Identification

Ultimately, the hazards chosen for the plan were determined by the Task Force. First, Region 6 identified the hazards most likely to affect the county based on the 2007 Iowa Hazard Mitigation Plan, past disaster declarations in Iowa, research, and knowledge of the area.

Iowa has experienced 28 presidential declared disasters since 1990. The state's most recent disasters occurred in late summer of 2010, when severe storms and flooding caused significant impacts to Central Iowa. Iowa's disaster declarations are listed below.

Table 4.1.1: Disaster Declarations in Iowa 1990-2010

Date Declared	Disaster Type
7/29/2010	Severe Storms, Flooding, Tornadoes
7/27/2010	Severe Storms and Flooding
3/2/2010	Severe Winter Storms
2/25/2010	Severe Winter Storms
8/13/2009	Severe Storm
5/27/2008	Severe Storms, Tornadoes, Flooding
1/4/2008	Severe Winter Storm
9/14/2007	Severe Storms, Flooding
5/25/2007	Severe Storms, Flooding, Tornadoes
3/30/2007	Snow
3/14/2007	Severe Winter Storms
9/10/2005	Hurricane Katrina Evacuation
5/25/2004	Severe Storms, Tornadoes, Flooding
6/19/2002	Severe Storms, Flooding
5/2/2001	Severe Storms, Flooding
7/22/1999	Severe Storms, Flooding
5/21/1999	Severe Storms, Flooding, Tornadoes
7/2/1998	Severe Weather, Tornadoes, Flooding
11/20/1997	Severe Snow Storms
8/21/1996	Flooding
6/24/1996	Flooding
7/9/1993	Flooding, Severe Storm
4/26/1993	Flooding, Severe Storm
10/2/1992	Flooding, Severe Storm
12/26/91	Ice Storm
7/12/1991	Flooding, Severe Storm
9/9/1990	Flooding, Severe Storm
5/26/1990	Flooding, Severe Storm

Data Source: Iowa Homeland Security, April 2010

According to Iowa's presidential disaster declaration history, severe storms, severe winter storms, tornadoes, and flooding are the hazards that most frequently reach disastrous levels. Poweshiek County was not included in all of these disaster declarations. According to available data,

Poweshiek County was included in at least four disaster declarations since 1993. These disasters involved the hazards listed as reaching disastrous levels most often.

To start narrowing down the number of hazards, Region 6 started with the list of hazards that includes all of the hazards identified in Iowa's 2007 hazard mitigation plan. Refer to Table 1.1 for the full list. Based on research, Region 6 identified 25 unique hazards from the comprehensive list that could possibly affect Poweshiek County. The hazards that were considered a general threat are listed in Table 4.1.2.

Table 4.1.2: Probable Poweshiek County Hazards

Natural Hazards	Man-made Hazards
Drought	Animal/Crop/Plant Disease
Dam Failure	Communications Failure
Earthquake	Energy Failure
Extreme Heat	Hazardous Materials Incident
Expansive Soils	Highway Transportation Incident
Flash Flood	Pipeline Transportation Incident
Grass or Wildland Fire	Railway Transportation Incident
Hailstorm	Structural Failure
Landslide	Structural Fire
Levee Failure	
River Flood	
Severe Winter Storm	
Sinkholes	
Thunderstorms and Lightning	
Tornado	
Windstorm	

At the meeting, the Planning Team was asked to agree or disagree with the list of hazards in Table 4.1.2. The entire list of possible hazards (Table 1.1 minus Agro-Terrorism and Human Pandemic Disease) was provided so Planning Team members could add hazards to the list. Members were also able to eliminate hazards if they could provide sufficient reasoning. Hazards not on the list were also welcome to be added. There was no mention of any agro-terrorism and human pandemic disease by any Planning Team members so the hazard list oversight may not have affected the results. The final list of hazards for Poweshiek County is found on the next page.

The final list of hazards for Poweshiek County includes all except two of the natural hazards suggested by Iowa's State Hazard Mitigation Plan. About half of the man-made hazards identified in the Iowa Hazard Mitigation Plan are included, too. The three hazards removed from the list are expansive soils, landslides, and levee failure because they are not an issue in Poweshiek County. Three man-made hazards were added to the list including Air Transportation Incident, Conventional Terrorism, and Human Disease Epidemic.

44 CFR §201.6(c)(2)(i): *[The risk assessment shall include a] description of the type… of all natural hazards that can affect the jurisdiction…*

The following table lists all the natural hazards along with all of the manmade hazards that could possibly affect Poweshiek County. Definitions are included so there is consistently in how each hazard is understood in the context of this plan.

Table 4.1.3: Poweshiek County Hazards and Definitions

Hazard	Definition
Drought	Lack of precipitation for a long period of time
Dam Failure	A break in or threat from any water retention fixture
Earthquake	Shaking or vibrating of the earth
Extreme Heat	Temperatures in excess of 100 degrees Fahrenheit or 3 days of 90+ degrees
Flash Flood	Flooding with little or no warning where water levels rise at a fast rate
Grass or Wildland Fire	Uncontrolled fire that threatens life and property
Hailstorm	Balls or irregularly shaped lumps of ice fall with rain
River Flood	Rising or overflowing of a body of water onto adjacent land
Severe Winter Storm	Severe winter weather conditions that affect day-to-day activities
Sinkholes	Collapsed land surface
Thunderstorms and Lightning	Heavy rains, high speed winds, tornadoes, hail
Tornado	Rotating column of air with wind speeds that can exceed 200 miles per hour
Windstorm	Extreme winds associated with severe storms
Air Transportation Incident	Any incident involving military, commercial or private aircraft
Animal/Crop/Plant Disease	Medical, health, or sanitation threat to wildlife or domestic animals
Communications Failure	Breakdown or disruption of normal communications
Conventional Terrorism	Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom.
Energy Failure	Extended interruption of an energy source
Hazardous Materials Incident	Accidental release of chemical substances or mixtures that present a danger to the public
Highway Transportation Incident	Auto accident exceeding normal capabilities
Human Disease Epidemic	A medical, health, or sanitation threat to the general public (such as contamination, epidemics, plagues, and inset infection).
Pipeline Transportation Incident	Break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.)
Railway Transportation Incident	Derailment or accident threatening life and property
Structural Failure	Collapse of structures, includes roads, bridges, etc.
Structural Fire	Uncontrolled fire of structures that threatens life and property.

The natural hazards suggested by both FEMA and the State Hazard Mitigation Plan that are not being included in this particular plan are expansive soils, landslides, and levee failure. Expansive soils are not found in Poweshiek County and are not considered further in this Plan. Also, the lack of major elevation changes within Poweshiek County does not constitute a landslide threat to the people and property of Poweshiek County. Like expansive soils, landslides are not considered further in this Plan. There are no levees located in Poweshiek County.

Across Poweshiek County, there is variance in what hazards can affect particular jurisdictions. Some communities do not have a rail line and others are not susceptible to Sinkholes. Poweshiek County is just one percent of Iowa's land area, but even in such a relatively small area, hazards vary in their coverage. Refer to Table 4.1.4 for the hazards identified for each jurisdiction in Poweshiek County.

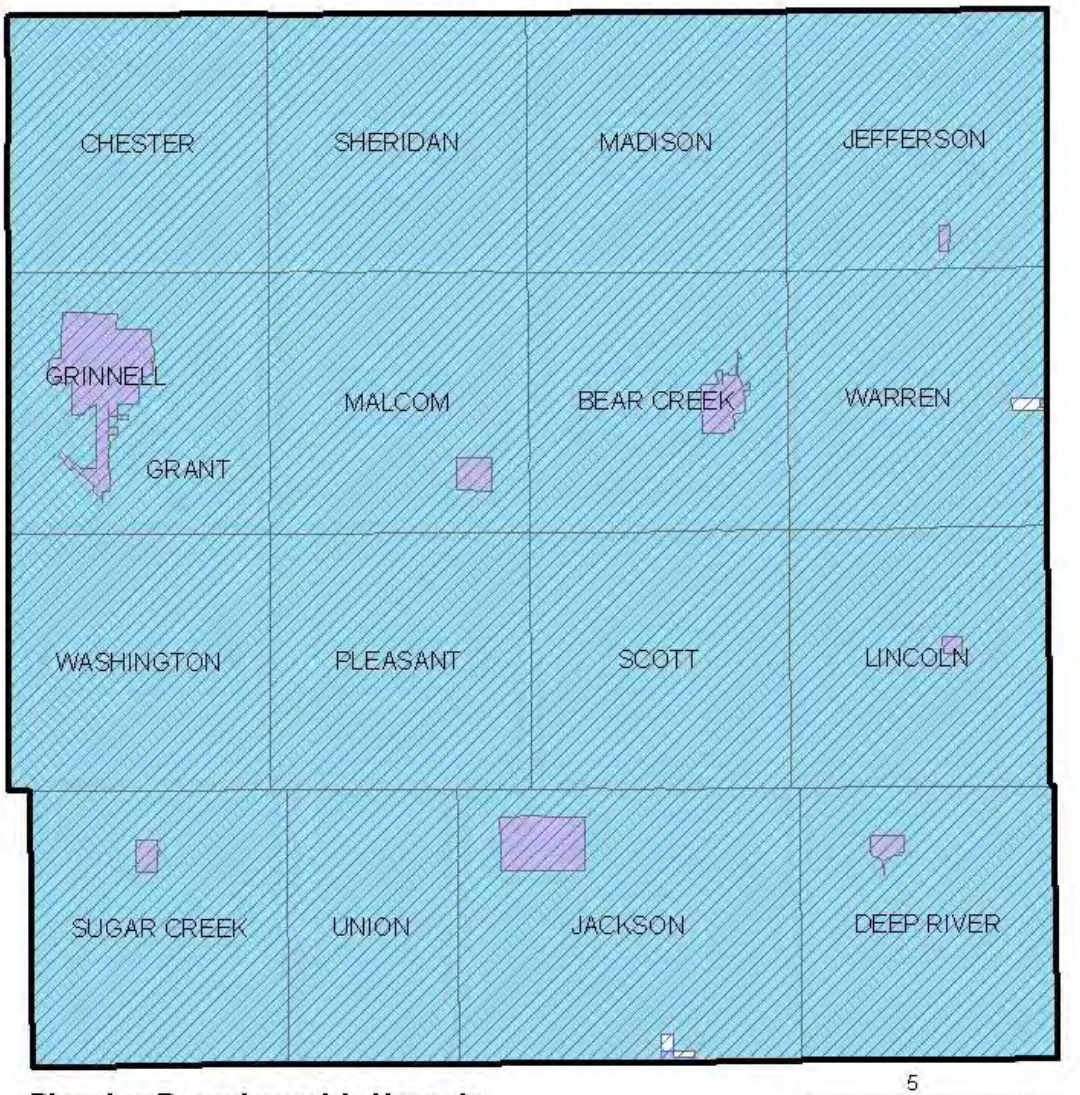
Table 4.1.4: Poweshiek County Hazard Boundaries

Hazard	Jurisdictions	Source(s) of Identification
Severe Winter Storm	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data Past disaster declarations
Flash Flood	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data
River Flood	Brooklyn Malcom Searsboro Montezuma Unincorporated Poweshiek County	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data FEMA FIRM Maps Past Disaster Declarations
Drought	All Jurisdictions	2007 Iowa Hazard Mitigation Plan
Hailstorm	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data
Windstorm	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data
Tornado	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data Past Disaster Declarations
Extreme Heat	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data
Thunderstorm	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan NCDC Data
Dam Failure	Brooklyn Grinnell Malcom Montezuma Unincorporated Poweshiek County	2007 Iowa Hazard Mitigation Plan Iowa DNR Data
Hazardous Materials Incident	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Highway Transportation Incident	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan Iowa DOT Data
Earthquake	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan

Grass/Wildland Fire	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan
Structural Fire	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Communications Failure	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan
Energy Failure	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Railway Transportation Incident	Brooklyn Grinnell Malcom Searsboro Unincorporated Poweshiek County	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Pipeline Transportation Incident	Brooklyn Grinnell Montezuma Unincorporated Poweshiek County	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Structural Failure	All Jurisdictions	Local knowledge 2007 Iowa Hazard Mitigation Plan Poweshiek County EMC Data
Animal/Crop/Plant Disease	Unincorporated Poweshiek County	Local knowledge 2007 Iowa Hazard Mitigation Plan
Sinkholes	Unincorporated Poweshiek County	Local knowledge 2007 Iowa Hazard Mitigation Plan Iowa DNR Data
Air Transportation Incident	All Jurisdictions	Poweshiek County EMC Data National Transportation Safety Board
Conventional Terrorism	Grinnell Montezuma Community SD	Poweshiek County EMC Data
Human Disease Epidemic	All Jurisdictions	Poweshiek County EMC Data

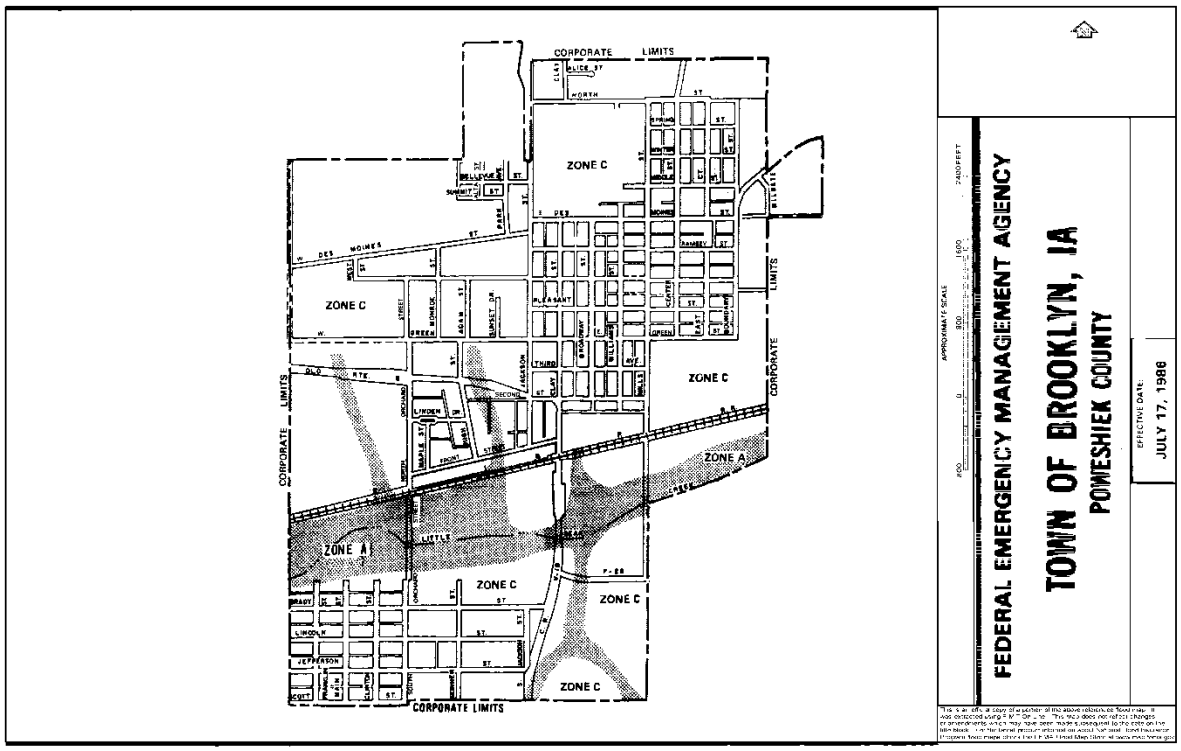
Maps are also a valuable tool for displaying which jurisdictions are affected by hazards. The following pages include maps that depict each hazard's coverage among the jurisdictions in the planning boundary.

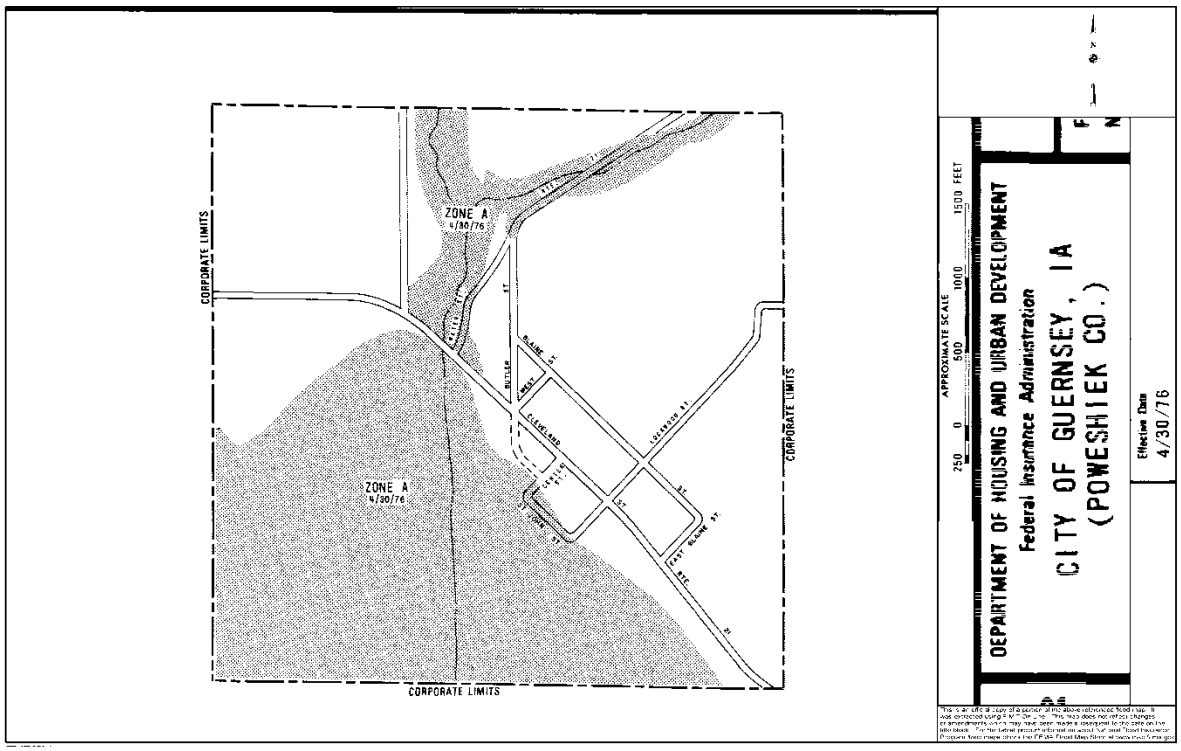
Figure 4.1.1: Planning Boundary-wide Hazards

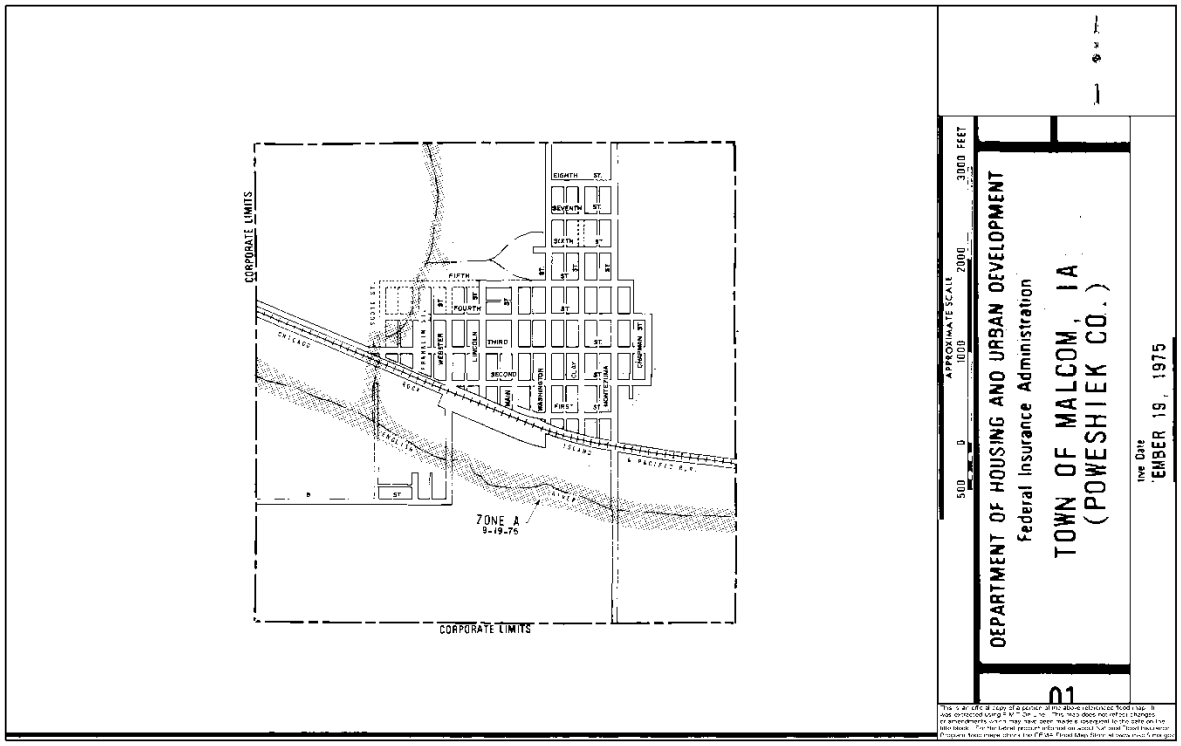


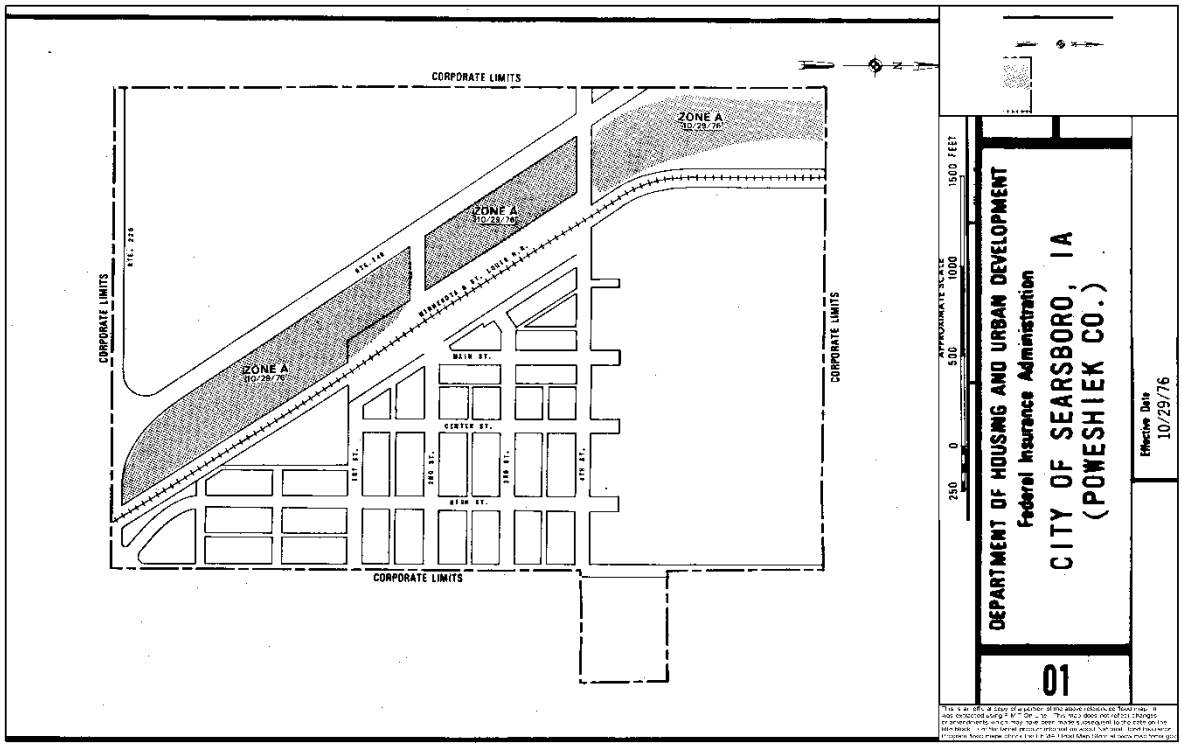
The Flood Insurance Rate Maps (FIRMs) below depict the Special Flood Hazard Areas in Poweshiek County, which indicate the areas that have 1% chance of flooding each year. A portion of each Poweshiek County jurisdiction is located in a Special Flood Hazard Area. As far as FEMA mapping is concerned, these are the only communities that have any flood plain mapping completed. There are no records for the cities of Deep River, Grinnell, or Hartwick. The specific boundaries of flooding for each jurisdiction will be discussed in the flood section of this plan. There are no levees in Poweshiek County; therefore, none of the jurisdictions are at risk for a levee failure.

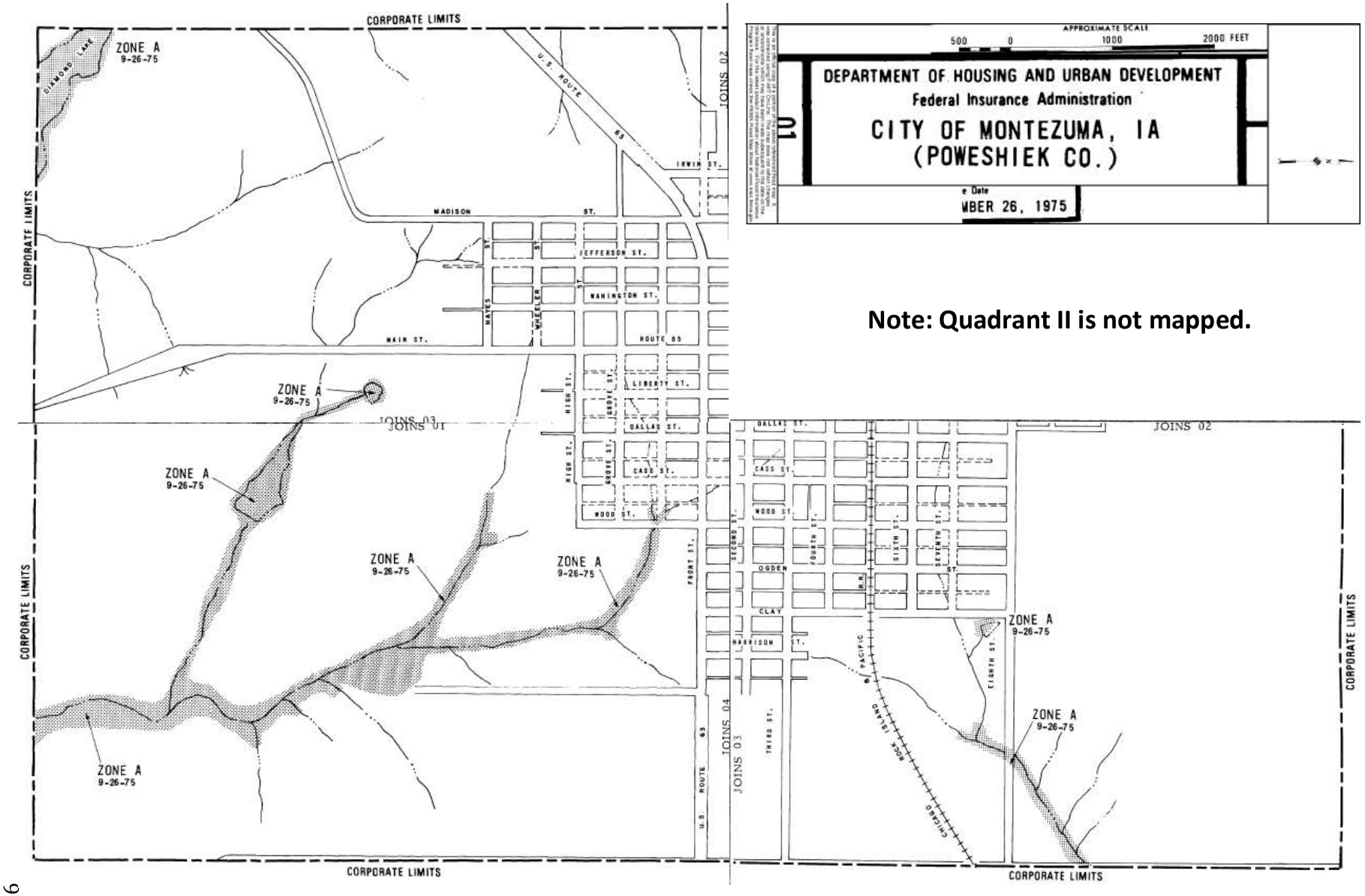
Figure 4.1.2: Special Flood Hazard Areas






CORPORATE LIMITS
EIGHTH ST.
SEVENTH ST.
FIFTH
FOURTH
THIRD
SECOND
MAIN
WASHINGTON
ZONE A
9-19-75
CORPORATE LIMITS
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWN OF MALCOM, IA
(POWESHIEK CO.)
01
Effective Date
SEPTEMBER 19, 1975


CORPORATE LIMITS
ZONE A
ZONE A
ZONE A
RTE. 224
MAIN ST.
CENTER ST.
1ST ST.
2ND ST.
3RD ST.
4TH ST.
MAIN ST.
CORPORATE LIMITS
CORPORATE LIMITS
CORPORATE LIMITS
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITY OF SEARSBORO, IA
(POWESHIEK CO.)
01
Effective Date
10/29/76



Note: Quadrant II is not mapped.

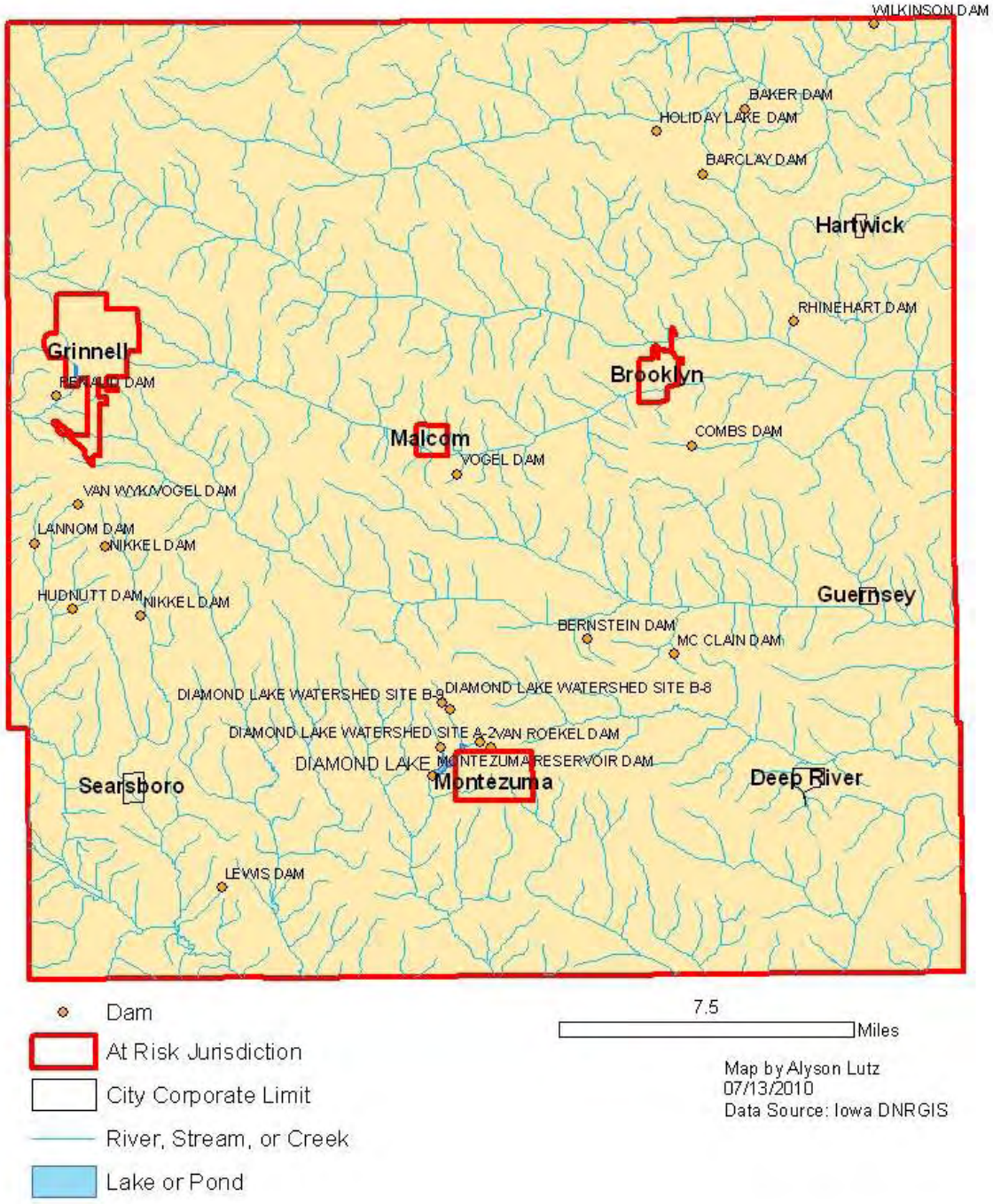
Data Source for all FIRMs: FEMA Map Service Center, 2010

Karst soils as an indicator of possible Sinkholes. The map below shows areas that are either near or vulnerable to the sinkhole hazard. There are no cities in Poweshiek County that are vulnerable in terms of Sinkholes, however, rural sections in the east central portion of the county, and a section in the north central portion of the county are vulnerable to this hazard.

Figure 4.1.3: Sinkholes

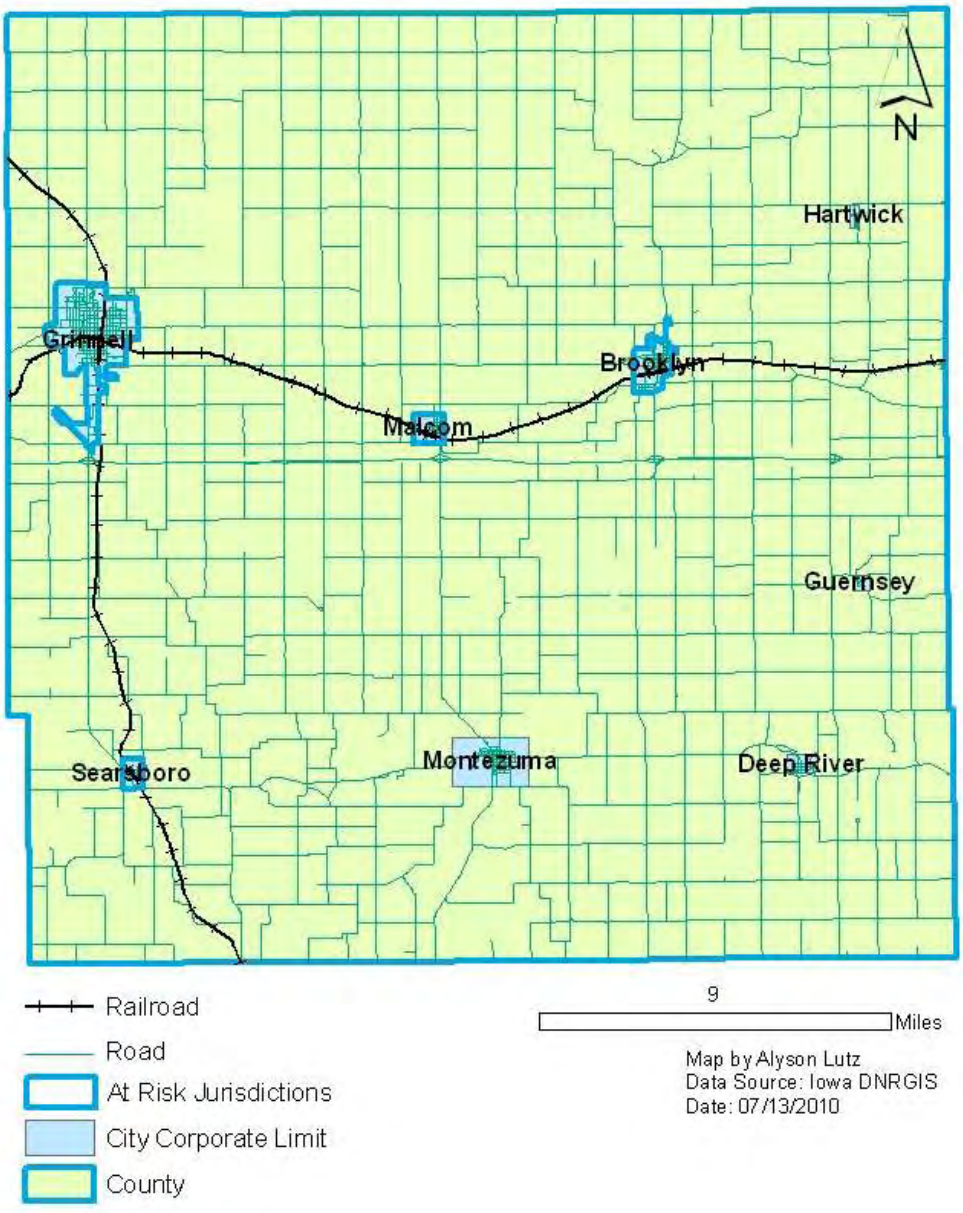
There are 22 dams located on the waterways of Poweshiek County, 6 of which are in close vicinity upstream of Montezuma, the county seat. The Montezuma Reservoir Dam and Diamond Lake Watershed sites A-2 and C-14 are located around Diamond Lake and can possibly cause loss of life to unincorporated residents living in the area. Though there is little probability of this, a lake is a body of water not to be underestimated; generally all areas near and downstream from a failed dam can be adversely affected by a dam failure. Just in case this hazard may occur, the jurisdictions that are downstream from a dam were identified to be within dam failure hazard boundaries.

Figure 4.1.4: Dam Failure



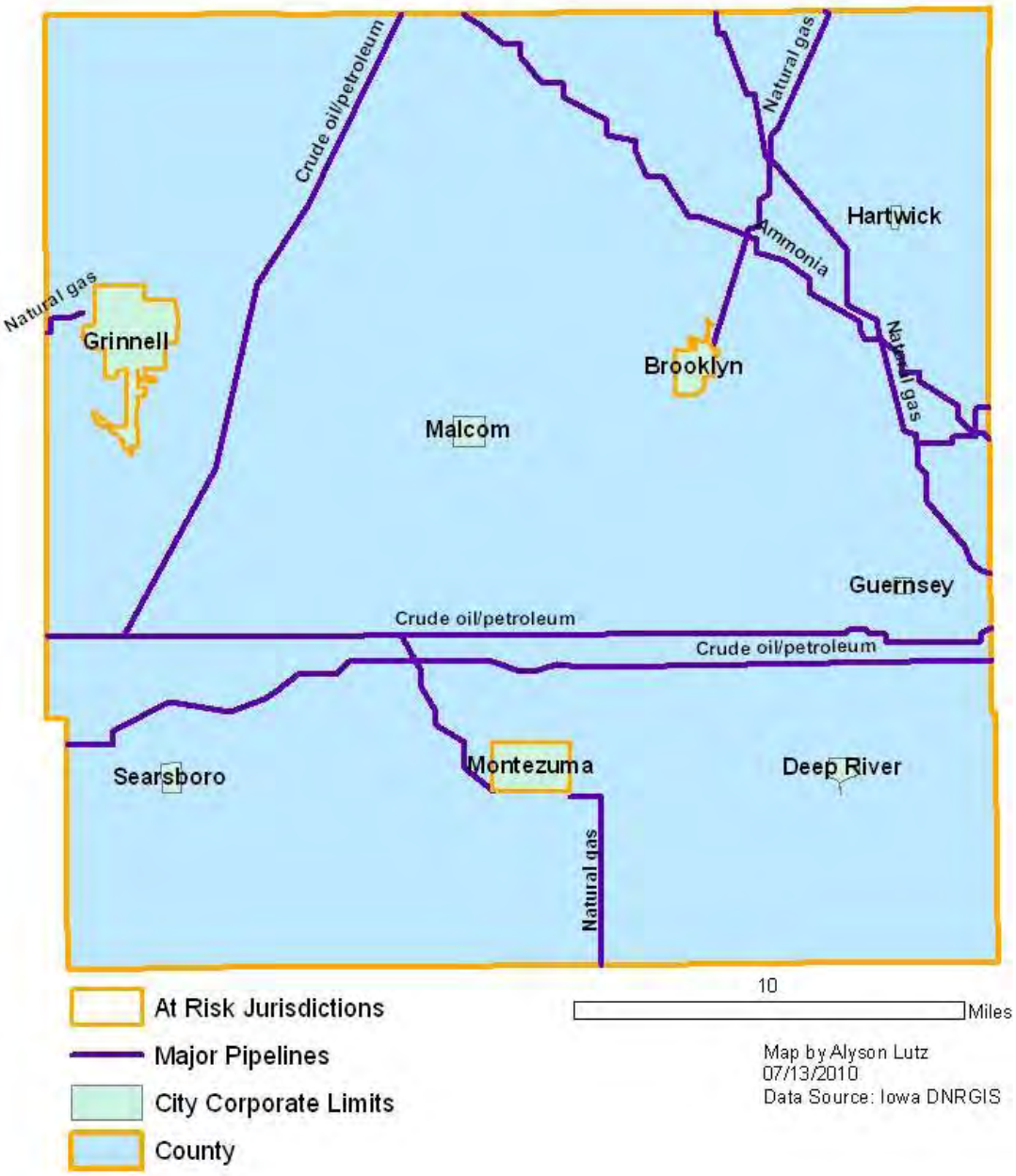
An Iowa Interstate Railroad freight line runs east-west through the middle portion of Poweshiek County while a Union Pacific Railroad freight line runs north-south through the west portion of the county. Only the jurisdictions along the rail line should be at risk for a rail transportation incident. Unincorporated Poweshiek County is listed, but only the immediate surroundings of the rail line throughout the county are most at risk.

Figure 4.1.5: Rail Transportation Incident



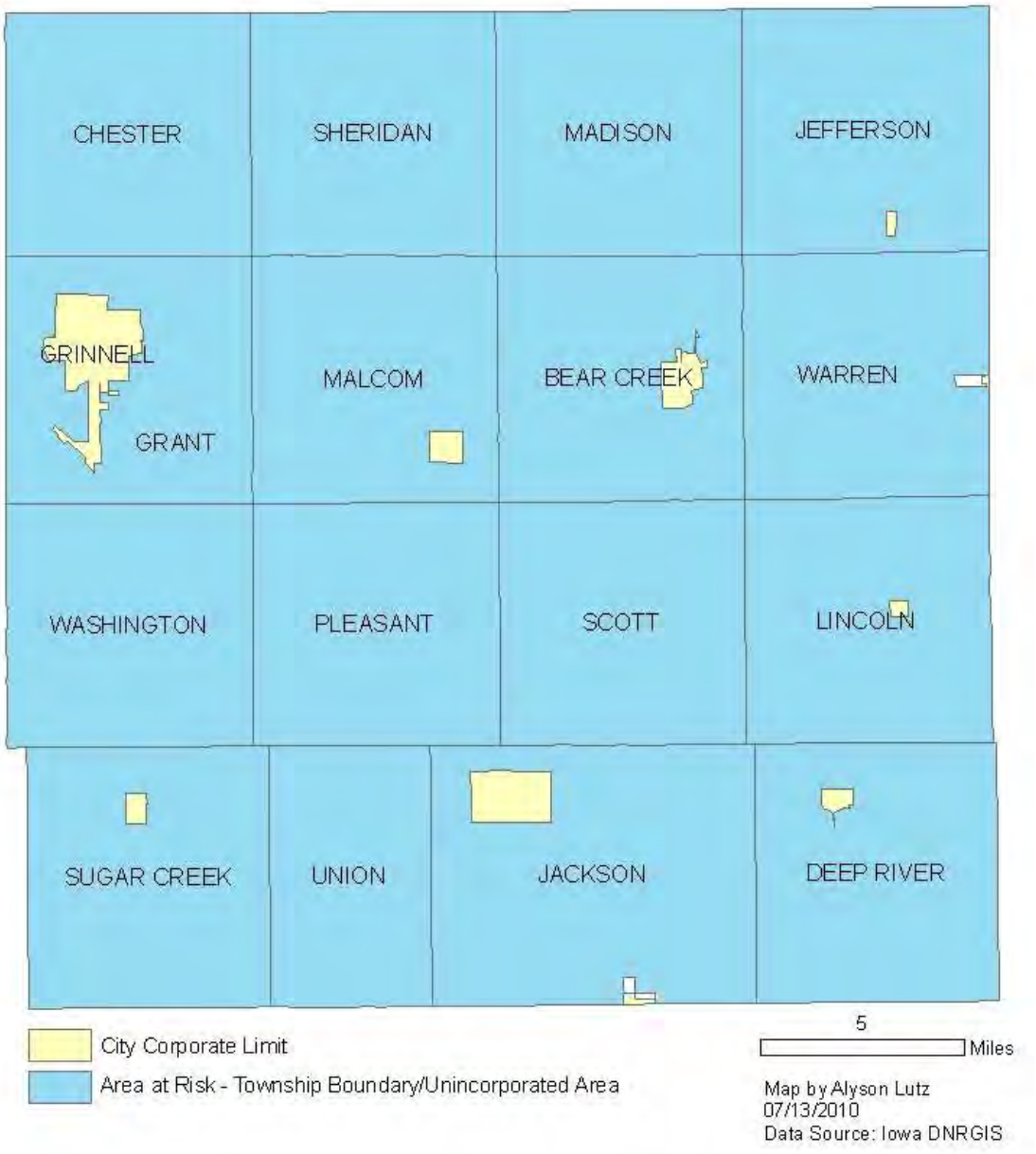
Major pipelines do not run through all jurisdictions in Poweshiek County. At least for natural gas lines, looking at the natural gas utility service availability in the county is an indicator besides this map. Most of the lines that run through the county are natural gas along with one ammonia line and three petroleum lines.

Figure 4.1.6: Pipeline Transportation Incident



Poweshiek County identified animal/crop/plant disease as a potential hazard. The most at risk areas are in the unincorporated portion of the county, which is more rural with livestock and wildlife. The incorporated cities of the county are much less likely to be affected by this hazard since there is very little if any livestock located in within city corporate limits.

Figure 4.1.7: Animal/Crop/Plant Disease



4.2 Hazard Profiles

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

All hazards that could possibly affect Poweshiek County were profiled. This was done through review of the Iowa Hazard Mitigation Plan, past events and declared disasters, reviewing data from Poweshiek County Emergency Management, and other research

The actual profiles of each possible hazard are based on the format used by Iowa's 2007 hazard mitigation plan. The following information for hazards in Poweshiek County is addressed:

- Definition of the hazard
- General description of the hazard
- Historical occurrence of the hazard
- Probability of the hazard occurring in the future
- Vulnerability of citizens, visitors, and emergency responders during and after a hazard event
- Maximum geographic extent of the hazard
- Severity of the hazard's potential impact on human life and property
- Speed of onset or amount of warning time before the hazard occurs

The hazard scoring and ranking method from Iowa's 2007 plan is also used and included in the hazard profiles in the following pages. Refer to pages 151-152 for an explanation of the score for each element of the hazard profiles. The total score for each hazard is at the bottom of its profile. The higher the score, the higher priority the hazard is in Poweshiek County. The hazards will be formally ranked in the next step of the planning process.

Note that the hazards are listed first by type, natural or man-made, then alphabetically so the order does not indicate any sort of ranking. The hazards will be ranked in the next step of the planning process.

Drought [A prolonged period of prolonged lack of precipitation producing severe dry conditions]

Description

There are three types of drought conditions that are relevant to Iowa: meteorlogic drought, which refers to precipitation deficiency; hydrological drought, which refers to declining surface water and groundwater supplies; and agricultural drought, which refers to soil moisture deficiencies. Droughts can be spotty or widespread and last from weeks to a period of years. A prolonged drought can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortage may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. While droughts are generally associated with extreme heat, drought can and do occur during cooler months.

Historical Occurrence (2)

According to the Palmer Drought Severity Index, a composite of evapotranspiration, recharge, runoff, loss, and precipitation, Iowa has suffered seven periods of drought condition since 1910. While some may have been more severe than others, agricultural areas were impacted much more than the metropolitan areas where impacts were indirect.

According to the National Climatic Data Center (NCDC), Poweshiek County has experienced six drought events since 1985. The most recent drought was in 2003. The total property damage, from the six events, to Poweshiek County and the other areas affected by the drought, totals $645 million. Crop damaged reached a total of $1.5 billion. No deaths or injuries were reported during any of these drought events. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Drought is $2,986,433.

Probability (2)

Drought is part of normal climate fluctuations. Climatic variability can bring dry conditions to the region for up to years at a time. Research and observations of the El Nino/La Nina climatic events are resulting in more predictable climatic forecasts.

Vulnerability (2)

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

Maximum Extent (4)

A drought would likely affect most of Poweshiek County and Iowa if not the entire Midwest. Because of the dependence on precipitation and water, the agricultural areas would be most

adversely impacted. Even though the agricultural areas would be most adversely impacted, the entire County would likely feel at least some impact.

Severity (2)

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

Speed of Onset (2)

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

Total Score: 14

Dam Failure [A break in, or imposed threat from, any water retention fixture which may endanger population downstream of the containment area]

Description

Dams are constructed for a variety of uses, including flood control, erosion control, water supply impoundment, hydroelectric power generation, and recreation. Flooding, operating error, poor construction, lack of maintenance, damage due to burrowing animals, vandalism, terrorism, and earthquakes can cause dam failure. Dams are classified into three categories based on the potential risk to people and property should a failure occur: High Hazard – if the dam was to fail, lives would be lost and extensive property damage could result; Moderate Hazard – failure could result in loss of life and significant property damage; and Low Hazard – failure results in minimal property damage only. The classification may change over time because of development downstream from the dam since its construction. Older dams may not have been built to the standards of this new classification. Dam hazard potential classifications have nothing to do with the material condition of a dam, only the potential for death or destruction due to the size of the dam, the size of the impoundment, and the characteristics of the area downstream of the dam. The Iowa Department of Natural Resources tracks all dams in the State of Iowa with a height of at least 25 feet or a total storage of at least 50 acre feet of water. The inventory excludes dams less than 6 feet high regardless of storage capacity and dams less than 15 acre feet of storage regardless of height.

Historical Occurrence (1)

There are no major dam failures to report for Poweshiek County.

Probability (1)

The probability of a major dam failure occurring in or affecting Poweshiek County is low.

Vulnerability (2)

People and property along streams are most vulnerable. Facilities and lives considerable distances from the actual impoundment are not immune from the hazard. Depending on the size and volume of the impoundment as well as the channel characteristics, a flash flood can travel a significant distance.

Maximum Extent (2)

The area impacted following a dam failure would be limited to those areas in and near the floodplain. People and property outside the floodplain could also be impacted depending on the proximity to the dam and the height above the normal stream level.

According to the Iowa DNR's Natural Resources Geographic Information System (NRGIS) Library, there are three dams located in very close vicinity to the City of Montezuma. Failure at the Montezuma Reservoir Dam or Diamond Lake Watershed sites A-2 or C-14 can affect some unincorporated areas which are downstream and around Diamond Lake.

Grinnell, Malcom, and Brooklyn were also identified as jurisdictions that are at risk for this hazard. All of these cities have dam(s) located upstream. These dams, though, are not high hazard so the chance of major issues is very low.

Severity (2)

There are 2,442 inventoried dams located in Iowa. Of these, 63 are high hazard, 160 are categorized as significant hazard, and 2,219 are classified as low-hazard dams. The severity of damage could range from property damage, if a small subdivision impoundment failed, all the way to multiple deaths, injuries, and extensive property damage if a large high-hazard dam, such as the Saylorville Reservoir, failed upstream from Des Moines. None of the dams in Poweshiek County are considered high hazard.

Speed of Onset (4)

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

Total Score: 12

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

Description

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods, and fires. The three general classes of earthquakes now recognized are: tectonic, volcanic, and artificially produced.

Historical Occurrence (1)

Iowa as a whole has experienced the effects of only a few earthquakes in the past two centuries. The epicenters of 12 earthquakes have been located in the state. The majority has been along the Mississippi River, and none have been in central Iowa. The last earthquake to occur in Iowa was near the eastern Iowa town of Oxford in 1948. Since the early 1800s, another 9 earthquakes have occurred outside of Iowa but have impacted areas in the state. The most recent quakes were in the 1960s and occurred in Illinois and Missouri. While more than 20 earthquakes have occurred in or impacted Iowa in the past 200 years, they have not seriously impacted Iowa.

According to the National Climatic Data Center, there have been no earthquakes in Poweshiek County.

Probability (1)

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

Vulnerability (1)

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

Maximum Extent (1)

The strongest earthquake in Iowa occurred in Davenport in 1934 and resulted in only slight damage. Estimated effects of a 6.5 Richter magnitude earthquake along the New Madrid Fault Zone suggests Iowans in four southeast counties could experience trembling buildings, some broken dishes and cracked windows. About 29 other counties, from Page to Polk to Muscatine, could

experience vibrations similar to the passing of a heavy truck, rattling of dishes, creaking of walls, and swinging of suspended objects. If an earthquake were to occur, it would more than likely be felt in all of Poweshiek County.

Severity (1)

Due to the relatively low magnitude of earthquakes that would occur in the state, and the distance from the epicenter of an earthquake that would occur in the New Madrid Fault Zone, Iowans would likely see only minor impacts. Fatalities would be very rare, injuries limited to falls and small-unsecured objects, property loss would likely be minimal, and economic loss could occur due to short disruptions in commercial and industrial activities.

Speed of Onset (4)

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

Total Score: 9

Extreme Heat [Temperatures, including heat index, in excess of 100 degrees Fahrenheit or three successive days of 90+ degrees Fahrenheit. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees]

Description

A prolonged period of excessive heat and humidity. The heat index is a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature. Exposure to full sunshine can increase the heat index by at least 15 degrees. Extreme heat can impose stress on humans and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks.

Historical Occurrence (1)

The record high temperature of 110 for Des Moines was recorded in 1936. During July 1936, 12 record setting days topped 100 degrees in Des Moines. The record high temperatures for Des Moines are above 90 degrees Fahrenheit beginning in March and lasting through October.

According to the National Climatic Data Center, two extreme heat events have occurred in Poweshiek County since 1995. The event in 1995 affected the entire State of Iowa and resulted in three deaths and $3.8 million in property damage. The last extreme heat event to affect Poweshiek County resulted in one death.

Probability (2)

Based on historical information, Iowa will likely experience about 26 days a year with temperatures above 90 degrees. There is a very good change that there will also be a period of 3 consecutive days or more with temperatures in the 90s. It is also common for the temperature to hit 100 degrees or more once every three years during the summer months.

Vulnerability (2)

Elderly people, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly susceptible to heat reactions. Healthy individuals working outdoors in the sun and heat are vulnerable as well. Individuals and families with low budgets as well as inner city dwellers can also be susceptible due to poor access to air-conditioned housing.

Maximum Extent (4)

Most of the County and State would likely be impacted by extreme heat, but urban areas pose special risks. The stagnant atmospheric conditions of the heat wave trap pollutants in urban areas and add to the stresses of hot weather.

Severity (2)

Extreme heat has broad and far-reaching sets of impacts. These include significant loss of life and illness, economic costs in transportation, agriculture, production, energy, and infrastructure. Transportation impacts include the loss of lift for aircrafts, softening of asphalt roads, buckling of highways and railways, and stress on automobiles and trucks (increase in mechanical failures). Livestock and other animals are adversely impacted by extreme heat. High temperatures at the wrong time inhibit crop yields as well. Electric transmission systems are impacted when power lines sag in high temperatures. High demand for electricity also outstrips supply, causing electric companies to have rolling blackouts. The demand for water also increases sharply during periods of extreme heat. This can contribute to fire suppression problems for both urban and rural fire departments.

Speed of Onset (1)

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

Total Score: 12

Flash Flood [A flood event occurring with little or no warning where water levels rise at an extremely fast rate]

Description

Flash flooding result 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 water moves at very fast speeds and can roll 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.

Historical Occurrence (1)

Flash floods are the most common and widespread of all natural disasters except fire. In Iowa, as much as 21" of rain has fallen in a 24-hour period. According to the National Climatic Data Center, one flash flood event has affected Poweshiek County since 2000. This flash flood occurred in 2007 and resulted in $50,000 in property damage and $100,000 in crop damage but no deaths or injuries were reported.

Probability (2)

Flash flooding has a high probability of happening in all communities. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. As more development occurs, the amount of runoff produced also increases. Unless measures are taken to reduce the amount of runoff (or slow its movement), flash floods will continue to occur and possibly increase. Also having sewer systems that cannot handle large amounts of water in a short period of time results in flash floods.

Vulnerability (2)

Flash floods occur in all fifty state in the US. Particularly at risk are those in low-lying areas; close to dry creek beds or drainage ditches; near water; or downstream from a dam, levee, or storage basin. People and property in areas with insufficient storm sewers and other drainage infrastructure can also be put at risk because the drains cannot rid the area of the runoff quickly enough.

Nearly half of all flash flood fatalities are auto-related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current. Six inches of swiftly moving water can knock persons off their feet and only two feet of water can float a full-sized automobile. Recreational vehicles and mobile homes located in low-lying areas can also be swept away by water.

Maximum Extent (2)

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

Severity (2)

Flash floods are the number one weather-related killer in the United States. They can quickly inundate areas thought not to be flood-prone. Other impacts can include loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and interruption of business. Hazards of fire, health and transportation accidents, and contamination of water supplies are likely effects of flash flooding situations. In Iowa, there have been 643 flash flood events since 1993, and there have been four deaths and eight injuries.

Speed of Onset (4)

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

Total Score: 13

Grass or Wildland Fire [An uncontrolled fire that threatens life and property in either a rural or wooded area and is beyond normal day-to-day response capabilities]

Description

Grass and wildland fire can occur when conditions are favorable such as during periods of drought when natural vegetation would be drier and subject to combustibility.

Historical Occurrence (1)

According to the National Climatic Data Center, there were no wildland or forest fire events reported in Poweshiek County. This does not account for small or contained grass fires that may not have been reported.

Probability (4)

There is nearly 100% chance that there will be a grass fire in each county in the state each year.

Vulnerability (2)

While wildfires have proven to be most destructive in the Western States, they have become an increasingly frequent and damaging phenomenon nationwide. People choosing to live in wildland settings are more vulnerable to wildfires, and the value of exposed property is increasing at a faster rate than population. Iowa is less vulnerable to wildfires because of the extremely large percentage of land that is developed. Grass fires are often more easily contained and extinguished before there is damage to people or developed property. Fires often burn large portions of field crops in the fall when the crops are dry and the harvesting equipment overheats or throws sparks. This can be quite costly to the farmer in terms of lost production.

Maximum Extent (1)

Most grass fires are contained to highway right-of-way and rail right-of-way ditches and are less than a few acres in size. High winds can turn a small flame into a multi-acre grass fire within a matter of minutes. The extent is dependent upon conditions such as land use/land cover, moisture, and wind. Grass fires are equally likely to affect Poweshiek County communities where there is dense or high vegetation. Rural areas are much more likely to experience grass or wildland fire issues.

Severity (1)

Most grass fires burn only the grasses, crops, or other low land cover. Injuries and deaths from fighting the fire most often occur by natural causes such as heart attack or stroke. Property damage is usually limited to grass, small trees, etc. Occasionally a house or outbuilding can be damaged or destroyed.

Speed of Onset (4)

As mentioned above, most grassfires occur without warning and travel at a moderate rate. This situation depends upon conditions at the time such as moisture, wind, and land cover.

Total Score: 13

Hailstorm [An outgrowth of a severe thunderstorm in which balls or irregularly shaped lumps of ice greater than 0.75 inches in diameter fall with rain]

Description

Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm carry water droplets to a height where freezing occurs. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be small than a pea or as large as a softball and can be very destructive to plants and crops. Pets and livestock are particularly vulnerable to hail.

Historical Occurrence (4)

According to the National Climatic Data Center, there have been 56 hail events in Poweshiek County since 1960. The size of hail ranges from 0.75 inches in diameter to 3 inches. No deaths or injuries were reported, but the sum total of all the property damage from these hail events is $393,000. The resulting crop damage is $209,000.

Probability (4)

Data on probability and frequency of occurrence of hailstorms is limited, but research indicates at any given point in Iowa, it can expect on average two to three hailstorms in a year.

Vulnerability (2)

Agricultural crops such as corn and beans are particularly vulnerable to hailstorms stripping the plant of its leaves. Hail can also do considerable damage to vehicles and buildings. Hail only rarely results in loss of life directly, although injuries can occur.

Maximum Extent (4)

The land area affected by individual hail events is not much small that that of the parent thunderstorm, an average of 15 miles in diameter around the center of the storm. Any area in Poweshiek County can be affected by this hazard.

Severity (3)

Hailstorms cause nearly $1 billion annually in property and crop damage in the United States. The peak hail activity coincides with the Midwest's peak agricultural season. Financial impacts resulting from damage to property is in the millions of dollars every year, most of which is covered by crop and hazard insurance.

Speed of Onset (4)

Forecasting hailstorms as with their parent thunderstorms is becoming quite accurate due to the advancement in Doppler Radar and other technologies operated by the National Weather Service and television network weather departments. Warnings in the 20 to 30 minute range are usually available prior to the occurrence of the storm.

Total Score: 21

River Flood [A rising or overflowing of a tributary or body of water that covers adjacent land not usually covered by water when the volume of water in a stream exceeds the channel's capacity]

Description

A flood is a natural event for rivers and streams. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes, and oceans that are subject to recurring floods. Hundreds of floods occur each year, making it one of the most common hazards in all of the United States. They can occur at any time of the year, in any part of the country, and at any time of day or night. Most injuries and deaths occur when people are swept away by flood currents, and most property damage results from inundation by sediment-filled water.

Several factors determine the severity of floods, including rainfall intensity (or other water source) and duration. A small amount of rain can also result in floods in locations where the soil is saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas.

Topography and ground cover are also contributing factors for floods. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover.

Historical Occurrence (4)

According to the NCDC, since 1950, Poweshiek County has experienced 41 river flood events with no deaths or injuries reported. The total property damages that resulted from these events total nearly $151.5 million, and the crop damages total nearly $50.2 million.

The most recent and major floods in Iowa since 1993 occurred in the spring and summer of 2008. Though this is the case for most of Iowa, Poweshiek County was not affected by these events. The most costly flood damage to Poweshiek happened in May of 2004 affecting 50 other counties and causing a total of $5 million in property damage and about $15 million in crop damage. According to the National Climatic Data Center (NCDC), the month started dry with only 0.19 inches of rain in the first week, regular seasonal rainfall for the second week and heavy rainfall in the third week. The heaviest rains came over the course of two days in the last week of May with about 6 inches in some parts of the state. A statewide average of 2.97 inches of rain fell from these two systems was Iowa's greatest rainfall since July 1993.

Flooding in the county seat of Montezuma is described in an excerpt from the Montezuma Hazard Mitigation Plan approved July 10, 2003 which states, "Portions of the city are subject to flooding from both the Wolf Creek and the Coon Creek. A large part of the Wolf Creek floodplain is occupied by the Montezuma Golf and Country Club. In addition, several structures are located in the floodplain. Subsequent to flooding in 1993, the City purchased two residential structures in the Wolf Creek Floodplain that were heavily damaged." (Montezuma Hazard Mitigation Plan, 2003)

Similar to the situation in Montezuma, the Malcom Hazard Mitigation Plan approved on October 6, 2003, states, "Malcom has had no major history with flooding within the past 20 years. The only concern would involve the English River south of the city. This creek has high banks and would need a great deal of rain in order to flood. If flooding were to occur, only farmland would be affected." (Malcom Hazard Mitigation Plan, 2003)

Probability (2)

Considering that there was no damage to Poweshiek County from the floods in the summer of 2008, flooding is not very likely to occur in the county's cities and unincorporated areas. The chance of human injury or property damage is low or will result in minimal damages.

Vulnerability (2)

The vulnerability from river flooding is quite delineated. Much work in the area of flood hazard mapping has allowed many communities to restrict development in hazardous area, but development does in fact exist in many areas susceptible to flooding so structures and people who live and work in structures that are in or located near the floodplain are at risk.

Maximum Extent (2)

The Federal Emergency Management Agency has delineated the probable extent of the 1% annual chance floodplain in most areas. These Flood Insurance Rate Maps (FIRMs) show properties affected by the floods that have at least 1% chance of occurring in any particular year. Generally, these areas are in the floodplain or adjacent areas. As an estimate made from visual study of FEMA FIRMs, we can derive that 17% of the land in Poweshiek County is in or could be affected by the floodplain, with an understanding that there is no information for Deep River, Grinnell, or Hartwick. Also, a portion of the town of Victor is in Poweshiek County but not included in the planning area and one quadrant of the City of Montezuma is not mapped. A small portion of the land in Poweshiek County's incorporated cities is within the 1% annual chance floodplain, and a great deal of land outside the city corporate limits is also within the floodplain.

Severity (2)

Flooding impacts include potential loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock losses; and interruption of businesses. Hazards of fire, health and transportation accidents; and contamination of water supplies are likely effects of flooding situations as well.

Speed of Onset (2)

Gages along streams and rain gages through the state provide for an early flood warning system. River flooding usually develops over the course of several hours or even days depending on the basin characteristics and the position of the particular reach of the stream. The National Weather Service provides flood forecasts for Iowa. Flood warnings are issued over emergency radio and television messages as well as the NOAA weather radios.

Total Score: 14

Severe Winter Storm [Severe winter weather conditions that affect day-to-day activities. These can include blizzard conditions, heavy snow, bowing snow, freezing rain, heavy sleet, and extreme cold]

Description

Winter storms are common during winter months of October through April. The various types of extreme winter weather cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapsed buildings, and loss of livestock and wildlife.

Blizzard conditions are winter storms which last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of ¼ mile or less, and white-out conditions. Heavy snows of more than six inches in a 12-hour period or freezing rain greater than ¼ inch accumulation causing hazardous conditions in the community can slow or stop the flow of vital supplies as wells as disrupting emergency and medical services. Loose snow begins to drift when the wind speed reaches 9 to 10 mph under freezing conditions. The potential for some drifting is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind.

Severe ice storms have caused total electric power losses over large areas of Iowa and rendered assistance unavailable to those in need due to impassable roads. Frigid temperatures and wind chills are dangerous to people, particularly the elderly and the very young. Dangers include frostbite or hypothermia. Water pipes, livestock, fish and wildlife, and pets are also at risk from extreme cold and severe winter weather.

Historical Occurrence (4)

Since 1993, Iowa has had 3,636, heavy snow, ice storm, or extreme wind chill events. There are many accounts of large numbers of deaths due to cold and blizzards in Iowa's history. While we are not as vulnerable as the early settlers, there are recent accounts of multiple deaths from snowstorms and extreme cold around the state.

According to the National Climatic Data Center, Poweshiek County has been affected by 51 snow and ice events since 1993. A total of six deaths and no injuries were reported due to these snow and ice events. Also, property damage reached a total of almost $56 million, and crop damages reached $65 million.

Probability (4)

Winter storms regularly move easterly and use both the southward plunge of arctic cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow and sometimes blizzard conditions in Iowa and other parts of the Midwest. From 1983 to 1998, Des Moines averaged nearly 50 days a year with falling snow. The cold temperatures, strong winds, and

heavy precipitation are the ingredients of winter storms. Most counties can usually expect 2 or 3 winter storms a season with an extreme storm every 3 to 5 years on average. A snowfall of 6 inches or more from one storm only occurs in 49% of Iowa winters, while a large winter storm even of 10 inches or more will occur about once every three years.

Vulnerability (2)

Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents. The leading cause of death during winter storms is transportation accidents. About 70 percent of winter-related deaths occur in automobiles and about 25 percent are people caught out in the storm. The majority of these are males over 40 years of age. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as feed, water and shelter for livestock are unable to be met. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity like shoveling snow, digging out vehicles, assisting stranded motorists, or are the elderly or very young. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizens' use of kerosene heaters and other alternative forms of heating may create other hazards such a structural fires and carbon monoxide poisoning.

Maximum Extent (4)

Winter storms are quite vast and would likely impact multiple counties. Certain areas may experience local variations in storm intensity and quantity of snow or ice. The Iowa Department of Transportation, county road departments, and local public works agencies are responsible for the removal of snow and treatment of snow and ice with sand and salt on the hundreds of miles of streets and highways in the area. Overall, any area of Poweshiek County can be affected.

Severity (2)

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

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

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

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

Speed of Onset (2)

The National Weather Service has developed effective weather advisories that are promptly and widely distributed. Radio, television, and Weather Alert Radios provide the most immediate means to do this. Accurate information is made available to public officials and the public up to a day in advance. Several notifications made by the National Weather Service include winter storm warning, blizzard warning, winter weather advisory, and a frost/freeze advisory.

Total Score: 18

Sink Hole [Land surface that is collapsed into subsurface voids]

Description

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground space just gets too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small or they can be huge and can occur where a house or road is on the surface.

Karst refers to geologic, hydrologic, and landscape features associated with the dissolution of soluble rocks, such as carbonates and evaporites. A common feature of Karst landscapes are sinkholes, which form when the land surface collapses into subsurface voids formed in the slowly dissolving rock.

In Iowa, carbonate rocks form the uppermost bedrock over roughly the eastern half of the state, and are mantled with a variable thickness of glacial and other unconsolidated materials. Where these unconsolidated materials are less than 50 feet, and particularly less than 25 feet thick, sinkholes may occur.

New sinkholes have been correlated to land-use practices, especially from ground-water pumping and from construction and development practices. Sinkholes can also form when natural water-drainage patterns are changed and new water-diversion systems are developed. Some sinkholes form when the land surface is changed, such as when industrial and runoff-storage ponds are created. The substantial weight of the new material can trigger an underground collapse of supporting material, thus causing a sinkhole.

The overburden sediments that cover buried cavities in the aquifer systems are delicately balanced by ground-water fluid pressure. The water below ground is actually helping to keep the surface soil in place. Ground-water pumping for urban water supply and for irrigation can produce new

sinkholes in sinkhole-prone areas. If pumping results in a lowering of ground-water levels, then underground structural failure, and thus, sinkholes, can occur.

Historical Occurrence (1)

There are three areas in Iowa where large numbers of sinkholes exist: (1) within the outcrop belt of the Ordovician Galena Group carbonates in Allamakee, Clayton, and Winneshiek counties; (2) in Devonian carbonates in Bremer, Butler, Chickasaw, and particularly Floyd and Mitchell counties; and (3) along the erosional edge of Silurian carbonates in Dubuque and Clayton counties. According to the Iowa Department of Natural Resources, there are no significant Sinkholes in Poweshiek County.

Probability (1)

In Poweshiek County, there are a few rural areas in Malcom, Scott, Lincoln and Jackson townships that are susceptible to sinkholes but there is no history of this issue so the probability of a sinkhole occurring is very low.

Vulnerability (1)

If a sinkhole were to form, people and structures located on or near the sinkhole are the most at risk for injury, death, and property damage. People can be injured while the sinkhole is forming as well as after by falling into the open sinkhole. People, buildings, and infrastructure can basically be swallowed by a sinkhole.

Maximum Extent (1)

There are three areas in Iowa where large numbers of sinkholes exist: (1) within the outcrop belt of the Ordovician Galena Group carbonates in Allamakee, Clayton, and Winneshiek counties; (2) in Devonian carbonates in Bremer, Butler, Chickasaw, and particularly Floyd and Mitchell counties; and (3) along the erosional edge of Silurian carbonates in Dubuque and Clayton counties. The only areas that are at risk for this hazard are unincorporated portions of Poweshiek County. For this jurisdiction, the worst case scenario would be if a sinkhole actually developed in these areas, but the sinkhole would more than likely not be large.

Severity (1)

Sinkhole impacts included potential loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock losses; and interruption of businesses. Hazards of fire, health, and transportation accidents; and contamination of water supplies are likely effects. Much of this depends on the location and size of a sinkhole.

Most of Iowa's sinkholes occur in rural areas where their main impact is rendering some land unsuitable for row-crop agriculture. Sinkholes have also resulted in the failure of farm and other types of ponds, roads, and one sewage-treatment lagoon. As sinkholes sometimes allow surface runoff to directly enter bedrock aquifers, their presence has implications for groundwater quality.

Speed of Onset (4)

Sinkholes are a geological hazard that forms over time. A community can only be aware of their potential to develop a sinkhole but often cannot be warned before a sinkhole forms.

Total Score: 9

Thunderstorm and Lightning [Atmospheric imbalance and turbulence resulting in heavy rains, winds reaching or exceeding 58 mph, tornadoes, or surface hail at least 0.75 inches in diameter]

Description

Thunderstorms are common in Iowa and can occur singly, in clusters, or in lines. They are formed from a combination of moisture, rapidly raising warm air, and a lifting mechanism such as clashing warm and cold air masses. Most thunderstorms produce only thunder, lightning, and rain. Severe storms, however, can produce tornadoes, high straight-line winds above 58 mph or higher, microburst, lightning, hailstorms, and flooding.

The National Weather Service considers a thunderstorm severe if it produces hail at least ¾ inch in diameter, wind 58 mph or higher, or tornadoes. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt.” This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000 degrees Fahrenheit in a split second. This rapid heating, expansion, and cooling of air near the lightning creates thunder.

Historical Occurrence (4)

According to the National Climatic Data Center, Poweshiek County has experienced 98 thunderstorm and high wind events since 1960. Out of these 98 events, no deaths and only 1 injury occurred. The total property damage from these storms reaches almost 4.1 million, and the crop damage totals $104,000. The high winds ranged from speeds of zero mph to nearly 90 mph.

Probability (4)

Iowa experiences between 30 and 50 thunderstorms days per year on average. With Iowa's location in the interior of the U.S., there is a very high likelihood that a few of these summer storms will become severe and cause damage. Because of the humid continental climate that Iowa experiences, ingredients of a severe thunderstorm are usually available (moisture to form clouds and rain, relatively warm and unstable air that can rise rapidly, and weather fronts and convective systems that lift air masses).

Vulnerability (2)

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

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

Flash floods and tornadoes can develop during thunderstorms as well. People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile homes are vulnerable to the impacts of thunderstorms.

Maximum Extent (3)

Thunderstorms and lightning have the ability to span a large area like all of Poweshiek County but in most cases it affects smaller areas and moves across the county over time. It is possible for the entire county to be affected by a large thunderstorm and lightning event that moves across the entire county but this hazard can also be more isolated and only affect certain areas.

Severity (2)

Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. Severe thunderstorms can bring a variety of associated hazards with them including straight-line winds in excess of 100 mph. Straight-line winds are responsible for most thunderstorm damage. High winds can damage trees, homes (especially mobile homes), and businesses and can knock vehicles off of the road. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures.

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. One or more severe thunderstorms occurring over a short period can lead to flooding and cause extensive damage, power and communication outages, and agricultural damage.

Speed of Onset (1)

Some thunderstorms can be seen approaching, while others hit without warning. The National Weather Service issues severe thunderstorm watches and warnings as well as statements about severe weather and localized storms. These messages are broadcast over NOAA Weather Alert Radios and area television and radio stations. Advances in weather prediction and surveillance have increased warning times. The resolutions of radar and Doppler radar have increased the accuracy of storm location and direction. Weather forecasting and severe weather warnings issued by the National Weather Service usually provide residents and visitors alike adequate time to prepare. Isolated problems arise when warnings are ignored.

Total Score: 16

Tornado [A violent, destructive, rotating column of air taking the shape of a funnel-shaped cloud that progresses in a narrow, erratic path—rotating wind speeds can exceed 200 mph and travel across the ground at average speeds of 25 to 30 mph]

Description

A tornado is a violent whirling wind characteristically accompanied by a funnel shaped cloud extending down from a cumulonimbus cloud. A tornado can be a few yards to about a mile wide where it touches the ground. An average tornado, however, is a few hundred yards wide. It can move over land for distances ranging from short hops to many miles, causing great damage wherever it descends. The funnel is made visible by the dust sucked up and by condensation of water droplets in the center of the funnel. The rating scale used to rate tornado intensity is the Enhanced Fujita Scale.

Historical Occurrence (4)

In the U.S., Iowa is ranked third in the number of strong-violent (F2-F5) tornadoes per 10,000 square miles. From 1950-1995, Iowa averaged 31 twisters per year. In Iowa most tornadoes occur in the spring and summer months, but twisters can and have occurred in every month of the year. Late afternoon to evening hour tornadoes are the most common, but they can occur at any time of the day.

According to the National Climatic Data Center, in Poweshiek County, there have been no funnel clouds since 1950, but 25 tornadoes reported since 1953. From these events, 4 deaths and 52 injuries have occurred. The intensity of these tornadoes ranges from FO to F3. The total property damage throughout the county totaled about $12 million, and the crop damage was about $1.2 million.

Probability (3)

Historically, 30-40 tornadoes are confirmed in Iowa per year. Looking at historical data, tornadoes do not occur every year in Poweshiek County. The years that the county does have a tornado, though, sometimes have multiple tornadoes. It should be noted that in the past decade, tornadoes have been reported only in the years 2000, 2001, 2007 and 2008, with multiple tornadoes in '07 and '08.

Vulnerability (3)

Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to twisters. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk.

Maximum Extent (3)

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. Normally, a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area. The most damaging tornado that is likely to occur is an F3, which is based on historical tornado events in Poweshiek County.

Severity (3)

The severity of damage from tornadoes can be very high. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction and disintegration of well constructed structures, infrastructure, and trees. Injury or death related to tornadoes most often occurs when buildings collapse; people are hit by flying objects or are caught trying to escape the tornado in a vehicle.

Speed of Onset (4)

Tornadoes strike with an incredible velocity. Wind speeds may approach 300 mph and the storm can travel across the ground at more than 70 mph. These winds can uproot trees and structures and turn harmless objects into deadly missiles, all in a matter of seconds. The advancement in weather forecasting has allowed watches to be delivered to those in the path of these storms up to hours in advance. The best lead-time for a specific severe storm and tornado is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground due to blowing dust or driving rain and hail.

Total Score: 20

Windstorm [Extreme winds associated with severe winter storms, severe thunderstorms, downbursts, and very steep pressure gradients]

Description

Extreme winds other than tornadoes are experienced in all regions of the United States. It is difficult to separate the various wind components that cause damage from other wind-related natural events that often occur with or generate windstorms.

Historical Occurrence (4)

Large-scale extreme wind phenomena are experienced over every region of the United States. Historically, high wind events are associated with severe thunderstorms and blizzards. It is often difficult to separate windstorms and tornado damage when winds get above 70 knots.

In Poweshiek County, according to the National Climatic Data Center, there are about 31 high wind events that were separated from either a thunderstorm or extreme wind chill. These windstorms occurred between 1993 and 2008, and wind speeds during these windstorms ranged from less than one knot to 72 knots. Two deaths and twelve injuries were reported during these windstorm events. The total amount of property damage from these windstorms is almost $48.58 million, and the total crop damage is about $385,000.

Probability (4)

Based on historical data, Poweshiek County should expect at least one windstorm each year, but because it is difficult to separate a windstorm from other hazard events such as a thunderstorm there may be occurrences of high winds that may not necessarily be considered a windstorm.

Vulnerability (2)

Those most at risk from windstorms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to windstorms. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk.

Maximum Extent (4)

Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area. Wind speeds can reach up to 70 knots or greater during a windstorm event so a major event is possible.

Severity (2)

The severity of damage from windstorms can be very high. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows, all the way to complete destruction and disintegration of well-constructed structures, infrastructure, and trees. Injury or death related to windstorms most often occurs when buildings collapse; people are hit by flying objects or are caught trying to escape the windstorm in a vehicle. Crop damage is often associated with windstorms, laying down crops, breaking stalks, and twisting plants, reduce the yield and making it difficult to harvest.

Speed of Onset (4)

Wind speeds may approach 120 miles per hour and the storm can travel across the ground at more than 30 mph. These winds can uproot trees and structures and turn harmless objects in to deadly missiles, all in a matter of seconds. The advancement of weather forecasting has allowed watches to be delivered to those in the path of these storms up to hours in advance. The best lead-time for a specific severe storm is about 30 minutes.

Total Score: 20

Air Transportation Incident [Any incident involving military, commercial, or private aircraft.]

Description

Air transportation is playing a more prominent role in transportation as a whole. Airplanes, helicopters, and other modes of air transportation are used to transport passengers for business and recreation as well as thousands of tons of cargo. A variety of circumstances can result in an air transportation incident. Mechanical failure, pilot error, enemy attack, terrorism, weather conditions, and on-board fire can all lead to an incident at or near the airport. Air transportation incidents can occur in remote unpopulated areas, residential areas, or downtown business districts. Incidents involving military, commercial, or private aircraft can also occur while the aircraft is on the ground.

Historical Occurrence (2)

Iowa has 8 commercial airports, 3 commercial reliever airports, 107 general aviation airports, and 79 heliports. Since 1962, there have been 1,877 air transportation accidents in which there was at least one injury involved. A total of 485 people have been killed in air transportation incidents in Iowa since 1962. One hundred eleven fatalities occurred during the crash of United Flight 232 in Sioux City.

According to the National Transportation Safety Board, in the past 25 years, there have been 6 air transportation incidents in Poweshiek County. These incidents, occurring in the cities of Brooklyn, Grinnell, and Montezuma resulted in six fatal and four non-fatal injuries.

Probability (2)

The greater the number of landings and takeoffs, the greater the probability of a crash or accident. More and more people are utilizing air travel now than in the past. The trend of increasing numbers of people flying is likely to continue as will the crowdedness of airports and the skies above Iowa.

In 1996, there were more than 650,000 flights handled by FAA towers in Iowa. Despite the increase in the number of people using air travel, incidents that require response personnel and involve casualties are likely to continue to decrease in number due to increases in the quality of training, equipment, and safety.

Proper land use in the vicinity of the airport will also decrease the chance that people and property on the ground will suffer significant impacts in the event of an air transportation accident.

Vulnerability (1)

People aboard airplanes are the most vulnerable. Statistics from the National Transportation Safety Board and the airline industry show that the majority—over 75 percent—of airplane crashes and accidents occur during the takeoff or landing phases of a flight. As a result, developed areas adjacent to the airports and in airport flight paths are particularly vulnerable to this hazard. For areas away from the airport, a smaller percentage of the population would be directly in the area of impact. Because of the infrequency of aircraft in the skies above areas away from the airport, these areas would not be considered as vulnerable.

Maximum Extent (1)

As mentioned above, most accidents occur during takeoffs and landings. Accordingly, the spatial extent of the majority of incident would occur on airport grounds or adjacent areas. Compared to many other hazards, an air transportation incident would occupy a relatively small area. The extent to which the impacts could be felt would depend on the materials involved in an accident, the area of concern would be significantly larger than the area of an accident involving a small personal aircraft carrying stable materials. The largest share of accidents would likely affect an area the size of only a few city blocks.

Severity (3)

The level of severity would depend on the type of aircraft involved, the type of cargo being transported, and the area on the ground which the accident occurred. The lives and health of the pilot, crew, passengers, and the population on the ground would be at risk.

There are very few injuries and fatalities when compared to the number of people involved in travel as a whole, but if there is an accident, it is very likely that the injuries will be serious or fatal. Damage to the aircraft itself is costly to the owner in terms of direct value lost and amount lost because of the airplane is now out of commission.

Significant damage can also occur to property on the ground. Often buildings, fences, utility lines, and trees are damaged or destroyed in the event of a plane crash. The cargo aboard the plane that has crashed can also sustain damage or destruction. This too can be extremely costly.

Speed of Onset (4)

The amount of warning time prior to an aircraft accident could vary from tens of minutes to a matter of seconds. Crew aboard a troubled aircraft can radio to ground crew to prepare for the incident, but little can be done to lessen the direct effected of the impact. Rarely is there adequate time to do more than position onsite response personnel and alert mass casualty care providers of the possible event.

Total Score: 13

Animal/Crop/Plant Disease [A medical, health, or sanitation threat to the wildlife or domestic animals like contamination, epidemics, plagues, and insect infestation]

Description

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

Historical Occurrence (1)

Statewide, the most recent animal disease epidemic was the West Nile Virus (WNV). First indentified in New York City and carried by birds and mosquitoes, the disease spread to four states in 1999 and to 12 states and the District of Columbia in 2000. WNV causes severe neuralgic infections humans, horses, and other mammal species. As of early 2003, the disease has been found in nearly all states east of the Rocky Mountains, including Iowa where 15 confirmed human cases, 113 birds, and 1,039 horses have tested positive. The rabbit calicivirus disease was first found in 2000, but the infected rabbits were quarantined. Since then, there have been no major breakouts in the state.

According to Poweshiek County Emergency Management, there have been no animal disease outbreaks in the county.

Probability (2)

As the nation's number one producer of corn, soybeans, eggs, and hogs, Iowa farmers and producers know the importance of securing America's food supply. With hundreds of thousands of head of livestock produced and transported in Iowa each year, Iowa could be a rich environment for a disease epidemic to take hold if precautions such as vaccinations and handling procedures are not rigorously followed.

Vulnerability (1)

U.S. agriculture is very vulnerable to the introduction of a foreign animal disease. Outbreaks can be inadvertently introduced by contaminated material carried by an international traveler or by the importation of infected animals and animal products. Foreign animal disease could enter the U.S. vectored by wild animals, insects, or migratory birds or they could be intentionally introduced to cause severe economic problems or to target human health.

Maximum Extent (2)

State and federal animal health programs have been very successful in preventing or limiting the scope and magnitude of animal emergencies. However, because threats to animal health are always changing and because the animal population is mobile, the possibility always exists for a local, regional, or statewide animal health emergency to occur. Unincorporated Poweshiek was identified as the jurisdiction most at risk for this hazard. Most livestock is located outside city corporate limits in Poweshiek County.

Severity (3)

Animal health emergencies can take many forms: disease epidemics, large-scale incidents of feed and water contamination, extended periods without adequate water, harmful exposure to chemical, radiological, or biological agents, and large-scale infestations of disease-carrying insects or rodents, to name a few. One of the principal dangers of disease outbreaks they can rapidly overwhelm the animal care system. Perhaps the greatest animal health hazard would be the intentional release of a foreign animal disease agent to adversely impact a large number of animals. Such a release would likely not be an act of sabotage and is covered in biological/agri-terrorism hazard worksheet.

Speed of Onset (1)

The private practitioner is the first line of defense and will undoubtedly be the first to witness the symptoms of animal disease epidemics. The United States Department of Agriculture monitors reports submitted by veterinarians and labs to identify patterns. The department is proactive in providing information to the agricultural community on medical concerns. Conditions related to scope and magnitude can escalate quickly and area resources can be drained of vets, medications, and vaccinations rather quickly.

Total Score: 10

Communications Failure [The widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities, or long-term interruption of electronic broadcast services]

Description

Emergency 911, law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services which rely on communication systems to effectively protect citizens. Business and industry rely heavily on various communication media as well. Mechanical failure, traffic accidents, power failure, line severance, and weather can affect communication systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term. If switching stations are affected, outage could be more widespread.

Historical Occurrence (1)

No widespread communications failures have occurred in Iowa or Poweshiek County.

Probability (1)

Widespread communications losses are unlikely due to backup systems and redundant system designs. Local communications failures are likely to affect small areas of the county.

Vulnerability (2)

Citizens of the community would be impacted only indirectly. Phone and data transmission could be impacted. Most communication systems that are highly necessary have backup and are redundant in order to provide continuity of service.

Maximum Extent (1)

Most communications failures would be limited to localized areas. In the event of a widespread communications failure, only portions of Poweshiek County would be impacted, but this highly unlikely due to the support of other jurisdictions and secondary communication devices.

Severity (1)

A communications failure would not directly result in injuries or fatalities. Most financial losses would be incurred due to the direct damage to electronic equipment and the communication system infrastructure. If emergency 911 systems were to fail due to phone communication disruption, secondary impacts could occur by the inability of citizens to alert responder of their needs. Inter-agency and intra-agency communications would be limited. Data transmission could also be affected. This could disrupt business and financial transactions resulting in potential loss of business.

Speed of Onset (4)

A communications failure would likely occur with little or no warning. It is usually impossible to predict a communications failure. Some communications may be shut down for a short while for improvements or maintenance. These disruptions are usually made during period of low demand and those who rely on them are given previous notice that the system will be out of service.

Total Score: 10

Conventional Terrorism [Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom]

Description

Conventional terrorism included detonation of an explosive device on or near a target delivered via person, vehicle, or projectile. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failures, etc. Conventional terrorism can also include tactical assault or sniping from remote locations.

Historical Occurrence (1)

Iowa has not been immune to acts of terrorism or sabotage. The state has experienced many bomb threats in the distant and recent past. During the spring of 2002, 18 pipe bombs were found in five states stretching from Illinois to Texas, including Iowa. Six people were injured in the bombings in Iowa and Illinois.

According to Poweshiek County Emergency Management, there have been zero terrorist attacks in Poweshiek County in the last 25years.

Probability (1)

Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction are usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money, and issue rhetoric, implementation of effective counter measures becomes even more important.

Vulnerability (1)

Energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device.

Maximum Extent (1)

Extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failure, etc.

Severity (3)

Property damage and injuries are almost certain outcomes of a conventional bomb are detonated in a developed or populated area. Threats and scares have psychological impacts and disrupt activities at a cost to productivity.

Speed of Onset (4)

Explosions are usually instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear.

Total Score: 11

Energy Failure [An extended interruption of electric, petroleum or natural gas service, which could create a potential health problem for the population]

Description

International events could potentially affect supplies of energy-producing products, while local conditions could affect distribution of electricity, petroleum, or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems. If disruptions are long lasting, public shelters may need to be activated to provide shelter from either extreme cold or extreme heat. Stockpiles of energy products eliminate short disruptions, but can also increase the level of risk to the safety of people and property in proximity to the storage site.

On the other hand, there are also shorter term interruptions of energy due to some sort of damage or malfunction to infrastructure. An example is a loss of electricity due to damaged electric lines or loss of natural gas due to a damaged pipeline.

Historical Occurrence (2)

According to Poweshiek County Emergency Management, there have been power outages in the county. Most of these are weather-driven and power cannot be restored for several hours following the event. In February of 2007, a county-wide ice storm left some residences without power for several days.

Probability (2)

Only when free market forces cease to provide for the health, welfare, and safety of the citizens, can governments take appropriate actions to limit the effects of an energy shortage. The State of Iowa has three strategies to limit the likelihood of an energy shortage. Through voluntary and mandatory demand reduction mechanisms; the substitution of alternative energy sources when possible; and

state government programs to curtail excessive use, energy supply and demand can be kept in check. The federal government has a strategic petroleum reserve to supplement the fuel supply during energy emergencies. Shortage, especially electrical shortage, can be unpredictable with immediate effects. Natural events, human destruction, price escalation, and national security energy emergencies can cause unavoidable energy shortages.

Vulnerability (2)

Because Iowa is almost entirely dependent on out-of-state resources for energy, Iowans must purchase oil, coal, and natural gas from outside sources. 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 because of their lower purchasing power. Agricultural, industrial, and transportation sectors are also vulnerable to supply, consumption, and price fluctuations. In Iowa, petroleum represents 97% of transportation fuel. Individual consumers such as commuters are also vulnerable.

In the case of shorter term outages, people in their homes or care facilities are vulnerable if they have special medical needs that require equipment powered by electricity or some other form of power that can be lost. During times of extreme temperature, people are vulnerable because they may not be able to heat or cool their home.

Maximum Extent (2)

The effects of energy shortage would be felt throughout Poweshiek County. If it were a major supply interruption type of incident local shortages could be quickly covered, because the distribution systems are very developed. An energy failure due to damaged infrastructure could affect a small or large are of the county, but this depends on what type and degree of damage that causes the loss.

Severity (2)

Injuries and fatalities would not be directly caused by an energy shortage. Injuries and fatalities could occur if energy was not available for heating during extreme cold periods or for cooling during extreme heat. Hospitals, shelters, emergency response vehicles and facilities, and other critical facilities would have priority during energy shortages. Rotating blackouts, voluntary conservation measures, and possibly mandatory restrictions could be used to limit the severity of an energy shortage. Effects could range from minor heating and air conditioning disruptions to transportation limitations all the way to civil unrest due to the high demand, low supply, and subsequent high price. Business disruption and increased cost of business would have far-reaching financial implications across many sectors of the economy.

Speed of Onset (4)

The Iowa Department of Natural Resources Energy Bureau monitors domestic and international energy situations and has developed a plan to deal with an energy crisis. Signs that an energy shortage may be developing can be recognized even months in advance, but energy shortages/emergencies can rise suddenly and unexpectedly. Supply distribution problems in other countries and local weather situations can lead to low supply coupled with high demand in a matter of a day or two. As for outages, there is no warning for this type of energy failure.

Total Score: 14

Highway Transportation Incident [A single or multi-vehicle incident which requires responses exceeding normal day-to-day capabilities]

Description

An extensive surface transportation network exists in Poweshiek County. Local residents, travelers, business, and industry rely on this network on a daily basis. Thousands of trips a day are made on the streets, roads, and highways. If the designed capacity of the roadway is exceeded, the potential for a major highway incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the county as does the time of day and day of week. Incidents involving buses and other high-occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.

Historical Occurrence (4)

According to the Iowa Department of Transportation, between 2001 and 2005, there were a total of 1,580 car crashes in Poweshiek County. Within these crashes, 739 injuries were sustained while 25 of these injuries were fatal.

From July 1, 2009 until June 30, 2010, there were 458 vehicle accidents with property damage, 72 vehicle accidents with personal injury, and 6 vehicle accidents were hit and run. There was one report of a fatality.

Rural crashes outnumber urban crashes in Poweshiek County with 1,024 crashes occurring in rural areas between 2001 and 2005. The urban crashes during this period of time are less than half at a total of 556. Also, more rural crashes result in fatal injuries than urban crashes. Three urban crashes resulted in three fatal injuries while rural crashes resulted in 22 fatal injuries.

Probability (4)

Although traffic engineering, inspection of traffic facilities, land use management of areas adjacent to roads and highways, and the readiness of local response agencies have increased, highway incidents continue to occur. As the volume of traffic on the county's streets and highways increases, the number of traffic accidents will likely also increase. The combination of large numbers of people on the road, unpredictable weather conditions, potential mechanical problems, and human error always leaves open the potential for a transportation accident.

Vulnerability (1)

Those who use the surface transportation system are most vulnerable. Travelers, truckers, delivery personnel, and commuters are at risk the entire time they are on the road. During high traffic hours and holidays the number of people on the road in Poweshiek County is higher. This is also true before and after major gatherings such as sporting events, concerts, and conventions. Pedestrians and citizens of the community are less vulnerable but still not immune from the impacts of a highway incident.

Maximum Extent (1)

Poweshiek County is crisscrossed by hundreds of miles of roads and highways. Highway incidents are usually contained to areas on the roadway or directly adjacent to the roadway. Very few highway incidents affect areas outside the traveled portion of the road and the right-of-way. Extensive segments of the transportation system can be impacted during significant weather events, such as a large snowstorm, when multiple separate accidents occur. The area of impact can extend beyond the localized area if the vehicle(s) is involved in transporting hazardous materials.

Severity (1)

Highway incidents threaten the health and lives of people in the vehicles, pedestrians, and citizens of the community if hazardous materials are involved. Mass casualty events can occur if mass transit vehicles are involved. Community bus and school buses have a good safety record, but accidents can and do occur. Numerous injuries are a very real possibility in situations involving mass transit vehicles. Property damage would be limited to vehicles and cargo involved; roads, bridges, and other infrastructure; utilities such as light and power poles; and third-party property adjacent to the accident scene such as buildings and yards. Between 2001 and 2005 there were 1580 car crashes and 23 of these crashes resulted in 25 fatal injuries.

Speed of Onset (4)

There is usually no warning of highway incidents. During snow storms and other weather events that may impede travel, travelers, response agencies, and hospitals alike can be notified of hazardous travel conditions.

Total Score: 15

Human Disease Epidemic [A medical, health, or sanitation threat to the general public (such as contamination, epidemics, plagues, and insect infestation)]

Description

Public health action to control infectious diseases in the 21st century is based on the 19th century discovery of microorganism as the cause of many serious diseases like cholera and tuberculosis. Disease control has resulted from improvements in sanitation and vaccination programs. Scientific and technologic advances have played a major role in each of these areas and are the foundation for today's disease surveillance and control systems. Scientific findings also have contributed to a new

understanding of the evolving relation between humans and microbes. As of January 1, 2000, a total of 60 infectious diseases were designated as notifiable at the national level. A notifiable disease is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of the disease.

Historical Occurrence (1)

The Iowa Department of Public Health track epidemiological statistics in Iowa. Their data indicate no major epidemics of diseases that have high percentages of loss of life or severe illness. Each year, there are many cases of the diseases on the national notification list.

The Grinnell Regional Medical Center News reported, in September of 2009, the first confirmed case of novel H1N1 influenza in Poweshiek County.

Probability (2)

Public health agencies work to protect Iowans from infectious diseases and preserve the health and safety through disease surveillance; investigation of acute outbreaks; education and consultation to county, local, and private health agencies on infectious diseases; immunization and vaccine guidelines; treatment after animal bites; and vaccines for international travel. While this reduces the number of cases, it does not eliminate them.

Vulnerability (1)

Public health agencies also work to reduce the impact of communicable diseases in Iowa and to eliminate the morbidity associated with these diseases. Prevention and care services target Chlamydia, syphilis, gonorrhea, HIV/AIDS, and tuberculosis. Programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious diseases, provide early detection and treatment for infected persons, and ensure access to health care for refugees in Iowa. While vaccines are available for many diseases, Iowans remain vulnerable to other diseases known and unknown.

Maximum Extent (1)

Because of our highly mobile society, these diseases can move rapidly across the county, state, and across the nation within days, weeks, or months.

Severity (3)

Many of the diseases on the national notification list result in serious illness of not death. Some are treatable, for others only the symptoms are treatable.

Speed of Onset (1)

The private practitioner is the first line of defense and will undoubtedly be the first to witness the symptoms of human disease epidemics. The Iowa Department of Public Health and the U.S. Center for Disease Control (CDC) monitor reports submitted by doctors, hospitals, and labs to identify patterns. The Department and CDC are proactive in providing information to the health care

community on medical concerns. Conditions related to scope and magnitude can escalate quickly and area resources can be drained of personnel, medications, and vaccinations rather quickly.

Total Score: 9

Pipeline Transportation Incident [A break in a pipeline creating a potential for an explosion or leak of a dangerous substance—oil, gas, water from water mains, etc.—possibly requiring evacuation]

Description

Iowa is served by many high pressure pipelines to residents and industries. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small slow leak that is not ignited to a large rupture in which the gas is ignited to a large rupture in which the gas is ignited. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those in proximity to the pipelines.

Historical Occurrence (1)

According to Poweshiek County Emergency Management, there have been no pipeline incidents in Poweshiek County.

Probability (1)

The vast majority of pipeline incidents that occur are caused by third-party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. With development occurring at an unprecedented rate and the ground becoming more and more congested with utilities, the probability of an underground pipeline incident is significant.

Petroleum and natural gas pipeline accidents occur with some regularity, but they usually have a limited impact and are quickly and adequately handled by pipeline company emergency crews and local and state responders. Pipeline operators are required to coordinate all safety preparedness and response activities with the communities. Planning, training, and exercising of emergency procedures with all involved parties helps to limit the occurrence and severity of incidents.

Vulnerability (2)

People and property with pipelines on their land or nearby are the most at risk. In the event of a pipeline incident, those downwind and downhill of the release are the most vulnerable. People excavating earth near a pipeline are also at risk. Private homes and business served by natural gas have small diameter pipelines connected to their structure. The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident.

Maximum Extent (1)

Though often overlooked, petroleum and natural gas pipelines pose a real threat in the community. Most incidents affect only the area directly above or near the damaged pipeline. Depending on the size of pipeline and amount of product released, the extent of impact could be several hundred feet in diameter. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. Pipelines have automatic shutoff valves installed so that damaged sections can be isolated and the volume of product escaping can be limited. Identification and caution signs are posted wherever pipelines pass under roads, streams, fence lines, or at any aboveground utilities.

Major pipelines are located in or around Poweshiek County, Montezuma, Grinnell, and Brooklyn. Other Poweshiek County cities do not have natural gas service and use other sources for power. The jurisdictions with major pipelines are much more likely to be affected by a potential pipeline transportation incident than those jurisdictions that do not.

Severity (3)

Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. Accidents may be caused by internal or external corrosion, defective welds, incorrect operation, outside damage, or other defective pipeline or equipment. Most incidents involve crude oil, gasoline, or natural gas pipelines. All petroleum liquids pose dangers from fire or explosion, and the fire may produce poisonous or irritating gasses. Toxic fumes and direct contact can cause health hazards. Vapor clouds can travel a distance and settle in low-lying areas where the fumes may overcome people and animals. Released products should be treated as any other hazardous material. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. These evacuations potentially save lives and limit injury, but they also disrupt businesses and inconvenience residents. A break in water pipelines may impact fire protection and continuity of operations at business and industry and may affect the area by saturating the soil and causing rapid erosion.

Speed of Onset (4)

A pipeline incident may occur suddenly, but sight, sound, and smell can alert individuals that there may have been damage done to a pipeline in the area. Products may bubble up from the ground or collect in low-lying areas, a roaring or hissing noise may be heard, and most products give off distinct odor. These warning signs can alert individuals not to use any devices that may act as ignition sources and cause a fire or explosion.

Total Score: 12

Railway Transportation Incident [A derailment or a train accident which directly threaten life or property, or which adversely impacts a community's capabilities to provide emergency services]

Description

Railway incidents may include derailments, collisions, and highway/rail crossing incidents. Train incidents can result from a variety of causes. Human error, mechanical failure, faulty signals, and problems with the track can all lead to railway incidents. Results of an incident can range from minor "track hops" to catastrophic hazardous materials incidents and even passenger casualties. With the many miles of track in Iowa, there are numerous at-grade crossing at which vehicles must cross the railroad tracks. These crossings can be found throughout the County.

Historical Occurrence (1)

Poweshiek County Emergency Management is unaware of any train derailments in the county. There was a recent semi truck versus train accident in mid July 2010.

Probability (2)

There are 61 railroad crossings in Poweshiek County. The miles of railroad track in the county combined with the large number of street and highway crossings makes the probability of highway/rail collision significant. Derailments are also possible, while a major derailment would occur less frequently.

Vulnerability (1)

People and property in close proximity to the railway lines, crossing, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad track and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

Maximum Extent (1)

An Iowa Interstate Railroad freight line runs east-west through the middle portion of Poweshiek County while a Union Pacific Railroad freight line runs north-south through the west portion of the county. There are 61 railways crossings throughout Poweshiek County. Vehicle/train collisions are usually limited to areas in and near intersections. Rarely, the incident will result in widespread effects. The direct area of impact is usually quite small, but depending on the materials involved, the effect could reach areas up to 1-5 miles from the scene. Harmful products may contaminate streams, rivers, water distribution systems, and storm water systems. If this occurs, a large portion of the community could be affected. The ability of response agencies to contain the product on-scene usually limits the area affected.

Severity (2)

Railway incidents can result in death, injury, and property damage. Deaths and injuries can range from those directly involved to citizens in the community affected by hazardous materials.

Depending on the materials involved, evacuations may occur, moving residents away from dangerous products and the possibility of explosion. Gases, liquids, and solids can contaminate air, soil, and water in and near the incident scene. If a railway incident occurred in an urban area, the health and welfare of thousands of people could be put in jeopardy. Damage may be limited to the train, railcars, and cargo involved, but it can also include loss of production, business disruption due to evacuations, and business disruptions of those served by the railroad. Business and traffic disruptions could last several days until the clean-up efforts are complete.

Speed of Onset (4)

Like other transportation incidents, a railway incident would occur with no warning. There may be a limited amount of time to warn those in the pathway of the harmful effects.

Total Score: 11

Structural Failure [The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings]

Description

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 a roof of a building to collapse under the weight of the 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. Enforcement of building codes can better guarantee that structures are designed to hold up under normal conditions. Routine inspection of older structures may alert inspectors to "weak" points. The level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge, and the type and amount of products stored in the structure.

Historical Occurrence (1)

According to Poweshiek County Emergency Management, there have been no major structural failures in the last five years.

Probability (1)

Civil structures may fail in a variety of modes. The unprecedented growth in technology has resulted in a host of problems related to complex structures, special materials, and severe operation and environmental loads, such as fire, excessive vibrations, explosion, high-energy piping failures, missiles, and earthquakes. With the possible exception of misuse, accidental or environmental loads, the causes of failure may be found in deficiencies in design, detailing, material, workmanship, or inspection. With the aging structures in the county along with problems with new materials, structural failures will continue to occur. Efforts to inspect and maintain structures will lessen the probability of a failure, but not guarantee that it will not happen in the future. Internal weaknesses can be hidden from inspectors and not be realized until it is too late.

Vulnerability (1)

There are many buildings in Poweshiek County that are very old or which may become hazardous in the event of an earthquake, fire, high winds, or other natural events. All bridges are vulnerable to the effects of elements and the deterioration that results. Increases in the amount and weight of traffic they are expected to support increase their vulnerability to failure.

Maximum Extent (1)

The impacts of the failed structure would be contained to the immediate area and adjacent properties. This could be as small as the house and yard of a fallen chimney, or the area could be relatively extensive if the structure that failed was a multi-story building of a downtown or a tall communication tower. All Poweshiek County jurisdictions are at risk for this hazard. Dam and levee failure would affect a much larger area and are discussed as separate hazards.

Severity (3)

Bridge failures and debris in streets and sidewalks would interrupt normal routes of travel. Functional purpose of the building would be terminated or suspended until the integrity of the structure could be restored. Personal injury, death, and property damage may occur in the collapse itself or by falling debris from nearby structures. There would also be a considerable cost to replace or fix the structure, not to mention the loss of revenue that would occur because the structure could not be used. Utilities may be cut off to surrounding areas and communication transmissions may be lost for a period of time.

Speed of Onset (4)

The actually failure of the structure would like occur suddenly with little or no warning. There are several events that could lead up to the failure, and these have various warning times and are discussed in separate hazard worksheets. Causal hazards can include fire, explosion, overloading of ice and snow, vibration, earthquakes, flooding, high wind, erosion, chemical corrosion, subsidence, and lack of general upkeep.

Total Score: 11

Structural Fire [An uncontrolled fire in a populated area that threatens life and property and is beyond normal day-to-say response capabilities]

Description

Structural fires present a great threat to life and property and the potential for large economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, couple with improved firefighting equipment, training, and techniques, lessen the chance and impact of major urban fire. Most structural fires occur in residential structures, but the occurrences of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of the material involved.

Historical Occurrence (4)

According to Poweshiek County Emergency Management, from July 1, 2009 to June 30, 2010 there have been152 fire calls. Of those 152 fire calls, a large majority would not be a structural fire.

Probability (3)

Much of the fire prevention efforts have gone into nonresidential fires and the results have been highly effective. Even with an increase in the prevention efforts in residential fires, both residential and nonresidential fire will continue to occur. During colder months, clogged chimneys and faulty furnaces and fire places can increase the probability of structural fires.

Vulnerability (1)

Older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Combustible building materials obviously are more vulnerable than structures constructed of steel or concrete. Structures without early detection devices are more likely to be completely destroyed before containment by response agencies. Structures in areas served by older, small, or otherwise inadequate water distribution infrastructure such as water mains and hydrants are also at significant risk. Problems vary from region to region, often as a result of climate, poverty, education, and demographics, but Iowa has about 13.4 fire deaths per million people. The fire death risk is nearly two times that of the average population for children 5 years of age or less.

Maximum Geographic Extent (1)

With modern training, equipment, fire detection devices, and building regulations and inspections, most fire can be quickly contained and limited to the immediate structure involved. Certain circumstances, such as the involvement of high combustible material or high winds, can threaten a larger area. The age and density of a particular neighborhood can also make it more vulnerable to fire due to the spreading of fire from neighboring structures. All Poweshiek County jurisdictions are at risk for structural fires.

Severity of Impact (2)

Based on national averages in the 1990s, there is one death for every 119 residential structure fires and one injury for every 22 residential fires. On average, each residential fire causes nearly $11,000 of damage. In nonresidential fires, there is one death for every 917 fires, one injury for each 52 fires, and each nonresidential fire causes and average of nearly $20,000 in damage.

Speed of Onset (4)

While fires usually start with little or no warning time, alert devices can allow time for responders to contain the fire and allow occupants to evacuate the structure.

Total Score: 15

Hazardous Materials Incident [Accidental release of chemical substances or mixtures that presents danger to the public health or safety]

Description

A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in ever increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced and transported across the county via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incident generally affect a localized area, and the use of planning and zoning can minimize the area of impact.

Historical Occurrence (2)

According to Poweshiek County Emergency Management, there have been three hazardous materials incidents in Poweshiek County from July 1, 2009 to June 30, 2010. It was not specified whether these incidents were fixed or transportation related.

Probability (2)

Large quantities of hazardous materials are transported daily on Iowa streets, highways, interstates, and railways. Roadways are a common site for the release of hazardous materials. Railways are another source for hazardous materials releases. The Department of Transportation regulates routes and speed limits used by carriers and monitor the types of hazardous materials crossing state lines. Despite increasing safeguards, more and more potentially hazardous materials are being used in commercial, agricultural, and domestic uses and are being transported on Iowa roads and railways.

Vulnerability (3)

A hazardous materials incident can occur almost anywhere so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to transportation corridors and populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.

Maximum Geographic Extent (2)

Most of the hazardous materials incidents are localized and are quickly contained or stabilized by highly trained fire departments and hazardous materials teams. Poweshiek County has an agreement with the Waterloo Hazmat team for hazmat response because their firemen are trained for hazardous materials incidents. The Waterloo Hazmat team provides HazMat Ops and HazMat Recertification training to emergency responders. Depending on the characteristic of the hazardous

or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. 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. All jurisdictions are at risk for this hazard.

Severity of Impact (4)

Many injuries and fatalities due to transport of hazardous materials are related to the collision itself rather than the product released. Immediate dangers from hazardous materials include fires and explosions. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. Some chemicals cause painful and damaging burns if they come in direct contact with skin. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. Loss of livestock and crops may lead to economic hardships within the community. The occurrence of a hazardous materials 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.

Speed of Onset (4)

When managed properly under current regulations, hazardous materials pose little risk. However, when handled improperly or in the event of an accident, hazardous materials can pose a significant risk to the population. Hazardous materials incidents usually occur very rapidly with little or no warning. Even if reported immediately, people in the area of the release have very little time to be warned and evacuated. During some events, sheltering in-place is the best alternative to evacuation because the material has already affected the area and there is no time to evacuate safely. Public address systems, television, radio, and the NOAA Weather Alert Radios are used to disseminate emergency messages about hazardous materials incidents.

Total Score: 17

4.3 Hazard Ranking

Once the hazards for Poweshiek County were chosen and profiled, they were ranked against each other to determine which hazards can have the greatest impact on the county. The ranking was done according to the method used in the 2007 Iowa Hazard Mitigation Plan. The ranking method involves assigning a rating for historical occurrence, probability, human vulnerability, maximum geographic extent, severity of impact, and speed of onset. The framework for this method is below:

1. Historical Occurrence is the number of times that a hazard has occurred in the jurisdiction in the past 25 years. Assign a score accordingly.

Score	Description
1	Less than 4 occurrences in the past 25 years
2	4 to 7 occurrences in the past 25 years
3	8 to 12 occurrences in the past 25 years
4	More than 12 occurrences in the past 25 years

2. Probability reflects the likelihood of a hazard occurring again in the future, sometimes without regard to the hazard's historical occurrence. Assign a score accordingly.

Score	Description
1	Unlikely-Less than 10% probability in the next 100 years
2	Possible-Between 10% and 25% probability in the next year
3	Likely-Between 25% and 60% probability in the next year
4	High Likely-More than 60% chance in the next year

3. Human vulnerability measures the percentage of people who will be adversely affected by the occurrence of a hazard. Assign a score accordingly.

Score	Description
1	Negligible-Less than 1% of the county
2	Limited-1% to 10% of the county
3	Critical-11% to 20% of the county
4	Catastrophic-More than 20% of the county

4. Maximum geographic extent is the percentage of the jurisdiction impacted by the hazard. Assign a score accordingly.

Score	Description
1	Less than 1% of the jurisdiction
2	1% to 10% of the jurisdiction
3	10% to 20% of the jurisdiction
4	More than 20% of the jurisdiction

5. Severity of impact is an assessment of severity in terms of injuries and fatalities, personal property, and infrastructure. Assign a score accordingly.

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

6. Speed of Onset is the rating of the potential amount of warning time that is available before the hazard occurs. Assign a score accordingly.

Score	Description
1	More than 24 hours warning time
2	12 to 24 hours warning time
3	6 to 12 hours warning time
4	Minimal or no warning

Initially, the ranking of hazards was done by Region 6 before the first countywide meeting where they were presented for the Planning Team to either agree or disagree with the outcome. The result of the ranking process is in Table 4.3.1.

Table 4.3.1: Poweshiek County Hazard Ranking Results

Hazard	Historical Occurrence	Probability	Human Vulnerability	Maximum Geographic Extent	Severity of Impact	Speed of Onset	Score
Hailstorm	4	4	2	4	3	4	**21**
Tornado	4	3	3	3	3	4	**20**
Windstorm	4	4	2	4	2	4	**20**
Severe Winter Storm	4	4	2	4	2	2	**18**
Hazardous Materials Incident	2	2	3	2	4	4	**17**
Thunderstorm and Lightning	4	4	2	3	2	1	**16**
Structural Fire	4	3	1	1	2	4	**15**
Highway Transportation Incident	4	4	1	1	1	4	**15**
Drought	2	2	2	4	2	2	**14**
Energy Failure	2	2	2	2	2	4	**14**
River Flood	4	2	2	2	2	2	**14**
Grass/Wildland Fire	1	4	2	1	1	4	**13**
Air Transportation Incident	2	2	1	1	3	4	**13**
Flash Flood	1	2	2	2	2	4	**13**
Pipeline Transportation Incident	1	1	2	1	3	4	**12**
Dam Failure	1	1	2	2	2	4	**12**
Extreme Heat	1	2	2	4	2	1	**12**
Railway Transportation Incident	1	2	1	1	2	4	**11**
Conventional Terrorism	1	1	1	1	3	4	**11**
Structural Failure	1	1	1	1	3	4	**11**
Animal/Crop/Plant Disease	1	2	1	2	3	1	**10**
Communications Failure	1	1	2	1	1	4	**10**
Human Disease Epidemic	1	2	1	1	3	1	**9**
Earthquake	1	1	1	1	1	4	**9**
Sinkhole	1	1	1	1	1	4	**9**

Note: We cannot assume that this ranking is accurate across the entire county. Hazard boundaries already indicate that areas are affected by different hazards. The vulnerability assessment will further refine what hazards should be considered in determining goals and mitigation actions for each jurisdiction.

According to the ranking method, higher scores coincide with a greater potential impact on the county. The hazards that have the greatest potential for affecting Poweshiek County are hailstorms, tornadoes and windstorms. Other hazards rank very closely, too. In Poweshiek County, the high ranking hazards occur the most frequently and cause the most damage throughout Poweshiek County.

The other hazards ranked lower may occur less frequently, but do not necessarily cause less damage. Hazards like sinkholes and earthquake are ranked low, but this makes them no less important. Their low ranking is mainly due to lack of historical data or knowledge. If one of these hazards were to occur, the results could be devastating.

Some hazards received the same score so they share an equal ranking. Among these shared rankings, major differences are present among the hazards. The first group, containing two of the top 3 (high) ranked hazards, include tornadoes and windstorms scored at 20. The differences are generally a one point difference in most of the categories. Tornadoes are scored 1 point lower in probability and maximum geographic extent since windstorms are more likely to occur and cover a larger area. They do, however, have a 1 point higher score for human vulnerability and severity of impact, given their relative threat to human life.

Next, highway transportation incident and structural fire were tied for the number six rank with equal scores of 15. The main differences between how these two hazards were scored are the probability and severity of impact. A highway incident has a higher probability of occurring because of the nature of travel and safety measures taken in protecting possible electric hazards that may lead to burning of structures. The severity of impact a building can have burning, may be worse than a small accident on the highway if people (like infants or elderly) can't get out of the building.

The third tied ranking is for seventh in which drought, energy failure, and river flood all scored a 14. All aspects of each of these hazards scored the same "2" except for a singular "4" each hazard received in one aspect. River flood has the greatest historical occurrence, drought has the greatest geographic extent and energy failure had the greatest speed of onset.

Grass/Wildland fire, air transportation incident, and flashflood all scored a 13 to tie for the eighth ranked hazards. They differ in rank for all aspects except the speed of onset which shows they are all practically spontaneous events.

Pipeline transportation incident, damn failure, and extreme heat also only agree on one aspect, that being human vulnerability. They are all ranked ninth with a score of 12.

Structural failure, conventional terrorism, and railway transportation incident all agree on speed of onset, which is very quick, historical occurrence which is incredibly low, if any incident has ever occurred, and human vulnerability, which is also a low score. They are all ranked tenth with a score of 11.

The final hazard groupings are animal/crop/plant disease and communications failure with a score of 10 in eleventh place. Animal/Crop/Plant Disease scoring higher on most categories besides the speed of onset which communications failure took with its fast onset.

The final ranking of nine was given to the final three hazards of human disease epidemic, earthquake, and sinkholes, making them the twelfth ranked hazards of Poweshiek County. These are very rare, if every occurring hazards.

4.4 Vulnerability Assessment

Requirement 44 CFR §201.6(c)(2)(ii): *[The risk assessment shall include] a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

Methodology

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

- Statewide GIS datasets compiled by state and federal agencies
- FEMA HAZUS-MH loss estimation software
- Asset mapping completed by each jurisdiction
- Existing plans and reports
- Local knowledge
- Public and Planning Team input

The vulnerability assessment also considers the varying degrees of vulnerability across the planning boundary for each hazard. Poweshiek County is extremely vulnerable to certain hazards while others may occur but are much less of a threat people and property. The effects of hazards can be very unique from one another so the unique effects each can have on the county will be considered.

4.4.1 Vulnerability

44 CFR §201.6(c)(2)(iii): *For multijurisdictional plans, the risk assessment must assess each jurisdiction's risk where they vary from the risks facing the entire planning area.*

Poweshiek County is not equally vulnerable to all of the hazards identified in this plan. There is a varying degree throughout the county, and this section of the plan will assess these differences. In the context of hazard mitigation, vulnerability is how open a jurisdiction is to damage from a particular hazard. Can a hazard potentially destroy the entire community, or damage just a few homes? Are people's lives in danger? These questions and several others are important to consider when assessing vulnerability.

The results from the hazard ranking in section 4.3 were used to help determine just how vulnerable Poweshiek County and its individual jurisdictions are to natural and manmade hazards. As a reminder, the ranking system considered the following hazard characteristics: historical occurrence, probability, vulnerability, maximum geographic extent, severity of impact, and speed of onset.

During the scoring process, the highest score a hazard could possibly receive is 24, and no hazard received a score this high. The highest overall score among Poweshiek County hazards is 21. These scores were used to assign a vulnerability rating of high, medium, or low. Hazards that scored 20 to 24 are considered high-rated. Hazards that scored 15 to 19 are medium, and hazards 14 or below are considered low-rated. Refer to Table 4.4.1.1 for the rating each hazard received and which jurisdictions may potentially be affected.

As for the vulnerability rating, a high rating generally indicates that the hazard is a major threat to a jurisdiction. Its effects may be widespread and severe, which result in human loss and major property damage. Effects may vary among the high vulnerability hazards so a more detailed description of a hazard's potential effects will be discussed later in this section. Also, referring back to the detailed ranking score for each hazard will help distinguish the differences between all of the high-rated hazards.

A hazard with a medium rating is also a major threat to a jurisdiction, but its effects are on a smaller, less severe scale. The details of these hazards will also be discussed, and referring back to Table 4.3.1 is helpful, too. The hazards rated "low," on the other hand, are those that do not pose a major threat to the jurisdiction. If they were to occur, more than likely, their effects would not be extremely widespread or very severe when compared to the high- and medium-rated hazards.

Table 4.4.1.1: Vulnerability across Poweshiek County

Hazard	Jurisdictions	Score	Priority
Hailstorm	**All Jurisdictions**	**21**	**High**
Tornado	**All Jurisdictions**	**20**	**High**
Windstorm	**All Jurisdictions**	**20**	**High**
Severe Winter Storm	**All Jurisdictions**	**18**	**Medium**
Hazardous Materials Incident	**All Jurisdictions**	**17**	**Medium**
Thunderstorm	**All Jurisdictions**	**16**	**Medium**
Structural Fire	**All Jurisdictions**	**15**	**Medium**
Highway Transportation Incident	**All Jurisdictions**	**15**	**Medium**
Drought	**All Jurisdictions**	**14**	**Low**
Energy Failure	**All Jurisdictions**	**14**	**Low**
River Flood	**Unincorporated Poweshiek County** **Brooklyn** **Malcom** **Montezuma** **Searsboro**	**14**	**Low**
Grass/Wildland Fire	**All Jurisdictions**	**13**	**Low**
Air Transportation Incident	**All Jurisdictions**	**13**	**Low**
Flash Flood	**All Jurisdictions**	**13**	**Low**
Pipeline Transportation Incident	**Unincorporated Poweshiek County** **Brooklyn** **Grinnell** **Montezuma**	**12**	**Low**
Dam Failure	**Unincorporated Poweshiek County** **Brooklyn** **Grinnell** **Malcom** **Montezuma**	**12**	**Low**
Extreme Heat	**All Jurisdictions**	**12**	**Low**
Railway Transportation Incident	**Unincorporated Poweshiek County** **Brooklyn** **Grinnell** **Malcom** **Searsboro**	**11**	**Low**
Conventional Terrorism	**Grinnell** **Montezuma Community SD**	**11**	**Low**
Structural Failure	**All Jurisdictions**	**11**	**Low**
Animal/Crop/Plant Disease	**Unincorporated Poweshiek County**	**10**	**Low**
Communications Failure	**All Jurisdictions**	**10**	**Low**
Human Disease Epidemic	**All Jurisdictions**	**9**	**Low**
Earthquake	**All Jurisdictions**	**9**	**Low**
Sinkholes	**Unincorporated Poweshiek County**	**9**	**Low**

Higher – Priority Hazards

Hazard: Hailstorms
Jurisdictions: All Jurisdictions
Score: 21

According to the National Climatic Data Center, there have been 56 hail events in Poweshiek County since 1960. The size of hail ranges from 0.75 inches in diameter to 3 inches. No deaths or injuries were reported, but the sum total of all the property damage from these hail events is $393,000. The resulting crop damage is $209,000. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Hail is $37,625.

Agricultural crops such as corn and beans are particularly vulnerable to hailstorms stripping the plant of its leaves. Hail can also do considerable damage to vehicles and buildings. Hail only rarely results in loss of life directly, although injuries can occur.

The land area affected by individual hail events is not much smaller than that of the parent thunderstorm, an average of 15 miles in diameter around the center of the storm. Any area in Poweshiek County can be affected by this hazard.

Hailstorms cause nearly $1 billion annually in property and crop damage in the United States. The peak hail activity coincides with the Midwest's peak agricultural season. Financial impacts resulting from damage to property is in the millions of dollars every year, most of which is covered by crop and hazard insurance.

Hazard: Tornado
Jurisdictions: All Jurisdictions
Score: 20

In the U.S., Iowa is ranked third in the number of strong-violent (F2-F5) tornadoes per 10,000 square miles. From 1950-1995, Iowa averaged 31 twisters per year. In Iowa, most tornadoes occur in the spring and summer months, but twisters can and have occurred in every month of the year. Late afternoon to evening hour tornadoes are the most common, but they can occur at any time of the day.

According to the National Climatic Data Center, Poweshiek County has experienced 98 thunderstorm and high wind events since 1960. Out of these 98 events, no deaths and only 1 injury occurred. The total property damage from these storms reaches almost 4.1 million, and the crop damage totals $104,000. The high winds ranged from speeds of zero mph to nearly 90 mph. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Tornado is $221,383.

Those most at risk during tornadoes include people living in mobile/manufactured homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to twisters. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of

destruction. People who may not understand tornado watches and warnings due to language barriers are also at risk.

Three jurisdictions in Poweshiek County identified manufactured homes that may be extremely vulnerability during a tornado. Brooklyn, Grinnell, and Montezuma all have two manufactured home parks located within the city. According to Iowa Code 435.1, three or more mobile homes together make up a park. The other jurisdictions in Poweshiek County did not identify any manufactured or mobile homes that may be at risk.

The Lake Ponderosa development outside of Montezuma and the Holiday Lake development outside of Brooklyn were identified as vulnerable areas because they are near lakes. However, 50-70% of housing in both developments have basements that can be used for shelter during severe weather.

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. Normally, a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area. The most damaging tornado that is likely to occur is an F3, which is based on historical tornado events in Poweshiek County. In an absolute worst case scenario, a tornado along with associated hazards could affect over 50% of Poweshiek County. This is not likely but very possible.

The severity of damage from tornadoes can be very high. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction and disintegration of well constructed structures, infrastructure, and trees. Injuries or deaths 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.

Hazard: Windstorm
Jurisdictions: All Jurisdictions
Score: 20

Large-scale extreme wind phenomena are experienced over every region of the United States. Historically, high wind events are associated with severe thunderstorms and blizzards. It is often difficult to separate windstorms and tornado damage when winds get above 70 knots.

In Poweshiek County, according to the National Climatic Data Center, there are about 31 high wind events that were separated from either a thunderstorm or extreme wind chill. These windstorms occurred between 1993 and 2008, and wind speeds during these windstorms ranged from less than one knot to 72 knots. Two deaths and twelve injuries were reported during these windstorm events. The total amount of property damage from these windstorms is almost $48.58 million, and the total crop damage is about $385,000. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Windstorm is $60,031.

Those most at risk from windstorms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to windstorms. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk.

Three jurisdictions in Poweshiek County identified manufactured homes that may be extremely vulnerability during a tornado. Brooklyn, Grinnell, and Montezuma all have two manufactured home parks located within the city. According to Iowa Code 435.1, three or more mobile homes together make up a park. The other jurisdictions in Poweshiek County did not identify any manufactured or mobile homes that may be at risk.

The Lake Ponderosa development outside of Montezuma and the Holiday Lake development outside of Brooklyn were identified as vulnerable areas because they are near lakes. However, 50-70% of housing in both developments have basements that can be used for shelter during severe weather.

Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide so over 50% of Poweshiek County could be affected by a windstorm event. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area. Wind speeds can reach up to 70 knots or greater during a windstorm event so a major event is possible.

The severity of damage from windstorms can be very high. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows, all the way to complete destruction and disintegration of well-constructed structures, infrastructure, and trees. Injury or death related to windstorms most often occurs when buildings collapse; people are hit by flying objects or are caught trying to escape the windstorm in a vehicle. Crop damage is often associated with windstorms, laying down crops, breaking stalks, and twisting plants, reduce the yield and making it difficult to harvest.

Medium – Priority Hazards

Hazard: Severe Winter Storm
Jurisdictions: All Jurisdictions
Score: 18

Since 1993, Iowa has had 3,636, heavy snow, ice storm, or extreme wind chill events. There are many accounts of large numbers of deaths due to cold and blizzards in Iowa's history. While we are not as vulnerable as the early settlers, there are recent accounts of multiple deaths from snowstorms and extreme cold around the state.

According to the National Climatic Data Center, Poweshiek County has been affected by 51 snow and ice events since 1993. A total of six deaths and no injuries were reported due to these snow and ice events. Also, property damage reached a total of almost $56 million, and crop damages reached

$65 million. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Extreme Cold is $283,375; Snow and Ice loss estimation was $256,940.

Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents. The leading cause of death during winter storms is transportation accidents. About 70 percent of winter-related deaths occur in automobiles and about 25 percent are people caught out in the storm. The majority of these are males over 40 years of age. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as feed, water and shelter for livestock are unable to be met. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity like shoveling snow, digging out vehicles, assisting stranded motorists, or are the elderly or very young. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizens' use of kerosene heaters and other alternative forms of heating may create other hazards such a structural fires and carbon monoxide poisoning.

Winter storms are quite vast and would likely impact multiple counties. Certain areas may experience local variations in storm intensity and quantity of snow or ice. Overall, any area of Poweshiek County can be affected, and it is very possible that over 50% of Poweshiek County could be affected during just one severe winter storm.

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

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

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

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

Hazard: Hazardous Materials Incident
Jurisdictions: All Jurisdictions
Score: 17

According to Poweshiek County Emergency Management, there have been three hazardous materials incidents in Poweshiek County from July 1, 2009 to June 30, 2010. It was not specified whether these incidents were fixed or transportation related.

A hazardous materials incident can occur almost anywhere so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to transportation corridors and populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.

Most of the hazardous materials incidents are localized and are quickly contained or stabilized by highly trained fire departments and hazardous materials teams. Poweshiek County depends on the Northeast Iowa Response Team out of the Waterloo or Cedar Rapids Fire Department for these incidents because their firemen are trained for hazardous materials incidents. Depending on the characteristic of the hazardous or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. 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. All jurisdictions are at risk for this hazard.

Many injuries and fatalities due to transport of hazardous materials are related to the collision itself rather than the product released. Immediate dangers from hazardous materials include fires and explosions. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. Some chemicals cause painful and damaging burns if they come in direct contact with skin. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. Loss of livestock and crops may lead to economic hardships within the community. The occurrence of a hazardous materials 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.

Hazard: Thunderstorm and Lightning
Jurisdictions: All Jurisdictions
Score: 16

According to the National Climatic Data Center, Poweshiek County has experienced 98 thunderstorm and high wind events since 1960. Out of these 98 events, no deaths and only 1 injury occurred. The total property damage from these storms reaches almost 4.1 million, and the crop damage totals $104,000. The high winds ranged from speeds of zero mph to nearly 90 mph. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Lightning is $1,764 and from Thunderstorm, $89,235.

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

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

Flash floods and tornadoes can develop during thunderstorms as well. People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile/manufactured homes are vulnerable to the impacts of thunderstorms.

Three jurisdictions in Poweshiek County identified manufactured homes that may be extremely vulnerability during a tornado. Brooklyn, Grinnell, and Montezuma all have two manufactured home parks located within the city. According to Iowa Code 435.1, three or more mobile homes together make up a park. The other jurisdictions in Poweshiek County did not identify any manufactured or mobile homes that may be at risk.

The Lake Ponderosa development outside of Montezuma and the Holiday Lake development outside of Brooklyn were identified as vulnerable areas because they are near lakes. However, 50-70% of housing in both developments have basements that can be used for shelter during severe weather.

Sudden strong winds often accompany a severe thunderstorm and may blow down trees across roads and power lines. Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year. Floods and flash floods are the number one cause of weather related deaths in the U.S.

Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. Severe thunderstorms can bring a variety of associated hazards with them including straight-line winds in excess of 100 mph. Straight-line winds are responsible for most thunderstorm damage. High winds can damage trees, homes (especially mobile homes), and businesses and can knock vehicles off of the road. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures. 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. One or more severe thunderstorms occurring over a short period can lead to flooding and cause extensive damage, power and communication outages, and agricultural damage.

Hazard: Structural Fire
Jurisdictions: All Jurisdictions
Score: 15

According to Poweshiek County Emergency Management, from July 1, 2009 to June 30, 2010 there have been152 fire calls. Of those 152 fire calls, a large majority would not be a structural fire.

Older structures with outdated electrical systems not built to current fire code standards are particularly vulnerable to fire. Combustible building materials obviously are more vulnerable than structures constructed of steel or concrete. Structures without early detection devices are more likely to be completely destroyed before containment by response agencies. Structures in areas served by older, small, or otherwise inadequate water distribution infrastructure such as water mains and hydrants are also at significant risk. Problems vary from region to region, often as a result of climate, poverty, education, and demographics, but Iowa has about 13.4 fire deaths per million people. The fire death risk is nearly two times that of the average population for children 5 years of age or less.

With modern training, equipment, fire detection devices, and building regulations and inspections, most fires can be quickly contained and limited to the immediate structure involved. Certain circumstances, such as the involvement of highly combustible material or high winds, can threaten a larger area. The age and density of a particular neighborhood can also make it more vulnerable to fire due to the spreading of fire from neighboring structures. All Poweshiek County jurisdictions are at risk for structural fires.

Based on national averages in the 1990s, there is one death for every 119 residential structure fires and one injury for every 22 of these fires. On average, each residential fire causes nearly $11,000 of damage. In nonresidential fires, there is one death for every 917 fires, one injury for each 52 fires, and each nonresidential fire causes and average of nearly $20,000 in damage.

Hazard: Highway Transportation Incident
Jurisdictions: All Jurisdictions
Score: 15

According to the Iowa Department of Transportation, between 2001 and 2005, there were a total of 1,580 car crashes in Poweshiek County. Within these crashes, 739 injuries were sustained while 25 of these injuries were fatal.

From July 1, 2009 until June 30, 2010, there were 458 vehicle accidents with property damage, 72 vehicle accidents with personal injury, and 6 vehicle accidents were hit and run. There was one report of a fatality.

Rural crashes outnumber urban crashes in Poweshiek County with 1,024 crashes occurring in rural areas between 2001 and 2005. The urban crashes during this period of time are less than half at a total of 556. Also, more rural crashes result in fatal injuries than urban crashes. Three urban crashes resulted in three fatal injuries while rural crashes resulted in 22 fatal injuries.

Those who use the surface transportation system are most vulnerable. Travelers, truckers, delivery personnel, and commuters are at risk the entire time they are on the road. During high traffic hours and holidays the number of people on the road in Poweshiek County is higher. This is also true before and after major gatherings such as sporting events, concerts, and conventions. Pedestrians and citizens of the community are less vulnerable but still not immune from the impacts of a highway incident.

Poweshiek County is crisscrossed by hundreds of miles of roads and highways. Highway incidents are usually contained to areas on the roadway or directly adjacent to the roadway. Very few highway incidents affect areas outside the traveled portion of the road and the right-of-way. Extensive segments of the transportation system can be impacted during significant weather events, such as a large snowstorm, when multiple separate accidents occur. The area of impact can extend beyond the localized area if the vehicle(s) is involved in transporting hazardous materials.

The percentage of Poweshiek County that could be affected by a highway transportation incident may have been overestimated in the hazard ranking process. More than likely, this hazard would affect much less than 10% of the county, but it received a ranking that indicates nearly 40% of the county could be affected, which is not likely.

A more vulnerable area in Poweshiek County may be at the intersection of U.S. Highway 6 and Iowa 146. These are two well-traveled highways in the state and they intersect each other in Grinnell so the jurisdiction and the Grinnell-Newburg Community School District, as well as Grinnell College are vulnerable. Another obvious vulnerable area is that around U.S. Interstate 80. Though it does not run through any specific jurisdiction, those traveling on the highway and the land around the highway are vulnerable to accidents and possible spills.

Highway incidents threaten the health and lives of people in the vehicles, pedestrians, and citizens of the community if hazardous materials are involved. Mass casualty events can occur if mass

transit vehicles are involved. Community bus and school buses have a good safety record, but accidents can and do occur. Numerous injuries are a very real possibility in situations involving mass transit vehicles. Property damage would be limited to vehicles and cargo involved; roads, bridges, and other infrastructure; utilities such as light and power poles; and third-party property adjacent to the accident scene such as buildings and yards.

Lower – Priority Hazards

Hazard: Drought
Jurisdictions: All Jurisdictions
Score: 14

According to the Palmer Drought Severity Index, a composite of evapotranspiration, recharge, runoff, loss, and precipitation, Iowa has suffered seven periods of drought conditions since 1910. While some may have been more severe than others, agricultural areas were affected much more than the metropolitan areas where impacts were indirect.

According to the National Climatic Data Center (NCDC), Poweshiek County has experienced six drought events since 1985. The most recent drought was in 2003. The total property damage, from the six events, to Poweshiek County and the other areas affected by the drought, totals $645 million. Crop damaged reached a total of $1.5 billion. No deaths or injuries were reported during any of these drought events.

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

A drought would likely affect most of Poweshiek County and Iowa if not the entire Midwest. Because of the dependence on precipitation and water, the agricultural areas would be most adversely impacted. Though this is the case, the entire County would likely feel at least some impact.

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

Hazard: Energy Failure
Jurisdictions: All Jurisdictions
Score: 14

Only when free market forces cease to provide for the health, welfare, and safety of the citizens, can governments take appropriate actions to limit the effects of an energy shortage. The State of Iowa has three strategies to limit the likelihood of an energy shortage. Through voluntary and mandatory demand reduction mechanisms; the substitution of alternative energy sources when possible; and state government programs to curtail excessive use, energy supply and demand can be kept in check. The federal government has a strategic petroleum reserve to supplement the fuel supply during energy emergencies. Shortage, especially electrical shortage, can be unpredictable with immediate effects. Natural events, human destruction, price escalation, and national security energy emergencies can cause unavoidable energy shortages.

Because Iowa is almost entirely dependent on out-of-state resources for energy, Iowans must purchase oil, coal, and natural gas from outside sources. 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 because of their lower purchasing power. Agricultural, industrial, and transportation sectors are also vulnerable to supply, consumption, and price fluctuations. In Iowa, petroleum represents 97% of transportation fuel. Individual consumers such as commuters are also vulnerable.

The effects of an energy shortage could be felt throughout all of Poweshiek County, but because the distribution systems are very developed, local shortages can be quickly covered. The likelihood of this hazard occurring is very low. The reason this hazard scored so high is because if it were to happen, the effects would be felt across the entire county and more than likely most of Iowa.

Injuries and fatalities would not be directly caused by an energy shortage. Injuries and fatalities could occur if energy was not available for heating during extreme cold periods or for cooling during extreme heat. Hospitals, shelters, emergency response vehicles and facilities, and other critical facilities would have priority during energy shortages. Rotating blackouts, voluntary conservation measures, and possibly mandatory restrictions could be used to limit the severity of an energy shortage. Effects could range from minor heating and air conditioning disruptions to transportation limitations all the way to civil unrest due to the high demand, low supply, and subsequent high price. Business disruption and increased cost of business would have far-reaching financial implications across many sectors of the economy.

Hazard: River Flood
Jurisdictions: Brooklyn, Malcom, Montezuma, Searsboro, Unincorporated Poweshiek County
Score: 14

According to the NCDC, since 1950, Poweshiek County has experienced 41 river flood events with no deaths or injuries reported. The total property damages that resulted from these events total nearly $151.5 million, and the crop damages total nearly $50.2 million.

The most recent and major floods in Iowa since 1993 occurred in the spring and summer of 2008. Though this is the case for most of Iowa, Poweshiek County was not affected by these events. The most costly flood damage to Poweshiek happened in May of 2004 affecting 50 other counties and causing a total of $5 million in property damage and about $15 million in crop damage. According to the National Climatic Data Center (NCDC), the month started dry with only 0.19 inches of rain in the first week, regular seasonal rainfall for the second week and heavy rainfall in the third week. The heaviest rains came over the course of two days in the last week of May with about 6 inches in some parts of the state. A statewide average of 2.97 inches of rain fell from these two systems was Iowa's greatest rainfall since July 1993. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Flood (river and flash) is $11,836,058.

Flooding in the county seat of Montezuma is described in an excerpt from the Montezuma Hazard Mitigation Plan approved July 10, 2003 which states, "Portions of the city are subject to flooding from both the Wolf Creek and the Coon Creek. A large part of the Wolf Creek floodplain is occupied by the Montezuma Golf and Country Club. In addition, several structures are located in the floodplain. Subsequent to flooding in 1993, the City purchased two residential structures in the Wolf Creek Floodplain that were heavily damaged." (Montezuma Hazard Mitigation Plan, 2003)

Similar to the situation in Montezuma, the Malcom Hazard Mitigation Plan approved on October 6, 2003, states, "Malcom has had no major history with flooding within the past 20 years. The only concern would involve the English River south of the city. This creek has high banks and would need a great deal of rain in order to flood. If flooding were to occur, only farmland would be affected." (Malcom Hazard Mitigation Plan, 2003)

Considering that there was no damage to Poweshiek County from the floods in the summer of 2008, flooding is not very likely to occur in the county's cities and unincorporated areas. The chance of human injury or property damage is low or will result in minimal damages.

Because there is little chance of flooding in this county, there are no levees built to protect the community from a 1% annual chance flood event.

The Federal Emergency Management Agency has delineated the probable extent of the 1% annual chance floodplain in most areas. Flood Insurance Rate Maps (FIRMs) show properties affected by the floods that have at least 1% chance of occurring in any particular year. Generally, these areas are in the floodplain or adjacent areas. A small portion of the land in Poweshiek County's incorporated cities is within the 1% annual chance floodplain, and a some land outside the city corporate limits is also within the floodplain.

Flooding impacts include potential loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock losses; and interruption of businesses. Hazards of fire, health and transportation accidents; and contamination of water supplies are likely effects of flooding situations as well.

Hazard: Grass or Wildland Fire
Jurisdictions: All Jurisdictions
Score: 13

According to the National Climatic Data Center, there were no wildland or forest fire events reported in Poweshiek County. This does not account for small or contained grass fires that may not have been reported.

While wildfires have proven to be most destructive in the Western States, they have become an increasingly frequent and damaging phenomenon nationwide. People choosing to live in wildland settings are more vulnerable to wildfires, and the value of exposed property is increasing at a faster rate than population. Iowa is less vulnerable to wildfires because of the extremely large percentage of land that is developed. Grass fires are often more easily contained and extinguished before there is damage to people or developed property. Fires often burn large portions of field crops in the fall when the crops are dry and the harvesting equipment overheats or throws sparks. This can be quite costly to farmers in terms of lost production.

Most grass fires are contained to highway right-of-way and rail right-of-way ditches and are less than a few acres in size. High winds can turn a small flame into a multi-acre grass fire within a matter of minutes. The extent is dependent upon conditions such as land use/land cover, moisture, and wind. Grass fires are equally likely to affect Poweshiek County communities where there is dense or high vegetation. Rural areas are much more likely to experience grass or wildland fire issues.

Most grass fires burn only the grasses, crops, or other low land cover. Injuries and deaths from fighting the fire most often occur by natural causes such as heart attack or stroke. Property damage is usually limited to grass, small trees, etc. Occasionally a house or outbuilding can be damaged or destroyed.

Hazard: Air Transportation Incident
Jurisdictions: All Jurisdictions
Score: 13

Iowa has 8 commercial airports, 3 commercial reliever airports, 107 general aviation airports, and 79 heliports. Since 1962, there have been 1,877 air transportation accidents in which there was at least one injury involved. A total of 485 people have been killed in air transportation incidents in Iowa since 1962. One hundred eleven fatalities occurred during the crash of United Flight 232 in Sioux City.

According to the National Transportation Safety Board, in the past 25 years, there have been 6 air transportation incidents in Poweshiek County. These incidents, occurring in the cities of Brooklyn, Grinnell, and Montezuma resulted in six fatal and four non-fatal injuries.

People aboard airplanes are the most vulnerable. Statistics from the National Transportation Safety Board and the airline industry show that the majority—over 75 percent—of airplane crashes and accidents occur during the takeoff or landing phases of a flight. As a result, developed areas adjacent to the airports and in airport flight paths are particularly vulnerable to this hazard. For areas away from the airport, a smaller percentage of the population would be directly in the area of impact. Because of the infrequency of aircraft in the skies above areas away from the airport, these areas would not be considered as vulnerable.

As mentioned above, most accidents occur during takeoffs and landings. Accordingly, the spatial extent of the majority of incident would occur on airport grounds or adjacent areas. Compared to many other hazards, an air transportation incident would occupy a relatively small area. The extent to which the impacts could be felt would depend on the materials involved in an accident, the area of concern would be significantly larger than the area of an accident involving a small personal aircraft carrying stable materials. The largest share of accidents would likely affect an area the size of only a few city blocks.

Most grass fires burn only the grasses, crops, or other low land cover. Injuries and deaths from fighting the fire most often occur by natural causes such as heart attack or stroke. Property damage is usually limited to grass, small trees, etc. Occasionally a house or outbuilding can be damaged or destroyed.

The level of severity would depend on the type of aircraft involved, the type of cargo being transported, and the area on the ground which the accident occurred. The lives and health of the pilot, crew, passengers, and the population on the ground would be at risk.

There are very few injuries and fatalities when compared to the number of people involved in travel as a whole, but if there is an accident, it is very likely that the injuries will be serious or fatal. Damage to the aircraft itself is costly to the owner in terms of direct value lost and amount lost because of the airplane is now out of commission.

Significant damage can also occur to property on the ground. Often buildings, fences, utility lines, and trees are damaged or destroyed in the event of a plane crash. The cargo aboard the plane that has crashed can also sustain damage or destruction. This too can be extremely costly.

Hazard: Flash Flood
Jurisdictions: All Jurisdictions
Score: 13

Flash floods are the most common and widespread of all natural disasters except fire. In Iowa, as much as 21" of rain has fallen in a 24-hour period. According to the National Climatic Data Center, one flash flood event has affected Poweshiek County since 2000. This flash flood occurred in 2007 and resulted in $50,000 in property damage and $100,000 in crop damage but no deaths or injuries were reported.

Flash floods occur in all fifty states in the US. Particularly at risk are those in low-lying areas; close to dry creek beds or drainage ditches; near water; or downstream from a dam, levee, or storage basin. People and property in areas with insufficient storm sewers and other drainage infrastructure can also be put at risk because the drains cannot rid the area of the runoff quickly enough.

Nearly half of all flash flood fatalities are auto-related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current. Six inches of swiftly moving water can knock persons off their feet and only two feet of water can float a full-sized automobile. Recreational vehicles and mobile homes located in low-lying areas can also be swept away by water.

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

Flash floods are the number one weather-related killer in the United States. They can quickly inundate areas thought not to be flood-prone. Other impacts can include loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and interruption of business. Hazards of fire, health and transportation accidents, and contamination of water supplies are likely effects of flash flooding situations. In Iowa, there have been 643 flash flood events since 1993, and there have been four deaths and eight injuries.

Hazard: Pipeline Transportation Incident
Jurisdictions: Unincorporated Poweshiek County, Brooklyn, Grinnell, Montezuma
Score: 12

According to Poweshiek County Emergency Management, there have been no pipeline incidents in Poweshiek County.

People and property with pipelines on their land or nearby are the most at risk. In the event of a pipeline incident, those downwind and downhill of the release are the most vulnerable. People excavating earth near a pipeline are also at risk. Private homes and business served by natural gas have small diameter pipelines connected to their structure. The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident.

Though often overlooked, petroleum and natural gas pipelines pose a real threat in the community. Most incidents affect only the area directly above or near the damaged pipeline. Depending on the size of pipeline and amount of product released, the extent of impact could be several hundred feet in diameter. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. Pipelines have automatic shutoff valves installed so that damaged sections can be isolated and the volume of product escaping can be limited. Identification and caution signs are posted wherever pipelines pass under roads, streams, fence lines, or at any aboveground utilities.

Major pipelines are located in or around Poweshiek County, Montezuma, Grinnell, and Brooklyn. Other Poweshiek County cities do not have natural gas service and use other sources for power. The jurisdictions with major pipelines are much more likely to be affected by a potential pipeline transportation incident than those jurisdictions that do not.

Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. Accidents may be caused by internal or external corrosion, defective welds, incorrect operation, outside damage, or other defective pipeline or equipment. Most incidents involve crude oil, gasoline, or natural gas pipelines. All petroleum liquids pose dangers from fire or explosion, and the fire may produce poisonous or irritating gasses. Toxic fumes and direct contact can cause health hazards. Vapor clouds can travel a distance and settle in low-lying areas where the fumes may overcome people and animals. Released products should be treated as any other hazardous material. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. These evacuations potentially save lives and limit injury, but they also disrupt businesses and inconvenience residents. A break in water pipelines may impact fire protection and the continuity of operations of business and industry and may affect the area by saturating the soil and causing rapid erosion.

Hazard: Dam Failure
Jurisdictions: Brooklyn, Grinnell, Malcom, Montezuma, Unincorporated Poweshiek County
Score: 12

There are no major dam failures to report for Poweshiek County. People and property along streams are most vulnerable. Facilities and lives considerable distances from the actual impoundment are not immune from the hazard. Depending on the size and volume of the impoundment as well as the channel characteristics, a flash flood can travel a significant distance.

The area impacted following a dam failure would be limited to those areas in and near the floodplain. People and property outside the floodplain could also be impacted depending on the proximity to the dam and the height above the normal stream level.

According to the Iowa DNR's Natural Resources Geographic Information System (NRGIS) Library, there are three dams located in very close vicinity to the City of Montezuma. Failure at the Montezuma Reservoir Dam or Diamond Lake Watershed sites A-2 or C-14 can affect some unincorporated areas which are downstream and around Diamond Lake.

Grinnell, Malcom, and Brooklyn were also identified as jurisdictions that are at risk for this hazard. All of these cities have dam(s) located upstream. These dams, though, are not high hazard so the chance of major issues is very low.

There are 2,442 inventoried dams located in Iowa. Of these, 63 are high hazard, 160 are categorized as significant hazard, and 2,219 are classified as low-hazard dams. The severity of damage in Poweshiek County would most likely be some property damage since none of the dams in Poweshiek County are considered high hazard.

Hazard: Extreme Heat
Jurisdictions: All Jurisdictions
Score: 12

The record high temperature of 110 for Des Moines was recorded in 1936. During July 1936, 12 record setting days topped 100 degrees in Des Moines. The record high temperatures for Des Moines are above 90 degrees Fahrenheit beginning in March and lasting through October.

According to the National Climatic Data Center, two extreme heat events have occurred in Poweshiek County since 1995. The event in 1995 affected the entire State of Iowa and resulted in three deaths and $3.8 million in property damage. The last extreme heat event to affect Poweshiek County resulted in one death. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Extreme Heat is $3,000.

Elderly people, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly susceptible to heat reactions. Healthy individuals working outdoors in the sun and heat are

vulnerable as well. Individuals and families with low budgets as well as inner city dwellers can also be susceptible due to poor access to air-conditioned housing.

Most of the County and State would likely be impacted by extreme heat, but urban areas pose special risks. The stagnant atmospheric conditions of the heat wave trap pollutants in urban areas and add to the stresses of hot weather.

Extreme heat has broad and far-reaching sets of impacts. These include significant loss of life and illness, economic costs in transportation, agriculture, production, energy, and infrastructure. Transportation impacts include the loss of lift for aircrafts, softening of asphalt roads, buckling of highways and railways, and stress on automobiles and trucks (increase in mechanical failures). Livestock and other animals are adversely impacted by extreme heat. High temperatures at the wrong time inhibit crop yields as well. Electric transmission systems are impacted when power lines sag in high temperatures. High demand for electricity also outstrips supply, causing electric companies to have rolling blackouts. The demand for water also increases sharply during periods of extreme heat. This can contribute to fire suppression problems for both urban and rural fire departments.

Hazard: Railway Transportation Incident
Jurisdictions: Brooklyn, Grinnell, Malcom, Searsboro, Unincorporated Poweshiek County
Score: 11

Poweshiek County Emergency Management is unaware of any train derailments in the county. There was a recent semi truck versus train accident in mid July 2010.

People and property in close proximity to the railway lines, crossing, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

An Iowa Interstate Railroad freight line runs east-west through the middle portion of Poweshiek County while a Union Pacific Railroad freight line runs north-south through the west portion of the county. There are 61 railways crossings throughout Poweshiek County. Vehicle/train collisions are usually limited to areas in and near intersections. Rarely, the incident will result in widespread effects. The direct area of impact is usually quite small, but depending on the materials involved, the effect could reach areas up to 1-5 miles from the scene. Harmful products may contaminate streams, rivers, water distribution systems, and storm water systems. If this occurs, a large portion of the community could be affected. The ability of response agencies to contain the product on-scene usually limits the area affected.

Railway incidents can result in death, injury, and property damage. Deaths and injuries can range from those directly involved, to citizens in the community affected by hazardous materials. Depending on the materials involved, evacuations may occur, moving residents away from dangerous products and the possibility of explosion. Gases, liquids, and solids can contaminate air, soil, and water in and near the incident scene. If a railway incident occurred in an urban area, the

health and welfare of hundreds of people could be put in jeopardy. Damage may be limited to the train, railcars, and cargo involved, but it can also include loss of production, business disruption due to evacuations, and business disruptions of those served by the railroad. Business and traffic disruptions could last several days until the clean-up efforts are complete.

Hazard: Conventional Terrorism
Jurisdictions: Grinnell, Montezuma Community SD
Score: 11

Conventional terrorism included detonation of an explosive device on or near a target delivered via person, vehicle, or projectile. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failures, etc. Conventional terrorism can also include tactical assault or sniping from remote locations.

According to Poweshiek County Emergency Management, there have been zero terrorist attacks in Poweshiek County in the last 25years.

When this hazard was identified in the Planning Team meetings, it was originally thought of in terms of school attacks in light of the recent University and College shootings around the country. It can also be an issue in the courthouse setting where judicial proceedings take place.

Energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device.

Extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failure, etc.

Property damage and injuries are almost certain outcomes of a conventional bomb are detonated in a developed or populated area. Threats and scares have psychological impacts and disrupt activities at a cost to productivity.

Hazard: Structural Failure
Jurisdictions: All Jurisdictions
Score: 11

According to Poweshiek County Emergency Management, there have been no major structural failures in the last five years.

There are many buildings in Poweshiek County that are very old or which may become hazardous in the event of an earthquake, fire, high winds, or other natural events. All bridges are vulnerable to the effects of elements and the deterioration that results. Increases in the amount and weight of traffic they are expected to support increase their vulnerability to failure.

The impacts of the failed structure would be contained to the immediate area and adjacent properties. This could be as small as the house and yard of a fallen chimney, or the area could be relatively extensive if the structure that failed was a multi-story building of a downtown or a tall communication tower. All Poweshiek County jurisdictions are at risk for this hazard. Dam and levee failure would affect a much larger area and are discussed as separate hazards.

Bridge failures and debris in streets and sidewalks would interrupt normal routes of travel. Functional purpose of the building would be terminated or suspended until the integrity of the structure could be restored. Personal injury, death, and property damage may occur in the collapse itself or by falling debris from nearby structures. There would also be a considerable cost to replace or fix the structure, not to mention the loss of revenue that would occur because the structure could not be used. Utilities may be cut off to surrounding areas and communication transmissions may be lost for a period of time.

Hazard: Animal/Crop/Plant Disease
Jurisdictions: Unincorporated Poweshiek County
Score: 10

Statewide, the most recent Animal/Crop/Plant Disease was the West Nile Virus (WNV). First indentified in New York City and carried by birds and mosquitoes, the disease spread to four states in 1999 and to 12 states and the District of Columbia in 2000. WNV causes severe neuralgic infections in humans, horses, and other mammal species. As of early 2003, the disease has been found in nearly all states east of the Rocky Mountains, including Iowa where 15 confirmed human cases, 113 birds, and 1,039 horses have tested positive. The rabbit calicivirus disease was first found in 2000, but the infected rabbits were quarantined. Since then, there have been no major breakouts in the state.

According to Poweshiek County Emergency Management, there have been no animal disease outbreaks in the county. According to the 2010 State of Iowa Hazard Mitigation Plan, the Poweshiek County's Annual Loss Estimation from Crop Loss is $615,706.

U.S. agriculture is very vulnerable to the introduction of a foreign animal disease. Outbreaks can be inadvertently introduced by contaminated material carried by an international traveler or by the importation of infected animals and animal products. Foreign animal disease could enter the U.S. vectored by wild animals, insects, or migratory birds or they could be intentionally introduced to cause severe economic problems or to target human health.

State and federal animal health programs have been very successful in preventing or limiting the scope and magnitude of animal emergencies. However, because threats to animal health are always changing and because the animal population is mobile, the possibility always exists for a local, regional, or statewide animal health emergency to occur. Unincorporated Poweshiek was identified as the jurisdiction most at risk for this hazard. Most domestic animals are located outside city corporate limits in Poweshiek County.

Animal health emergencies can take many forms: disease epidemics, large-scale incidents of feed and water contamination, extended periods without adequate water, harmful exposure to chemical, radiological, or biological agents, and large-scale infestations of disease-carrying insects or rodents, to name a few. One of the principal dangers of disease outbreaks, they can rapidly overwhelm the animal care system. Perhaps the greatest animal health hazard would be the intentional release of a foreign animal disease agent to adversely impact a large number of animals. Such a release would likely not be an act of sabotage and is covered in biological/agro-terrorism hazard worksheet.

Hazard: Communications Failure
Jurisdictions: All Jurisdictions
Score: 10

No widespread communications failures have occurred in Iowa. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner.

Citizens of the community would only be impacted indirectly. Phone and data transmission could be impacted. Most communication systems that are highly necessary have backup and are redundant in order to provide continuity of service.

Most communications failures would be limited to localized areas. In the event of a widespread communications failure, only portions of Poweshiek County would be impacted, but this highly unlikely due to the support of other jurisdictions and secondary communication devices.

A communications failure would not directly result in injuries or fatalities. Most financial losses would be incurred due to the direct damage to electronic equipment and the communication system infrastructure. If emergency 911 systems were to fail due to phone communication disruption, secondary impacts could occur by the inability of citizens to alert responder of their needs. Inter-agency and intra-agency communications would be limited. Data transmission could also be affected. This could disrupt business and financial transactions resulting in potential loss of business.

Hazard: Human Disease Epidemic
Jurisdictions: All Jurisdictions
Score: 9

The Iowa Department of Public Health track epidemiological statistics in Iowa. Their data indicate no major epidemics of diseases that have high percentages of loss of life or severe illness. Each year, there are many cases of the diseases on the national notification list.

The Grinnell Regional Medical Center News reported, in September of 2009, the first confirmed case of novel H1N1 influenza in Poweshiek County.

Public health agencies also work to reduce the impact of communicable diseases in Iowa and to eliminate the morbidity associated with these diseases. Prevention and care services target

Chlamydia, syphilis, gonorrhea, HIV/AIDS, and tuberculosis. Programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious diseases, provide early detection and treatment for infected persons, and ensure access to health care for refugees in Iowa. While vaccines are available for many diseases, Iowans remain vulnerable to other diseases known and unknown.

Because of our highly mobile society, these diseases can move rapidly across the county, state, and across the nation within days, weeks, or months. Many of the diseases on the national notification list result in serious illness of not death. Some are treatable, for others only the symptoms are treatable.

Hazard: Earthquake
Jurisdictions: All Jurisdictions
Score: 9

Iowa as a whole has experienced the effects of only a few earthquakes in the past two centuries. The epicenters of 12 earthquakes have been located in the state. The majority have been along the Mississippi River, and none have been in central Iowa. The last earthquake to occur in Iowa was near the eastern Iowa town of Oxford in 1948. Since the early 1800s, another 9 earthquakes have occurred outside of Iowa but have impacted areas in the state. The most recent quakes were in the 1960s and occurred in Illinois and Missouri. While more than 20 earthquakes have occurred in or impacted Iowa in the past 200 years, they have not seriously affected the state. According to the National Climatic Data Center, there have been no earthquakes in Poweshiek County.

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

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

Due to the relatively low magnitude of earthquakes that would occur in the state, and the distance from the epicenter of an earthquake that would occur in the New Madrid Fault Zone, Iowans would likely see only minor impacts. Fatalities would be very rare, injuries limited to falls and small-unsecured objects, property loss would likely be minimal, and economic loss could occur due to short disruptions in commercial and industrial activities.

Hazard: Sinkholes
Jurisdictions: Unincorporated Poweshiek County
Score: 9

There are three areas in Iowa where large numbers of sinkholes exist: (1) within the outcrop belt of the Ordovician Galena Group carbonates in Allamakee, Clayton, and Winneshiek counties; (2) in Devonian carbonates in Bremer, Butler, Chickasaw, and particularly Floyd and Mitchell counties; and (3) along the erosional edge of Silurian carbonates in Dubuque and Clayton counties. According to the Iowa Department of Natural Resources, there are no significant sinkholes in Poweshiek County.

In Poweshiek County, there are a few rural areas in Malcom, Scott, Lincoln and Jackson townships that are susceptible to sinkholes but there is no history of this issue so the probability of a sinkhole occurring is very low. If a sinkhole were to form, people and structures located on or near the sink hole are the most at risk for injury, death, and property damage. People can be injured while the sinkhole is forming as well as after by falling into the open sinkhole. People, buildings, and infrastructure can basically be swallowed by a sinkhole.

Sinkhole impacts included potential loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock losses; and interruption of businesses. Hazards of fire, health, and transportation accidents; and contamination of water supplies are likely effects. Much of this depends on the location and size of a sinkhole.

Most of Iowa's sinkholes occur in rural areas where their main impact is rendering some land unsuitable for row-crop agriculture. Sinkholes have also resulted in the failure of farm and other types of ponds, roads, and one sewage-treatment lagoon. As sinkholes sometimes allow surface runoff to directly enter bedrock aquifers, their presence has implications for groundwater quality.

4.4.2 Community Assets

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

This section covers the location and density of the population, structures, critical facilities, infrastructure, and other important assets in Poweshiek County that may be at risk of the natural and manmade hazards identified in the previous section.

Hazards designated as "planning boundary-wide" can affect all of the people, structure, critical facilities, infrastructure, and other assets identified in this section. As a reminder, the planning boundary-wide hazards include—in no particular order:

- Communication Failure
- Drought
- Energy Failure
- Extreme Heat
- Flash Flood
- Grass or Wildland Fire
- Hailstorm
- Severe Winter Storm
- Earthquake
- Structural Failure
- Structural Fire
- Thunderstorm and Lightning
- Tornado
- Windstorm
- Hazardous Materials Incident
- Highway Transportation Incident
- Air Transportation Incident
- Human Disease Epidemic

The hazards that only affect certain jurisdictions and require more specific analysis include—in no particular order:

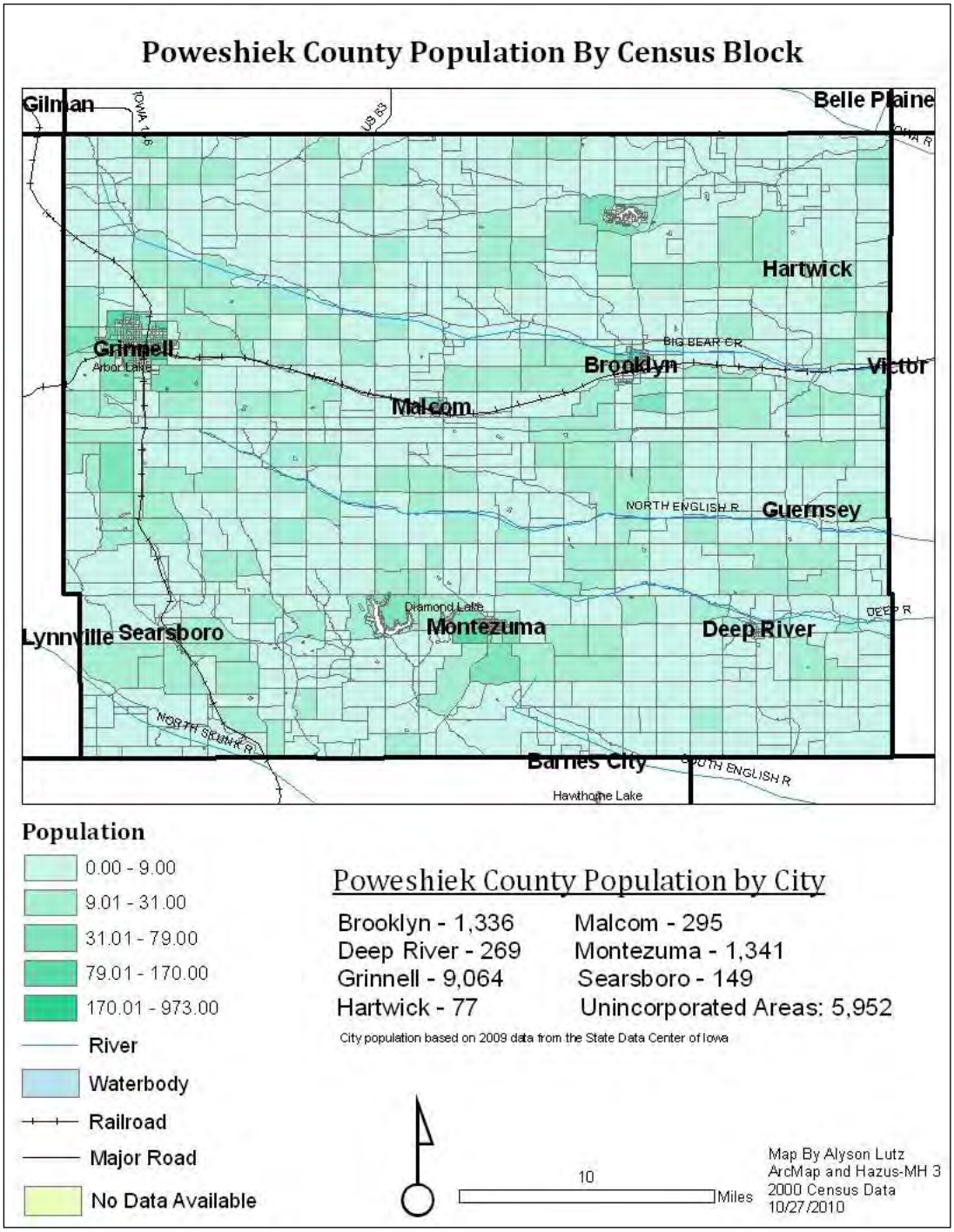
- Animal/Crop/Plant Disease—Unincorporated Poweshiek County
- Dam Failure—Unincorporated Poweshiek County, Brooklyn, Grinnell, Malcom, Montezuma
- Pipeline Transportation Incident— Unincorporated Poweshiek County, Grinnell, Brooklyn, Montezuma
- Railway Transportation Incident— Unincorporated Poweshiek County, Grinnell, Malcom, Searsboro
- River Flooding— Unincorporated Poweshiek County, Brooklyn, Malcom, Montezuma, Searsboro
- Sinkholes— Unincorporated Poweshiek County
- Conventional Terrorism—Grinnell, Montezuma Community SD

Each hazard and the effect it can have on a jurisdiction will be discussed in the next section of this plan. This section is purely a summarization of the assets that are generally in danger when a hazard event occurs and their importance to the corresponding jurisdiction. There are quite a few similarities between jurisdictions, but there are also dozens of assets unique to each jurisdiction.

Human Assets

The people who live and visit Poweshiek County are the first priority for providing protection from natural and manmade hazards. One of the two main goals of hazard mitigation is to prevent human injury and death. Nearly 18,500 people live in Poweshiek County and thousands more visit and travel through the county regularly. Refer to Figure 4.4.2.1 below for the population distribution across Poweshiek County.

Figure 4.4.2.1: Poweshiek County Population by Jurisdiction and Census Block

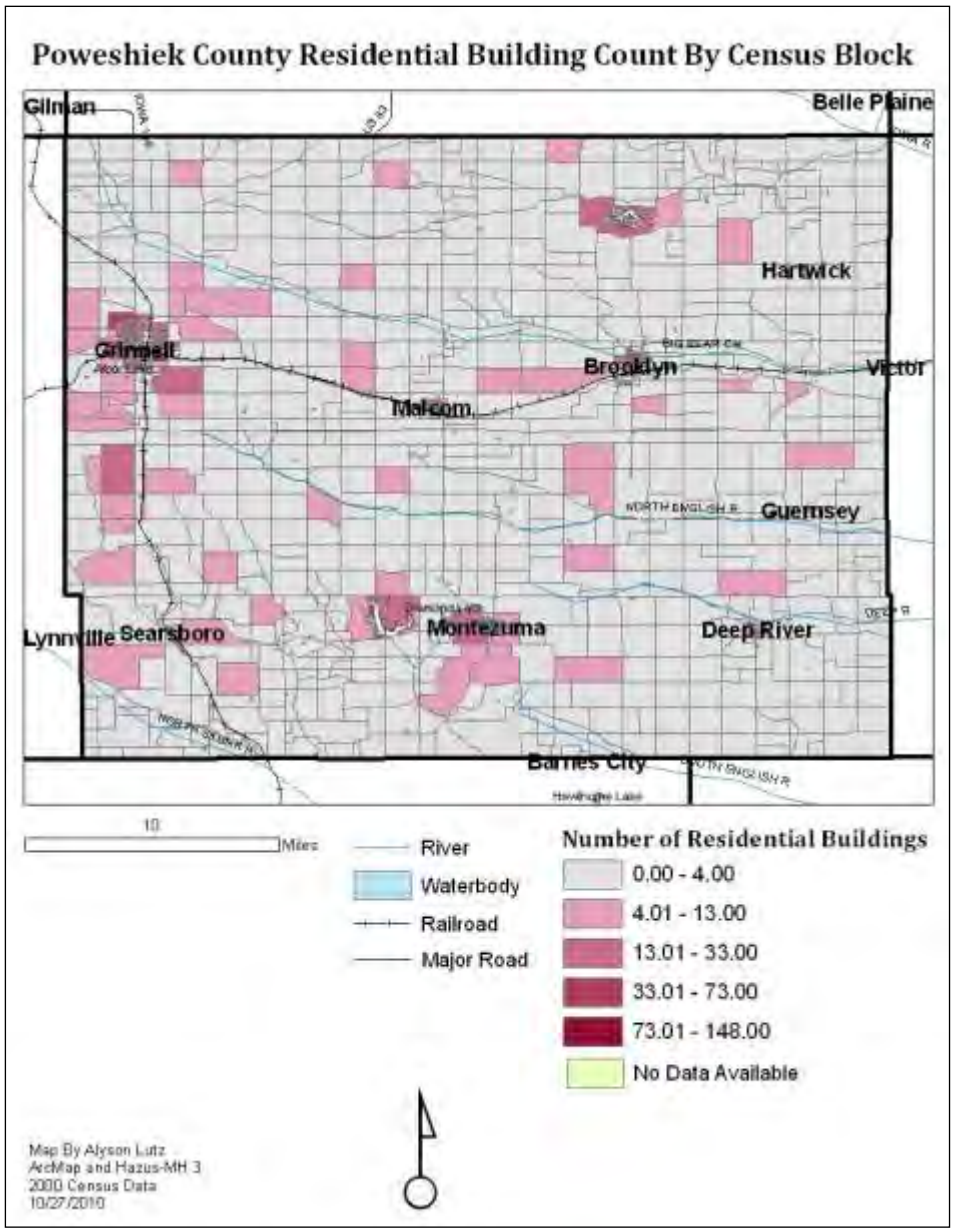


The largest concentration of people in Poweshiek County is in its incorporated cities. Grinnell and Montezuma have the highest populations followed by Brooklyn. There is also a higher concentration of people living in a census block south of Grinnell. Otherwise, the rest of the population is evenly spread among the smaller cities and the unincorporated areas throughout the county.

Structural Assets

The other main goal of hazard mitigation is to prevent property damage, which can be both dangerous and extremely expensive to repair. For the sake of analysis, Poweshiek County's structural assets were divided into five different use categories: residential, commercial, industrial, agricultural, and historic. Figure 4.4.2.2 below features residential structures.

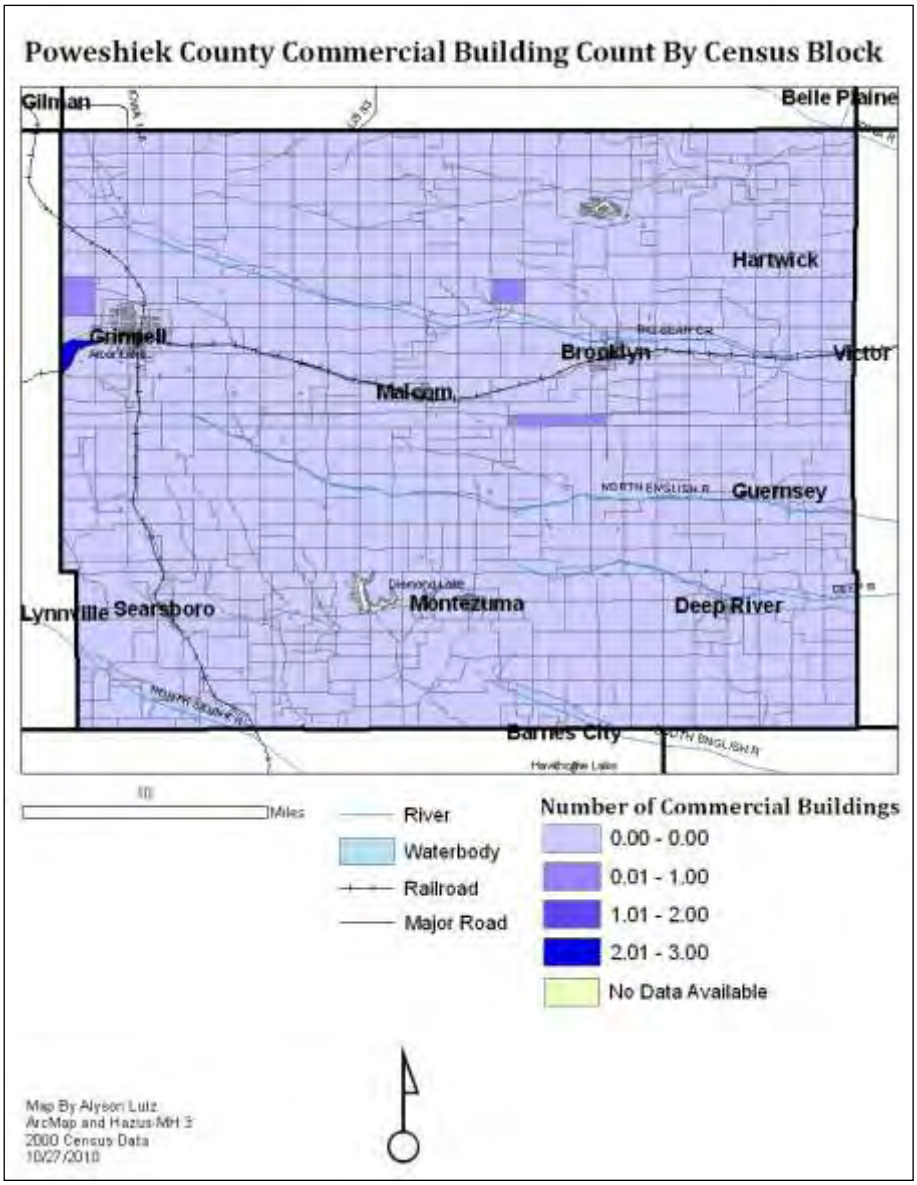
Figure 4.4.2.2: Poweshiek County Residential Building Count by Census Block



The pattern of residential development resembles the population distribution of the county since it is based on residence. The majority of residential structures are concentrated in the county's largest cities. Smaller concentrations can be found the smaller cities of Poweshiek County and throughout the unincorporated areas. Again, in the northeast corner of the county, there is a high concentration of residential structures. Overall, the majority of the structures in Poweshiek County are for residential use. Refer to Figure 4.4.2.3.

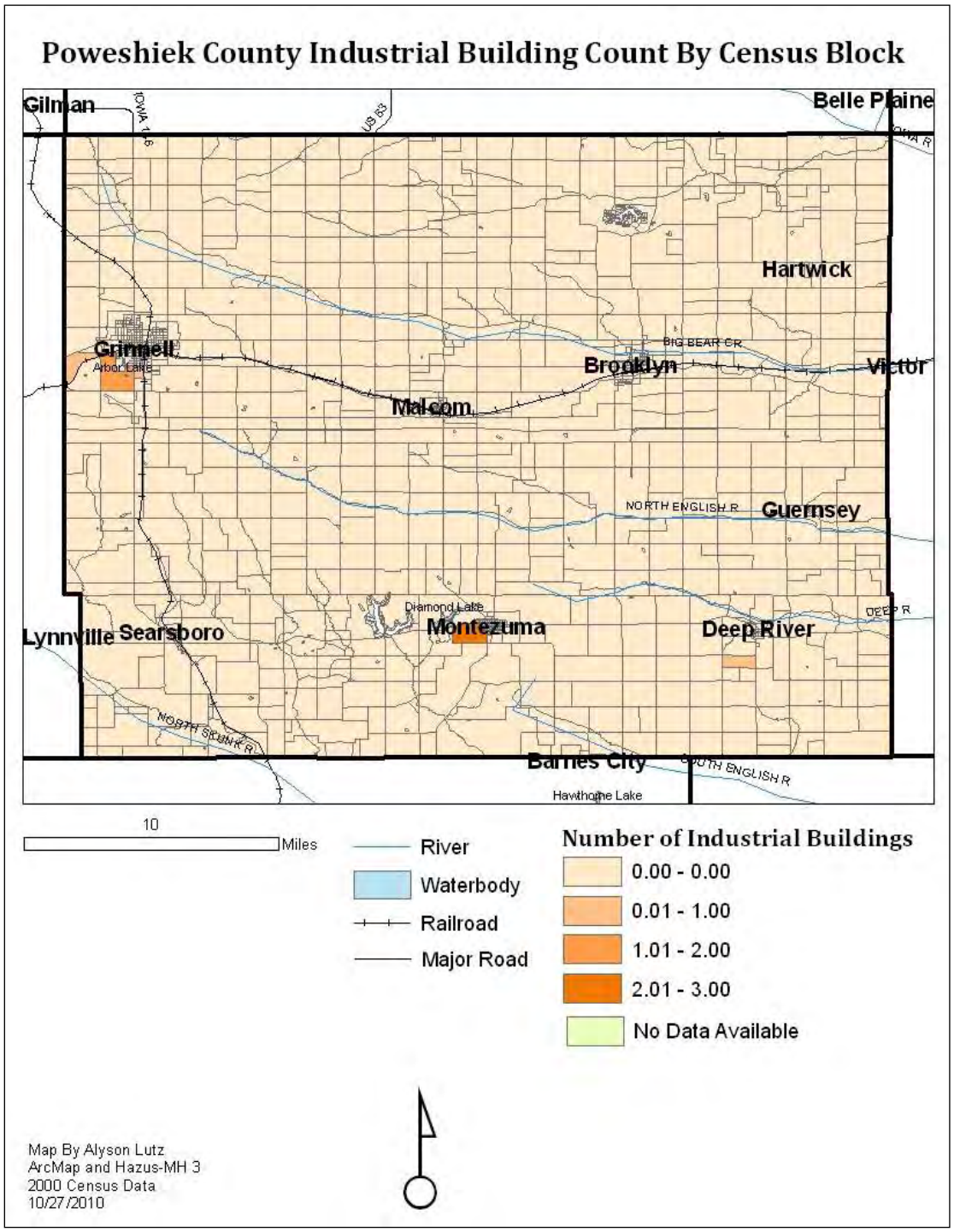
The second structure type, commercial, does not closely resemble the patterns of residential development. Most commercial buildings are located in the north and western portions of the county. The highest concentrations of buildings in one census block, though, is just six to eight so there are no extremely dense areas of commercial buildings. Generally, Poweshiek County's largest cities have higher concentrations but there are also denser areas in the unincorporated, city periphery.

Figure 4.4.2.3: Poweshiek County Commercial Building Count by Census Block



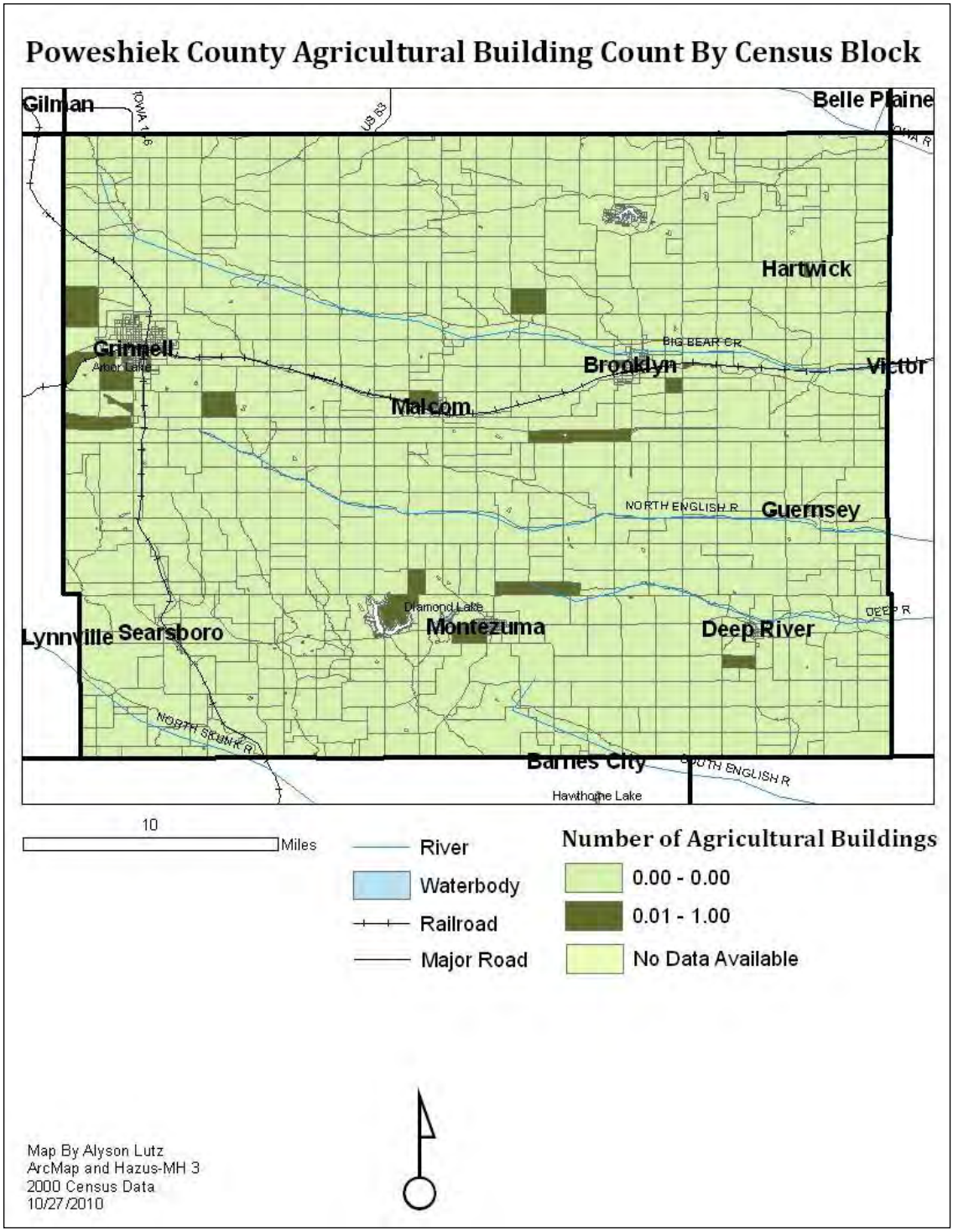
The concentration of industrial buildings is also not very dense with the highest concentration ranging from just two to four buildings. Refer to Figure 4.4.2.4. There are four areas that stand out as the densest industrial areas with two to four buildings. There are also three areas with just one industrial building. Overall, Poweshiek County does not have a high concentration of these buildings in one area so the county's industrial economy does not seem to be extremely vulnerable.

Figure 4.4.2.4: Poweshiek County Industrial Building Count by Census Block



The distribution of Poweshiek County's agricultural buildings is quite similar to the distribution of industrial buildings with some slight variations. None of the areas are extremely dense because the highest range in number of buildings per census block is just one building. All agricultural buildings are located outside of city corporate limits in the unincorporated areas of the county. Refer to Figure 4.4.2.5 for the location of agricultural buildings in Poweshiek County.

Figure 4.4.2.5: Poweshiek County Agricultural Building Count by Census Block



Historic Assets

The 21 historic sites are spread across most of Poweshiek County. There is one major cluster of historic sites in the city of Grinnell, which can be seen in the call out in Figure 4.4.2.6 on the next page. This cluster contains a majority of the sites in the county. Because these historic sites are in such close proximity, they should have a high priority and consideration when it comes to protection from hazards. Many of these sites are used presently as educational facilities and therefore, maintain a high importance to the cities as historic sites as well as functioning pieces of the educational system in Grinnell.

In order to identify the locations of 21 registered historic sites in Poweshiek County, Geographic Information Systems software was used. The National Geographic Information System Library and the Iowa Department of Natural Resources provided aerial photos as well as county and incorporated city boundary shapefiles. The State Historic Society provided the points of the historic sites listed on the National Register of Historic Places. (http://www.nps.gov/nr/) The full list of Poweshiek County's historic sites is below:

1. Bowers and McDonald Office Building
2. The Brooklyn Hotel
3. Chicago, Rock Island and Pacific Railroad-Grinnell Passenger Station
4. Goodnow Hall on Grinnell College campus
5. Grinnell Herald Building
6. Grinnell Historic Commercial District, aka Merchants National Bank
7. Grinnell, Levi P., House
8. Interior Telephone Company Building
9. Manatt, William,
10. Marsh, E.A. and Rebecca (Johnson), House
11. McDowell Bridge
12. Mears Hall on the Grinnell College campus
13. Merchants' National Bank
14. The Montezuma Public Library
15. New Carroll House Hotel
16. Poweshiek County
17. Raymond, P. P., House
18. Ricker, B. J., House
19. Spaulding Manufacturing Company
20. Spencer, Charles H., House
21. Stewart Library

Refer to Figure 4.4.2.6 on the following page. This map shows the location of each historic site with its corresponding number in the list above as its identifier.

Figure 4.4.2.6: Poweshiek County Historic Sites

Jurisdiction Identified Assets, Critical Facilities, and Vulnerable Populations

A community asset diagram was completed for each individual jurisdiction and the unincorporated areas of Poweshiek County. ***The schools were also included in this process by having school representatives participate in the asset mapping for the community in which their buildings are located.*** The assets particular to each jurisdiction can be found in the following pages.

Critical facilities and vulnerable populations were also identified for each jurisdiction. These facilities and populations are also important to identify for the purpose of determining hazard mitigation priorities. Knowing who is most vulnerable during a hazard event and what facilities are most important during and immediately after a hazard event is extremely valuable.

Critical facilities are defined as facilities that are extremely important to the health, safety, and welfare of the people of jurisdiction. These facilities are especially important following hazard events. Examples of critical facilities include but are not limited to:

- Shelters
- Police, fire, ambulance stations
- City Hall
- Hospitals, medical clinics, nursing facilities
- Emergency operation centers
- Transportation facilities like roads, bridges, airports, etc.
- Infrastructure for water, wastewater, power, communications, etc.
- Power generation facilities
- Schools
- Businesses that provide necessities like food, fuel, hardware, and money

Every Poweshiek County jurisdiction is unique so the critical facilities identified for one jurisdiction may be very different from others. Critical facilities from other jurisdictions can be identified, too. An example is a grocery store or gas station. These facilities may not be located in a certain community but residents depend on that grocery store or gas station for their basic needs.

A vulnerable population includes people who may require special assistance or medical care. These people should be identified so their needs are a priority in the event of a disaster. Examples of vulnerable populations include but are not limited to:

- Elderly in their homes, assisted living, or nursing facility
- Disabled in their homes, assisted living, or nursing facility
- Young children in school or daycare

The elderly or disabled people in a jurisdiction may not be able to cope with a disaster as well as others. These people might require help getting to a shelter, boarding up broken windows, buying groceries, or contacting their family.

Brooklyn

It is important to identify community assets, which may be infrastructure, buildings, activities, or institutions, because it helps residents decide what to protect from the harmful impacts of hazard events. The assets identified for Brooklyn are below:

1. Flag Days
2. Flag Store
3. Brooklyn Economic Development
4. Brooklyn Chamber of Commerce
5. Restaurants
6. Medical Clinic
7. Pharmacy
8. Wellness center
9. BGM Community School District
10. Nursing Home
11. Bank
12. Churches
13. Businesses
14. Grain elevator
15. Cement company
16. Hardware store
17. Electronics
18. Gas station/Convenience store
19. Men's softball
20. Coed volleyball
21. Softball complex
22. Community service groups
23. Little league
24. Bear Creek
25. University extension
26. BGM Nature Center
27. MJM Community Center
28. Housing development
29. Brooklyn Museum
30. Bear Creek Addition
31. Industrial Park
32. Telephone
33. Cable
34. Brooklyn Municipal Utilities
35. 200,000 gallon water tower
36. Poweshiek Water Association
37. DOC's Auto Repair
38. NAPA
39. Trail by school
40. Walking trail in Bear Creek Addition
41. City parks
42. Brooklyn Public Library

The critical facilities for the community were also identified. These are the facilities in the community that are important to maintain the health, safety, and welfare of the residents and visitors of the Brooklyn community. The critical facilities identified for Brooklyn are below:

1. Brooklyn Public Safety Building
2. City Hall
3. Brooklyn Medical Clinic
4. BGM School District Buildings
5. MJM Community Center – has shelter
6. Municipal Utilities

These six facilities were identified for several reasons. The city hall serves as the city command post during disaster events. The medical clinic can help serve those injured in the hazard before, during and following the event. The community center also serves as a shelter during hazard events. Refer to Figure 4.4.2.7 for each facility's location in Brooklyn.

The vulnerable populations living in Brooklyn were also identified. These are the people in the community who may require special assistance or medical care. Vulnerable populations are identified so their needs can be made a priority in the event of a disaster. The vulnerable populations living in the City of Brooklyn are identified below.

1. Elderly persons at the Brooklyn Community Estate
2. Persons in low-rent housing
3. Children in Preschool at BGM

Figure 4.4.2.7: Brooklyn's Critical Facilities

Deep River

Deep River's assets were identified by the Planning Team members who volunteered to represent the city. The assets were identified through asset mapping activity at the first countywide hazard mitigation meeting. For this activity, three major asset areas were considered: environment, economy, and social. Deep River's assets are listed below.

1. Fun Days
2. Hardware Store
3. Pancake Breakfast
4. MDR Trust
5. Farming Community
6. Bank
7. At-home Businesses
8. Housing Variety
9. Newspaper
10. Historic Schoolhouse
11. Parks
12. Vehicle Repair Shop
13. Community Center
14. Peoplerides

The city's critical facilities were also identified at this meeting but in a separate activity. Several of the city's assets were also considered critical facilities. The facilities that need to function immediately following a hazard event are listed below.

1. Fire Station
2. County and City Road Departments
3. Water Tower
4. Phone Building
5. City Building with generator for the Fire Department
6. Winegarden Hardware
7. County Bank
8. Community Center
9. Storm Siren

All of these facilities are extremely important to Deep River during and after a hazard event. These nine facilities were chosen for many reasons of which some are very obvious. The Fire Station and City Building are a command post for City operations and protect important equipment that will most likely be needed immediately following a hazard event. The phone building serves city communications. The Community Center is a potential shelter space, and the hardware store is a source for supplies. For the location of Deep River's critical facilities, refer to Figure 4.4.2.8.

Deep River's representative also identified vulnerable populations. These are the people in the community who may need immediate assistance after a hazard event due to special circumstances. The vulnerable populations identified in Deep River are listed below.

1. Elderly residents in the 2 retirement homes

Deep River representatives expressed concern for the elderly and disabled who live in the retirement homes in town. These people may not have the mobility needed to respond quickly to hazard events and this is of more concern considering the number of people living in each home who would need assistance in an event.

Figure 4.4.2.8: Deep River's Critical Facilities

Grinnell

Grinnell's assets were identified by the Planning Team members who volunteered to represent the city. The assets were identified through asset mapping activity at the first countywide hazard mitigation meeting. For this activity, three major asset areas were considered: environment, economy, and social. Grinnell's assets are listed below.

1. Ahrens Park
2. Jewel Box Bank
3. Ag Center
4. Skate park
5. Schools
6. Grocery Stores
7. Restaurants and Bars
8. Midwest Ambulance
9. Fire and Police department
10. Funeral home
11. Hospital
12. Trucking company
13. Manufacturing companies
14. Major agricultural chemical company
15. Retail and Down town businesses
16. Gas station/Convenience stores
17. Car dealerships
18. Theater
19. HUD low-income housing
20. Retirement facilities
21. Senior housing
22. apartment complexes
23. Manufactured housing
24. Grinnell College dormitories
25. Grinnell College
26. Grinnell College Library
27. Faulconer Gallery
28. Greater Grinnell Art Council & Theater group
29. Bike trail
30. Skate park
31. Bowling
32. Ag center
33. Golf courses
34. Ahrens park
35. City parks
36. Arbor Lake and Lake Nyanza
37. Grinnell Museum
38. Jewel Box Bank
39. Historic homes
40. Mayflower
41. Seeland Park retirement community
42. New development
43. City water distribution
44. City waste water plant
45. Bike trail
46. Railroads
47. Peoplerides
48. Cab service
49. Airport
50. Nationwide bus service

The critical facilities for the community were also identified. These are the facilities in the community that are important to maintain the health, safety, and welfare of the residents and visitors of the Grinnell community. The critical facilities identified for Grinnell are below.

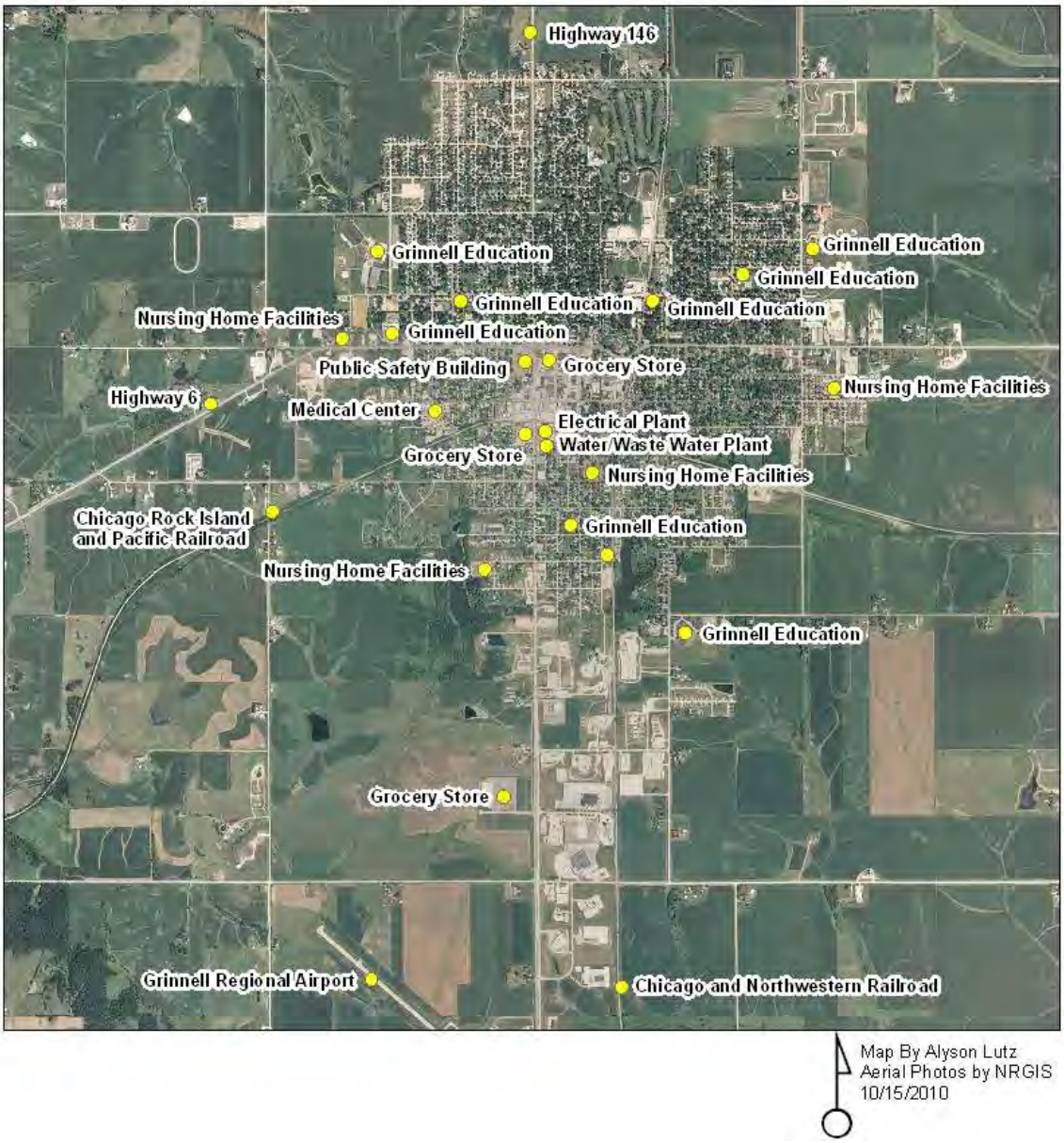
1. Grinnell Public Safety Building
2. Grinnell EMS Building
3. Grinnell Regional Medical Center
4. Grinnell Water and Wastewater Plant
5. Electrical Plant
6. Public Schools, College and Day Cares
7. Grinnell Regional Airport
8. Transportation: highways, railways
9. Grocery stores

For the most part, Grinnell has critical facilities that cannot be found in many other jurisdictions in the county. The wastewater treatment facility is prominent as a critical facility that is very important after such events as flash flooding and river flooding. The locations of Grinnell's critical facilities can be viewed in Figure 4.4.2.9.

Vulnerable populations have also been identified for Grinnell and are again, somewhat different than other jurisdictions in Poweshiek County. Not all cities in the county have mental health, long term care, hospital facilities, or a college campus where some students will not have independent transportation. The vulnerable populations living in the City of Grinnell are identified below.

1. Elderly in long term care facilities
2. Young Children
3. Those in hospital care
4. Those in mental health housing
5. Students at Grinnell College

Figure 4.4.2.9: Grinnell's Critical Facilities



Hartwick

Hartwick's representatives identified 12 major assets in the community. Some assets include agricultural assets, natural features, and social events so there are not just physical assets but also social assets in this community. The complete list of assets from the asset mapping activity is below.

1. Fire Department
2. Bank
3. Poweshiek County Maintenance Shop
4. Coop telephone substation
5. Heartland Cooperative branch
6. Rolle Bolle court
7. 125 year celebration (August 7th)
8. City Park
9. City well
10. Wireless cell phone tower
11. Grain bins and elevator
12. Hartwick Congregational Church

Since Hartwick is one of the smaller communities in Poweshiek County, all basic services like a grocery store and gas station are not located in the city and there are not many critical facilities to serve the community. The critical facility Hartwick identified is listed below. Refer to Figure 4.4.2.10 for the location of the critical facility in Hartwick.

1. Fire Station

Of all the types of critical facilities that may be needed the quickest after a hazard event, fire rescue is much more time sensitive than grocery or banking needs.

The vulnerable population identified in Hartwick is the elderly residents who are living in their home. This is a commonly identified group of people in Poweshiek County. Most cities have older residents who live alone and may not have the mobility to respond quickly during a hazard event.

Figure 4.4.2.10: Hartwick's Critical Facilities

Malcom

Eighteen major assets were identified in Malcom. These assets include both structural and social assets. Not just buildings but also service groups. The full list of identified assets is below:

1. Gas station
2. Pour House restaurant/bar
3. ITWC
4. Grain storage
5. Malcom meat locker
6. Community issues/social
7. Bed and breakfast
8. Senior citizen home
9. Local businesses
10. Churches
11. City park
12. Social service organizations
13. U.S. Post Office
14. Downtown
15. Poweshiek Water Association
16. Water towers
17. Railroad stops for agricultural purposes
18. BGM school bus

All of the critical facilities identified for Malcom are located within the actual city. Several common critical facilities, though, are located outside of Malcom in surrounding cities. Businesses like a grocery or hardware store are not located in Malcom but in nearby cities. Although these facilities were not directly identified, they are still extremely important. All of the critical facilities that were identified by Malcom Planning Team representatives are below. Refer to Figure 4.4.2.11 for facility locations in Malcom.

1. Fire Station/City Hall
2. City Auditorium
3. Churches (2)

The vulnerable populations living in Malcom were also identified. These are the people in the community who may require special assistance or medical care immediately following a hazard event. Vulnerable populations are identified so their needs can be made a priority in the event of a disaster. The vulnerable populations living in Malcom are the elderly living in Malcom Manor Senior Living and children in daycare. Churches were identified because several times a week there are large gatherings of people at these facilities, which may be an issue during a hazard event.

Figure 4.4.2.11: Malcom's Critical Facilities

Montezuma

A large number of assets were identified in the Montezuma jurisdiction. Assets include mostly infrastructure and buildings but they also include very unique attractions like the Poweshiek County Museum, Diamond Lake and its parks and campgrounds. Montezuma also hosts the annual Christmas Walk.

Other assets include critical facilities. In Montezuma, critical facilities are primarily water infrastructure, emergency response facilities, and structures that can function as shelter. A full list of Montezuma's critical facilities is below:

1. Old Carnegie Library
2. Poweshiek County Historical Society
3. Monument at courthouse and church
4. County seat
5. Diamond Lake camping and park
6. Food pantry and clothes closet
7. Ambulance service
8. Brownell expansion
9. Montezuma Manufacturing
10. Strong rural farming community
11. Grocery stores
12. Retail services
13. Subdivisions
14. Montezuma Community School District
15. New library
16. Poweshiek County Museum
17. Summer night events
18. Lake Ponderosa
19. New camping and trail development
20. Annual Christmas Walk
21. 4th of July Celebration
22. Lions Club
23. Bonham Trail
24. City parks
25. Grocery stores
26. Restaurants
27. Nice residential areas
28. Poweshiek County Museum
29. Old jail
30. Carnegie Library
31. Poweshiek County Historical Society
32. Courthouse
33. Infrastructure services maintained locally
34. Pending plant improvements
35. Car dealership
36. Recreational trail
37. Peoplerides

Since Montezuma is a larger jurisdiction, its population is able to support basic services like a grocery store, gas station, and medical clinic. These were identified as critical facilities for Montezuma but they also serve surrounding communities that do not have these services. All of the critical facilities that were identified by Montezuma Planning Team representatives are below. Refer to Figure 4.4.2.12 for facility locations in Montezuma.

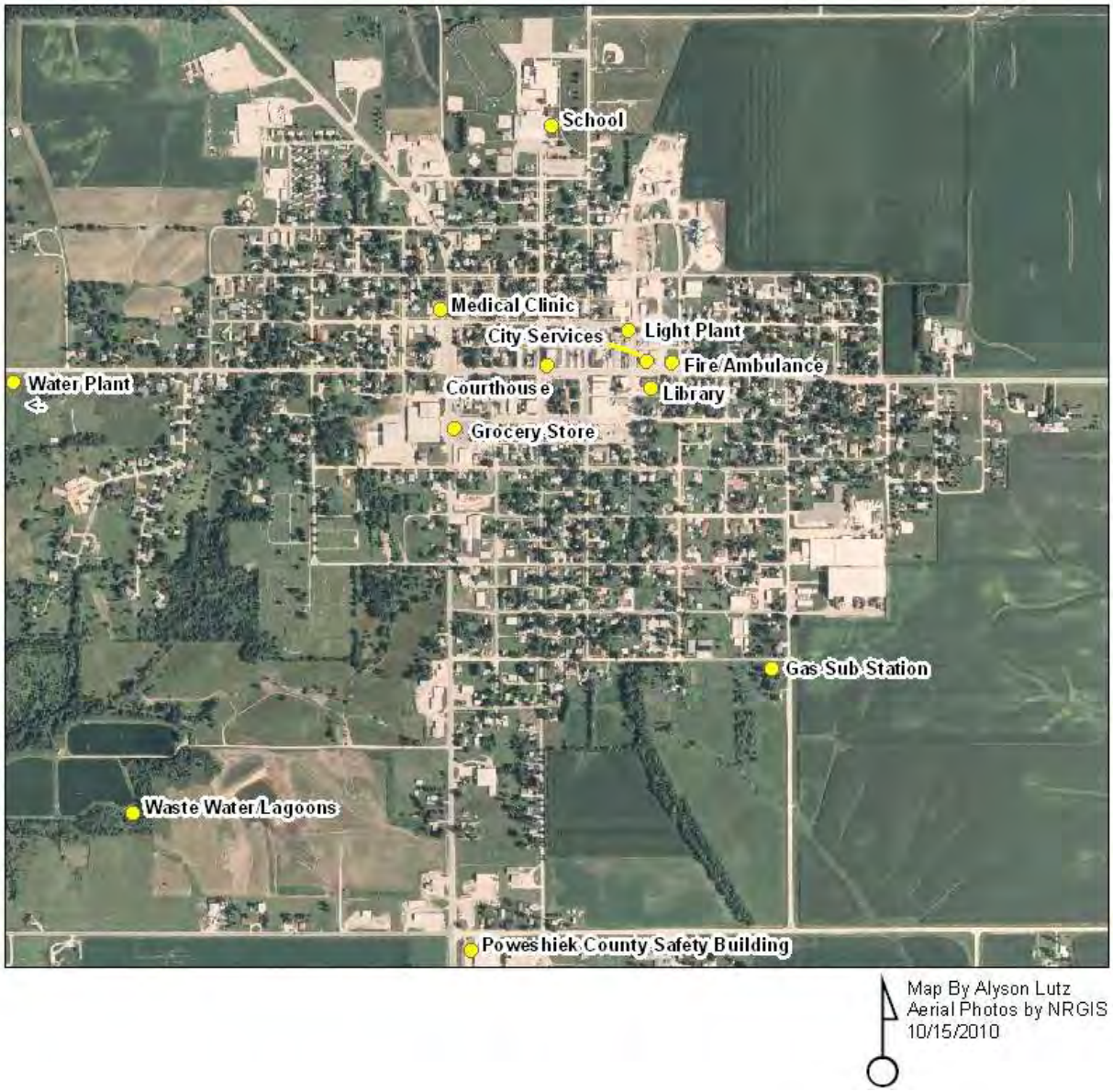
1. Courthouse
2. School
3. City Services
4. Library
5. Fire/Ambulance
6. Poweshiek County Safety Building
7. Light Plant
8. Gas sub-station
9. Water Plant
10. Wastewater plant and lagoons
11. Medical Clinic
12. Grocery Store

The vulnerable populations living in Montezuma were also identified. These populations are identified so their needs can be made a priority in the event of a disaster. The vulnerable populations living in Montezuma are below.

1. Montezuma Nursing and Rehab
2. Sunnyview Retirement Apartments
3. Diamond Life Care Facility
4. Montezuma Schools

The nursing and care facilities are especially vulnerable due to the limited mobility and special medical needs of their residents. The school is also vulnerable because large groups of young children may be difficult to manage in a hectic hazard event.

Figure 4.4.2.12: Montezuma's Critical Facilities



Searsboro

Searsboro's assets were identified by the Planning Team members who volunteered to represent the city. The assets were identified through asset mapping activity at the first countywide hazard mitigation meeting. For this activity, three major asset areas were considered: environment, economy, and social. Searsboro's assets are listed below.

1. Big Spring Range
2. Searsboro Telephone Co. and
3. Searsboro Fire Department
4. James Greenhouse
5. Skunk River Sawmill
6. Subsidized housing
7. Low-income housing
8. City park
9. Post Office
10. Community Center
11. Poweshiek Rural Water
12. City sewer system

Just a few of the commonly identified critical facilities are located in Searsboro for it is a very small jurisdiction. Their critical facilities include a Fire Station, Sewer System and Power Sub Stations, but there is no ambulance service or a grocery store in the city. The full list of critical facilities is below.

1. Fire Station
2. Community and city offices
3. Post Office
4. Sewer System
5. Power Sub Stations

A grocery store is located in Montezuma, and ambulance service is also provided by Montezuma. This is a case where critical facilities are located in a neighboring jurisdiction. Refer to Figure 4.4.2.13 for the location of critical facilities actually located in Searsboro.

The disabled and elderly living in their private residence were identified as this jurisdiction's vulnerable population. These individuals may require priority assistance during and immediately following a hazard event.

Figure 4.4.2.13: Searsboro's Critical Facilities

Unincorporated Poweshiek County

The representatives for Poweshiek County identified almost twenty assets in the county, and there are more than likely dozens more. Refer to the list below for the assets indentified in Poweshiek County.

1. Diamond, Ponderosa, & Holiday Lakes
2. Transfer Station
3. Farming and livestock
4. Poweshiek Animal Rescue
5. PCPS Building
6. Monsanto
7. Fremont Farms
8. Grinnell Reinsurance
9. Motocross track
10. Sky Dive Iowa
11. Bed and Breakfast
12. Housing near lakes
13. Case by case development pattern incentives
14. Diamond Lake drinking water
15. Poweshiek Water Association
16. Septic opportunity for waste water
17. Bike trail to Diamond Lake
18. Peoplerides

Poweshiek County has an extensive network of critical facilities that include several types of infrastructure, businesses, and structures. These are the facilities in the community that are important to maintain the health, safety, and welfare of the residents and visitors of Poweshiek County so they are especially important during and immediately following a hazard event. A list of Poweshiek County's critical facilities is below.

1. County government facilities, equipment, and vehicles (courthouse, administration offices and vehicles, sheriff's office, jail, emergency operations center, record storage, vehicle and equipment storage, etc.)
2. Transportation facilities (bridges, major highways, county roads, etc.)
3. Communication infrastructure (county radio towers, cell towers, telephone lines, etc.)
4. Potable water infrastructure (water towers, mains, pumps, wells, treatment facilities, etc.)
5. Major pipelines
6. Electrical infrastructure (power lines, sub stations, etc.)
7. Grocery stores
8. Hardware stores and businesses with disaster supplies

These facilities are located throughout Poweshiek County in both incorporated and unincorporated areas. The condition of these facilities is maintained by their respective operator or whoever is appointed by the county.

Vulnerable populations in unincorporated Poweshiek County include most groups that were identified in the incorporated cities. The elderly and disabled individuals who live in their private homes are especially vulnerable when a hazard event occurs. Also, individuals with special medical needs are vulnerable because they might have equipment that depends on electricity or medication from a pharmacy, inaccessible due to unsafe travel conditions.

4.4.3 Repetitive Loss Properties

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

Flooding is a not a major concern in Poweshiek County. The county does not have any repetitive loss properties, identified by Iowa Homeland Security. Five out of six Region 6 member jurisdictions are not participating in NFIP. Montezuma, which participates in the NFIP, has no policies in action through the program.

5 Mitigation Strategy

44 CFR Requirement §201.6(c)(3): *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

This section presents the mitigation strategy developed by the Planning Team based on the risk assessment. The mitigation strategy was developed through a collaborative group process and consists of general goal statements to guide the jurisdictions in efforts to lessen hazard impacts as well as specific mitigation actions that can be put in place to directly reduce vulnerability to hazards and losses. The following definitions are based upon those found in FEMA publication 386-3, *Developing a Mitigation Plan* (2002):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how they can be accomplished so they are not dependent on the means of achievement. Goals are long-term and broad in scope.
- **Mitigation actions** are specific actions that may help achieve goals.

These definitions were used to help the Planning Team understand the scope of the goals and mitigations actions that they chose for their respective jurisdiction.

5.1 Goals, Mitigation Actions, and Evaluation

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

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

Region 6 and the Planning Team developed goals to provide direction for reducing hazard-related losses in Poweshiek County. These were based on the results of the risk assessment and review of mitigation goals from other state and local plans, specifically the Iowa Hazard Mitigation Plan, 2007, and a past hazard mitigation plan for Poweshiek County and certain communities in the county. The review was to ensure that this plan's mitigation strategy was integrated or aligned with existing plans and policies.

Initially, Region 6 created four goals for all of Poweshiek County to serve as a baseline. With these goals, Planning Team members either edited them to fit their jurisdiction's specific needs or disregarded them to form completely different goals that served their jurisdiction's needs. The four basic goals are:

1. Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.
2. Protect the health and safety of Poweshiek County residents and visitors.
3. Educate Poweshiek County citizens about the dangers of hazards and how they can be prepared.
4. The continuity of county and local operations will not be significantly disrupted by disasters in Poweshiek County.

Some Planning Team members decided to completely omit certain goals to fit their needs. School districts are the main example because their needs differ quite a bit from cities. Unlike cities, Poweshiek County had to keep a much broader view in forming their goals because their jurisdiction is large and varies.

At public hazard mitigation meetings in individual jurisdictions, the public was given the chance to voice their concerns and propose potential mitigation ideas for any hazard they deemed to be a concern. Also, at the first planning boundary-wide meeting, Planning Team members shared mitigation ideas for each hazard that can affect their respective jurisdiction. The mitigation ideas from the meetings were compiled into a full list that could be used as a reference when choosing mitigation actions that fulfilled their jurisdiction's goals. This list complemented the results of the risk assessment, allowed idea sharing, and made sure that their community's ideas were considered. The list can be found in Appendix F.

Six types of mitigation actions were considered for this plan. The definition for mitigation action types is based on the definitions provided in the 2003 FEMA publication, *Developing the Mitigation Plan*. The six types of mitigation actions are:

1. **Prevention**. Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

2. **Property Protection**. Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

3. **Public Education and Awareness**. Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

4. **Natural Resource Protection**. Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

5. **Emergency Services**. Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

6. **Structural Projects**. Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, seawalls, retaining walls, and safe rooms.

In the following section, each jurisdiction's goals and mitigation actions along with their action plan will be listed and discussed. Several jurisdictions have similar goals and mitigation actions while others are unique to the jurisdiction's specific needs. The variance in hazard coverage, population, and structures require that each jurisdiction determine their own goals and actions rather than determining a set of goals and actions that blanket the entire planning area.

The STAPLEE Evaluation technique that was described in the process section of this plan was used to evaluate each of the mitigation actions identified for all the jurisdictions. The number in parentheses included next to each mitigation action is the STAPLEE score that each project received. The highest score a mitigation action could receive is 23, and the higher the mitigation action's score, the higher priority it will receive when all of the actions are prioritized.

The STAPLEE Evaluation considers not just political support and community acceptance but also the cost and benefits associated with the completion of a project. Some projects may have an intrinsic benefit to the community but the cost of the project may be too large to justify completion. The evaluation ensures that Planning Team members consider the feasibility of the projects chosen for their community. Often times, the cost of a project are what pulls down its evaluation score.

Please note that in many cases, mitigation actions received the same score. Even though these actions are shown in a particular order in the jurisdiction's priorities, no action has more value than another. They are interchangeable at the discretion of the particular jurisdiction. Conditions change allowing one project to take precedence over another like new grant programs, disaster declarations, loss of funding, etc. Also, mitigation actions that receive a negative score should be reconsidered for inclusion in the plan by the jurisdiction during the implementation process.

All of the evaluation sheets for the mitigation actions are included in Appendix G.

Brooklyn

Goal 1: Protect the health and safety of residents and visitors

Mitigation Action 1.1: Inform citizens of designated shelters (14)

Plan for implementation and administration:	Contact all citizens via city-wide informational fliers, phone, email or door to door announcement of designated sheltered areas available during a hazard event.
Lead agency:	City of Brooklyn
Partners:	To be identified
Potential Funding Source:	City of Brooklyn
Total cost:	None (printing costs may be an exception)
Benefits (loss avoided):	Quick response during and immediately following hazard events
Completion Date:	Ongoing

Mitigation Action 1.2: Improve warning system (13)

Plan for implementation and administration:	Purchase and install 1 or 2, 360 degree siren and a power back up system for them
Lead agency:	City of Brooklyn
Partners:	To be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, and others to be identified
Total cost:	Sirens can cost up to $25,000, used sirens are sometimes available for purchase, which helps reduce the cost
Benefits (loss avoided):	Life safety of Brooklyn residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 2: Minimize losses to future and existing structures

Mitigation Action 2.1: Purchase Equipment to clean debris immediately following an event (15)

Plan for implementation and administration:	Purchase newer backhoe with a grappler bucket and a newer sweeper
Lead agency:	City of Brooklyn
Partners:	Region 6 Planning Commission
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown until equipment is priced.

Benefits (loss avoided):	Restore safety of city infrastructure immediately following a hazard event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 2.2: Create hazard-proof measures for people and businesses during hazards (9)

Plan for implementation and administration:	NOAA radios for all businesses and homes in city limits. Install storm shelters for trailer park senior citizen housing
Lead agency:	City of Brooklyn
Partners:	Region 6 Planning Commission
Potential Funding Source:	FEMA HMPG
Total cost:	Radio cost unknown till need is assessed. Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Reduce damage to homes and businesses during storm events
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 3: The continuity of operations will not be significantly disrupted by disasters in Brooklyn.

Mitigation Action 3.1: Purchase generators (12)

Plan for implementation and administration:	Purchase a generator for City use
Lead agency:	City of Brooklyn
Partners:	To be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, and others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Power generation to maintain the function of critical facilities
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 3.2: Create larger water supply storage in city (13)

Plan for implementation and administration:	Install larger water tower and back up power for the master meter pit at the tower.
Lead agency:	City of Brooklyn
Partners:	To be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, and others to be identified
Total cost:	Unknown until towers and backup power are priced
Benefits (loss avoided):	Larger water supply available for city residents during/after an event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 3.3: Sewer improvements and backup generator (15)

Plan for implementation and administration:	General storm & sanitary sewer improvements. Improve inflow and infiltration issues in lagoon. Replace or clean and line 17,650 feet of 6" and 5,000 feet of 8" sewer mains and replace 50 man holes.
Lead agency:	City of Brooklyn
Partners:	To be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, others to be identified
Total cost:	Unknown for sewer improvements, for generator, depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	Prevent damages due to sewer backup
Completion Date:	One year from when funds are secured or within time allotted by funding source

Goal 4: Educate Brooklyn citizens about the dangers of hazards and how they can be prepared.

Mitigation Action 4.1: Encourage farmers to invest in crop insurance (9)

Plan for implementation and administration:	Through education or some sort of incentive program, encourage Brooklyn farmers to invest in crop insurance
Lead agency:	Brooklyn
Partners:	Brooklyn departments, others to be identified
Potential Funding Source:	Brooklyn, others to be identified
Total cost:	Unknown, public education would be more cost effective than an incentive program
Benefits (loss avoided):	Protection of farmers' investment
Completion Date:	1 year from when strategy is established and funding is secured

Mitigation Action 4.2: Public education program (16)

Plan for implementation and administration:	Create a program to educate Brooklyn residents about the dangers of hazard and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops
Lead agency:	City of Brooklyn
Partners:	To be identified, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Brooklyn and others to be identified
Total cost:	Unknown, this project may be of little cost depending on the medium used
Benefits (loss avoided):	Life safety of Brooklyn residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Brooklyn Mitigation Action Prioritization

1. **Mitigation Action 4.2:** Public education program (16)
2. **Mitigation Action 2.1**: Purchase Equipment to clean debris immediately following an event (15)
3. **Mitigation Action 3.3:** Sewer improvements and backup generator (15)
4. **Mitigation Action 1.1:** Inform citizens of designated shelters (14)
5. **Mitigation Action 1.2:** Improve warning system -New emergency siren (13)
6. **Mitigation Action 3.2**: Create larger water supply storage in city (13)
7. **Mitigation Action 2.2**: Create hazard-proof measures for people and businesses during a hazard (9)
8. **Mitigation Action 4.1:** Encourage farmers to invest in crop insurance (9)

Deep River

Goal 1: Protect the health and safety of Deep River residents and visitors.

Mitigation Action 1.1: Construct safe room (21)

Plan for implementation and administration:	Add a storm shelter to the Fire Department
Lead agency:	City of Deep River
Partners:	Community of Deep River, Fire Department, Others to be identified
Potential Funding Source:	FEMA HMGP and PDM, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety for residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 2: The continuity of operations will not be significantly disrupted by disasters in Deep River.

Mitigation Action 2.1: Purchase generator for community center (23)

Plan for implementation and administration:	Purchase a generator for the Community Center that serves as the city shelter
Lead agency:	City of Deep River
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, and others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Power generation to maintain the function of critical facilities
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 2.2: Write an emergency plan for community use (23)

Plan for implementation and administration:	Complete a plan including practice drills based on crisis planning for the community
Lead agency:	City of Deep River
Partners:	Poweshiek County Emergency Management, local fire, law enforcement, and emergency response personnel
Potential Funding Source:	City of Deep River, others to be identified
Total cost:	This may be of little cost besides printing
Benefits (loss avoided):	A crisis plan will be set in place so the community will be prepared for crises and respond correctly and quickly, modifications can be made to crisis plans if problems occur
Completion Date:	At such time the plan is complete, possible ongoing updates

Goal 3: Educate Deep River citizens about the dangers of hazards and how they can be prepared.

Mitigation Action 3.1: Distribute informational flyers on the hazards that affect Deep River (17)

Plan for implementation and administration:	Create informational flyers and mail or hand deliver to residents of Deep River
Lead agency:	City of Deep River
Partners:	To be identified, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Deep River and others to be identified
Total cost:	Unknown, this project may be of little cost besides the printing costs
Benefits (loss avoided):	Life safety of Deep River residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 3.2: Public education program (13)

Plan for implementation and administration:	Create a program to educate Deep River residents about the dangers of hazard and how to prepare through informational meetings, and interactive media like drills and workshops
Lead agency:	City of Deep River
Partners:	Local emergency responders, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Deep River and others to be identified
Total cost:	Unknown, this project may be of little cost depending on the medium used
Benefits (loss avoided):	Life safety of Deep River residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Deep River Mitigation Action Prioritization

1. **Mitigation Action 2.1:** Purchase generator for community center (23)
2. **Mitigation Action 2.2:** Write an emergency plan for community use (23)
3. **Mitigation Action 1.1:** Construct safe room (21)
4. **Mitigation Action 3.1:** Distribute informational flyers on the hazards that affect Deep River (17)
5. **Mitigation Action 3.2:** Public education program (13)

Grinnell

Goal 1: Maintain communication and create redundant communication during hazard events.

Mitigation Action 1.1: Purchase generators (13)

Plan for implementation and administration:	Purchase a generator for City use
Lead agency:	City of Grinnell
Partners:	Local fire and EMS
Potential Funding Source:	City of Grinnell, FEMA HMGP, and others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Power generation to maintain the function of critical facilities
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 1.2: Purchase new communication equipment (10)

Plan for implementation and administration:	Update or replace substandard communication equipment in all City departments
Lead agency:	City of Grinnell
Partners:	Local fire and EMS, Others to be indentified
Potential Funding Source:	City of Grinnell, others to be identified
Total cost:	Unknown until equipment is assessed and new equipment is priced
Benefits (loss avoided):	Grinnell City personnel will have better communication capabilities
Completion Date:	Possibly ongoing or 1 year from when funds are secured

Mitigation Action 1.3: Stockpile supplies for housing critical personnel (10)

Plan for implementation and administration:	Purchase emergency supplies for shelters which vulnerable populations use during and after hazard events
Lead agency:	City of Grinnell
Partners:	To be indentified
Potential Funding Source:	City of Grinnell, others to be identified
Total cost:	Unknown until supplies are assessed and priced
Benefits (loss avoided):	Grinnell City personnel will serve these populations better in events
Completion Date:	Ongoing or 1 year from when funds are secured

Mitigation Action 1.4: Ensure proper MOU's for goods, products and services in Grinnell (10)

Plan for implementation and administration:	Jointly purchase mutually needed emergency supplies with memorandums of understanding
Lead agency:	City of Grinnell
Partners:	Grinnell Schools, Emergency Departments, Others to be indentified
Potential Funding Source:	City of Grinnell, Grinnell Schools, Emergency Departments, Others to be identified
Total cost:	Unknown until supplies are identified and priced
Benefits (loss avoided):	No redundancy or unnecessary purchasing of emergency equipment
Completion Date:	Ongoing as equipment is identified and purchased

Mitigation Action 1.5: Provide back-up power for emergency warning systems (17)

Plan for implementation and administration:	Purchase and install battery or generator back-up power for existing warning systems
Lead agency:	City of Grinnell
Partners:	To be identified
Potential Funding Source:	City of Grinnell, FEMA HMGP, and others to be identified
Total cost:	To be determined once back up power sources are researched and priced
Benefits (loss avoided):	Life safety of Grinnell residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 2: Educate Grinnell citizens about the dangers of hazards and how they can be prepared.

Mitigation Action 2.1: Public education program (9)

Plan for implementation and administration:	Create a program to educate Grinnell residents about the dangers of hazards and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops
Lead agency:	City of Grinnell
Partners:	To be identified, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Grinnell and others to be identified
Total cost:	Unknown, this project may be of little cost depending on the medium used
Benefits (loss avoided):	Life safety of Grinnell residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 2.2: Youth-oriented hazard education (9)

Plan for implementation and administration:	Create a hazard education program that targets a youth audience
Lead agency:	City of Grinnell
Partners:	Grinnell-Newburg Schools, City of Grinnell Emergency Response, others to be identified
Potential Funding Source:	Grinnell-Newburg Schools , City of Grinnell, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Grinnell youth will be educated about the dangers of hazards
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 2.3: Work with local businesses to stockpile emergency supplies (17)

Plan for implementation and administration:	Donations of emergency supplies from various businesses for shelter use during and after hazard events
Lead agency:	City of Grinnell
Partners:	Local Grinnell Businesses, Others to be indentified
Potential Funding Source:	City of Grinnell, donations of local businesses
Total cost:	Unknown until supplies are priced
Benefits (loss avoided):	Grinnell City will serve residents better in events
Completion Date:	Ongoing

Goal 3: Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.

Mitigation Action 3.1: Construct safe rooms in critical facilities (5)

Plan for implementation and administration:	Construct safe rooms
Lead agency:	City of Grinnell
Partners:	Emergency Departments
Potential Funding Source:	City of Grinnell, FEMA HMGP and PDM, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of residents and visitors
Completion Date:	Unknown until buildings in need are identified

Grinnell Mitigation Action Prioritization

1. **Mitigation Action 2.3:** Work with local businesses to stockpile emergency supplies (17)
2. **Mitigation Action 1.5:** Provide back-up power for emergency warning systems (17)
3. **Mitigation Action 1.1**: Purchase generators (13)
4. **Mitigation Action 1.2:** Purchase new communication equipment (10)
5. **Mitigation Action 1.3:** Stockpile supplies for housing critical personnel (10)
6. **Mitigation Action 1.4:** Ensure proper MOU's for goods, products & services in Grinnell (10)
7. **Mitigation Action 2.1:** Public education program (9)
8. **Mitigation Action 2.2:** Children's education program (9)
9. **Mitigation Action 3.1:** Construct safe rooms in critical facilities (5)

Hartwick

Goal 1: Protect the health and safety of Hartwick residents and visitors.

Mitigation Action 1.1: Purchase new emergency siren with remote triggering (23)

Plan for implementation and administration:	Purchase and install a new warning siren with remote triggering
Lead agency:	City of Hartwick
Partners:	To be identified
Potential Funding Source:	City of Hartwick, FEMA HMGP, and others to be identified
Total cost:	Sirens can cost up to $25,000, used sirens are sometimes available for purchase, which helps reduce the cost
Benefits (loss avoided):	Life safety of Hartwick residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Hartwick Mitigation Action Prioritization

1. **Mitigation Action 1.1:** Purchase new emergency siren with remote triggering (23)

Malcom

Goal 1: Protect the health and safety of Malcom residents and visitors.

Mitigation Action 1.1: Update emergency siren and add a siren to the north part of town (19)

Plan for implementation and administration:	Update emergency siren, add backup power, and purchase a siren to be located in the north part of town
Lead agency:	City of Malcom
Partners:	Poweshiek County Emergency Management
Potential Funding Source:	City of Malcom, others to be identified
Total cost:	New sirens can cost up to $25,000, used sirens are sometimes available for purchase, which helps reduce the cost
Benefits (loss avoided):	Life safety for Malcom residents and visitors, quicker and more reliable warning before a hazard occurs
Completion Date:	1 year from when funds are secured or time allotted by funding source

Mitigation Action 1.2: Public education program (10)

Plan for implementation and administration:	Create a program to educate Malcom residents about the dangers of hazard and how to prepare through informational flyers, meetings, or other interactive media like drills and workshops
Lead agency:	City of Malcom
Partners:	To be identified, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Malcom and others to be identified
Total cost:	Unknown, this project may be of little cost depending on the medium used
Benefits (loss avoided):	Life safety of Malcom residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 2: Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.

Mitigation Action 2.1: Hazard-proof homes and businesses to withstand hailstorms/tornados (16)

Plan for implementation and administration:	Purchase materials to protect homes and businesses (such as storm shutters) during hazard events
Lead agency:	City of Malcom
Partners:	To be identified
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown until needs are assessed and materials priced
Benefits (loss avoided):	Reduce damage to homes and businesses during storm events
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 3: Better communications between Malcom citizens and authorities before and during a hazard event.

Mitigation Action 3.1: Create an emergency, strategic plan of action for disasters i.e. determine who makes the call to open a shelter, when should the shelter be opened, etc. (10)

Plan for implementation and administration:	Create a plan of action for disasters determining who makes the call to open a shelter, when should the shelter be opened, etc.
Lead agency:	City of Malcom
Partners:	All City Departments, Poweshiek County Emergency Management, and others to be identified
Potential Funding Source:	City of Malcom, other to be identified
Total cost:	Unknown, planning may be at little to no cost
Benefits (loss avoided):	No time lost in opening a shelter, residents will have access as soon as possible if the shelter is needed
Completion Date:	To be identified

Mitigation Action 3.2: Create an emergency phone tree. (9)

Plan for implementation and administration:	Hold a meeting for all those who wish to be included on the phone tree, especially the elderly and those with small children
Lead agency:	City of Malcom
Partners:	All City Departments, Poweshiek County Emergency Management, and others to be identified
Potential Funding Source:	City of Malcom, other to be identified
Total cost:	Printing will be of some cost.
Benefits (loss avoided):	Ensuring all vulnerable populations and citizens will be notified and taken care of in an event. Regular updates will be needed.
Completion Date:	Ongoing from the publication of the call tree

Goal 4: The continuity of county and local operations will not be significantly disrupted by disasters in the City of Malcom.

Mitigation Action 4.1: Purchase updated corded telephones for city use (15)

Plan for implementation and administration:	Purchase updated corded telephones for the use of city departments during hazards
Lead agency:	City of Malcom
Partners:	To be identified
Potential Funding Source:	FEMA HMPG, Poweshiek County, others to be identified
Total cost:	Unknown until needs are assessed and telephones priced
Benefits (loss avoided):	Keep operations up and running at critical city facilities and communication open in and out of the city
Completion Date:	1 year from when funding is secured or within time allotted by funding source

Malcom Goal Prioritization

1. **Mitigation Action 1.1:** Update emergency siren and add a siren to the north part of town (19)
2. **Mitigation Action 2.1**: Hazard-proof homes and businesses to withstand hailstorms/tornados (16)
3. **Mitigation Action 4.1:** Purchase updated corded telephones for city use (15)
4. **Mitigation Action 1.2:** Public education program (10)
5. **Mitigation Action 3.1:** Create an emergency, strategic plan of action for disasters i.e. determine who makes the call to open a shelter, when should the shelter be opened, etc. (10)
6. **Mitigation Action 3.2:** Create an emergency phone tree. (9)

Montezuma

Goal 1: Ensure a safe location for all residents and visitors to Montezuma during a hazard event.

Mitigation Action 1.1: Construct a safe room for all residents who live in mobile home courts or homes with no basement (9)

Plan for implementation and administration:	Construct a safe room for Montezuma residents and visitors to use during severe weather
Lead agency:	City of Montezuma
Partners:	Others to be identified
Potential Funding Source:	City of Montezuma, FEMA HMGP and PDM, CDBG, others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of Montezuma residents and visitors
Completion Date:	1 year from funding or within the time allotted by funding source

Mitigation Action 1.2: Construct a community shelter with basic services (8)

Plan for implementation and administration:	Assess where needed most, construct a shelter to serve the community and those in recreational areas (between town and the Lakes)
Lead agency:	City of Montezuma
Partners:	City of Montezuma, Poweshiek Conservation, others to be identified
Potential Funding Source:	FEMA HMGP and PDM, Montezuma, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed shelter. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of Montezuma residents and visitors
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 1.3: Purchase generator for community shelter (9)

Plan for implementation and administration:	Purchase a generator to use in the community shelter during power outages, generator hook up capabilities need to be installed
Lead agency:	City of Montezuma
Partners:	Others to be identified
Potential Funding Source:	City of Montezuma, FEMA HMGP, others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	Continuation of shelter functions during a power outage
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Goal 2: Keep and maintain a well equipped and well trained fire and ambulance service in case of a hazard event.

Mitigation Action 2.1: Stay updated in all aspects of emergency care (16)

Plan for implementation and administration:	Purchase new and update equipment and training as needed for emergency departments
Lead agency:	City of Montezuma
Partners:	Poweshiek County Emergency Management, others to be identified
Potential Funding Source:	City of Montezuma, others to be identified
Total cost:	Unknown until needs are assessed and equipment purchased. Training can be researched and implemented with little cost
Benefits (loss avoided):	Up-to-date equipment for emergency services in Montezuma
Completion Date:	Ongoing, starting 1 year from when funds are secured or within time allotted by funding source

Mitigation Action 2.2: Educate community on basic CPR; require certifications for emergency staff (18)

Plan for implementation and administration:	Hold free courses in community on basic CPR procedure and encourage citizens to obtain a certification
Lead agency:	City of Montezuma
Partners:	Poweshiek County Emergency Management, others to be identified
Potential Funding Source:	City of Montezuma, Montezuma Emergency Services, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Montezuma residents and emergency staff will be educated and/or certified in CPR
Completion Date:	Ongoing, certifications expire

Mitigation Action 2.3: Expand warning system programs (12)

Plan for implementation and administration:	Purchase an additional warning siren with backup power capability
Lead agency:	City of Montezuma
Partners:	Poweshiek County Emergency Management, others to be identified
Potential Funding Source:	City of Montezuma, others to be identified
Total cost:	New sirens can cost up to $25,000, used sirens are sometimes available for purchase, which helps reduce the cost. Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	Life safety of Montezuma residents and visitors, use of siren even if there is a power outage
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Goal 3: Continued education to Montezuma citizens about the dangers of hazards and how to be prepared.

Mitigation Action 3.1: Expand and maintain fire safety education program in schools (17)

Plan for implementation and administration:	Maintain the current fire safety information program at Montezuma schools and expand to be more frequent than 1 week per school year
Lead agency:	City of Montezuma
Partners:	Montezuma Schools, City of Montezuma Emergency Response, others to be identified
Potential Funding Source:	Montezuma Schools , City of Montezuma, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Montezuma youth will be educated about the dangers of fires
Completion Date:	Ongoing, starting 1 year from when funds are secured or within time allotted by funding source

Mitigation Action 3.2: Utilize alternate methods of educating citizens on electric and natural gas safety (17)

Plan for implementation and administration:	Utilize media, local TV and brochures to educate citizens
Lead agency:	City of Montezuma
Partners:	To be identified, possibly other Poweshiek County jurisdictions
Potential Funding Source:	City of Montezuma and others to be identified
Total cost:	Unknown, this project may be costly due to the mediums used
Benefits (loss avoided):	Life safety of Montezuma residents and visitors and education of some rare hazards
Completion Date:	Ongoing, 1 year after funds are secured or the time allotted by funding source

Goal 4: The continuity of local operations and maintenance of infrastructure will not be significantly disrupted by disasters in Montezuma.

Mitigation Action 4.1: Ensure soundness of buildings in disrepair in Montezuma (-2)

Plan for implementation and administration:	Structural evaluations and improvements on buildings in need
Lead agency:	City of Montezuma
Partners:	Region 6 Planning Commission, others to be identified
Potential Funding Source:	FEMA HMGP, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Ensure safety of residents and those who use aged properties in Montezuma
Completion Date:	Within the time allotted by funding source

Mitigation Action 4.2: Identify vulnerable areas of the City of Montezuma for back up command center (3)

Plan for implementation and administration:	Neighborhood and structural evaluations of buildings in Montezuma and identify a new location for backup operations center
Lead agency:	City of Montezuma
Partners:	Poweshiek County Building and Zoning
Potential Funding Source:	City of Montezuma
Total cost:	Unknown
Benefits (loss avoided):	Identify critical areas in the city
Completion Date:	Ongoing

Mitigation Action 4.3: identify emergency repair supplies for city facilities (3)

Plan for implementation and administration:	Identify what is needed for materials for emergency repairs to city facilities
Lead agency:	City of Montezuma
Partners:	Poweshiek County Building and Zoning
Potential Funding Source:	City of Montezuma
Total cost:	Unknown, depending on amount and cost of materials identified
Benefits (loss avoided):	Critical repairs can be made in a timely manner
Completion Date:	Ongoing

Montezuma Mitigation Action Prioritization

1. **Mitigation Action 2.2:** Educate community on basic CPR; require certifications for emergency staff (18)
2. **Mitigation Action 3.1:** Expand and maintain fire safety education program in schools (17)
3. **Mitigation Action 3.2:** Utilize alternate methods of educating citizens on electric and natural gas safety (17)
4. **Mitigation Action 2.1:** Stay updated in all aspects of emergency care (16)
5. **Mitigation Action 2.3:** Expand warning system programs (12)
6. **Mitigation Action 1.1:** Construct a safe room for all residents who live in mobile home courts or homes with no basement (9)
7. **Mitigation Action 1.3:** Purchase generator for community shelter (9)
8. **Mitigation Action 1.2:** Construct a community shelter with basic services (8)
9. **Mitigation Action 4.2:** Identify vulnerable areas of the City of Montezuma (3)
10. **Mitigation Action 4.3:** Identify emergency repair supplies for city facilities (3)
11. **Mitigation Action 4.1:** Ensure soundness of buildings in disrepair in Montezuma (-2)

Searsboro

Goal 1: Minimize losses to infrastructure, critical facilities, and other assets.

Mitigation Action 1.1: Sewer (lagoon) improvements (21)

Plan for implementation and administration:	General storm & sanitary sewer improvements. Improve inflow and infiltration issues in lagoon.
Lead agency:	City of Searsboro
Partners:	To be identified
Potential Funding Source:	City of Searsboro, FEMA HMGP, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Prevent damages due to lagoon problems
Completion Date:	One year from when funds are secured or within time allotted by funding source

Goal 2: Protect the safety of Searsboro residents and visitors.

Mitigation Action 2.1: Purchase generator for fire department and community center (18)

Plan for implementation and administration:	Purchase generator for use in the fire department, community shelter, which will also serve the siren to be placed by the fire department
Lead agency:	City of Searsboro
Partners:	To be identified
Potential Funding Source:	City of Searsboro, FEMA HMGP, others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	The ability to power critical facilities, shelters, and warning devices during a power outage
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Goal 3: Educate Searsboro citizens about hazard dangers, preparations, and procedures.

Mitigation Action 3.1: Develop public education session on hazardous waste safety (19)

Plan for implementation and administration:	Create a program to inform Searsboro residents about the dangers of hazardous waste materials that may be traveling on the rail line through town and how to recognize and respond to any incidents
Lead agency:	City of Searsboro
Partners:	Poweshiek County Emergency Management, others to be identified
Potential Funding Source:	City of Searsboro, others to be identified
Total cost:	This may be of little cost besides printing information
Benefits (loss avoided):	Searsboro residents will be informed and prepared to respond to incidents while emergency personnel come to the site
Completion Date:	Ongoing

Goal 4: The continuity of county and local operations will not be significantly disrupted by disasters in Searsboro.

Mitigation Action 4.1: Create access to Highway 146 from town (17)

Plan for implementation and administration:	Pave direct access to highway from town
Lead agency:	City of Searsboro
Partners:	Iowa Department of Transportation, engineer firm, county engineer, and others to be identified
Potential Funding Source:	City of Searsboro, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	Having easier access to the town so responders can be more effective in their duties

Completion Date:	1 year from when funding is secured

Mitigation Action 4.2: Add culverts (21)

Plan for implementation and administration:	Add culverts, in part, to support the highway access
Lead agency:	City of Searsboro
Partners:	Iowa Department of Transportation, engineer firm, county engineer, and others to be identified
Potential Funding Source:	FEMA HMGP, City of Searsboro, and others to be identified
Total cost:	The cost of a culvert varies on the location and type. Culverts in a ditch or under a driveway are usually around $1,000 while culverts under a road are $4,000 and higher depending on the size and type of road.
Benefits (loss avoided):	Reduces potential damages due to flash or river flooding and helps gain access
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 5: Maintain communication abilities during hazard events.

Mitigation Action 5.1: Erect emergency siren (21)

Plan for implementation and administration:	Install town's warning siren with backup power
Lead agency:	City of Searsboro
Partners:	To be identified
Potential Funding Source:	City of Searsboro, FEMA HMGP, and others to be identified
Total cost:	Because the siren is already purchased, only costs will include those of the actual installation
Benefits (loss avoided):	Life safety of Searsboro residents and visitors
Completion Date:	Time allotted by funding source

Searsboro Mitigation Action Prioritization

1. **Mitigation Action 1.1:** Sewer (lagoon) improvements (21)
2. **Mitigation Action 4.2:** Add culverts (21)
3. **Mitigation Action 5.1:** Erect emergency siren (21)
4. **Mitigation Action 3.1:** Develop public education session on hazardous waste safety (19)
5. **Mitigation Action 2.1:** Purchase generator for fire department and community center (18)
6. **Mitigation Action 4.1:** Create access to Highway 146 from town (17)

Unincorporated Poweshiek County

Goal 1: Minimize losses to existing and future structures within hazard areas. Critical facilities and identified assets are high priority structures.

Mitigation Action 1.1: Uniform building codes (14)

Plan for implementation and administration:	Modify all jurisdictions' building codes by adding requirements that may help to reduce the adverse effects hazards may have on buildings
Lead agency:	Poweshiek County Planning and Zoning
Partners:	Poweshiek County Emergency Management, Poweshiek County Supervisors
Potential Funding Source:	Poweshiek County
Total cost:	Unknown, this project may be of little cost
Benefits (loss avoided):	Prevent unnecessary damage to buildings during hazard events
Completion Date:	1 year from when political and public support is leveraged

Mitigation Action 1.2: Implementation of burn bans (23)

Plan for implementation and administration:	Implementation of burn bans throughout the county
Lead agency:	Poweshiek County Emergency Management
Partners:	Fire Chiefs throughout the county
Potential Funding Source:	Poweshiek County, local fire departments, others to be identified
Total cost:	Unknown, project may be of little cost
Benefits (loss avoided):	Prevent grass fires during very dry weather
Completion Date:	Ongoing

Mitigation Action 1.3: Identify sinkholes and inform and educate land owners (20)

Plan for implementation and administration:	Locate sinkholes in Poweshiek County and hold information session for landowners to educate on dangers and actions to prevent possible incidents
Lead agency:	Poweshiek County Emergency Management
Partners:	Emergency Departments
Potential Funding Source:	Poweshiek County, local fire departments, others to be identified
Total cost:	Unknown, project may be of little cost
Benefits (loss avoided):	Land owners are aware of risks and possible incidents
Completion Date:	Ongoing

Mitigation Action 1.4: Request a bridge and dam study (21)

Plan for implementation and administration:	Hire a consultant to complete a bridge and dam study to survey the state of the structures in Poweshiek County
Lead agency:	Poweshiek County
Partners:	Engineering Companies, County Engineer, Others to be identified
Potential Funding Source:	FEMA HMGP, others to be identified
Total cost:	Unknown till consultants are profiled and their services priced
Benefits (loss avoided):	Problems with the critical structures in town will be identified
Completion Date:	Within the time allotted by funding source

Mitigation Action 1.5: Request fire-proofing study for the courthouse (17)

Plan for implementation and administration:	Hire a consultant to complete a study to identify the possibilities of fire-proofing the Poweshiek County Courthouse
Lead agency:	Poweshiek County
Partners:	Fire Department, EMS, Law enforcement, Others to be identified
Potential Funding Source:	FEMA HMGP, others to be identified
Total cost:	Unknown till consultants are profiled and their services priced
Benefits (loss avoided):	Fire proofing a facility critical to county operations
Completion Date:	Within the time allotted by funding source

Goal 2: Protect health and safety of Poweshiek County residents and visitors.

Mitigation Action 2.1: Alert downstream residences and businesses of dam failures (22)

Plan for implementation and administration:	Put plan in place for alert due to a break in, or imposed threat from, any water retention fixture which may endanger the population downstream of the containment area.
Lead agency:	Poweshiek County Emergency Management
Partners:	To be identified
Potential Funding Source:	Poweshiek County, FEMA HMGP, others to be identified
Total cost:	This project may be of little cost depending on the system to be put in place whether it be professional or manual phone calls
Benefits (loss avoided):	Inform those in the path of destruction so they may evacuate or prepare
Completion Date:	1 year within securing funds or within the time allotted by funding source

Mitigation Action 2.2: Evacuation of people residing near or on secondary roads (21)

Plan for implementation and administration:	Communicate to National Guard those residents living on or near secondary roads so they can be evacuated upon a flash flood event
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County Sherriff's Department, local emergency responders, National Guard, others to be identified
Potential Funding Source:	To be identified
Total cost:	This may be of little cost
Benefits (loss avoided):	Quick response during flash flood events for those in inaccessible parts of the county
Completion Date:	Ongoing starting after residents are identified

Mitigation Action 2.3: Purchase of emergency equipment for water rescue (20)

Plan for implementation and administration:	Purchase emergency equipment for use during and after river flood events
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until supplies are priced
Benefits (loss avoided):	Emergency personnel will serve residents better in events
Completion Date:	Ongoing or 1 year from when funds are secured

Mitigation Action 2.4: Develop/build shelter at Diamond Lake (18)

Plan for implementation and administration:	Build a shelter for visitors, residents and community members at Diamond Lake during hazard events
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County, Others to be identified
Potential Funding Source:	FEMA HMPG and PDM, county, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of community, residents and visitors
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 2.5: Develop/build safe room in rural parks (17)

Plan for implementation and administration:	Build a safe room for visitors, residents and community members at rural parks during hazard events
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County, Others to be identified
Potential Funding Source:	FEMA HMPG and PDM, county, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of community, residents and visitors in exposed areas
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 2.6: Identify alternate advance warning systems for windstorms (18)

Plan for implementation and administration:	Identify alternate systems such as radios or backup sirens
Lead agency:	Poweshiek County Emergency Management
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, Poweshiek County, others to be identified
Total cost:	Sirens can cost up to $25,000, used sirens are sometimes available for purchase, which helps reduce the cost
Benefits (loss avoided):	Life safety of residents and visitors by ensuring a redundant warning system
Completion Date:	1 year from when funds are secured and the system is established or within time allotted by funding source

Mitigation Action 2.7: Purchase of emergency equipment and training of personnel for air transportation incident (19)

Plan for implementation and administration:	Purchase emergency equipment for use during and after any incident involving a military, commercial or private aircraft and hold session to train emergency personnel for such events.
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Airports in County, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until supplies are priced
Benefits (loss avoided):	Personnel will serve better in events with required equipment and proper training
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.8: Education and training for responders by local veterinarian (14)

Plan for implementation and administration:	Hold session to train emergency personnel to identify animal/crop/plant disease outbreaks and proper response
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, County Veterinarian, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	This may be of little cost since it is an information session
Benefits (loss avoided):	Personnel will serve better in events with proper training
Completion Date:	Ongoing starting when a course can be formulated and possible funding secured

Mitigation Action 2.9: Identify back up communication equipment to be purchased for a communications failure (20)

Plan for implementation and administration:	Identify back up communication equipment to be purchased for widespread breakdown or disruption of normal communication system capabilities including loss of or long-term interruption of local government radio facilities and major telephone outages due to mechanical failure, traffic accidents, power failure, line severance, and weather.
Lead agency:	Poweshiek County Emergency Management
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, Poweshiek County, others to be identified
Total cost:	To be determined once an assessment of equipment can be finalized
Benefits (loss avoided):	Ensure a redundant system so no communication is lost during a failure
Completion Date:	1 year from when funds are secured and the system is established or within time allotted by funding source

Mitigation Action 2.10: Purchase and install security cameras at the County Courthouse (16)

Plan for implementation and administration:	Purchase and install security cameras at main and private entrances of the Poweshiek County Courthouse
Lead agency:	Poweshiek County Emergency Management
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, Poweshiek County, others to be identified
Total cost:	To be determined once cameras, equipment, and labor are priced
Benefits (loss avoided):	Catch suspicious (terrorist) activity near county court proceedings
Completion Date:	1 year from when funds are secured and the system is established or within time allotted by funding source

Mitigation Action 2.11: Purchase of emergency equipment and training of personnel for hazardous materials incidents (21)

Plan for implementation and administration:	Purchase emergency equipment for use during and after hazardous materials incidents and hold session to train emergency personnel for such events
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Northeast Iowa Response Group, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until supplies are priced, training session already exists
Benefits (loss avoided):	Personnel will serve better in events with required equipment and proper training
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.12: Develop response exercise for multi-jurisdictional highway incidents (21)

Plan for implementation and administration:	Write an exercise plan with input from all jurisdictions in Poweshiek County – especially those located on/near major highways
Lead agency:	Poweshiek County Emergency Management
Partners:	All county emergency responders, Northeast Iowa Response Group, Others to be indentified
Potential Funding Source:	Poweshiek County, Participating jurisdictions, others to be identified
Total cost:	This may be of little cost besides possible printed copies of the finished plan
Benefits (loss avoided):	All jurisdiction emergency aids will have one comprehensive plan for a mass highway incident (A single or multi-vehicle incident which requires responses exceeding normal day-to-day capabilities) which effects multiple jurisdictions, and therefore , communicate better about response needs
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.13: Purchase rescue and communication equipment for multi-jurisdictional highway incidents (18)

Plan for implementation and administration:	Identify equipment needed as a part of the multi-jurisdictional highway incident exercise plan (to be completed - action 2.12)
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Northeast Iowa Response Group, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until supplies are priced
Benefits (loss avoided):	Personnel will serve better in events (A single or multi-vehicle incident which requires responses exceeding normal day-to-day capabilities) with required equipment
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.14: Purchase of emergency equipment and training of personnel for human disease epidemic cases (16)

Plan for implementation and administration:	Purchase emergency equipment for use during human disease epidemic cases and hold session to train emergency personnel for such events
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Hospitals, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until equipment is priced and training session created
Benefits (loss avoided):	Personnel will serve better in events with required equipment and proper training
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.15: Purchase of emergency equipment and on-site training of personnel for pipeline incidents (18)

Plan for implementation and administration:	Purchase emergency equipment for use during and after and hold training sessions for emergency responders for a break in a pipeline creating a potential for an explosion or leak of a dangerous substance.
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Northeast Iowa Response Group, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until equipment is priced and training session created
Benefits (loss avoided):	Personnel will serve better in events with required equipment and proper training
Completion Date:	Ongoing starting 1 year from when funds are secured

Mitigation Action 2.16: Purchase of emergency equipment and training of personnel for railway response (18)

Plan for implementation and administration:	Purchase emergency equipment for use during and after and hold training sessions for emergency responders for a derailment or a train accident which directly threatens life and/or property, or which adversely impacts a community's capabilities to provide emergency services.
Lead agency:	Poweshiek County Emergency Management
Partners:	Local emergency responders, Northeast Iowa Response Group, Others to be indentified
Potential Funding Source:	Poweshiek County, others to be identified
Total cost:	Unknown until equipment is priced and training session created
Benefits (loss avoided):	Personnel will serve better in events with required equipment and proper training
Completion Date:	Ongoing starting 1 year from when funds are secured

Goal 3: Educate Poweshiek County citizens about the dangers of hazards and how they can be prepared.

Mitigation Action 3.1: Create a public information session and conservation (water) program for each town in Poweshiek County (21)

Plan for implementation and administration:	Create a public information and conservation (water) program for each town in Poweshiek County
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County Conservation, cities in Poweshiek County
Potential Funding Source:	Poweshiek County
Total cost:	Unknown, this project may be of little cost besides the water supply
Benefits (loss avoided):	Giving information about drought hazards and being prepared with the necessary supplies in case of an event
Completion Date:	1 year from when political and public support is leveraged

Mitigation Action 3.2: Education on emergency procedures for earthquakes (22)

Plan for implementation and administration:	Create a course on emergency procedures available to all communities in Poweshiek County
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County Supervisors, cities in Poweshiek County
Potential Funding Source:	Poweshiek County
Total cost:	This project may be of little cost besides printing information materials
Benefits (loss avoided):	Giving information about earthquake hazards
Completion Date:	Ongoing

Mitigation Action 3.3: Public service announcements for extreme heat events (22)

Plan for implementation and administration:	Broadcast public service announcements as a notification of extreme heat events and information on livestock and crop mortality
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County Supervisors, cities in Poweshiek County
Potential Funding Source:	Poweshiek County
Total cost:	Unknown, this project may be of little cost besides the broadcasting costs
Benefits (loss avoided):	Giving information about extreme heat hazards and being prepared for its effects
Completion Date:	Ongoing seasonally after a funding source is identified

Goal 4: Continuity of county and local operations will not be significantly disrupted by disasters in Poweshiek County.

Mitigation Action 4.1: Update debris removal plan (22)

Plan for implementation and administration:	Increase transfer station capacity
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County Sanitarian
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown till an assessment can be made on the project
Benefits (loss avoided):	Restore safety of city infrastructure immediately following a hazard event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 4.2: Purchase and update road maintenance equipment (20)

Plan for implementation and administration:	Purchase needed equipment and update run-down equipment
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County, Others to be identified
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown till equipment is identified and priced
Benefits (loss avoided):	Restore safety of city infrastructure immediately following a hazard event, as well as ensuring efficiency of equipment
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 4.3: Develop protection measures for communication tower (19)

Plan for implementation and administration:	Research protection devices for communication towers during a lightning event.
Lead agency:	Poweshiek County Emergency Management
Partners:	Poweshiek County
Potential Funding Source:	FEMA HMPG and PDM, county, CDBG, and others to be identified
Total cost:	Costs are variable depending on what protection measures are selected
Benefits (loss avoided):	Ensures the continuity of the communications tower, one of the most important structures before and during hazard events
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 4.4: Purchase larger generator system for courthouse (14)

Plan for implementation and administration:	Purchase larger generator system to be used in courthouse during an extended power outage
Lead agency:	Poweshiek County Emergency Management
Partners:	Other Poweshiek County departments
Potential Funding Source:	FEMA HMPG, Poweshiek County, others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Avoid loss of critical facilities' function and prevent damages to critical facilities and other structures associated with an extended power outage
Completion Date:	1 year from when funding is secured or within time allotted by funding source

Mitigation Action 4.5: Implement assistant command center at courthouse (14)

Plan for implementation and administration:	Establish a command center in the courthouse for energy failure incidents
Lead agency:	Poweshiek County Emergency Management
Partners:	Other Poweshiek County departments
Potential Funding Source:	FEMA HMPG, Poweshiek County, others to be identified
Total cost:	Unknown –depends on what equipment or supplies will be involved in the post.
Benefits (loss avoided):	Establishes a go-to place for public to receive info and possibly supplies in an energy failure incident
Completion Date:	1 year from when funding is secured or within time allotted by funding source

Mitigation Action 4.6: Request a commodity flow study for the railway (21)

Plan for implementation and administration:	Hire a consultant to complete a commodity flow study to survey the types of shipments made on railway through Poweshiek County
Lead agency:	Poweshiek County
Partners:	County Engineer, Others to be identified
Potential Funding Source:	FEMA HMGP, others to be identified
Total cost:	Unknown till consultants are profiled and their services priced
Benefits (loss avoided):	Obtain knowledge on possible hazardous materials and the like, traveling through the county
Completion Date:	Within the time allotted by funding source

Mitigation Action 4.7: Identify energy conservation measures that can lessen the impact of energy shortages. (16)

Plan for implementation and administration:	Put plan in place for alert due to long-term/widespread loss, or reduction of power generation/transmission, that could have an adverse effect on maintenance of property and preservation of life.
Lead agency:	Poweshiek County Emergency Management

Partners:	County Engineering Department, Others to be identified
Potential Funding Source:	To be identified
Total cost:	Unknown, may be of little cost
Benefits (loss avoided):	County operations won't be badly affected in event of a power outage
Completion Date:	Ongoing

Unincorporated Poweshiek County Mitigation Action Prioritization

1. **Mitigation Action 1.2:** Implementation of burn bans (23)
2. **Mitigation Action 2.1:** Alert downstream residences and businesses of dam failures (22)
3. **Mitigation Action 3.2:** Education on emergency procedures for earthquakes (22)
4. **Mitigation Action 3.3:** Public service announcements for extreme heat events (22)
5. **Mitigation Action 4.1**: Update debris removal plan (22)
6. **Mitigation Action 2.2:** Evacuation of people residing near or on secondary roads (21)
7. **Mitigation Action 2.11:** Purchase of emergency equipment and training of personnel for hazardous materials incidents (21)
8. **Mitigation Action 2.12:** Develop response exercise for multi-jurisdictional highway incidents (21)
9. **Mitigation Action 1.4:** Request a bridge and dam study (21)
10. **Mitigation Action 4.6:** Request a commodity flow study for the railway (21)
11. **Mitigation Action 3.1:** Create a public information session and conservation (water) program for each town in Poweshiek County (21)
12. **Mitigation Action 4.2**: Purchase and update road maintenance equipment (20)
13. **Mitigation Action 1.3:** Identify sinkholes and inform and educate land owners (20)
14. **Mitigation Action 2.3:** Purchase of emergency equipment for water rescue (20)
15. **Mitigation Action 2.9:** Identify back up communication equipment to be purchased for a communications failure (20)
16. **Mitigation Action 2.7:** Purchase of emergency equipment and training of personnel for air transportation incident (19)
17. **Mitigation Action 4.3:** Develop protection measures for communication tower (19)
18. **Mitigation Action 2.6:** Identify alternate advance warning systems for windstorms (18)
19. **Mitigation Action 2.13:** Purchase rescue and communication equipment for multi-jurisdictional highway incidents (18)
20. **Mitigation Action 2.15:** Purchase of emergency equipment and on-site training of personnel for pipeline incidents (18)
21. **Mitigation Action 2.16:** Purchase of emergency equipment and training of personnel for railway response (18)
22. **Mitigation Action 2.4:** Develop/build shelter at Diamond Lake (18)
23. **Mitigation Action 1.5:** Request fire-proofing study for the courthouse (17)
24. **Mitigation Action 2.5:** Develop/build safe room in rural parks (17)
25. **Mitigation Action 2.10:** Purchase & install security cameras at the County Courthouse (16)
26. **Mitigation Action 2.14:** Purchase of emergency equipment and training of personnel for human disease epidemic cases (16)
27. **Mitigation Action 4.7:** Identify energy conservation measures that can lessen the impact of energy shortages (16)
28. **Mitigation Action 1.1:** Uniform building codes (14)
29. **Mitigation Action 2.8:** Education and training for responders by local veterinarian (14)
30. **Mitigation Action 4.4:** Purchase larger generator system for courthouse (14)
31. **Mitigation Action 4.5:** Implement assistant command center at courthouse (14)

Goal 1: Protect the health and safety of BGM students, employees, and visitors.

Mitigation Action 1.1: Inform students, employees and visitors of designated shelters (14)

Plan for implementation and administration:	Inform via school assemblies, regular PA announcements, and informational sheets in classrooms and hallways
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Brooklyn Emergency Services
Potential Funding Source:	BGM Schools
Total cost:	None (printing costs may be an exception)
Benefits (loss avoided):	Order and quick response during and immediately following hazard events for a large vulnerable population
Completion Date:	Ongoing

Mitigation Action 1.2: Install fire alarms in school to improve the warning system (15)

Plan for implementation and administration:	Purchase and install more fire alarms in schools
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, and others to be identified
Total cost:	Unknown till need is assessed and alarms priced
Benefits (loss avoided):	Life safety of BGM students, faculty and staff
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 1.3: Purchase generators for school buildings (21)

Plan for implementation and administration:	Purchase a generator for school use
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	BGM Schools, FEMA HMGP, and others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Power generation to maintain the function of school facilities
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 2: Minimize losses to future and existing structures

Mitigation Action 2.1: Purchase equipment to clean debris immediately following an event (21)

Plan for implementation and administration:	Purchase front end loaders to clean debris on school property
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown till equipment is priced
Benefits (loss avoided):	Restore safety of school infrastructure immediately following a hazard event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 2.2: Hazard-proof school to withstand hailstorms/tornados (9)

Plan for implementation and administration:	Purchase materials to protect school (such as storm shutters) during hazard events
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	FEMA HMPG
Total cost:	Unknown till shutters and materials are priced
Benefits (loss avoided):	Reduce damage to school during storm events
Completion Date:	1 year after funds are secured or the time allotted by funding source

Goal 3: The continuity of school operations will not be significantly disrupted by disasters in Brooklyn.

Mitigation Action 3.1: Create larger water supply storage for school (11)

Plan for implementation and administration:	Install additional water tower in city for use during hazard events
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	BGM Schools, City of Brooklyn, FEMA HMGP, and others to be identified
Total cost:	Unknown till pricing is complete for purchase and installation costs
Benefits (loss avoided):	Larger water supply available for school and residents during/after an event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 3.2: Sewer improvements and backup generator (15)

Plan for implementation and administration:	General storm & sanitary sewer improvements for high school buildings to street and internally in school building
Lead agency:	BGM Schools
Partners:	City of Brooklyn, Others to be identified
Potential Funding Source:	City of Brooklyn, FEMA HMGP, others to be identified
Total cost:	Unknown for sewer improvements, for generator, depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	Prevent damages due to sewer backup in schools
Completion Date:	One year from when funds are secured or within time allotted by funding source

Goal 4: Educate BGM students, employees, and visitors about the dangers of hazards and how they can be prepared.

Mitigation Action 4.1: Student-oriented hazard education (17)

Plan for implementation and administration:	Create a hazard education program that targets students
Lead agency:	BGM Schools
Partners:	City of Brooklyn Emergency Response, others to be identified
Potential Funding Source:	BGM Schools , City of Brooklyn, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	BGM students will be educated about the dangers of hazards
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Brooklyn-Guernsey-Malcom Community School District Mitigation Action Prioritization

1. **Mitigation Action 1.3**: Purchase generators for school buildings (21)
2. **Mitigation Action 2.1**: Purchase Equipment to clean debris immediately following an event (21)
3. **Mitigation Action 4.1:** Student-oriented hazard education (17)
4. **Mitigation Action 1.2:** Install fire alarms in school to improve the warning system (15)
5. **Mitigation Action 3.2:** Sewer improvements and backup generator (15)
6. **Mitigation Action 1.1:** Inform students, employees and visitors of designated shelters (14)
7. **Mitigation Action 3.1**: Create larger water supply storage for school (11)
8. **Mitigation Action 2.2**: Hazard-proof school to withstand hailstorms/tornados (9)

Goal 1: Maintain communication and develop redundant communication during hazard events.

Mitigation Action 1.1: Purchase generators (13)

Plan for implementation and administration:	Purchase generators and install hookups for school district buildings
Lead agency:	Grinnell - Newburg Community School District
Partners:	Poweshiek County Emergency Management
Potential Funding Source:	FEMA HMPG, Grinnell-Newburg Community School District, others to be identified
Total cost:	Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs - standby requires a permanent fuel source
Benefits (loss avoided):	Prevent major disruptions
Completion Date:	1 year from when funding is secured or within time allotted by funding source

Mitigation Action 1.2: Purchase communication equipment to use in event of disaster (10)

Plan for implementation and administration:	Update or replace substandard communication equipment in schools
Lead agency:	Grinnell-Newburg Community School District
Partners:	City of Grinnell, City of Newburg, Others to be indentified
Potential Funding Source:	City of Grinnell, others to be identified
Total cost:	Unknown until equipment is assessed and new equipment is priced
Benefits (loss avoided):	School personnel will have better communication capabilities
Completion Date:	Possibly ongoing or 1 year from when funds are secured

Mitigation Action 1.3: Stockpile supplies for school in disaster event (10)

Plan for implementation and administration:	Purchase emergency supplies for school buildings for use during and after hazard events
Lead agency:	Grinnell-Newburg Community School District
Partners:	City of Grinnell, City of Newburg, Others to be indentified
Potential Funding Source:	City of Grinnell, others to be identified
Total cost:	Unknown until supplies are priced
Benefits (loss avoided):	Grinnell School personnel will serve students better in events
Completion Date:	Ongoing or 1 year from when funds are secured

Mitigation Action 1.4: Develop/build safe room with communication equipment (13)

Plan for implementation and administration:	Build a safe room for emergency communication equipment and personnel
Lead agency:	Grinnell-Newburg Community School District
Partners:	City of Grinnell, City of Newburg and Poweshiek County
Potential Funding Source:	FEMA HMPG and PDM, Grinnell-Newburg Community School District, city, county, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Safety of communications for hazard events
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Goal 2: Minimize losses to existing/future structures within hazard areas.

Mitigation Action 2.1: Develop/build safe rooms in school buildings (13)

Plan for implementation and administration:	Build a safe room for students, staff, and community members in each of the 5 school buildings
Lead agency:	Grinnell-Newburg Community School District
Partners:	City of Grinnell, City of Newburg, and Poweshiek County
Potential Funding Source:	FEMA HMPG and PDM, Grinnell-Newburg Community School District, city, county, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety of students, staff, and community
Completion Date:	1 year from when funds are secured or within time allotted by funding source

Mitigation Action 2.2: Construct food storage for school in case a hazard results in a long-term detention at the school (17)

Plan for implementation and administration:	Addition to each school to accommodate food storage with backup power generation
Lead agency:	Grinnell-Newburg Community School District
Partners:	City of Grinnell, City of Newburg, Others to be identified
Potential Funding Source:	Grinnell-Newburg Community School District, FEMA HMGP, and others to be identified
Total cost:	Cost for an addition are unknown, Depending on wattage, fuel source, and type—standby or portable—a generator may cost from $500 to $15,000 plus wiring and switch installation costs also standby requires a permanent fuel source
Benefits (loss avoided):	Larger food supply so enough is available for students and city residents during/after an event
Completion Date:	1 year after funds are secured or the time allotted by funding source

Grinnell Community School District Mitigation Action Prioritization

1. **Mitigation Action 2.2**: Construct food storage for school in case a hazard results in a long-term detention at the school (17)
2. **Mitigation Action 1.1:** Purchase generators (13)
3. **Mitigation Action 1.4:** Develop/build safe room with communication equipment (13)
4. **Mitigation Action 2.1:** Develop/build safe rooms in school buildings (13)
5. **Mitigation Action 1.2:** Purchase communication equipment to use in event of disaster (10)
6. **Mitigation Action 1.3:** Stockpile supplies for school in disaster event (10)

Montezuma Community School District

Goal 1: Minimize losses to existing and future structures of the school district.

Mitigation Action 1.1: Construct a safe room for the high school (12)

Plan for implementation and administration:	Retrofit and remodel high school gym and locker rooms and safe room
Lead agency:	Montezuma Community School District
Partners:	City of Montezuma, Others to be identified
Potential Funding Source:	Montezuma Community School District, FEMA HMGP and PDM, CDBG, and others to be identified
Total cost:	Costs are variable depending on the size of the shelter and whether or not it is a retrofit or newly constructed safe room. For a small safe room in a house the minimum cost is approximately $2,500-$6,000. For a large community shelter, the cost usually ranges from $250,000 to over $1 million depending on the size.
Benefits (loss avoided):	Life safety for students, residents and visitors
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 1.2: Maintain quality of high school building structure with temperature regulation (12)

Plan for implementation and administration:	Add air conditioning to high school building for year round use
Lead agency:	Montezuma Community School District
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, Montezuma Community School District
Total cost:	Unknown –includes unit(s)
Benefits (loss avoided):	Integrity of the school structure would not be affected by extreme heat
Completion Date:	Ongoing, starting when funding is secured and unit(s) are installed

Mitigation Action 1.3: Ensure efficiency of life-safety alert devices (12)

Plan for implementation and administration:	Upgrade fire alarm system, PA system, sprinkler system
Lead agency:	Montezuma Community School District
Partners:	To be identified
Potential Funding Source:	FEMA HMGP, Montezuma Community School District
Total cost:	Unknown –includes unit(s)
Benefits (loss avoided):	All warning systems be up to date
Completion Date:	Ongoing, starting when funding is secured and unit(s) are installed

Goal 2: Have emergency plan in place for the Montezuma School District.

Mitigation Action 2.1: Write an emergency plan for school district use (12)

Plan for implementation and administration:	Complete a plan including practice drills based on crisis planning for the school district
Lead agency:	Montezuma Community School District
Partners:	Poweshiek County Emergency Management, local fire, law enforcement, and emergency response personnel
Potential Funding Source:	Montezuma Community School District, others to be identified
Total cost:	Unknown
Benefits (loss avoided):	A crisis plan will be set in place so students and staff will be prepared for crises and respond correctly and quickly, modifications can be made to crisis plans if problems occur
Completion Date:	At such time the plan is complete, possible ongoing updates

Mitigation Action 2.2: Include professional expertise and advice in the emergency plan for the schools (12)

Plan for implementation and administration:	Hire a professional consultant to help with emergency plan writing
Lead agency:	Montezuma Community School District
Partners:	Poweshiek County Emergency Management, local fire, law enforcement, emergency response personnel, and professional consultant to be determined
Potential Funding Source:	Montezuma Community School District, others to be identified
Total cost:	Unknown until consultants are profiled and services priced
Benefits (loss avoided):	Professional advice for the crisis plan
Completion Date:	At such time the plan is complete, possible ongoing updates

Goal 3: Educate students on emergency safety plans during hazard events.

Mitigation Action 3.1: Ensure a prepared school staff to implement crisis plan actions (12)

Plan for implementation and administration:	Establish some sort of program to train staff and teach parents, officials, and the public about the school's crisis plan
Lead agency:	Montezuma Community School District
Partners:	To be identified
Potential Funding Source:	Montezuma Community School District
Total cost:	Unknown, this project may be of little cost
Benefits (loss avoided):	Staff will be trained to move children safely and efficiently in the event of a hazard and parents, officials, and the public would be aware of the school's plan
Completion Date:	1 year from when program is established and funding is secured

Mitigation Action 3.2: Purchase of emergency equipment and supplies (12)

Plan for implementation and administration:	Purchase emergency supplies for school buildings for use during and after hazard events, including handheld radios
Lead agency:	Montezuma Community School District
Partners:	City of Montezuma, Others to be indentified
Potential Funding Source:	City of Montezuma, others to be identified
Total cost:	Unknown until supplies are priced and need assessed
Benefits (loss avoided):	Montezuma School personnel will serve students better in events
Completion Date:	Ongoing or 1 year from when funds are secured

Goal 4: The local operation of the school will not be significantly disrupted by disasters in Poweshiek County.

Mitigation Action 4.1: Add culverts to school property to drain storm water and tile low areas (10)

Plan for implementation and administration:	Add new culverts where they are needed around the school properties
Lead agency:	Montezuma Community School District
Partners:	City of Montezuma, Engineering firm, others to be identified
Potential Funding Source:	FEMA HMGP, City of Montezuma, and others to be identified
Total cost:	The cost of a culvert varies on the location and type. Culverts in a ditch or under a driveway are usually around $1,000 while culverts under a road are $4,000 and higher depending on the size and type of road.
Benefits (loss avoided):	Reduces potential damages to schools due to flash or river flooding
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 4.2: Raise and pave parking lots to prevent flooding (10)

Plan for implementation and administration:	Raise and pave parking lots to prevent loss of school staff parking and dangers that come with flooding on school properties
Lead agency:	Montezuma Community School District
Partners:	City of Montezuma, Engineering firm, others to be identified
Potential Funding Source:	FEMA HMGP, City of Montezuma, and others to be identified
Total cost:	Unknown until estimates are complete and number of lots are assessed, cost depends on the size of parking lot.
Benefits (loss avoided):	Reduces potential damages due to flash or river flooding
Completion Date:	1 year after funds are secured or the time allotted by funding source

Mitigation Action 4.3: Acquire contingent property to eliminate disasters that would interrupt the operation of school (10)

Plan for implementation and administration:	Create physical space between school and roads/surrounding properties as a safe-zone/barrier for disasters such as fire
Lead agency:	Montezuma Community School District
Partners:	To be identified
Potential Funding Source:	Montezuma Community School District, others to be identified
Total cost:	Unknown until lots are identified
Benefits (loss avoided):	Vehicles, including emergency response, will have better access to the school, a physical barrier can get the students and staff far from the disaster area
Completion Date:	1 year from when funds are secured

Montezuma Community School District Mitigation Action Prioritization

1. **Mitigation Action 1.1**: Construct a safe room for the high school (12)
2. **Mitigation Action 1.2:** Maintain quality of high school building structure with temperature regulation (12)
3. **Mitigation Action 1.3:** Ensure efficiency of life-safety alert devices (12)
4. **Mitigation Action 2 .1:** Write an emergency plan for school district use (12)
5. **Mitigation Action 2 .2:** Include professional expertise and advice in the emergency plan for the schools (12)
6. **Mitigation Action 3.1:** Ensure a prepared school staff to implement crisis plan actions (12)
7. **Mitigation Action 3.2:** Purchase of emergency equipment and supplies (12)
8. **Mitigation Action 4.1**: Add culverts to school property to drain storm water and tile low areas (10)
9. **Mitigation Action 4.2**: Raise and pave parking lots to prevent flooding (10)
10. **Mitigation Action 4.3:** Acquire contingent property to eliminate disasters that would interrupt the operation of school (10)

6 Plan Maintenance Process

This section of the plan provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The section also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

6.1 Monitoring, Evaluating, and Updating the Plan

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

With the adoption of this plan, the Planning Team (members may vary over time) agrees to monitor, evaluate, and maintain the plan. The Planning Team will meet once each year to monitor and evaluate the plan. The Poweshiek County Emergency Manager will coordinate the meeting time and place and notify other members. Other organizations may be of some assistance in this process. The participating jurisdictions and agencies, led by Poweshiek County Emergency Management, will do the following:

- Meet annually to monitor and evaluate the implementation of the plan
- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities
- Pursue the implementation of high priority, low- or no cost mitigation actions
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the county and other jurisdictions implement the plans mitigation actions for which no current funding exists
- Monitor and assist in implementation and updating of this plan
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters
- Report on plan progress and recommend changes to the Poweshiek County Board of Supervisors and governing bodies of participating jurisdictions
- Inform and solicit input from the public

The primary duty of the Planning Team is to see that the plan is successfully carried out and to report to the governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns, and passing concerns on to appropriate entities.

Evaluation of progress can be achieved by monitoring changes and vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions
- Increased vulnerability as a result of failed or ineffective mitigation actions
- Increased vulnerability as a result of new development or annexation

Updates to the plan will:

- Consider changes in vulnerability due to action implementation
- Document success stories where mitigation efforts have proven effective
- Document areas where mitigation actions were not effective
- Document any new hazards that may arise or were previously overlooked
- Incorporate new data or studies on hazards and risks such as Digital Flood Insurance Rate Maps
- Incorporate new capabilities or changes in capabilities
- Incorporate growth and development-related changes to inventories
- Incorporate new action recommendations or changes in action prioritization

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will undergo the following process:

- A representative from the jurisdiction will be responsible for tracking and reporting annually on action status. The representative will also provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate action that have failed or are not considered feasible after a review of their adherence to established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan, every five years as a minimum, will be enacted through written changes and submissions, as Poweshiek County Emergency Management deems appropriate and necessary, and as approved by the Poweshiek Board of Supervisors or the governing board of the participating jurisdictions.

6.2 Incorporation into Existing Planning Mechanisms

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

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. This plan builds upon the some of the previous related efforts and recommends implementing actions, where possible, through the following means:

- General or related plans of participating jurisdictions
- Ordinances of participating jurisdictions
- Building codes
- Capital improvements plans and budgets
- School district facilities plans
- Mutual aid agreement (28E Agreement)
- Other community plans within the county either in existence or developed in the future such as water conservation plans, storm water management plans, and parks and recreation plans

The governing bodies of the jurisdictions adopting this plan will encourage all other relevant planning mechanism under their authority to consult this plan to ensure minimization of risk to natural and manmade hazards as well as coordination of activities.

The Planning Team involved in the plan update will be responsible for encouraging the integration of the findings actions of the mitigation plan as appropriate. The Planning Team is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the plan.

6.3 Continued Public Involvement

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

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information will be posted in the local newspaper concerning projects and the annual hazard mitigation meeting that will be held. The public will be invited to attend the annual hazard mitigation meeting where the Planning Team will meet to monitor and evaluate the plan. The public will have to chance to participate and interact with their respective jurisdiction representative in order to have a stake in the outcome of plan implementation and update. Planning Team members will be invited by invitation to the annual meeting and the public will be invited through a public notice in the local newspapers and flyer(s) posted in their jurisdiction by the City or administration.

7 Recommendations

Aside from the goals and projects each jurisdiction identified to mitigate hazards, the writers of the plan would also like to use the knowledge acquired during plan research, training, observation, and writing to make some general recommendations to Poweshiek County and participating jurisdictions. These recommendations may be considered during the five-year life of this plan or in the plan update. Our recommendations include the following:

- Jurisdictions should encourage businesses and care facilities especially those that were identified as critical facilities to complete continuity plans so there is little interruption in service and economic losses can be avoided.

- The jurisdictions that already have generator(s) should complete the needed changes to make the generators usable. The generator(s) should also be tested on a regular basis to ensure that they will function during a power outage.

- Jurisdictions with mobile homes should require tie-downs to prevent flying large debris that may be a danger during severe weather that involves high speed winds. Also, jurisdictions should consider providing or requiring some sort of shelter for residents of mobile homes to use during severe weather.