Cerro Gordo County Multi-Jurisdictional Hazard Mitigation Plan

Effective February 2018

Cerro Gordo County Hazard Mitigation Planning Committee (HMPC) Members

Name	Title	Jurisdiction	Kick-off Meeting	Meeting #1	Meeting #2	E-mail Correspondence
Heather Hahn	Dispatch Director	County	X			
Matt Klunder	Deputy Sheriff	County	X			
Mike Webb	Conservation Director	County	X	X	X	
Jodi Willemsen	Public Health Preparedness	County	X	X	X	X
Tom Drzycimski	Planning & Zoning	County	X			X
John Robbins	Planning & Zoning	County	X	X	X	X
Paula Lemke	GIS Department	County	X	X	X	
Andy Flagge	IT Department	County	X			
Kevin Molar	Clear Lake Sanitary Department	Clear Lake	X			
Jeff Brinkley	Chief of Police	Mason City	X	X		X
Brent Trout	City Administration	Mason City	X			
Doug Janssen	Deputy Fire Chief	Mason City	X			X
Tricia Sandahl	Planning & Zoning	Mason City	X			
Robert Berggren	Maintenance Department	Mason City	X			
Jessy Willadsen	GIS Department	Mason City	X			
Jim Bills	Mayor	Rockwell	X	X	X	
Michelle Duff	Clerk	Thornton	X	X	X	X
Brian Crowell	Mayor	Thornton	X	X	X	
Steve Nelson	Security	Mercy Medical Center	X			
Cheri Collins	Safety	Mercy Medical Center	X			
Mike Penca	Superintendent	Mason City Schools	X			
Ryan Fiser	IT Department	County		X	X	
Mary Kelly	Engineer	County		X	X	
Kevin Pals	Sheriff	County		X	X	
Pete Roth	Chief of Police	Clear Lake		X	X	
Doug Meyer	Fire Chief	Clear Lake		X		
Justin Morrow	Water Department	Clear Lake		X		
Mike Ritter	Public Works	Clear Lake		X		
Joe Weigel	Public Works	Clear Lake		X		
Nelson Crabb	Mayor	Clear Lake		X		
Jim Sholly	Clear Lake Watershed	Clear Lake		X		
Dave Johnson	Deputy Fire Chief	Mason City		X		
Mark Rahn	Engineer	Mason City		X		
Curt Sauve	Development Services	Mason City		X		
Kevin Jacobson	Finance Director	Mason City		X		

Name	Title	Jurisdiction	Kick-off Meeting	Meeting #1	Meeting #2	E-mail Correspondence
William Stangler	Operations	Mason City		X		
Steven VanSteenhuyse	Planning	Mason City		X		
Ashley Martin	Clerk	Plymouth		X		X
Gary Clark	Council	Plymouth		X		
Wade Eastman	Council	Plymouth		X		
Amy Berding	Council	Plymouth		X		
Jeff Robak	Council	Plymouth		X		
Mark Brosz	Council	Rock Falls		X		
Randy Dodd	Mayor	Rock Falls		X		
Tracy Ward	Clerk	Rock Falls		X		X
Jessica Prazak	Council	Rock Falls		X		
Jodi Wyborny	Council	Rock Falls		X		X
Tim Dodd	Council	Rock Falls		X		
Jay Siefken	Public Works	Rockwell		X		
Tom Hensley	Public Works	Rockwell		X		
Larry Wentz	Council	Rockwell		X	X	
Tom Worley	Council	Rockwell		X	X	
Tim Brown	Council	Rockwell		X		
Lorna Weier	Clerk	Rockwell		X	X	X
Brian Koob	Council	Rockwell		X	X	
Andy Johnson	Council	Rockwell		X	X	
Darrin Strike	Superintendent	West Fork Schools			X	X
Debbie Bills	Rockwell Library	Rockwell			X	
Rick Whitney	Police Chief	Rockwell			X	
Mark Lowe	Fire Chief	Rockwell			X	
Adam Wedmore	EMT	Rockwell			X	
Troy Smeby	Council	Swaledale			X	
John Bonner	Council	Swaledale			X	
Greg Meier	Public Works	Swaledale			X	
Jalynn Eddy	Council	Swaledale			X	
John Drury	Mayor	Swaledale			X	X
Judy Witte	Clerk	Swaledale			X	X
Randy Bohman	Council	Thornton		X	X	
Rob Duff	Council	Thornton		X	X	
Michael Young	Council	Thornton		X		
Shelby Steenhard	Council	Thornton		X		
Betty Jensen	Council	Thornton		X	X	

Name	Title	Jurisdiction	Kick-off Meeting	Meeting #1	Meeting #2	E-mail Correspondence
Else Taylor	Clerk	Ventura				X
Richard Miller	Mayor	Meservey				X
Doug Gee	Superintendent	Clear Lake Schools				X
Dave Versteeg	Superintendent	Mason City Schools				X

TABLE OF CONTENTS

EXECUTIVE SUMMARY

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

The Cerro Gordo County Multi-Jurisdictional Hazard Mitigation Plan covers the following 14 jurisdictions that participated in the planning process:

- Unincorporated Cerro Gordo County
- City of Clear Lake
- City of Dougherty
- City of Mason City
- City of Meservey
- City of Plymouth
- City of Rock Falls
- City of Rockwell
- City of Swaledale
- City of Thornton
- City of Ventura
- Clear Lake School District
- Mason City School District
- West Fork School District

Cerro Gordo County and the incorporated areas that participated in this plan update developed a Multi-Jurisdiction Hazard Mitigation Plan that was approved by FEMA in February 2013 (hereafter referred to as the 2013 Cerro Gordo County Hazard Mitigation Plan). Therefore, this current planning effort serves to update the previous plan.

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

Based upon the risk assessment, the HMPC determined the goals developed in the 2013 plan for reducing risk from hazards were still relevant for the revised plan. The goals are listed below:

- Goal 1: Minimize vulnerability of the people and their property in Cerro Gordo County to the impacts of hazards.
- Goal 2: Protect critical facilities, infrastructure and other community assets from the impact of hazards.
- Goal 3: Improve education and awareness regarding hazards and risk in Cerro Gordo County.
- Goal 4: Strengthen communication among agencies and between agencies and the public.

To meet the identified goals, the recommended mitigation action details are in Chapter 4. The HMPC developed action plans, identified priorities, background information, and ideas for implementation, responsible agency, cost estimates, potential funding sources, and more.

PREREQUISITES

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

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

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

- Unincorporated Cerro Gordo County
- City of Clear Lake
- City of Dougherty
- City of Mason City
- City of Meservey
- City of Plymouth
- City of Rock Falls
- City of Rockwell
- City of Swaledale
- City of Thornton
- City of Ventura
- Clear Lake School District
- Mason City School District
- West Fork School District

Model Resolution

Resolution # _____

Adopting the Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan

Whereas, the (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community: and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to states and local governments; and

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the (Name of Government/District/Organization) fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Hazard Mitigation Plan; and

Whereas, the Iowa Homeland Security and Emergency Management Department and the Federal Emergency Management Agency Region VII officials have reviewed the "Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas, the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption by the governing body for the (Name of Government/District/Organization) demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan;

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the "Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolves, the (name of Government/District/Organization) will submit this Adoption Resolution to the Iowa Homeland Security and Emergency Management Department and Federal Emergency Management Region VII officials to enable the plan's final approval.

Date: _____

Certifying Official: _____

1 INTRODUCTION AND PLANNING PROCESS

1.1 Purpose

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

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

1.2 Background and Scope

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

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. Cerro Gordo County and the incorporated areas that participated in this plan update developed a Multi-jurisdictional Hazard Mitigation Plan that was approved by FEMA in February 2013 (hereafter referred to as the 2013 Cerro Gordo County Hazard Mitigation Plan). Therefore, this current planning effort serves to update the previous plan.

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

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

- Unincorporated Cerro Gordo County
- City of Clear Lake
- City of Dougherty
- City of Meservey
- City of Mason City
- City of Plymouth
- City of Rock Falls
- City of Rockwell
- City of Swaledale
- City of Thornton
- City of Ventura
- Clear Lake School District
- Mason City School District
- West Fork School District

The above cities will be invited as official plan participants in the Cerro Gordo County plan. The Risk Assessment will include incorporation of analysis of building exposure/critical facilities of the entire city limits for these jurisdictions.

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

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

1.3 Plan Organization

This Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan update is organized as follows:

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

This is a different format than what was used for the 2013 Multi-jurisdictional Cerro Gordo County Hazard Mitigation Plan. In this update, Chapter 2 contains all community profiles and capabilities and the jurisdictional information about hazards is discussed within each hazard section in Chapter 3. This format provides for a more coordinated approach.

1.4 Planning Process

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

In June 2016, it was determined that Cerro Gordo County Emergency Management facilitates the update of the multi-jurisdictional, local hazard mitigation plan. Cerro Gordo Emergency Management's role was to:

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

1.4.1 Multi-Jurisdictional Participation

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

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

- Designate a representative to serve on the HMPC;
- Participate in at least one HMPC planning meeting by either direct representation or authorized representation, or through electronic communication;
- Provide information to support the plan development by completing and returning a Data Collection Guide and validating/correcting critical facility inventories;
- Update existing mitigation actions and identify additional mitigation actions for the plan (at least one);
- Review and comment on plan drafts;
- Inform the public, local officials, and other interested parties about the planning process and provide an opportunity for them to comment on the plan; and
- Formally adopt the mitigation plan.

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

Table 1.1. Jurisdictional Participation in Planning Process

Jurisdiction	Initial Planning Meeting	Jurisdiction Planning Meeting #1	Jurisdiction Planning Meeting #2	Jurisdiction Planning Meeting #3	EMAIL Correspondence	Data Collection Guide	Update/Develop Mitigation Actions
Cerro Gordo County	**X**	**X**	**X**		X	**X**	**X**
City of Clear Lake		X			X	X	X
City of Dougherty					X	X	X
City of Mason City	X	X			X	X	X
City of Meservey					X	X	X
City of Plymouth		X			X	X	X
City of Rock Falls		**X**			X	**X**	**X**
City of Rockwell	X	**X**	**X**		X	**X**	**X**
City of Swaledale		X			X	X	X
City of Thornton	X	**X**			X	**X**	**X**
City of Ventura					X	X	X
Clear Lake School District					X	X	X
Mason City School District	X	X			X	X	X
West Fork School District			**X**		X	**X**	**X**

1.4.2 The Planning Steps

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

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

Into this process, Cerro Gordo Emergency Management integrated a detailed 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the process used for this plan meets the funding eligibility

requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program, and Community Rating System. **Table 1.2** shows how the process followed fits into FEMA's original four-phase DMA process as well as the revised Nine Task Process outlined in the 2013 *Local Mitigation Planning Handbook* and the 10-step CRS process.

Table 1.2. Mitigation Planning Process Used to Develop the Cerro Gordo County Multi-jurisdictional Local Hazard Mitigation Plan

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

Phase 1 Organize Resources

Step 1: Organize the Planning Team (Handbook Tasks 1 & 2)

The planning process resulting in the preparation of this plan document officially began with a coordination meeting in Mason City, Iowa on September 29, 2016. The purpose of this meeting was to determine the jurisdictions and other stakeholders that would be invited to be participants of the HMPC (Step 1), set tentative planning meeting dates, provide recommendations regarding the hazards to in included in the plan update, discuss options for the flood risk assessment methodology, and discuss the plan update format. Detailed meeting minutes are included in Attachment B.

An HMPC was created that includes representatives from each participating jurisdiction, departments of the County, and other local, state and federal organizations responsible for making decisions in the plan and agreeing upon the final contents. In addition to the participating jurisdictions, the agencies and organizations that participated in the planning meetings included the following:

- Mercy Medical Center - North Iowa
- Clear Lake Sanitary District

After the coordination meeting, individual planning meetings were held at the various jurisdictions participating in the plan. A complete list of all representatives of the agencies and organizations that participated on the Cerro Gordo County HMPC is provided in Attachment B.

The HMPC communicated during the planning process with a combination of face-to-face meetings, phone interviews, and email correspondence. The meeting schedule and topics are listed in **Table 1.3.** The meeting minutes for each of the meetings are included in Attachment B.

Table 1.3. Schedule of HMPC Meetings

Meeting	Topic	Date
Initial Planning	General overview of planning process/requirements and schedule. Introduction to DMA, the planning process, hazard identification and public input strategy. Distribution of data collection guide to jurisdictions. Preliminary hazard ranking results. Determine process to monitor, evaluate, and update plan.	Sept. 29, 2016
Jurisdictional Planning Meetings	Review of draft Risk Assessment, distribution of critical facility inventories for jurisdictions to validate/correct, development of plan goals. Mitigation action update, development, and prioritization.	Oct 1, 2016 Through Dec. 30, 2017

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

During the initial planning meeting, (see **Figure 1.1**) Cerro Gordo County Emergency Management presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. Plans for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. Cerro Gordo County Emergency Management also introduced hazard identification requirements and data needs. The HMPC discussed potential hazards as well as past events and impacts and refined the identified hazards to be relevant to Cerro Gordo County. The hazard ranking methodology utilized by Iowa Homeland Security and Emergency Management Department in the State Hazard Mitigation Plan was introduced and the HMPC made preliminary determinations of probability, magnitude, warning time, and duration for each hazard identified.

Participants were given the Data Collection Guide to facilitate the collection of information needed to support the plan, such as data on historic hazard events, values at risk, and current capabilities. Each participating jurisdiction completed and returned the worksheets in the Data Collection Guide to Cerro Gordo County Emergency Management. Cerro Gordo County Emergency Management integrated this information into the plan, supporting the development of Chapters 2 and 3.

It was also determined that each jurisdiction would solicit participation from the public by requesting citizens to complete the hazard survey and return to the designated official for that jurisdiction. The results from each jurisdiction are found in Appendix B.1. The public was also involved in the final draft review by email or phone contact to the Emergency Management Agency as shown in Appendix B.4.

4.64 CFR Requirement 201(b)(2): An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

To insure that other organizations not within Cerro Gordo County, but whose goals and interests could interface with hazard mitigation in the county, would have meetings set-up with the county emergency management coordinator. These organizations also had the opportunity to comment on the final draft the same as the public as shown in Appendix B.4. Organizations meeting with the emergency management coordinator included adjacent county emergency management coordinators, local representatives of the Iowa Department of Transportation and Iowa Department of Natural Resources, the University of Iowa Flood Center, Alliant Energy, ITC, Mid-American Energy, and local long Term Care providers.

Integration of Other Data, Reports, Studies and Plans

Appendix A contains a list of the technical data, reports, and plans that were referenced. This information was used in the development of the hazard identification, vulnerability assessment, and capability assessment and in the formation of goals, objectives, and mitigation actions. Other sources of information are documented throughout the plan.

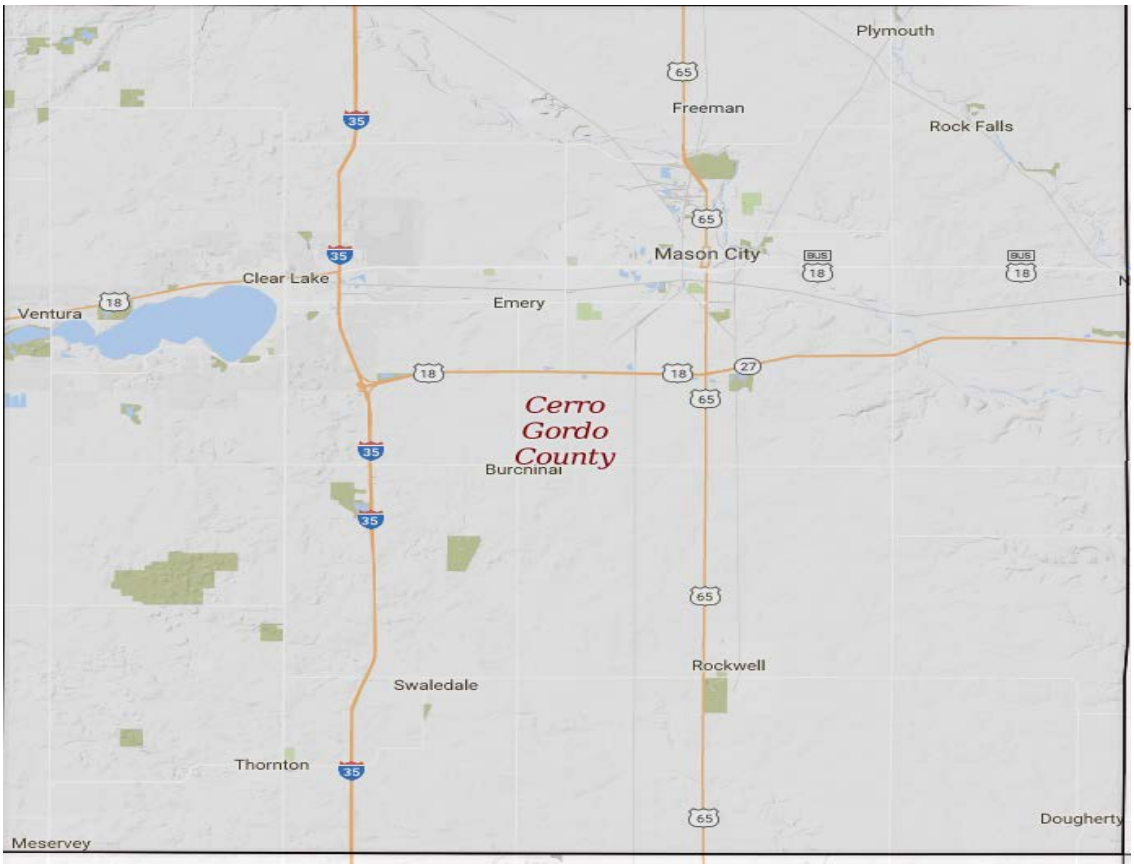
2 PLANNING AREA PROFILE AND CAPABILITIES

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

2.1 Cerro Gordo County Planning Area Profile

Figure 2.1 provides a map of the Cerro Gordo County planning area. The planning area boundaries include the unincorporated areas of Cerro Gordo County as well as all portions (including portions in adjacent counties) of the city limits of the following incorporated cities. City of Clear Lake, City of Dougherty, City of Mason City, City of Meservey, City of Plymouth, City of Rock Falls, City of Rockwell, City of Swaledale, City of Thornton, City of Ventura.

Figure 2.1 Cerro Gordo County Planning Area

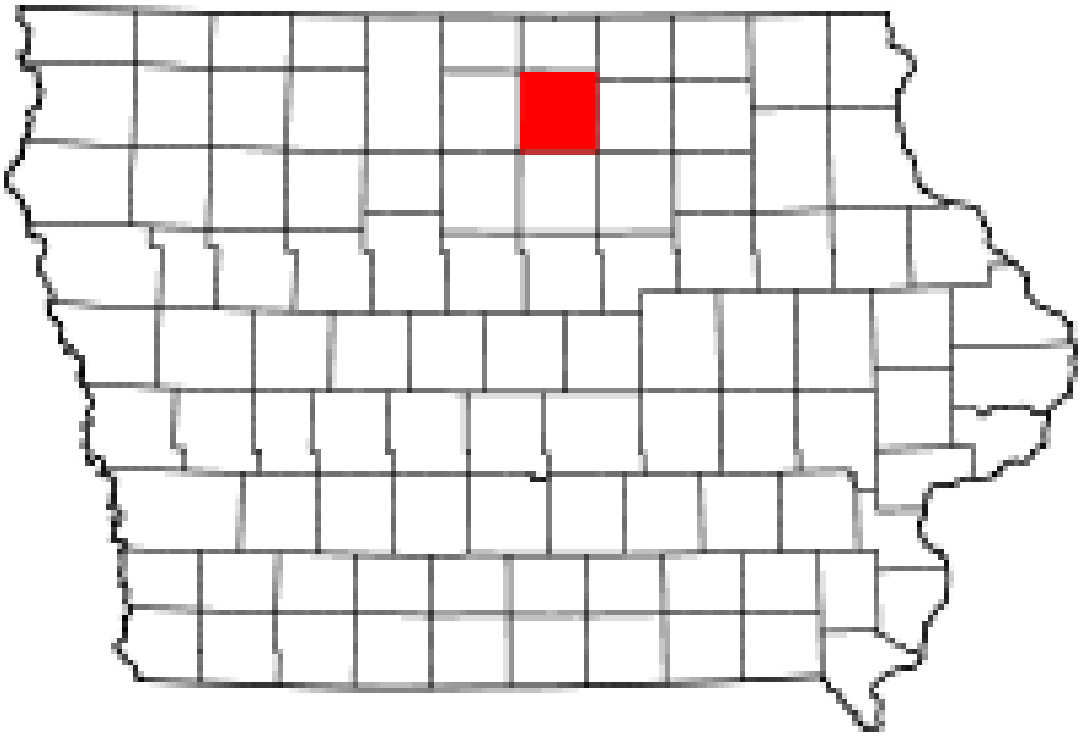


Source: 2011 Cerro Gordo County, Multi-Jurisdictional Hazard Mitigation Plan

2.1.1 Geography and Topography

Cerro Gordo County, Iowa is located in north-central Iowa (see **Figure 2.2**). The county seat of Cerro Gordo County is in the city of Mason City. Cerro Gordo County has 568 square miles of land area and 6.8 square miles of water area.

Figure 2.2 Location of Cerro Gordo County in the State of Iowa



Source: 2009 Hazard Mitigation Plan

Most of Cerro Gordo County is still mostly rural with the primary land use being agriculture. Major streams in the county flow through relatively flat land with broad floodplains. Cerro Gordo County has two significant rivers within its borders. The Shell Rock River enters on the northern border of the county just north of Plymouth. The Shell Rock flows through the cities of Plymouth and Rock Falls before exiting the county on the east border into the city of Nora Springs in Floyd County. The Shell Rock path takes it through relatively flat farm land interrupted by sections of high limestone bluffs. The Winnebago River enters the county on the north border crossing under Interstate 35. The Winnebago River flow, takes it mostly through rural land with Mason City as the only community it passes through. Like the Shell Rock River, the Winnebago's path fluctuates between relative flat land and limestone bluffs. In 2008, the Winnebago was the source of major flooding in Mason City. A list of these watersheds with the cities contained within each is provided below.

- 07080202 Shell Rock – Plymouth, Rock Falls and Unincorporated County.
- 07080203 Winnebago – Mason City and Unincorporated County

- 07080204 West Fork Cedar – Rockwell and Unincorporated County
- 07080207 Upper Iowa – Unincorporated County

Figure 2.3 shows the four watersheds in Cerro Gordo County.

Figure 2.3 Cerro Gordo County, Iowa Watersheds (Cerro Gordo County is red square)

Source: Environmental Protection Agency. http://cfpub.epa.gov

The topography of the greater part of Cerro Gordo County might be regarded by some observers as somewhat characterless and monotonous. Leaving out the western tier of townships, the remaining portion of the county is a gently undulating drift plain, almost level over large area. Stream valleys that have cut to but a very limited extent below the general level, and a few knobs or ridges that rise to a height of twenty to thirty feet above the otherwise unbroken plain, give some diversity to a landscape in general devoid of salient topographic features. The drift covering the county is in some places very thin, erosion since the deposition of the drift has been insignificant in amount, and hence the most conspicuous hills and valleys of eastern Cerro Gordo are in reality remnants of a pre-glacial topography.

All the eastern part of the county is occupied by Iowan drift; the western tier of townships is almost wholly occupied by the knobs, ridges and kettle holes that characterize the marginal moraine of Chamberlin. A small area in the southwest corner of Grimes Township presents some of the characteristics of plains of Wisconsin drift; but this last area is so small as to make it comparatively unimportant. The county is, therefore, topographically divisible into two principal areas, the area of the Iowan drift and the area of the Altamont moraine.

2.1.2 Climate

The climate of Cerro Gordo County typifies north-central Iowa with wide seasonal fluctuations in temperature and precipitation. The average annual temperature is 45.2 degrees Fahrenheit (F.) with an average high in July of 82.7 degrees F. and average low in January of 6.4 degrees F. The annual precipitation averages 35.2 inches. The average snowfall amount is 30.5 inches. (Weatherbase, 2017, http://www.weatherbase.com).

2.1.3 Population/Demographics

The 2016 population estimate of Cerro Gordo County was 43,070. This is down from the 2010 census population of 44,151. According to the 2015 Data USA Survey, the Cerro Gordo County median household income was $46,122. Cerro Gordo County median property value is $115,200.

Table 2.1 provides the populations for each city and the unincorporated county for 2000, 2010, with the number and percent change from 2000 to 2010.

Table 2.1 Cerro Gordo County Population 2000-2010 by City

Jurisdiction	2000 Population	2010 Population	# Change 2000-2010	% Change 2000-2010
Iowa	2,926,324	3,046,355	120,031	4.1%
Cerro Gordo County	46,447	44,151	-2,296	-4.9%
Clear Lake	8,161	7,777	-384	-4.7%
Dougherty	80	58	-22	-27.5%
Mason City	29,172	28,079	-1093	-3.7%
Meservey	252	256	4	1.6%
Plymouth	429	382	-47	-11%
Rock Falls	170	155	-15	-8.8%
Rockwell	989	1,039	50	5%
Swaledale	174	165	-9	-5%
Thornton	422	422	0	0%
Ventura	670	717	47	7%
Unincorporated Areas	5928	5101	-827	-14%

Source: U.S. Bureau of the Census

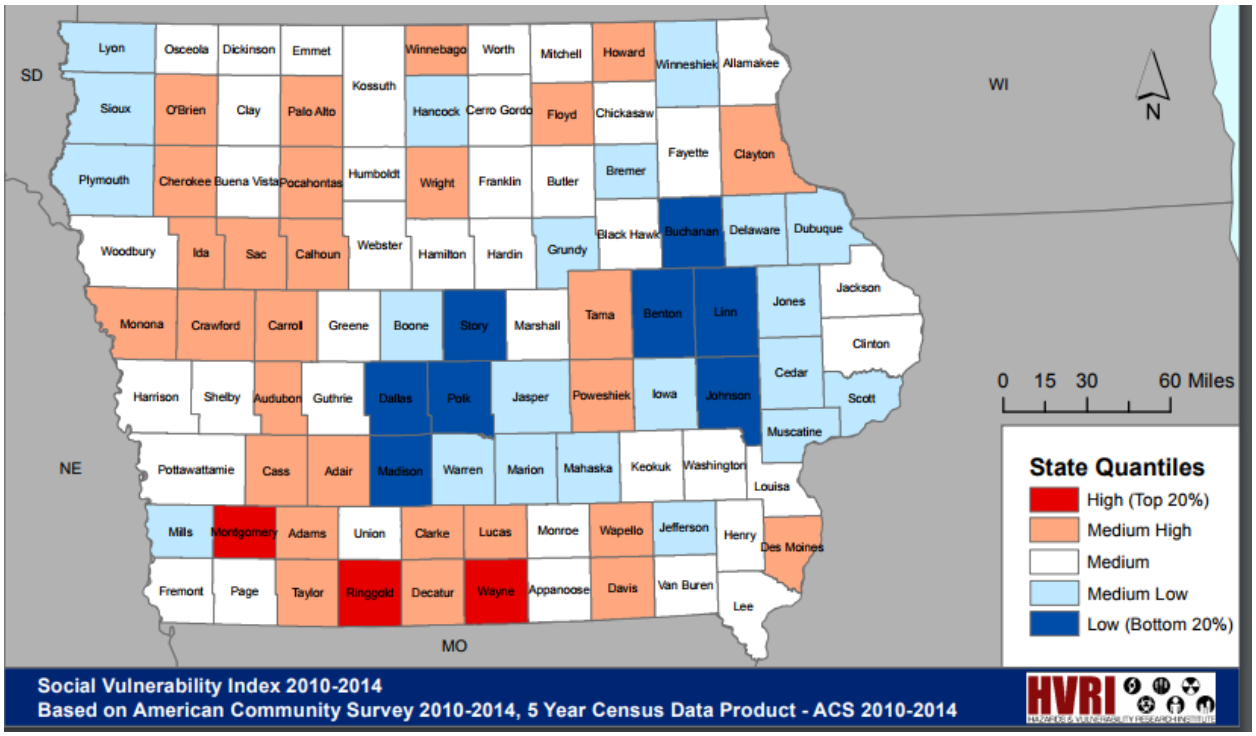
According to the 2010 census, 5.7 percent of the population is under age 5 and 17.94 percent of the population is over age 65 in Cerro Gordo County. There were 12,688 households with an average household size of 2.11 people.

The Hazards and Vulnerability Research Institute at the University of South Carolina developed the Social Vulnerability Index (SOVI ®) to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 30 socioeconomic variables, which the research literature suggests contribute to reduction in a community's ability to prepare

for, respond to, and recover from hazards. SOVI ® data sources include primarily those from the United States Census Bureau.

Figure 2.4 show that Cerro Gordo County has a low Social Vulnerability Index of 1.24. The low index indicates that Cerro Gordo County is more able to cope and recover from disasters than counties with a higher index.

Figure 2.4 County Comparisons Within the State for Social Vulnerability Index, 2010-2014



Source: Hazards and Vulnerability Research Institute

Table 2.2 provides additional demographic and economic indicators for Cerro Gordo County. The Cerro Gordo County values are for all Cerro Gordo County, including the incorporated cities.

Table 2.2 Unemployment, Income, Poverty, and Education, Demographics, Cerro Gordo County, Iowa

Jurisdiction	Population	Percent of Population Unemployed	Median Household Income	Percent of Individuals Below the Poverty Level	Percent of Population (High School graduate or higher)
Iowa	3,046,355	2.5	$54,570	12.3%	91.7%
Cerro Gordo	43,481	2.7	$47,788	12.8%	93.3%
Clear Lake	7,675	2.4	$53,298	13.8%	93.8%
Dougherty	91	2.4	$57,500	2%	96.1%
Mason City	27,643	3.2	$46,072	13.3%	92.7%
Meservey	226	2.4	$59,063	13.1%	97.7%
Plymouth	352	2.4	$46,500	10.4%	90%
Rock Falls	168	2.4	$61,250	4.1%	96.3%
Rockwell	2155	2.4	$60,370	5.8%	95.2%
Swaledale	187	2.4	$50,250	22.5%	96.9%
Thornton	494	2.4	$39,861	19.1%	94.6%
Ventura	738	2.4	$69,432	1%	98.6%

Source: U.S. Census, 2016 American Community Survey

2.1.4 History

Cerro Gordo County, located in the second tier of counties from the north and midway east and west, was, in the early days of the state, a part of Fayette County. The county is named after the location of a battle in the Mexican War. At this site, General Winfield Scott defeated General Santa Ana of the Mexican army on April 18, 1847. The American troop, 8500 strong, was outnumbered by the 12,000 men who fought on the opposing side. The battle was significant because it opened the way for the United States to take Mexico City. During the battle, 63 American soldiers were killed. The Spanish translation of Cerro Gordo is “fat hill”. The first white settlers came to the county in 1851, settling at Clear Lake. The total population at the close of the year was 8. In 1853, federal surveyors laid out the county into townships and later in the same year the townships were sub-divided into sections and quarter sections.

The profusion of wild game developed a race of hunters and trappers. Buffalo, deer, beaver, bear, elk, mink, muskrat, gophers, and squirrels were plentiful. Settlement and civilization came to North Iowa in the life span of one generation. Mrs. Margaret McMillin Shipley, born in Rockford, Illinois in 1853, was brought by her parents to Mason City in March of 1854 where she was the first white baby in Cerro Gordo County.
The first physician set up an office in Mason City in 1854 and a county medical society was organized in 1871. On August 7, 1855, when the population of the county was 632, an election was held at John B. Long’s cabin near the junction of Lime and Willow Creeks. Closely

following these elections was the appointment of three locating commissioners located the county seat at Mason City, which was first called Shibboleth and later Masonic Grove. The first court was held in Mason City in 1857. It was short-lived because in the summer of 1857, the county seat was moved to Livonia. A new courthouse was built there, and the county records and offices were soon located at this small town. This too was short-lived, because in April, 1858, Mason City won back the county seat in an election. Newspapers were established at an early date, the Cerro Gordo Press having put out its first issue on July 17, 1858. The Independent was established two years later.

In 1862, Cerro Gordo County was placed in the forty-second senatorial district and became the fifty-fourth representative district. The county erected a $600 stone courthouse in Mason City. Built in 1866, this building was used until 1900, when it was abandoned. It was not until 1869 that the first railroad laid its tracks into Mason City.

Cerro Gordo County has a number of claims to world-wide fame. The inception and development of the farmers' co-operative has distinguished the county from others. The movement has probably been more thoroughly worked out locally here than elsewhere in the United States, starting with the farmers' co-operative society at Rockwell which claimed nationwide attention in a day when the word co-operative was scarcely understood.

In 1918, Mason City established the first Junior College in the states. One of the early teachers in and afterwards principal of the Mason City Schools was Carrie Lane Chapman Catt, who has been an international figure in the cause of Equal Suffrage for Women.

Meredith Willson, a Mason City boy, achieved national fame as a musician and orchestra leader, while his sister Dixie Willson, was a well-known writer. General Hanford MacNider, whose father and grandfather lived in Mason City, served with distinction in the World War and later was National Commander of the American Legion, Assistant Secretary of War and Minister to Canada.

Clear Lake, which is the fishing and recreation mecca for North Iowans, is located on the shores of a beautiful little lake of the same name, created by ancient ice sheets. The city was platted in 1856 by James Dickirson and Marcus Tuttle.

2.1.5 Occupations

Table 2.3 provides occupation statistics for the incorporated cities and the county as a whole.

Table 2.3 Occupation Statistics, Cerro Gordo County, Iowa

Jurisdiction	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Iowa	34.9%	16.5%	23.0%	9.4%	16.2%
Cerro Gordo	30.8%	16.8%	24.4%	7.9%	20.1%
Clear Lake	30.8%	17.2%	26.0%	7.1%	18.9%
Dougherty	42.2%	6.3%	25.0%	14.1%	12.5%
Mason City	30.8%	17.0%	24.2%	7.4%	20.6%
Meservey	38.1%	2.8%	38.6%	5.1%	15.3%
Plymouth	29.9%	14.3%	20.1%	8.2%	27.6%
Rock Falls	34.9%	2.3%	27.9%	18.6%	16.3%
Rockwell	30.4%	11.6%	24.9%	10.1%	23.0%
Swaledale	22.5%	19.7%	11.6%	17.3%	28.9%
Thornton	27.6%	17.9%	19.3%	15.5%	19.7%
Ventura	35.1%	17.7%	25.6%	11.1%	10.5%

Source: http://factfinder.gov

2.1.6 Agriculture

According to the Iowa State University, University Extension Agricultural Profile for Cerro Gordo County, there were 780 farms in the County covering 326,879 acres of land. Crop and livestock production are visible parts of the agricultural economy, but many related businesses contribute by producing, processing, and marketing farm and food products. These businesses generate income, employment and economic activity throughout the region. Farms on average are larger in Cerro Gordo County with the average size 419 acres. Cerro Gordo County agriculture provides 3,810 jobs. Cerro Gordo County agriculture and economy contributions are summarized in **Table 2.4.**

Table 2.4 Cerro Gordo County Agriculture and the Economy

	Dollars Generated	Jobs
Crop Production	$196,900,000	4.5% of all jobs
Livestock	$48,000,000	3.0% of all jobs
Employment	$241,400,000 in wages	12.2% Ag. & Ag. Related jobs 3,810 Total Jobs
Total Ag Sales	$1,105.90 million in total sales	

Iowa State University, University Extension

2.1.7 FEMA Hazard Mitigation Assistance Grants in Planning Area

Since 2003, more than $14.6 Million in Federal Hazard Mitigation Assistance grants has been awarded to sub grantees in Cerro Gordo County (total project cost). **Table 2.5** provides details on the previous FEMA Hazard Mitigation Assistance Grants in the planning area.

Table 2.5 FEMA HMA Grants in Cerro Gordo County from 2003-2014

Project Type	Sub Applicant	Award Date	Final Project Cost (Total)
Property Acquisition	Mason City, City of	1/25/2005	$60,708
Tornado Safe Room	Clear Lake VFW, Post 4868	7/14/2004	$557,505
Tornado Safe Room	Ventura, City of	4/16/2003	$682,939
Infrastructure	Mason City, City of	10/7/2009	$677,695
Infrastructure	Mason City, City of	10/28/2009	$748,523
Property Acquisition	Mason City, City of	5/29/2009	$326,823
Property Acquisition	Mason City, City of	5/29/2009	$88,762
Property Acquisition	Mason City, City of	8/3/2009	$3,074,005
Property Acquisition	Mason City, City of	7/15/2009	$4,194,336
Tornado Safe Room	Mason City CSD	11/17/2010	$2,001,790
Tornado Safe Room	Mason City Newman Catholic Schools	9/14/2010	$669,091
Property Acquisition	Mason City, City of	10/15/2014	$846,733
Property Acquisition	Mason City, City of	3/25/2005	$177,840
Tornado Safe Room	Mason City, City of	8/15/2007	$558,824

Source: Iowa Homeland Security and Emergency Management Division

2.2 City/County Capabilities and Jurisdictional Profiles

This section summarizes the capabilities of each jurisdiction that relate to their ability to implement mitigation opportunities. The Unincorporated County is governed by a 3-member Board of Supervisors and each city is governed by a Mayor and City Council. This section begins with a general discussion of capabilities of the Unincorporated County followed by **Table 2.6** which provides a summary of the following capabilities in the County and each incorporated city: planning capabilities, policies/ordinances, programs, studies/reports/maps, staff resources, non-governmental organizations, and financial resources. **Table 2.7** that follows provides additional profile information for each participation jurisdiction including population, land area, government structure, and previous and ongoing mitigation capabilities, programs, and infrastructure.

2.2.1 Unincorporated Cerro Gordo County

The jurisdiction of Cerro Gordo County includes all unincorporated areas within the County boundaries. The Cerro Gordo County government structure is a County Board of Supervisors with three members. The Cerro Gordo County government includes the following departments and offices.

- Board of Supervisors
- Assessor's Department
- Attorney's Department
- Auditor's Department
- CASA
- Central Point of Coordination
- Community Services Office
- Conservation Board Office
- Emergency Management Agency
- Engineer Office
- Public Health Department
- Recorder Department
- Sheriff's Office
- Treasurer's Department
- Veteran Affairs
- General Relief Department
- Planning and Zoning Department
- Personnel and Safety Department
- Targeted Case Management
- Lime Creek Nature Center
- Information Technology

Mitigation Initiative/Capabilities

Chapter 29C of the Code of Iowa creates the State Emergency Management Division and the local Emergency Management Commissions. The Cerro Gordo County Emergency Management Commission is made up of the mayors of all of the jurisdictions in Cerro Gordo County and one member of the County Board of Supervisors, and the Sheriff. The Commission appoints an Emergency Management Coordinator to manage the agency and assist the Commission. Additional mitigation initiatives/capabilities are discussed below.

- Ongoing training for fire, EMS, and law enforcement staff.
- Utilize Code Red System as a community warning system.
- Continued development of Community Emergency Response Teams and Medical Reserve Corps programs.
- The county is working to become a Storm Ready Community.

Table 2.6. Mitigation Capabilities for Cerro Gordo County and Incorporated Cities

Capabilities	Cerro Gordo County	Clear Lake	Dougherty	Mason City	Meservey	Plymouth	Rock Falls	Rockwell	Swaledale	Thornton	Ventura
Planning Capabilities											
Comprehensive Plan	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	No
Builder's Plan	No	No	No	No	Yes	Yes	No	No	No	No	No
Capital Improvement Plan	No	Yes	No	Yes	No	Yes	No	No	No	No	No
Local Emergency Plan	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No
County Emergency Plan	Ye	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Recovery Plan	No	No	No	No	Yes	Yes	No	No	Yes	No	No
County Recovery Plan	Ye	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Mitigation Plan	No	No	No	No	Yes	Yes	No	No	Yes	No	No
County Mitigation Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Debris Management Plan	Yes	Yes (county)	Yes (County)	Yes (county)	Yes	Yes (county)	Yes (County)	Yes (County)	Yes (county)	Yes (County)	Yes (county)
Economic Development Plan	No	Yes	No	No	No	No	No	Yes	Yes	No	No
Transportation Plan	No	No	No	Yes	No	No	No	No	No	No	No
Land-Use Plan	Yes	Yes	No	Yes	No	No	No	No	No	No	No
Flood Mitigation Plan	No	No	No	Yes	Yes	Yes	No	No	No	No	No
Watershed Plan	No	Yes	No	No	Yes	No	No	No	Yes	No	No
School Mitigation Plan	No	No	No	No	No	No	No	No	No	No	No
Critical Facilities Plan	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	No

Capabilities	Cerro Gordo County	Clear Lake	Dougherty	Mason City	Meservey	Plymouth	Rock Falls	Rockwell	Swaledale	Thornton	Ventura
Policies/Ordinances											
Building Code	No	Yes	No	Yes	Yes	Yes	No	No	Yes	No	No
Floodplain Ordinance	Yes	Yes	No	Yes	Yes	Yes		No	No	Yes	Yes
Subdivision Ordinance	Yes	Yes	No	Yes	No	No	No	No	No	No	Yes
Tree Trimming Ordinance	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Nuisance Ordinance	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Storm Water Ordinance	No	Yes	No	No	Yes	No	No	No	No	No	No
Drainage Ordinance	No	Yes	No	No	Yes	No	No	No	No	No	No
Site Plan Review Requirements	No	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Historic Preservation Ordinance	No	Yes	No	Yes	No	No	No	No	No	No	No
Landscape Ordinance	Yes	Yes	No	Yes	No	No	No	No	No	No	No
Iowa Wetlands and Riparian Areas Conservation Plan	No	Yes	No	No	No	No	No	No	No	No	No
Programs											
Zoning/Land Use Restrictions	Yes	Yes	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Codes Building Site/Design	No	Yes	No	Yes	No	No	No	No	No	No	Yes
National Flood Insurance Program (NFIP) Participant-Nondelegated	Yes		Yes	No	No	No	Yes	No	Yes	Yes	Yes
NFIP Participant-Delegated	No	Yes	No	Yes	No	No	No	No	No		No
NFIP Community Rating System Participating Community	No		No	No	No	No	No	No	No	No	No
Building Code Effectiveness Grading	No	No	No	No	Yes	No	No	No	No	No	No

ISO Fire Rating	No	Yes 5/9	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economic Development Program	No	No	No	Yes	No	No	No	No	Yes	No	No

Capabilities	Cerro Gordo County	Clear Lake	Dougherty	Mason City	Meservey	Plymouth	Rock Falls	Rockwell	Swaledale	Thornton	Ventura
Land Use Program	Yes	No	No	Yes	Yes	No	No	No	No	No	No
Public Education/Awareness	Yes	No	No	No	Yes	No	No	No	No	No	No
Property Acquisition	No	No	No	Yes	No	No	No	No	No	No	No
Planning/Zoning Boards	Yes	Yes	No	Yes	No	Yes		Yes	No	Yes	Yes
Stream Maintenance Program	Yes	No	No	No	No	No	No	No	No	No	No
Tree Trimming Program	Yes	No	No	No	Yes	No	No	No	Yes	No	No
Engineering Studies for Streams	No	No	No	No	No	No	No	No	No	No	No
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Studies/Reports/Maps											
Hazard Analysis/Risk Assessment (Local)	No	Yes	No	No	Yes	Yes	No	No	Yes	No	No
Hazard Analysis/Risk Assessment (County)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Flood Insurance Maps	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FEMA Flood Insurance Study (Detailed)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
Evacuation Route Map	Yes	Yes	No	No	No	No	No	No	No	Yes	No
Critical Facilities Inventory	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes	No
Vulnerable Population Inventory	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No
Land Use Map	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No
Staff/Department											
Building Code Official	No	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Building Inspector	No	Yes	No	Yes	Yes	No	No	No	No	No	Yes

Capabilities	Cerro Gordo County	Clear Lake	Dougherty	Mason City	Meservey	Plymouth	Rock Falls	Rockwell	Swaledale	Thornton	Ventura
Mapping Specialist (GIS)	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Engineer	Yes	No	No	Yes	Yes	No	No	No	No	No	Yes
Development Planner	Yes	No	No	Yes	Yes	No	No	No	No	No	No
Public Works Official	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emergency Management Coordinator	Yes	Yes (County)	No	Yes (County)	Yes (County)	Yes (County)	Yes (County)	Yes (County)	Yes (County)	Yes (county)	Yes (County)
NFIP Floodplain Manager	Yes	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Hazardous Materials Expert	No	No	No	No	No	No	No	No	Yes	No	No
Local Emergency Planning Committee	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)	Yes (Regional)
Bomb Squad	No	No	No	No	No	No	No	No	No	No	No
County Emergency Management Commission	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Sanitation Department	No	No	No	Yes	Yes	No	No	No	No	Yes	No
Transportation Department	No	No	No	Yes	Yes	No	No	No	No	Yes	No
Economic Development Department	No	No	No	Yes	Yes	No	No	No	No	No	No
Housing Department	No	No	No	Yes	Yes	No	No	No	No	No	No
Planning	No	No	No	Yes	yes	No	No	No	No	No	No

Consultant											
Regional Planning Agencies	Yes	Yes (Regional COG)	Yes (Regional COG)	Yes (Regional COG)	Yes (Regional COG)	No	Yes (Regional COG)	Yes (Regional COG)	Yes (Regional COG)	No	Yes (Regional Cog)
Historic Preservation	No	Yes	No	Yes	Yes	No	No	No	No	No	No
Non-Governmental Organizations (NGOs)											
American Red Cross	No	No	No	No	No	No	No	No	No	No	No
Salvation Army	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Capabilities	**Cerro Gordo County**	**Clear Lake**	**Dougherty**	**Mason City**	**Meservey**	**Plymouth**	**Rock Falls**	**Rockwell**	**Swaledale**	**Thornton**	**Ventura**
Veterans Groups	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No
Environmental Organization	No	No	No	No	No	No	No	No	No	No	No
Homeowners Association	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Neighborhood Associations	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Chamber of Commerce	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No	No
Community Organizations (Lions, Kiwanis, etc.)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No
Financial Resources											
Apply for Community Development Block Grants	Yes	Yes	No	Yes	Yes	Yes	No	No	No	Yes	No
Fund projects through Capital Improvements funding	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	Yes	yes	Yes	Yes	No	Yes	Yes	Yes
Fees for water, sewer,	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

gas, or electric services											
Impact fees for new development	No	Yes	No	No	No	No	No	No	No	No	No
Incur debt through general obligation bonds	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Incur debt through special tax bonds	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes	No
Incur debt through private activities	No		No	No	No	No	No	No	Yes	Yes	No
Withhold spending in hazard prone areas	No	Yes	No	No	No	No	No	No	Yes	No	No

Additional Capabilities	**Cerro Gordo County**	**Clear Lake**	**Dougherty**	**Mason City**	**Meservey**	**Plymouth**	**Rock Falls**	**Rockwell**	**Swaledale**	**Thornton**	**Ventura**
Outdoor Warning Sirens	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Other Warning Systems	Yes (Code Red)	Yes (Code Red)	Yes (Code Red)	Yes (Code Red)	Yes (Code Red)	No	Yes (Code Red)	Yes (Code Red)	Yes (Code Red)	No	No
Tornado Safe Rooms		Yes	No	Yes	Yes	Yes	No	No	No	no	Yes
Current Mitigation Projects	Yes (FEMA project –road repairs to repair flood damage. Floodplain Ordinance Enforcement – ongoing		No	Yes	Yes						

2.2.2 Public School District Profiles and Mitigation Capabilities

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

- Clear Lake School District, #1233
- Mason City School District, #4131
- West Fork School District, #5922
- Newman Catholic Schools

Figure 2.5 provides the boundaries of the school districts in Cerro Gordo County and **Table 2.8** that follows provides location and enrollment information for each school district. For school districts that are in more than one county, the school building and enrollment data is for the portion in Cerro Gordo County only.

Note: There are four school districts whose boundaries extend into Cerro Gordo County. However, those school districts do not have any buildings in Cerro Gordo County and are not official participants in this plan. Those school districts are: Forest City, Central Springs, Garner/Hayfield/Ventura, and Rudd/Rockford/Marble Rock.

Figure 2.5 Cerro Gordo County, Iowa School Districts

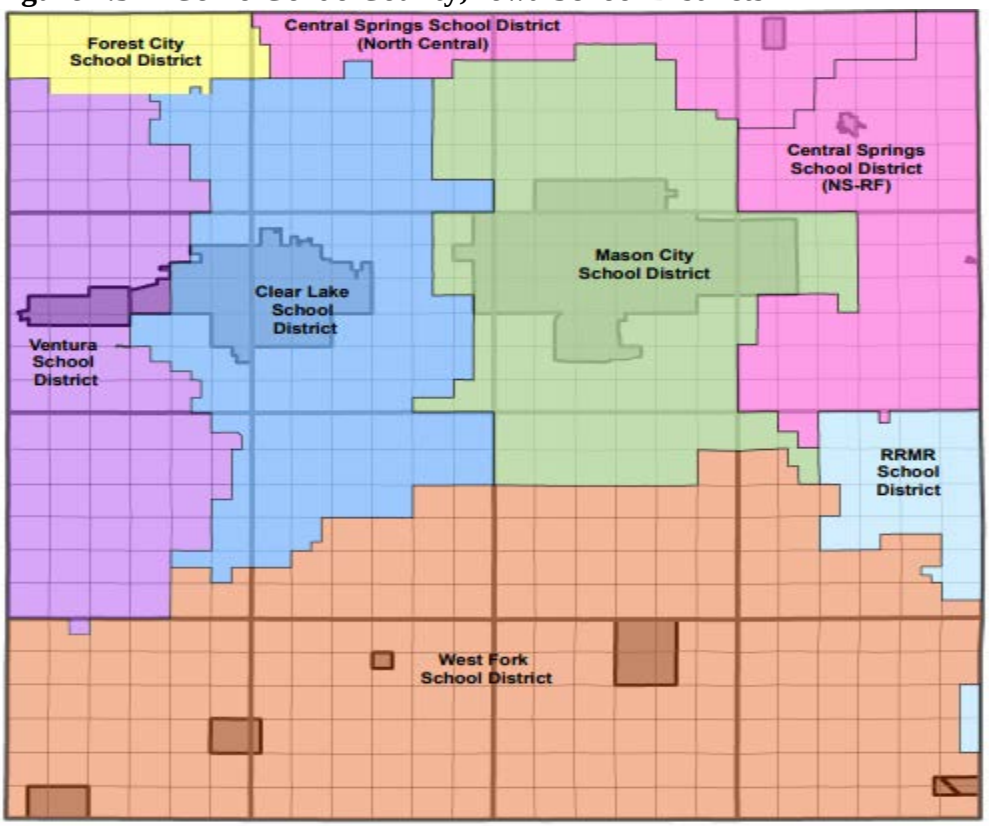


Table 2.8 Cerro Gordo County School Buildings and Enrollment Data 2017

District Name	Building Name	Building Total
Clear Lake	Middle School	350
Clear Lake	High School	455
Clear Lake	Clear Creek Elementary	705
Clear Lake	Sunset Preschool	80
Clear Lake	Administrative Office	5
Mason City	Harding Elementary	350
Mason City	Hoover Elementary	400
Mason City	Jefferson Elementary	425
Mason City	Roosevelt Elementary	450
Mason City	Lincoln Intermediate	660
Mason City	John Adams Middle School	610
Mason City	High School	1,100
Mason City	Administration Center	30
Mason City	Pinecrest Center	50
West Fork	Middle School	206
West Fork	Elementary School	184
West Fork	Alternative School	12
West Fork	Industrial Academy	16

Potential capabilities to implement mitigation programs and projects can vary among school districts. To determine mitigation capabilities, each of the participating school districts completed a Data Collection Guide to report planning, personnel, fiscal, and other capabilities related to implementation of mitigation programs and projects. **Table 2.9** provides a summary of the reported capabilities for each participating school district.

Table 2.9 Summary of Mitigation Capabilities, Cerro Gordo County Public School Districts

If yes is marked for the school it indicates they have the capability, a no indicates they do not have the capability.

Capability	Clear Lake School District	Mason City School District	West Fork School District
Planning Elements			
School Disaster Plan	Yes	Yes	Yes
Capital Improvement Plan	Yes	Yes	Yes
Master Plan	Yes	Yes	Yes
Weapons Policy	Yes	Yes	Yes
Personnel Resources			
Full-time Building Official	Yes – Tony Laudner	Yes –Dave Versteeg	Yes – Darrin Strike
Emergency Manager	No	Yes – Todd Huff	Yes – Darrin Strike
Grant Writer	No	No	Yes – Darrin Strike
Public Information Officer	No	Yes	Yes – Darrin Strike
Financial Resources			
Capital Improvements Project Funding	Yes	Yes	Yes
Local Funds	Yes	Yes	Yes
General Obligation Bond	No	Yes	Yes
Bonds	Yes	Yes	Yes
Private Activities/Donations	Yes	Yes	Yes
State and Federal Funds	Yes	No	Yes
Other			
Public address/emergency alert systems (alarms, bells, intercoms, etc.)	Yes	Yes	Yes
NOAA Weather radios	Yes	Yes	Yes
Public Education Programs (Alice Training, fire/tornado drills, etc.)	Yes	Yes	Yes
Mitigation Programs (video cameras, buzz-in system, door locks, etc.)	Yes	Yes	Yes
Tornado Shelter/Safe room	Yes	Yes	No
Do you have law enforcement on campus?	No	Yes	No

3 RISK ASSESSMENT

44 CFR Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

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

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

Step 1 - Describe Hazards
Step 2 - Identify Community Assets
Step 3 - Analyze Risks
Step 4 - Summarize Vulnerability

This chapter is divided into six main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and the methodology utilized to score or rank the hazards;
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk;
- **Section 3.3 Development Since 2011 Plan Update** discusses what changes in development have occurred since the previous Hazard Mitigation Plan;
- **Section 3.4 Future Land Use and Development** discusses areas of planned future development;
- **Section 3.5 Hazard Profiles and Vulnerability** for each hazard, this section is divided into two parts: 1) Hazard Profile discusses the threat to the planning area, the geographic location/extent at risk, previous occurrences of hazard events, and probability of future occurrence; and 2) Vulnerability Assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards;
- **Section 3.6 Hazard Analysis Summary** provides a tabular summary of the hazard ranking for each jurisdiction in the planning area.

3.1 Hazard Identification

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

The 14 hazards identified for this plan update are listed below in alphabetical order

- Blizzard
- Cyber Attack*
- Drought*
- Flooding
- Hail Storm*
- HAZMAT Facility
- HAZMAT Transportation
- Ice Storm
- Major Fire/Structural
- Pandemic
- Power Outage
- Severe Summer Storm (Non-Tornadic)
- Terrorism
- Tornado

*denotes hazards added to this plan update that were not included in the 2011 Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan.

Section 3.1.1 through 3.1.3 describes how these hazards were identified for this plan update.

3.1.1 Review of Existing Mitigation Plans

Prior to 2011, Hazard Mitigation Planning in Cerro Gordo County was accomplished on a jurisdictional basis. In 2011, the unincorporated county and incorporated municipalities came together to coordinate multi-jurisdictional mitigation planning for the entire Cerro Gordo County planning area. This coordinated effort resulted in the Cerro Gordo County, Iowa Multi-jurisdictional Hazard Mitigation Plan, approved by FEMA in February 2013. To identify hazards to include in the Risk Assessment update, a comparison was performed of the hazard identification in the 2013 Iowa State Hazard Mitigation Plan, and the 2011 Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan. **Table 3.1** provides the details of the comparison.

Table 3.1 Hazard Comparison Chart

2013 Iowa State Hazard Mitigation Plan Hazard	2013 Cerro Gordo County Hazard Mitigation Plan Hazard
River Flooding	River Flooding
Flash Flooding	Flash Flooding
Tornado/Windstorm	Tornado
Thunderstorm/Lightning/Hail	Severe Thunderstorm (Windstorms/Hailstorms/Thunder and Lightning
Severe Winter Storm	Severe Winter Storm
Levee/Dam Failure	Levee Failure/Dam Failure
Terrorism	Terrorism
Animal/Plant/Crop Disease	Animal/Plant/Crop Disease
HAZMAT Incident	Hazardous Materials
Radiological Incident	Radiological Incident
Drought	Drought
Human Disease	Human Disease
Transportation Incident	Transportation Incident
Infrastructure Failure	Infrastructure Failure
Extreme Heat	Extreme Heat
Grass/Wind Land Fire	Grass or Wild land Fire
Sinkholes	Not Included
Landslides	Not Included
Earthquake	Earthquake
Expansive Soils	Not Included

After a review of the hazards, it was agreed that the hazards/hazard naming for this update will be consistent with the 2013 State Plan with the following exceptions:

- Levee Failure was not included because the one levee in Cerro Gordo County is in Mason City and all structures that would be affected by failure have been removed.
- Dam Failure will not be included as a separate hazard. There are no high or moderate hazard dams within the county boundaries.
- Animal/Plant/Crop Disease will not be included. The agricultural community works with animal/plant/crop disease specialists routinely to address preventative steps that can be taken. This hazard is adequately addressed through other planning mechanisms.
- Infrastructure Failure will not be included as a separate hazard. The failure to infrastructure that can occur as a result of natural hazards will be discussed under each hazard. Infrastructure failure as a result of human causes is not required for inclusion in Hazard Mitigation Plans.
- Extreme heat was not considered a significant threat by committee members based on past county history.
- Landslides will not be included. The planning committee determined there have been no instances of landslides as a result of natural causes in the planning area.
- The committee removed Grass/Wild Land Fire from the list. The reasoning for this is because the fires in our county would be contained in a reasonable amount of time with little impact to significant structure.
- Expansive Soil and Sinkholes were not considered by the committee due to the fact the geology of the area does not support a high probability of these impacts.

- Cerro Gordo County is in a very geologically stable area with very low probability of impacts from earthquakes. The committee has chosen to remove this from the list.
- With recent history of events and our nation heavy dependence on technology, the committee has added Cyber Attack to the list of hazards/risks.

3.1.2 Review Disaster Declaration History

Information utilized to identify hazards relevant for Cerro Gordo County was obtained by examining events that triggered federal disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to responds and recover. Disaster assistance is supplemental and sequential. When issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state governments' capacities are exceeded; a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

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

Table 3.2 lists federal disaster declarations that included Cerro Gordo County for the period from 1993 to 2016.

Table 3.2 FEMA Disaster Declarations that Included Cerro Gordo County, Iowa 1993-2016

Number	Declared	Incident Period	Description
4289	**10/31/2016**	**9/21-10/30/2016**	**Severe storms and flooding**
1763	**5/27/2008**	**5/25-8/13/2008**	**Severe storms, tornadoes, flooding**
1282	**7/22/1999**	**7/2-8/10/1999**	**Severe storms and flooding**
996	**7/9/1993**	**4/13-7/9/1993**	**Flooding, severe storms**

Source: Federal Emergency Management Agency: www.fema.gov/

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

Table 3.3 provides the USDA Secretarial disaster declarations that included Cerro Gordo County in 2012.

Table 3.3 USDA Secretarial Disaster Declarations Including Cerro Gordo Co. (2012-2017)

Number	Date	Cause				
		Drought	Fire, Wildfires	Heat	Insects	Winter Storm
53310	2012	X	X	X	X	X
53337	2012	X	X	X	X	X
53361	2012	X	X	X	X	X
53390	2012	X	X	X	X	X

Source: U.S. Department of Agriculture

3.1.3 Research Additional Sources

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

- Cerro Gordo County Digital Flood Insurance Rate Map, FEMA
- Cerro Gordo County Emergency Management
- Cerro Gordo County Flood Insurance Study, FEMA
- Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan (February 2013)
- Data Collection Guides completed by each jurisdiction
- Environmental Protection Agency
- Federal Emergency Management Agency (FEMA)
- Flood Insurance Administration
- Hazards US (HAZUS)
- Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation
- Iowa Department of Education, Bureau of Information and Analysis Services
- Iowa Department of Natural Resources
- Iowa Department of Public Safety
- Iowa Department of Transportation, Office of Traffic and Safety
- Iowa Flood Center
- Iowa State Fire Marshal Division
- Iowa State Hazard Mitigation Plan (September 2013)
- Iowa Utilities Board
- National Drought Mitigation Center Drought Reporter
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center
- Pipeline and Hazardous Materials Safety Administration
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin
- U.S. Army Corps of Engineers

- U.S. Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
- U.S. Department of Transportation
- United States Geological Survey
- Various articles and publications available on the internet (sources are indicated where data is cited)

3.1.4 Hazards Identified

Through the hazard identification review process, 14 natural and human-caused/technological hazards that have the potential to significantly affect the planning area were chosen for further analysis in the risk assessment. The hazards identified for this plan update are listed below in alphabetical order:

- Blizzard*
- Cyber Attack*
- Drought
- Flooding
- Hail*
- HAZMAT Facility
- HAZMAT Transportation
- Ice Storm*
- Major Fire (structural)*
- Pandemic
- Power Outage*
- Severe Summer Storm (Non-tornadic)
- Terrorism
- Tornado

*denotes hazards added to this plan update that were not included in the 2013 Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan.

3.1.5 Multi-Jurisdictional Risk Assessment

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

The hazards that have the potential to vary across the planning area in terms of geographic areas at risk include hazardous materials incident, flooding, major structure fire, cyber attack and terrorism.

3.1.6 Hazard Scoring Methodology

To maintain reporting format consistent with the 2013 Iowa State Hazard Mitigation Plan, the Cerro Gordo County Hazard Mitigation Planning Committee (HMPC) used the same methodology to score and prioritize the hazards. This prioritization was based on a hazard scoring system that considers four elements of risk: probability, magnitude/severity, warning time, and duration. **Table 3.4** provides definitions for each of the four elements along with associated rating levels.

Table 3.4 Hazard Score Element Definitions and Rating Scales

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

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

(Probability x .45) + (Magnitude/Severity x .30) + (Warning Time x .15) + (Duration x .10) = SCORE

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

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

The HMPC determined overview hazard ranking scores for the planning area as a whole. The results of this overview are provided below in **Table 3.5.** Additionally, the hazard ranking overview is provided at the beginning of each hazard profile and vulnerability section. A detailed hazard summary by jurisdiction is provided at the conclusion of each hazard profile. Appendix B.1 lists the scores by individual jurisdiction to display how each hazard may vary by jurisdiction.

Table 3.5 Cerro Gordo County Planning Area Hazard Ranking Results

Hazard	Average Weighted Score	Hazard Level
Power Outage	2.55	Moderate
Tornado	2.50	Moderate
Cyber Attack	2.45	Moderate
Severe Summer Storm	2.40	Moderate
Ice Storm	2.38	Moderate
Blizzard	2.34	Moderate
Hazardous Material Incident – Transportation	2.19	Moderate
Pandemic	2.12	Moderate
Terrorism	2.07	Moderate
Hazardous Materials Incident – Facility	2.05	Moderate
Flooding	1.87	Low
Major Structure Fire	1.82	Low
Hailstorm	1.74	Low
Drought	1.57	Low

3.2 Assets at Risk

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

3.2.1 Total Exposure of Population and Structures

3.2.1.1 Unincorporated County and Incorporated Cities

Table 3.6 shows the total populations, building count, estimated value of buildings, and estimated total exposure to parcels for the unincorporated county and each incorporated city. A

recognized data limitation associated with utilizing parcel data with assessed values is the exclusion of tax exempt properties in the planning area

Table 3.6

Jurisdiction	2010 Population	Residential #	Residential Cost	Commercial and Industrial #	Commercial and Industrial Cost	Multi-Residential #	Multi-Residential Cost
Unincorporated County	5,101	2,740	$368,352,790	165	$61,390,682	5	$2,808,765
Clear Lake	7,777	3,734	$538,893,130	352	$122,525,345	44	$3,133,805
Dougherty	58	45	$720,490	13	$1,546,400	0	0
Mason City	28,079	10,605	$1,106,895,880	758	$444,018,439	177	$51,495,001
Meservey	256	123	$3,885,960	21	$377,859	0	0
Plymouth	382	163	$11,639,260	15	$1,627,520	0	
Rock Falls	155	67	$5,991,410	6	$916,550	0	
Rockwell	1,039	399	$39,634,600	47	$4,530,452	0	
Swaledale	165	80	$2,749,650	18	$781,700	0	
Thornton	422	188	$9,690,530	36	$2,459,885	0	
Ventura	717	365	$61,586,700	30	$3,900,284	3	$652,616
Total	44,151	18,346	$2,150,040,400	1,461	$642,528,771	229	$58,090,187

Sources: Cerro Gordo County Assessor, Mason City Assessor, U.S. Census 2010
(2016 Abstract) (2016 Abstract)

3.2.1.2 Public School Districts

The enrolled number of students at the participating public school districts is provided in **Table 3.7** as well as the number of buildings, building values and contents value.

Table 3.7 Enrollment and Building Exposure by Jurisdiction-Public School Districts

School District	Enrollment	Building Count	Building Value ($)	Content Value ($)	Total Value ($)
Clear Lake	1,590	4 Schools	$52,211,832	$7,607,065	$61,115,414
		1 Garage	$340,888	$134,741	
		2 Storage	$100,104	$7,924	
		1 Sports Complex	$712,860	$0	
Mason City	4,105	9 Schools	$133,529,106	$13,225,984	$153,032,577
		1 Admin Building	$2,206,082	$648,488	
		2 Garages	$921,281	$276,020	
		6 Storage Facilities	$258,949	$35,981	
		3 Sports Complex	$2,081,592	$29,094	
West Fork	418	2 Schools	$12,288,658	$1,747,897	$14,133,560
		1 Garage	$90,087	$6,918	

Source: Clear Lake, Mason City, and West Fork Schools

3.2.2 Critical and Essential Facilities and Infrastructure

As part of the update to the Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan, participating jurisdictions assessed the vulnerability of the following types of facilities below:

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

Table 3.8 is a summary of the inventory or xxx critical and essential facilities and infrastructure in the planning area. This list was compiled from an inventory of critical facilities that was developed by the County and incorporated cities as part of the 2013 Hazard Mitigation Plan. This inventory was revised with updates from the planning committee.

Table 3.8 Inventory of Critical/Essential Facilities and Infrastructure

Jurisdiction	Facility Type	Facility Count
Cerro Gordo County	1 Ambulance	0
	2 Communications	2
	3 Fire Department	0
	4 Government	4
	5 Hospital	0
	6 Law Enforcement	1
	7 Public Works	7
	8 Recreation	15
	9 Transportation	0
	10 Waste Water	0
	11 Water	0
Clear Lake	1 Ambulance	1
	2 Communications	1
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	1
	7 Public Works	1
	8 Recreation	2
	9 Transportation	0
	10 Waste Water	1
	11 Water	5
Dougherty	1 Ambulance	0
	2 Communications	0

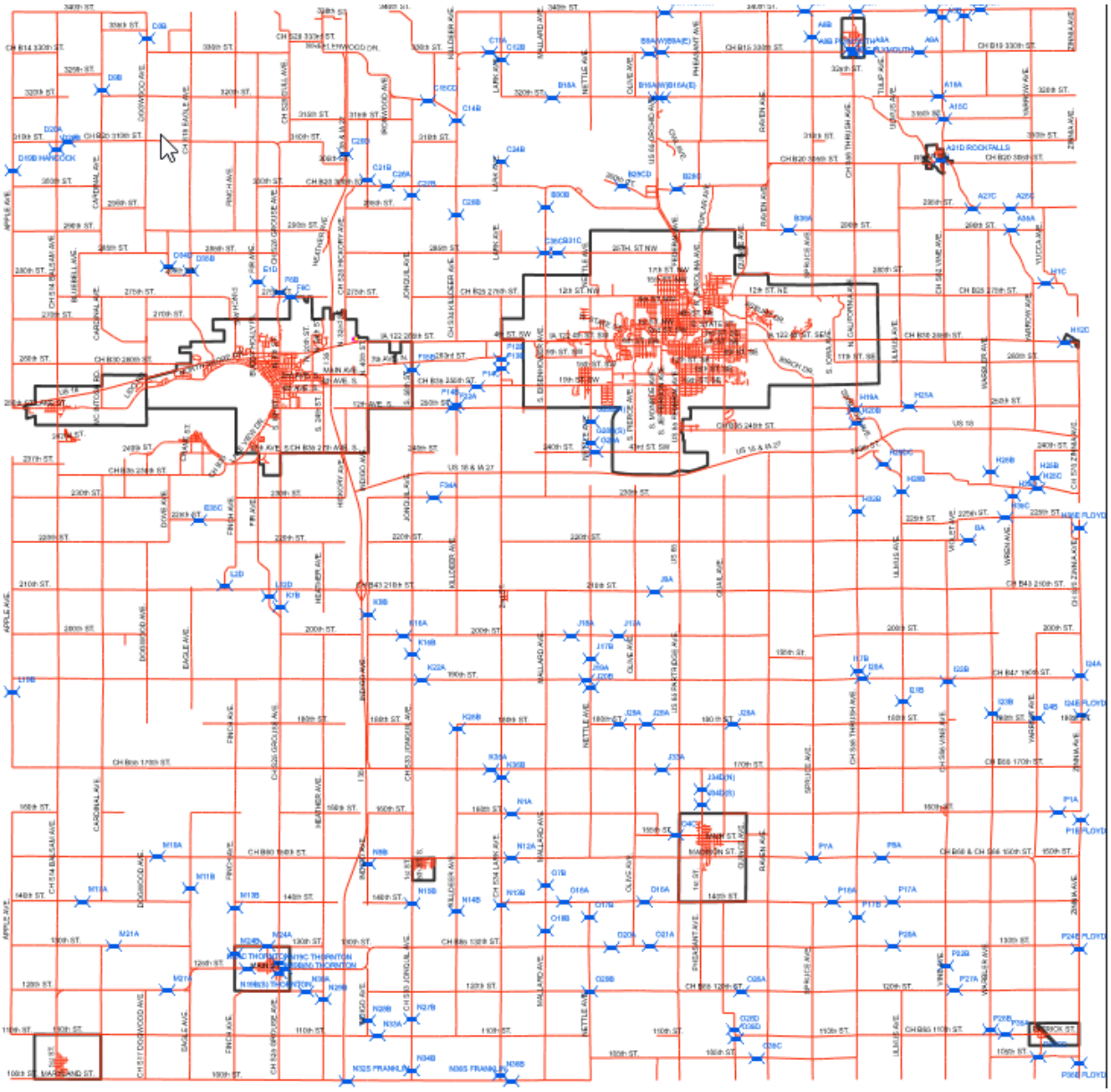
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	0
	9 Transportation	0
	10 Waste Water	0
	11 Water	1
Mason City	1 Ambulance	1
	2 Communications	0
	3 Fire Department	1
	4 Government	1
	5 Hospital	1
	6 Law Enforcement	1
	7 Public Works	1
	8 Recreation	5
	9 Transportation	1
	10 Waste Water	1
	11 Water	6
Meservey	1 Ambulance	0
	2 Communications	0
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	0
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Plymouth	1 Ambulance	0
	2 Communications	0
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	1
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Rock Falls	1 Ambulance	0
	2 Communications	0
	3 Fire Department	0

	4 Government	1
	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	1
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Rockwell	1 Ambulance	0
	2 Communications	0
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	1
	7 Public Works	1
	8 Recreation	3
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Swaledale	1 Ambulance	0
	2 Communications	0
	3 Fire Department	1
	4 Government	3
	5 Hospital	0
	6 Law Enforcement	1
	7 Public Works	1
	8 Recreation	1
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Thornton	1 Ambulance	1
	2 Communications	0
	3 Fire Department	1
	4 Government	1
	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	0
	9 Transportation	0
	10 Waste Water	1
	11 Water	1
Ventura	1 Ambulance	0
	2 Communications	0
	3 Fire Department	1
	4 Government	1

	5 Hospital	0
	6 Law Enforcement	0
	7 Public Works	1
	8 Recreation	2
	9 Transportation	0
	10 Waste Water	1
	11 Water	1

Figure 3.1 shows the locations of bridges in the planning area.

Figure 3.1 Cerro Gordo County Bridges



3.2.3 Other Assets

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

- The plan participants may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing about them ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.
- Losses to economic assets (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

In the planning area, specific assets include the following:

Threatened and Endangered Species: **Table 3.9** includes Federally Threatened, Endangered, Proposed and Candidate Species in Cerro Gordo County, Iowa.

Table 3.9 Threatened and Endangered Species in Cerro Gordo County

Common Name	Scientific Name	Status
Northern Long-eared bat	Myotis Septentrionalis	Threatened
Powershiek Skipperling	Discus Macclintox	Endangered

Source: U.S. Fish and Wildlife Service, http://fws.gov/midwest/endangered/lists/Iowa_spp.html

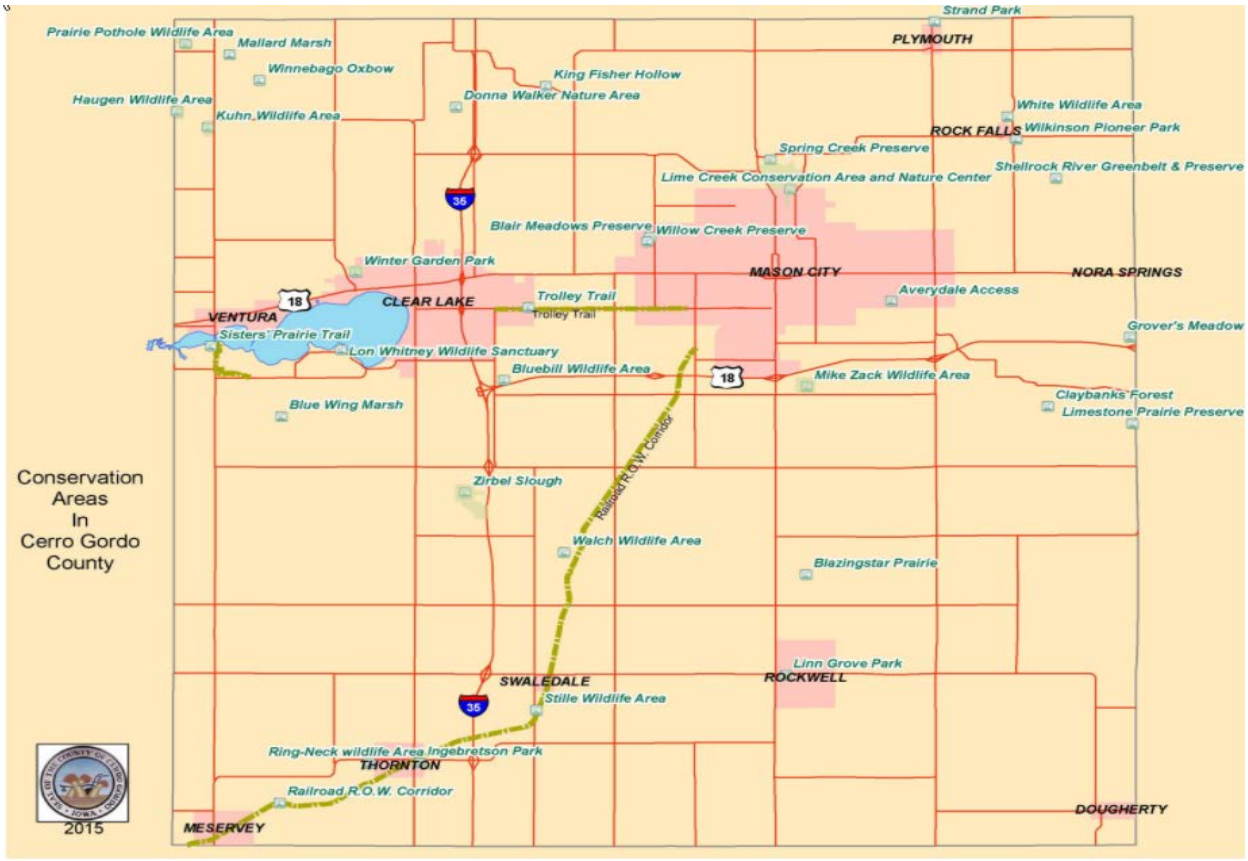
Natural Resources: The Cerro Gordo County Conservation Board manages parks and wildlife areas throughout the county. The parks and wildlife areas in Cerro Gordo County are listed below and shown in the map in **Figure 3.2.**

Parks and Wildlife Areas:

- Ingebretson Park
- Linn Grove Park
- Wilkerson Pioneer Park
- Strand Park
- Spring Creek Preserve
- Kuhn Wildlife Area
- Winter Garden Park
- Shellrock River Greenbelt & Preserve
- Claybanks Forest
- Zirbel Slough
- Blue Wing Marsh
- Grover's Meadow
- Walch Wildlife Area
- Blazinger Prairie
- Lon Whitney Wildlife Sancturary
- Blair Meadows Preserve
- Winnebago Oxbo
- Limestone Prairie Preserve
- Willow Creek Preserve
- Prairie Pothole Wildlife Area
- Bluebill Wildlife Area
- Lime Creek Conservation Area
- Haugan Wildlife Area
- Mallard Marsh
- Stille Wildlife Area
- Mike Zak Wildlife Area
- Averydale Access
- King Fisher Hollow
- White Wildlife Area

- Donna Walker Nature Area
- Ring-Neck Wildlife Area

Figure 3.2. Cerro Gordo County Parks and Natural Areas



Historic Resources: The National Register of Historic Places is the official list of the Nation's cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering, and culture. The properties in Cerro Gordo County that are on the National Register of Historic Places are identified in **Table 3.10.**

Table 3.10 Cerro Gordo Co, Iowa Properties on the National Register of Historic Places

Site Name	Year Listed	Address
A.J. Andrus Duplex	January 29, 1980 (#80001431	Mason City

	(https://npgallery.nps.gov/AssetDetail/NRIS/80001431))	
Amaziah and Cornelia (Wait) Cannon House	August 25, 2004 (#04000899 (https://npgallery.nps.gov/AssetDetail/NRIS/04000899))	Mason City
City National Bank Building	September 14, 1972 (#72000469 (https://npgallery.nps.gov/AssetDetail/NRIS/72000469))	Mason City
East Park Band Shell	October 14, 2009 (#09000825 (https://npgallery.nps.gov/AssetDetail/NRIS/09000825	Mason City
East Park Historic District	October 15, 2014 (#14000855 (https://npgallery.nps.gov/AssetDetail/NRIS/14000855))	Mason City
William C. & Margaret Egloff House	May 1, 2017 (#100000934 (https://npgallery.nps.gov/AssetDetail/NRIS/100000934))	Mason City
Elks-Rogers Hotel	June 21, 1982 (#82002611 (https://npgallery.nps.gov/AssetDetail/NRIS/82002611))	Clear Lake
John L. Etzel House	January 27, 1983 (#83000347 (https://npgallery.nps.gov/AssetDetail/NRIS/83000347))	Clear Lake
First Church of Christ Scientist	October 30, 1997 (#97001285 (https://npgallery.nps.gov/AssetDetail/NRIS/97001285))	Mason City
First National Bank of Mason City	May 2, 1997 (#97000392 (https://npgallery.nps.gov/AssetDetail/NRIS/97000392))	Mason City
Forest Park Historic District	January 20, 2015 (#14001167 (https://npgallery.nps.gov/AssetDetail/NRIS/14001167))	Mason City
C.F. Franke House	January 29, 1980 (#80001432 (https://npgallery.nps.gov/AssetDetail/NRIS/80001432))	Mason City
E.R. Gibson House	January 29, 1980 (#80001433 (https://npgallery.nps.gov/AssetDetail/NRIS/80001433))	Mason City
Hotel Lester-Lester Café	December 20, 2002 (#02001543 (https://npgallery.nps.gov/AssetDetail/NRIS/02001543))	Mason City
Jewell Apartments	January 29, 1980 (#80001434 (https://npgallery.nps.gov/AssetDetail/NRIS/80001434))	Mason City
Keerl-Decker House	December 20, 2002 (#02001537 (https://npgallery.nps.gov/AssetDetail/NRIS/02001537))	Mason City
The Kirk	April 12, 1982 (#82002613 (https://npgallery.nps.gov/AssetDetail/NRIS/82002613))	Mason City
Lippert House	January 29,1980 (#80001435 (https://npgallery.nps.gov/AssetDetail/NRIS/80001435))	Mason City
Mason City Downtown Historic District	September 8, 2005 (#05000956 (https://npgallery.nps.gov/AssetDetail/NRIS/05000956	Mason City
Mason City Public Library	May 25, 1989 (#89000405 (https://npgallery.nps.gov/AssetDetail/NRIS/89000405))	Mason City
Mason City YMCA	May 2, 2002 (#02000426 (https://npgallery.nps.gov/AssetDetail/NRIS/02000426))	Mason City
MBA (Modern Brotherhood of America) Building	September 12, 2002 (#02001021 (https://npgallery.nps.gov/AssetDetail/NRIS/02001021))	Mason City
F.M. Norris House	January 29, 1980 (#80001436 (https://npgallery.nps.gov/AssetDetail/NRIS/80001436))	Mason City
Park Inn Hotel	September 14, 1972 (#72000470 (https://npgallery.nps.gov/AssetDetail/NRIS/72000470))	Mason City
Parker's Opera House	November 20, 1998 (#98001325 (https://npgallery.nps.gov/AssetDetail/NRIS/98001325))	Mason City
Parker's Woods Park Historic District	October 15, 2014 (#14000856 (https://npgallery.nps.gov/AssetDetail/NRIS/14000856))	Mason City
Rock Crest-Rock Glen Historic	December 28, 1979 (#79000885 (https://npgallery.nps.gov/AssetDetail/NRIS/79000885))	Mason City

District		
Rock Falls Bridge	June 25, 1998 (#98000742 (https://npgallery.nps.gov/AssetDetail/NRIS/98000742))	Rock Falls
Rogers-Knutson House	September 9, 1982 (#82002612 (https://npgallery.nps.gov/AssetDetail/NRIS/82002612))	Clear Lake
George Romey House	January 29, 1980 (#80001437 (https://npgallery.nps.gov/AssetDetail/NRIS/80001437))	Mason City
Duncan Rule House	October 16, 1979 (#79000886 (https://npgallery.nps.gov/AssetDetail/NRIS/79000886))	Mason City
Chris Rye House	January 29, 1980 (#80001438 (https://npgallery.nps.gov/AssetDetail/NRIS/80001438))	Mason City
St. John Baptist Church	January 24, 2002 (#01001484 (https://npgallery.nps.gov/AssetDetail/NRIS/01001484))	Mason City
Charles Seney House	January 29, 1980 (#80001439 (https://npgallery.nps.gov/AssetDetail/NRIS/80001439))	Mason City
C.P. Shipley House	January 29, 1980 (#80001440 (https://npgallery.nps.gov/AssetDetail/NRIS/80001440))	Mason City
State Street Bridge	June 25, 1998 (#98000740 (https://npgallery.nps.gov/AssetDetail/NRIS/98000740))	Mason City
Stewart Avenue Bridge	June 25, 1998 (#98000741 (https://npgallery.nps.gov/AssetDetail/NRIS/98000741))	Mason City
Dr. G.C. Stockman House	September 17, 1992 (#80001441 (https://npgallery.nps.gov/AssetDetail/NRIS/80001441))	Mason City
Surf Ballroom	September 6, 2011 (#10000261 (https://npgallery.nps.gov/AssetDetail/NRIS/10000261))	Clear Lake
Wagner-Mozart Music Hall	November 16, 1978 (#78001210 (https://npgallery.nps.gov/AssetDetail/NRIS/78001210))	Mason City
Winnebago River Bridge	June 25, 1998 (#98000812 (https://npgallery.nps.gov/AssetDetail/NRIS/98000812))	Mason City
Mier Wolf House	January 29, 1980 (#80001442 (https://npgallery.nps.gov/AssetDetail/NRIS/80001442))	Mason City
Curtis Yelland House	January 29, 1980 (#80001443 (https://npgallery.nps.gov/AssetDetail/NRIS/80001443))	Mason City
Tessa Youngblood House	January 29, 1980 (#80001444 (https://npgallery.nps.gov/AssetDetail/NRIS/80001444))	Mason City

Source: State Historical Society of Iowa, http://www.iowahistory.org/historic-preservation/national-register-of-historic-places/properties-in-iowa.html

For additional information on the Cerro Gordo County economy, see Chapter 2.

3.3. Development Since 2013 Plan Update

This section provides information on development that has occurred since the 2013 Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan Update. **Table 3.11** show building permits; Issued 2011-2017.

Table 3.11 Building Permits Issued 2011-2017

Jurisdiction	2011	2012	2013	2014	2015	2016	2017
County	17	75	28	87	91	94	131

Clear Lake	14	13	46	15		193	333
Mason City	16	75	28	67	287	255	254
Plymouth		1					
Rock Falls		1					
Rockwell	1	1	1				
Swaledale				1			
Thornton	1						
Ventura	1	14	6	1			

3.3.1 Significant Developments Since 2013 Mitigation Plan

Cerro Gordo County

- The County in cooperation with Clear Lake and Mason City is working on further commercial and industrial development of the Hwy. 122 corridor between Clear Lake and Mason City.
- Two new wind turbine projects estimated at $9 million.
- Iowa Traction Railroad $1 million development project.
- ITC Midwest $19 million substation development projects.
- $1.1 Million North Iowa COOP bulk seed facility.
- $4.6 million North Iowa COOP bulk fertilizer plant

Clear Lake

- A major project for the city was the construction of a 340,000 sq. ft. warehouse and distribution center for medical and pharmaceutical equipment.
- There has also been extensive Commercial – Retail development on the east side of Clear Lake along the Interstate 35 intersection.

Dougherty

- The Cooperative Elevator recently completed extensive new construction.

Mason City

- The city has begun a new project for the revitalization of the downtown area. This project includes a new multi-purpose recreational complex and hotel convention center.
- There has been significant residential construction in new development areas in the S.E. off of South Kentucky Avenue and the N.W. off of North Taft Avenue.
- Hampton Inn and Suites just opened a newly constructed 83 room hotel on Hwy. 122 West
- In what was an large K-mart store on Hwy. 122 West, a new 15,000 sq. ft. Harbor Freight and a 37,000 sq. ft. Ashley Furniture store, with 100,000 sq. ft. being made ready for future retail tenants.

Rockwell

- Has begun development of a new residential site with construction beginning or completed on several new homes.

There has not been any significant new development in the other communities in Cerro Gordo County since 2013.

3.4 Future Land Use and Development

According to the U.S. Census Bureau, the Cerro Gordo County population decreased 2.4 percent from 2010 to 2016. **Table 3.12** provides the population growth statistics for all cities in Cerro Gordo County as well as the county as a whole. The unincorporated areas population was

determined by subtracting the populations of the incorporated areas from the overall county population.

Table 3.12. Cerro Gordo County Population Growth 2010-2016

Jurisdiction	2010	2015	2016	# Change 2010-2016	%Change 2010-2016
Cerro Gordo County	44,151	42,988	43,070	-1,081	-2.4%
Clear Lake	7,777	7,566	7,589	-188	-2.4%
Dougherty	58	56	56	-2	-3.5%
Mason City	28,079	27,378	27,430	-649	-2.3%
Meservey	256	248	249	-7	-2.7%
Plymouth	382	371	371	-11	-2.9%
Rock Falls	155	153	151	-4	-2.6%
Rockwell	1,039	1,011	1,012	-27	-2.6%
Swaledale	165	160	166	1	.6%
Thornton	422	405	406	-16	-3.8%
Ventura	717	718	720	3	.4%

Source: U.S. Bureau of the Census, 2016 populating estimate data is from the Iowa State University of Science and Technology, Iowa Community Indicators Program.

Table 3.13 provides the change in numbers of housing units in the planning area from 2013 to 2016.

Table 3.13. Change in Housing Units 2013-2016

Date	Total Housing Units in Cerro Gordo County
2013	22,115
2014	22,182
2015	22,215
2016	22,254

Source: U.S. of the Census

According to the population projections for Cerro Gordo County between 2010 and 2040 population is expected to have an average increase of 1.8 percent. See **Table 3.14.**

Table 3.14. Cerro Gordo County Population Projection 2010-2040

Date	2010	2015	2020	2030	2035	2040
Population	44,748	45,352	46,358	47,200	48,051	48,917
% Change		+1.35	+2.22	+1.82	+1.8	+1.8

Source: 2005 State Profile: Iowa, State Data Center of Iowa, Woods & Poole Economics, Inc.

3.5 Hazard Profiles and Vulnerabilty

Hazard Profiles

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

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

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

Hazard Description
This section consists of a general description of the hazard and the types of impacts it may have on a community. It also includes the ratings assigned to the hazard relative to typical warning times and duration of hazard events as described in **Table 3.5.**

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

Previous Occurrences
This section includes information on historic incidents and their impacts.

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

Vulnerability Assessments

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

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

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

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

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

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

- Available GIS data sets such as DFIRM, parcel data, critical facilities, etc (all sourced when used);
- FEMA's HAZUS-MH loss estimation software;
- Written descriptions of assets and risks provided by participating jurisdictions;
- Existing plans and reports;
- Personal interviews with planning committee members and other stakeholders; and
- Other sources as cited.

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

Vulnerability Overview
This section consists of a general overview narrative of the planning area's vulnerability to the hazard. Within this section, the magnitude/severity of the hazard is discussed. The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected the resilience of the community, and the effectiveness of the emergency response and disaster recovery efforts.

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

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

3.5.1 Power Outage

Weighted Hazard Score	
Weighted Score	Level
2.55	Moderate

Profile

Hazard Description
America's electric grid is made up of more than 450,000 miles of high voltage transmission lines. Comprised of the West, East, and Texas power grids, these grids supply more than 140 million customers over industries, businesses and residences with electricity.

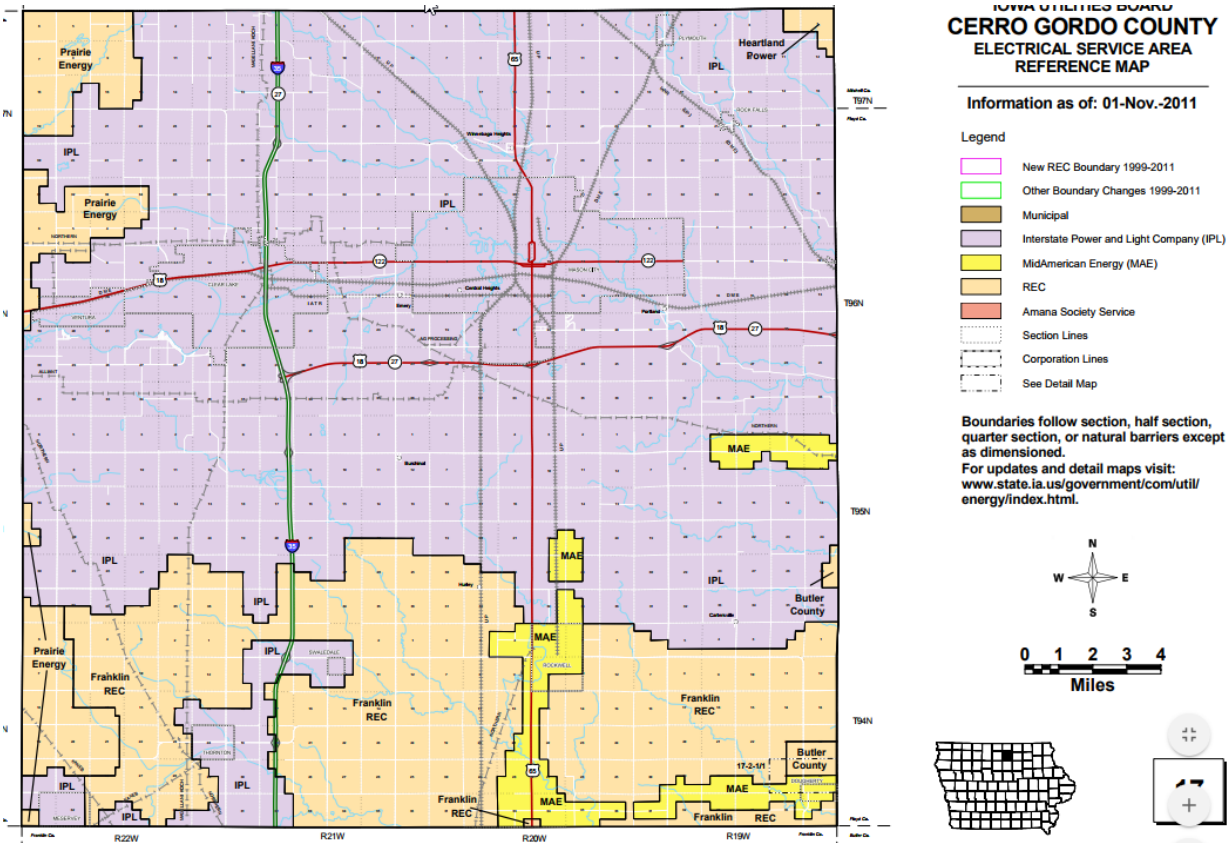
We use this electricity every day and often take for granted that it will always be readily available sometimes this isn't the case – for many reasons. Blackout or power outages occur all the time. Typically, they are quite manageable and get resolved within a few minutes or in less than an hour.

However, there are other instances where this isn't possible. In these situations, homes and businesses can go without power for half a day to many days. Industries and businesses are greatly affected as well as methods of transportation and communication.

Many areas of the United States have experienced major blackouts or power outages over the years.

Geographic Location/Extent
Cerro Gordo County's electrical power is provided by Interstate Power and Light Company (IPL), owned by Alliant Energy, Mid America Energy, and four Rural Electric Companies (REC), Prairie Energy, Franklin REC, Butler County REC, and Heartland Power. The service areas of each Company are illustrated in **Figure 3.5.1.a.**

Figure 3.5.1.a.



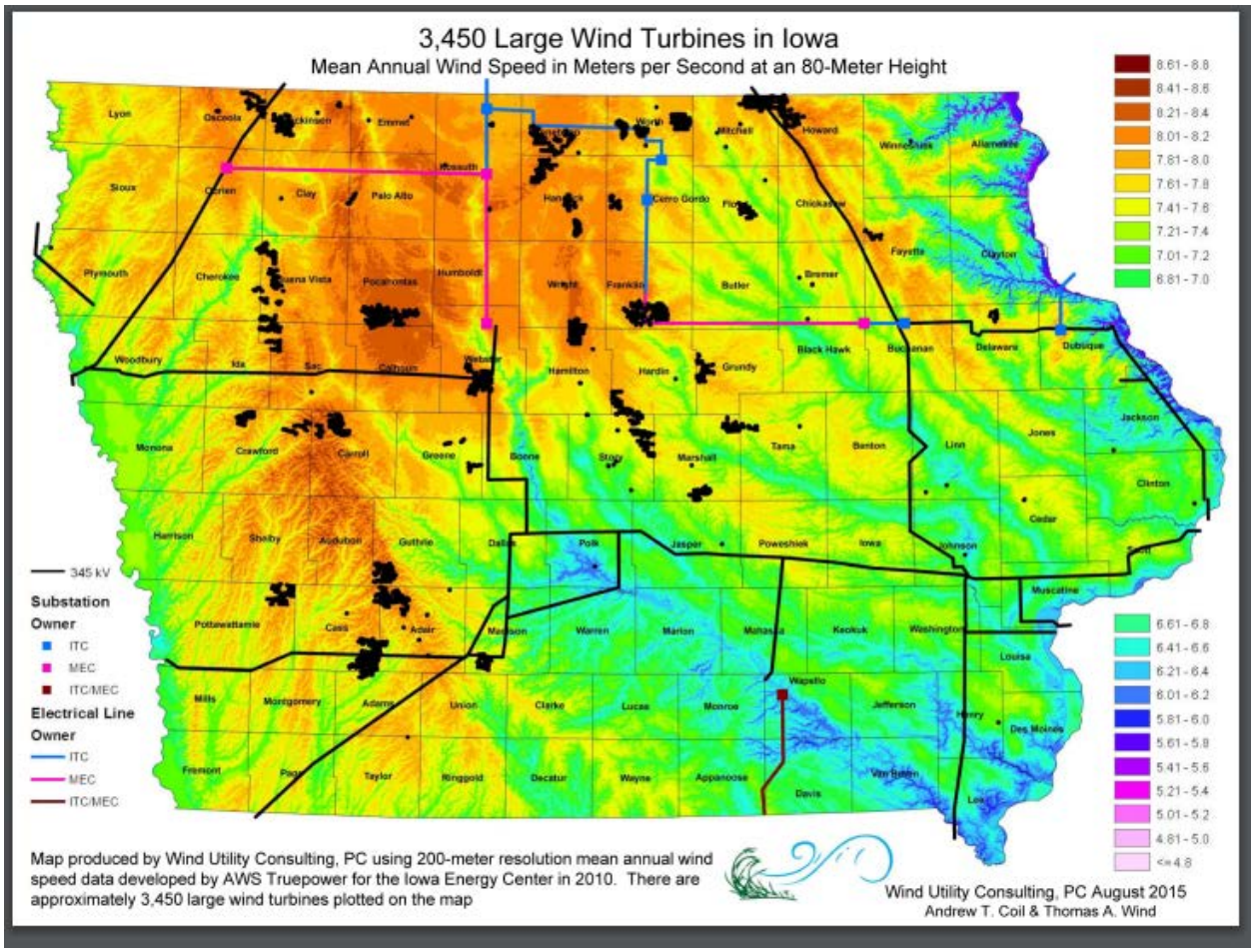
There are six main transmission lines, one petroleum, and one natural gas power plants, and seven substations, all shown in **Figure 3.5.1.b.**

Natural Gas Power Plant
Nuclear Power Plant
Other Power Plant
Petroleum Power Plant
Pumped Storage Power Plant
Solar Power Plant
Wind Power Plant
Wind Turbine (USGS, 2014)

Transmission line

Substation

There is also a large transmission line running from a wind turbine farm in Worth County and a wind turbine farm near Clear Lake as show in **Figure 3.5.1.c.**



Previous Occurrences

Over the past ten years, there have been numerous reports of power outages in Cerro Gordo County with various causes and durations. Below are a few of the occurrences in Cerro Gordo County from 2007 through 2017.

- February 17, 2007 – An Ice Storm/Blizzard created a power outage for 8,000 Alliant customers in the Mason City Region including the communities and rural areas of Clear Lake, Mason City, Meservey, Plymouth and Rockwell. Some customers were without service for three days or more.

- March 10, 2007 – An explosion at a substation near the Franklin County border took out power to the communities of Rockwell and Dougherty for 3 hours.

- June 2008 – A large portion of Mason City including Mercy Medical Center – North Iowa lost power nearly twenty-four hours due to flooding which destroyed a substation in downtown Mason City.

- June 22, 2915 – The community of Plymouth was without power for half a day as a result of high winds from a fast moving strong thunderstorm.

- May 17, 2017 – 717 customers in Cerro Gordo County were without power for several hours as a result of severe storms.

- July 17, 2017 – 3,500 residents in Clear Lake and 200 residents in Mason City were without power for most of the day due to severe storms.

Probability of Future Occurrence
The majority of power lines in Cerro Gordo County are still above ground. Our county is yearly open to the possibilities of ice storms, severe thunderstorms with high winds and blizzards making highly likely that power distribution systems will be affected. Cyberattacks are continually rising and power grid systems are a likely target adding to the probability of power outages either localized or regional.

Vulnerability
As stated above because of power lines located above ground they are susceptible to damage from severe weather. If a failure would occur during the winter months and are prolonged, residents could be seriously injured or possibly death. The same would be true if the failure occurred during an extreme heat event. Residents most at risk during an energy failure, include children, the elderly and chronically ill persons.

Potential Losses
Losses to power outages will vary greatly depending of cause, location and duration of the outage. Time of year the loss occurs can also have a significant effect on costs. Physical damage to system will create significant costs for repairs and/or replacements of those components. Other losses can include lost profits from businesses unable to operate, damage to public water and sewer systems, and lost product from inoperable refrigeration systems.

Future Development
Continued development of our community's residential and industrial areas will require new power distribution lines, generating plants, and substations, increasing vulnerability.

3.5.2 Tornado

Weighted Hazard Score

Weighted Score	Level
2.50	Moderate

Profile

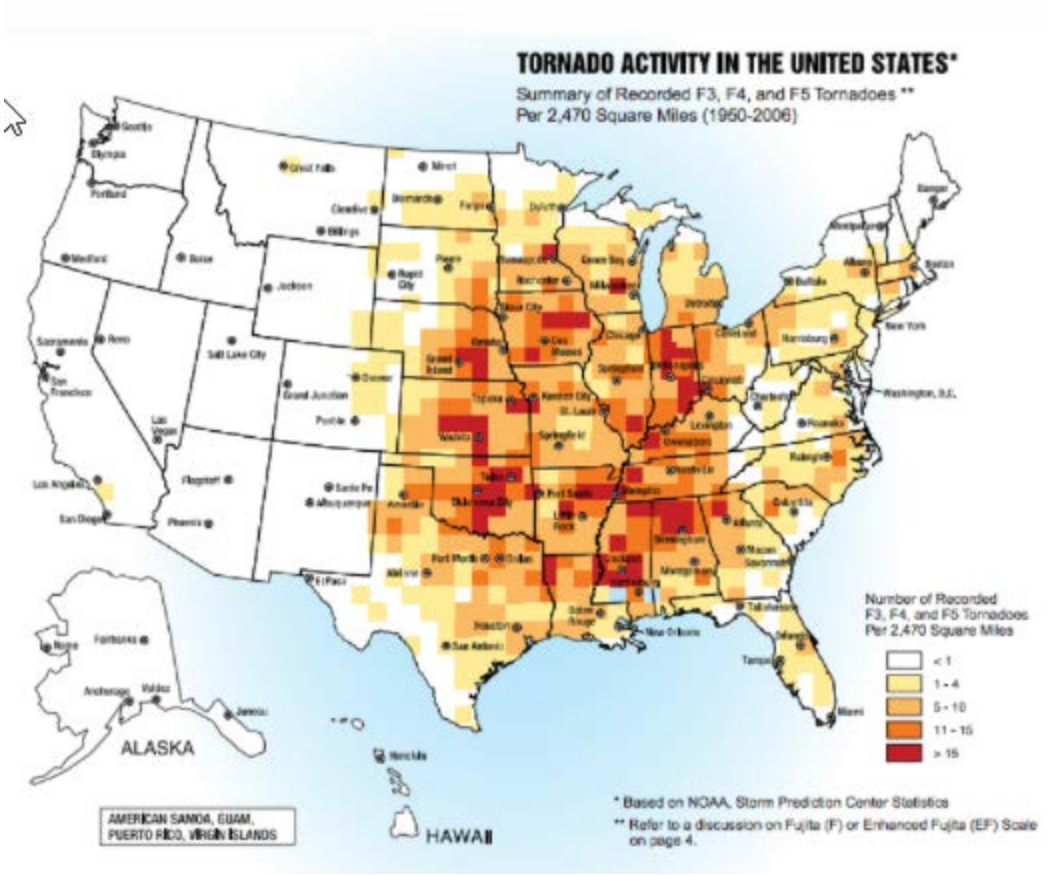
Hazard Description
This hazard section discusses tornadoes.

Tornado: The NWS defines a tornado as "a violently rotating column of air extending a thunderstorm to the ground." It is usually spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Often, vortices remain suspended in the atmosphere as funnel clouds. When the lower tip of a vortex touches the ground, it becomes a tornado and a force of destruction.

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more the 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also generate a tremendous amount of flying debris or "missiles," which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Geographic Location/Extent
Iowa is located in a part of the United States where tornadoes are a common occurrence. Iowa has experienced 1,717 tornadoes from 1980 through 2016 (37 year period) with 86 percent of them being rated F0 and F1, 14 percent rated F2 through F5. Only the F5 rated tornadoes have occurred in Iowa during this timeframe (Parkersburg in 2008). Since 1980, there have been on average 46 tornadoes per year in Iowa. Most tornadoes occurred in May and June but can occur during any month. Also midafternoon until around sunset is the peak time of the day for tornado activity. There have been 783 injuries and 29 deaths attributable to tornadoes (source: National Weather Service, Iowa Tornado Climatology Report 1980-2016).
Tornadoes can occur in the entire planning area. **Figure 3.5.2.a.** illustrates the number of F3, F4, and F5 tornadoes recorded in the United States per 3,700 square miles between 1950 and 2006. Cerro Gordo County is in the section with orange shading, indicating 5 to 10 tornadoes of this magnitude during this 57-year period.

Figure 3.5.2.a. Tornado Activity in the United States



Tornadoes are classified according to the EF-Scale (the original F-Scale was developed by Dr. Theodore Fujita, a renowned severe storm researcher). The Enhanced F-Scale (see **Table 3.5.1.**) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F scale was implemented in the U.S. on February 1, 2007

Table 3.5.1. Enhanced F Scale for Tornado Damage

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest ¼-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Source: The National Weather Service, www.spc.noaa.gov/faq/tornado/ef-scale.html

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.5.2.** The damage descriptions are

summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees of damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.5.2. Enhanced Fujita Scale with Potential Damage

Enhanced Fujita Scale			
Scale	**Wind Speed (mph)**	**Relative Frequency**	**Potential Damage**
EF0	65-85	53.5%	Light. Peels surface off some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6%	Moderate. Roofs severely stripped, mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; tree debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center

All of Cerro Gordo County is susceptible to high wind events. The County is located in Wind Zone IV, which is susceptible to winds up to 250 mph. All of the participating jurisdictions are vulnerable to this hazard. **Figure 3.5.2.b.** shows the wind zones of the United States based on maximum wind speeds; the entire state of Iowa is located within wind zone IV, the highest inland category.

Figure 3.5.2.b. Wind Zones in the United States

Source: FEMA: http://www.fema.gov/plan/prevent/saferooom/tsfs02windzones.shtm

The advancement in weather forecasting has provided for the ability to predict severe weather that is likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, this limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

Previous Occurrences

According to statistics reported by the NCDC, Cerro Gordo County has 30 recorded tornado events from 1957-2007. Of these, 1 was F4, 1 was F3, 4 were F2, 13 were F1 and EF1, and 11 were F0. These tornadoes caused 0 facilities, 6 injuries, over 4.265 Million in property damages, and over $36,000 in crop damage. **Table 3.5.3.** summarizes these events

Table 3.5.3. Recorded Tornadoes in Cerro Gordo County, 1957-2007

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Cerro Gordo CO.	5/10/1953	16:30	F4	0	0	$250,000	$36,000
Cerro Gordo CO.	8/28/1960	17:00	F1	0	0	$2,500	
Cerro Gordo CO.	4/30/1967	17:05	F3	0	0	$250,000	
Cerro Gordo CO.	9/26/1973	03:00	F2	0	0	$25,000	
Cerro Gordo CO.	2/23/1977	14:10	F1	0	1	$250,000	
Cerro Gordo CO.	8/28/1979	17:45	F1	0	0	$25,000	
Cerro Gordo CO.	5/29/1980	16:30	F2	0	0	$25,000	
Cerro Gordo CO.	5/30/1980	10:20	F1	0	0	$25,000	
Cerro Gordo CO.	6/16/1984	18:25	F1	0	2	$250,000	
Cerro Gordo CO.	6/22/1984	17:45	F1	0	0	$2.500M	
Cerro Gordo CO.	3/24/1988	14:45	F1	0	0	$250,000	
Cerro Gordo CO.	8/02/1990	16:26	F1	0	0	$25,000	
Cerro Gordo CO.	5/16/1992	16:28	F0	0	0	$25,000	

Portland	7/6/1994	13:30	F1	0	0	$50,000	$5,000
Mason City airport	6/6/1995	18:21	F1	0	0	$75,000	$2,000
Thornton	6/27/1998	18:46	F2	0	0	$50,000	$2,000
Swaledale	6/27/1998	19:22	F2	0	0	$125,000	$10,000
Mason City	6/6/1999	15:46	F0	0	0		
Burchinal	8/9/1999	21:01	F0	0	0		
Rockwell	6/21/2002	12:18	F1	0	0		$5,000
Mason City	7/4/2003	01:08	F0	0	0		
Mason City	4/17/2004	20:40	F0	0	0		
Mason City	3/30/2005	13:39	F0	0	0		
Mason City	3/30/2005	13:42	F0	0	0		
Mason City	7/3/2005	17:35	F0	0	0		$1,000
(MCW) Mason City	6/7/2008	16:42	EF0	0	0	$5,000	
(MCW) Mason City	6/16/2014	17:48	EF1	0	0	$50,000	$9,000
Freeman	6/16/2014	17:56	EF0	0	0	$5,000	$2,0

Source: http://www.ncdc.noaa.gov/stormevents/listevents.jsp

Table 3.5.4. shows the number of Tornado Watches and Warnings issued by NOAA's National Weather Service. The data is kept on Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, (http://mesonet.agron.iastate.edu/vtec/search.php).

Table 3.5.4. National Weather Service Tornado Watches and Warnings, 2010-2017

Year	Tornado Watch	Tornado Warning
2017	2	0
2016	0	1
2015	2	0
2014	3	4
2013	3	2
2012	1	0
2011	5	1
2010	6	2
Total	22	10

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

Probability of Future Occurrence

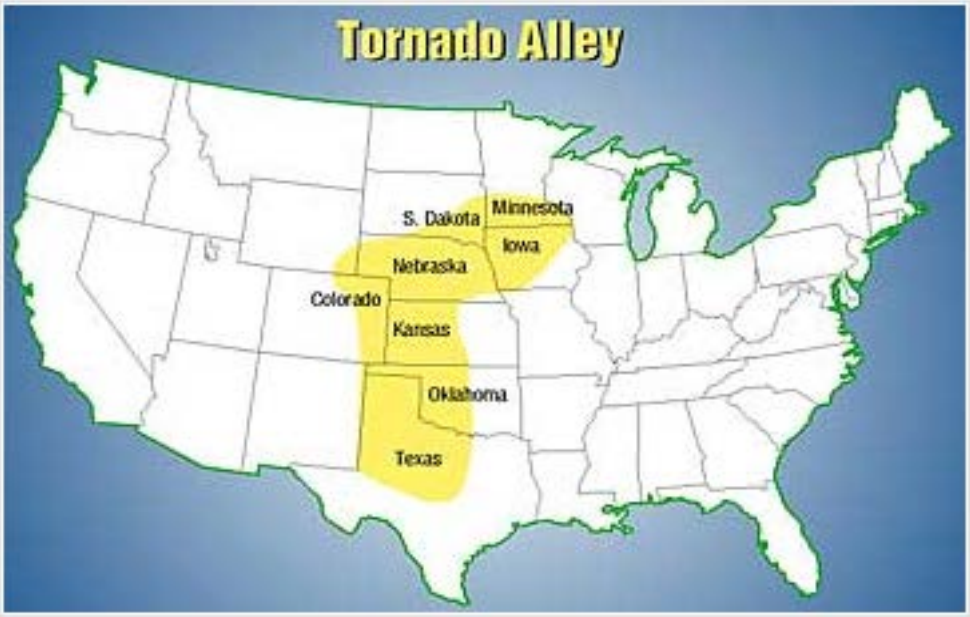
The NCDC reported 30 tornadoes in Cerro Gordo County in a 62 year time period, which calculates to 48.4 percent chance of a tornado in any given year.

With the 17 NWS tornado warnings issued for Cerro Gordo County from 2005 thru April 2014 there have been an average of 1.7 tornado warnings per year during these 10 years of data.

Vulnerability

Cerro Gordo County is located in a region of the U.S. with a high frequency of dangerous and destructive tornadoes and is referred to as “Tornado Alley”. Figure 3.5 is based on areas where dangerous tornadoes are most likely to take place.

Figure 3.5.2.c Tornado Alley in the U.S.



Source: https://www.thinglink.com/scene/617419502144978944

Light frame structures, such as mobile homes, outbuildings and sheds are considered especially vulnerable to damage from tornadoes.

According to the 2013 Iowa Hazard Mitigation Plan, of the 8 hazards for which data was available to estimate annualized losses, tornadoes ranked 3rd with $36 million in annualized losses based on data spanning a 63-year period.

Due to the potential for damaging tornadoes in the planning area, the magnitude was determined to be a 3, “critical”.

Potential Losses to Existing Development

In Cerro Gordo County, the NCDC estimate for past property damages resulting from tornadoes from 1957-2007 (62 years) was $4,265,000. This translates to an annualized loss of amount of $68,790.

On average Cerro Gordo County has a 50/50 chance in any given year to experience a tornado. However, the planning committee determined that a severe damaging tornado will likely occur in Cerro Gordo County in any given year.

Although each community is unique and varies in size, complexity, and demographics, there are also several important commonalities. Such as,

1. Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements.
2. The elderly, very young, and physically and mentally challenged are most vulnerable because of the lock of mobility to escape the path of destruction.

Even though the exact size, direction and path of a tornado is very unpredictable, there are some assumptions that can be made.

1. Generally the destructive path of a tornado is only a couple of hundred feet in width, but stronger tornadoes can leave a path of destruction up to a mile wide.
2. 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.
3. Large hail, strong straight-live winds, heavy rain, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area.

Impacts can range from broken tree branches, simple damage to roofs, and some broken windows; all the way to complete destructions and disintegration of well-constructed structures, infrastructure, and trees. Tornadoes cam impact may critical services, mainly electrical power. Buried services are not as vulnerable, but can be affected by their system components that are above ground.

With the small size of most of Cerro Gordo County's communities, there is the possibility of a large tornado completely "wiping the town off the map." Even a smaller scale tornado impacting the communities of Clear Lake or Mason City, could cause serious impacts to the community depending on their path of travel. Economic impacts can also result from direct damages to facilities, or business disruption from the lack of critical services such as power, gas, or water.

Future Development

Public buildings such as schools, government offices, as well as other buildings with high occupancy, and mobile home parks, should consider inclusion of tornado safe room to shelter occupants in the event of a tornado.

3.5.3 Cyber Attack

Weighted Hazard Score	
Weighted Score	Level
2.45	Moderate

Profile

Hazard Description

This hazard section discusses cyber-attacks.

Cyber-attack: A cyber-attack is any type of offensive maneuver employed by nation-states, individuals, groups, or organizations that targets computer information systems, infrastructures, computer networks, and/or personal computer devices by various means of malicious acts usually originating from an anonymous source that either steals, alters, or destroys a specified target by hacking into a susceptible system. These can be labeled as a cyber campaign, cyber

warfare or cyber terrorism in different context. Cyber-attacks can range from installing spyware on a personal computer to attempts to destroy the infrastructure of entire nations. Researchers are concerned over the strength and comprehensiveness of cyber security in the U.S., as companies across the country are being targeted in cyber-attacks at an increasing rate of both occurrence and cost. Concerns continue to grow as both the number of attacks on companies' networks and the cost to companies are increasing. The quantity and quality of information being hacked, stolen, destroyed, or leaked is becoming more of a problem for consumers, businesses, and governments alike.

The Ponemon Institute recently released its 2015 Cost of Cyber Crime, which analyzes the cost of all cyber-crime for a variety of 58 U.S. organizations both public and private.[1] The U.S., in comparison with other nations in the Ponemon study, continues to rank highest in its cost of cyber-crime at an annual average of $15.4 million per company.

Ponemon surveyed companies in the areas of finance, energy and utilities, and defense and aerospace-three of the most affected sectors-as well as communication, retail, and health care. The annual cost of cyber-crime for these companies has more than doubled since 2010, which then averaged $6.5 million.

[1]http://www.newsweek.com/china-could-shut-down-us-power-grid-cyber-attack-says-nsa-chief-286119

Within the security industry and across government, we have long discussed nightmare scenarios caused by cyber-attacks against critical infrastructure; however, only now do these scenarios seem likely. Recently, National Security Agency director Admiral Mike Rodgers described threats against critical infrastructure as a matter of "the when, not if…"

Critical infrastructure sectors, from financial services to transportation to healthcare, all depend on massive information technology networks. Many of the cyber defenses used by critical infrastructure owners and operators to ward off attacks are outdated and ineffective. These systems remain highly vulnerable to hackers, who could gain control of nuclear plants, railways and any number of other vital systems.

Unfortunately, the frequency of attacks against critical infrastructure is increasing at an alarming rate.

In 2015, a cyber-attack on Ukraine's power grid left 700,000 people without electricity for several hours.[2] Alarmingly, the actors behind this attack were previously seen conducting attacks against the U.S. energy sector, prompting an alert by the Industrial Control Systems Computer Emergency Response Team (ICS-CERT) in 2014. Though disruption never occurred in the U.S., this was believed to be reconnaissance for a potential future attack.

The U.S. hasn't escaped all disruptive attacks, however. In March 2016, the U.S. Justice Department indicted seven hackers tied to the Iranian regime.[3] These hackers staged a coordinated cyber-attack that targeted 46 major financial institutions and a dam outside of New York City.

The fact is that cyber attackers have repeatedly targeted U.S. critical infrastructure. U.S. industrial control systems were threatened by cyber-attacks at least 245 times over a 12-month period, according to a 2014 report from the ICS-CERT.[4]
Despite the increasing frequency of cyber-attacks targeting critical infrastructure, these otherwise highly-regulated industries have few protocols in place to protect against cyber security breaches. According to a report from the Government Accountability Office, nearly all of the critical infrastructure industries lack adequate cyber security metrics.[5]

Take the U.S. transportation system, for example. The Department of Transportation (DOT) has hundreds of thousands of regulation; however, DOT currently has no concrete cyber security plan in place – and that is despite the fact that DOT's IT network is one of the federal governments largest.[6] [7]
[2] http://foreignpolicy.com/2016/01/08/did-russia-knock-out-ukraines-power-grid/
[3] http://www.politico.com/story/2016/03/us-indicts-iranians-in-cyber-attacks-on-dam-221196
[4] http://www.trendmicro.com/cloud-content/us/pdfs/security-intelligence/reports/critical-infrastructures-west-hemisphere.pdf
[5] http://thehill.com/policy/cybersecurity/260963-feds-lack-method-to-grade-critical-infrastructure-cybersecurity
[6] https://www.regulations.gov/#!searchResults;rpp=25;po=0;cat=AD
[7]https://www.transportation.gov/cio

Geographic Location/Extent
The entire planning area has a high probability of cyber-attack. These attacks may include the following consequences:

- Identity theft, fraud, extortion
- Malware, pharming, phishing, spamming, spoofing, spyware, Trojans and viruses
- Stolen hardware, such as laptops or mobile devices
- Denial-of-service and distributed denial-of-service attacks
- Breach of access
- Password sniffing
- System infiltration
- Website defacement
- Private and public Web browser exploits
- Instant messaging abuse
- Intellectual property (IP) theft or unauthorized access

While governments, businesses, and individuals are all being targeted on an exponential basis, infrastructure is becoming a target of choice among both individual and state-sponsored cyber attackers, who recognize the value of disrupting security systems that were previously thought of as impenetrable. This has served to demonstrate just how vulnerable cities, states, and countries have become and the growing importance of achieving global risk agility in the face of such a threat.

Previous Occurrences
While there have been no known large-scale cyber-attacks on local infrastructure in Cerro Gordo County, high profile cases of cyber-attack are increasingly becoming the norm. The U.S. government had little difficulty finding evidence to assign blame (to China) for the theft of

personal information of more than 22 million government employees from the computer systems of the Office of Personnel Management in 2015. Similarly, it did not take long for the United States to determine that North Korea was responsible for the cyber-attack against Sony in 2015. Cyber attackers essentially give nations of all sizes, degrees of wealth, and resources a seat at the table of the super powers, affording them a disproportionate amount of clout. While China, the United States, and Russia lead the world in cyber-attacks, virtually every government engages in such attacks, and nearly every country has its share of computer hackers.
Listed below are a few occurrences of cyber-attacks within the United States 2013-2015. There are four reports.

- Staples, Inc. (retail). In another point-of-sale system breach, security experts from Staples detected malware at 115 different stores—1.16 million credit cards were reportedly affected. The breach occurred between July and September 2014.

- Anthem, Inc. (health care). Health insurer Anthem, Inc., suffered a massive cyber-attacks that affected upwards of 80 million current and former customers. The compromised information included Social Security numbers, birthdates, addresses, and employee information. The information of anywhere between 8.8 million and 18.8 million customers of Blue Cross Blue Shield was also affected, having been stored on the same servers. The breach has been accredited to the Black Vine cyber-espionage group by cyber security firm Symantec, which is also accredited with the later Office of Personnel Management hacks and numerous other breaches dating back to 2012.

- Forbes.com (news and business). In late November 2014, the cyber-espionage group Codoso Team used the Forbes.com website as a watering hole (a cyber campaign that uses trusted Web sites to launch attacks) to target U.S. defense contractors and financial services companies.

- Premera Blue Cross (health care). In an attack that began in May of 2014, Premera Blue Cross fell victim to a cyber-attack that exposed the medical and financial information of 11 million people, including their clinical records, bank account numbers, Social Security numbers, and birthdates. Also affected in the attacks were Premera Blue Cross Shield of Alaska, Vivacity, and Connection Insurance Services.

- United Airlines (transportation). Reportedly the victims of the Chinese cyber team Black Vine, United systems were accessed in May or early June, around the same time as OPM and Anthem. Airline records, including flight manifests, were taken.

September 2015

- Excellus BlueCross BlueShield (health care). In another health insurer cyber-attack the company Excellus has the financial and medical information of 10 million of its customers compromised. The hackers found their way around the encrypted data and were able to access names, addresses, Social Security Numbers, medical claims information, etc.

Probability of Future Occurrence
While difficult to estimate, with over 90 million cyber-attacks occurring last year alone, it is highly probable Cerro Gordo County will be affected by a cyber-attack within the next 10 years. A simple search through the Department of Homeland Security's Daily Open Source Infrastructure Reports [36] or the Department of Health and Human Services' Breach Portal[37] will show the large number of breaches within the past few years. This data indicates cyber-attack is a growing concern, and will continue to be so for the near future.

[36] U.S. Department of Homeland Security, "Daily Open Source Infrastructure Report, October 22 – November 5, 2015," https://www.dhs.gov/publication/daily-open-source-infrastructure-report (accessed November 5, 2015).
[37] U.S. Department of Health and Human Services, Office of for Civil rights, "Breaches Affecting 500 or More Individuals, 2009-2015," https://ocrportal.hhs.gov/ocr/breach/breach_report.jsf (accessed November 5, 2015).

Vulnerability
The Number of cyber-attacks targeting critical infrastructure increased from 245 episodes in 2014 to 295 episodes in 2015, or 20 percent year over year, according to a 2015 report by Industrial Control Systems Cyber Emergency Response Team (ICS-CERT). According to cyber security Ventures by 2021, damages related to cyber-crime will top $6 Trillion. In 2015, the U.S. government was a victim of over 77,000 cyber incidents, ranging from security breaches to data thefts. In 2014, 317 million pieces of malware were created- that is close to a million pieces of malware created daily. With our reliance on technology growing daily, the threat of a cyber-attack becomes more probable.

3.5.4 Severe Summer Storm

Weighted Hazard Score	
Weighted Score	Level
2.40	Moderate

Profile

Hazard Description
A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When the upper air which is cold, sinks and the warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, in clusters or in lines. Severe thunderstorms most often occur in Iowa in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms and lightning include: heavy rains causing flash flooding (discussed separately in **Section 3.5.10**) and tornadoes (discussed further in **Section 3.5.2**).

Lightning
All thunderstorms produce lightning which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is a huge discharge of electricity. When a lightning strike, electricity shoots through the air and causes vibrations creating the sound of thunder.

Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start structure fires, wild land fires, and damage electrical systems and equipment.

Windstorm: Windstorms for purposes for this plan refer to other non-tornadic damaging winds of thunderstorms including downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Straight-line winds are generally any thunderstorm wind that is not associated with rotation. It is these winds, which can exceed 100 mph, which represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase.

Strong winds can occur year-round in Iowa. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems are, (one high pressure, one low pressure) the stronger the pressure gradient, and therefore, the stronger the winds are. Objects such as trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. Downbursts can be particularly dangerous to aviation.

The NWS can issue High Wind Watch, High Wind Warning, and Wind Advisory to the public. The following are the definitions of these issuances:

- High Wind Watch – This is issued when there is the potential of high wind speeds developing that may pose a hazard or is are life-threatening.
- High Wind Warning- The 1-minute surface winds of 35 knots (40 mph) or greater lasting for one hour or longer, or winds gusting to 50 knots (58 mph) or greater, regardless of duration, that are either expected or observed over land.
- High Wind Advisory- This is issued when high wind speeds may pose a hazard. Sustained winds 25 to 39 mph and/or gusts to 57 mph.

The onset of thunderstorms with lightning and hail is generally rapid. Duration is less than 6 hours and warning time is generally 6 to 12 hours.

Geographic Location/Extent

Thunderstorms and the associated high winds and lightning impact the entire County with relatively similar frequency. Although, these events occur similarly throughout the planning area, they are more frequently reported in more urbanized areas. In addition, damages are more likely to occur in more densely developed urban areas. **Figure 3.5.4.a.** displays the average number of thunderstorm days experienced throughout different areas of the county each year,

showing the County experiences between 30 to 50 thunderstorms days per year. **Figure 3.5.4.b.**shows 4 to 5 lightning strikes per square kilometer per year with the yellow shaded area.

Figure 3.5.4.a. Average Number of Thunderstorm Days Per Year

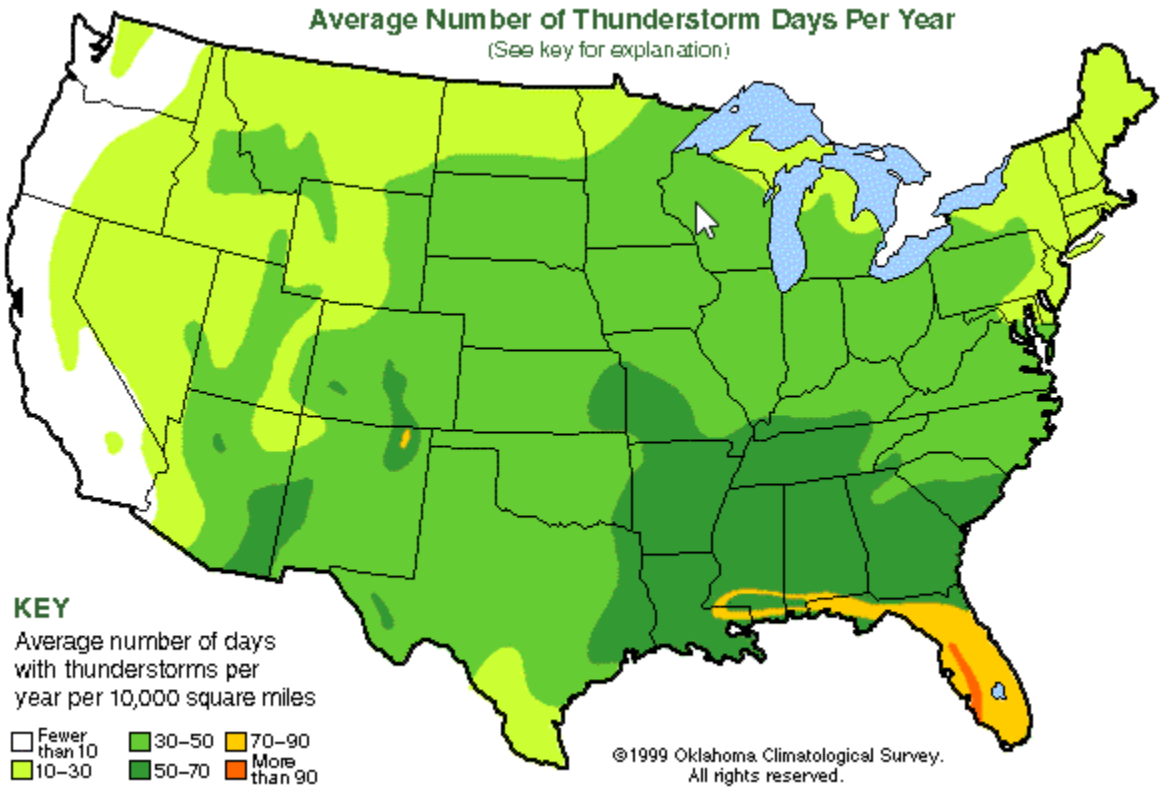
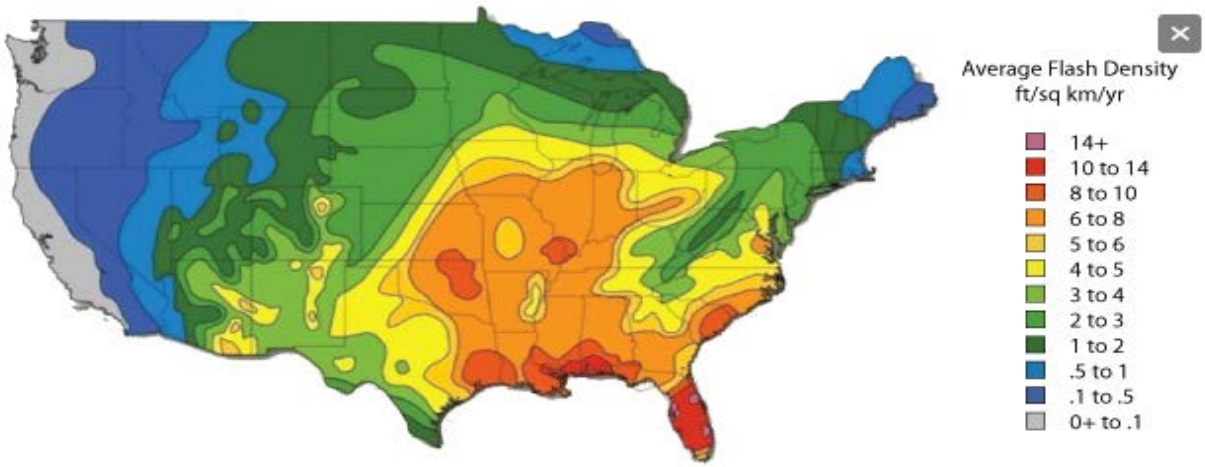


Figure 3.5.4.b. Location and Frequency of Lightning in Iowa



Previous Occurrences

Since 1979, Cerro Gordo County has been included in five presidential disaster declarations that included severe storms (see **Table 3.5.5.**). Some of the damages that resulted in the declarations were from tornadoes and flooding that accompanied the severe weather.

Table 3.5.5. Presidential Disaster Declarations for Severe Storms that included Cerro Gordo County (1979-2016)

Number	Declared	Description
1763	May 27, 2008	Severe Storms, Tornadoes, and Flooding
1518	May 25, 2004	Severe Storms, Tornadoes, and Flooding
1282	July, 1999	Severe Storms and Flooding
1230	July 2, 1998	Severe Weather, Tornadoes, and Flooding
590	July 1, 19789	High Winds and Tornadoes

Source: FEMA

The NCDC reported 112 total thunderstorm events for the Cerro Gordo County planning area from January 1997 thru December 2017, excluding multiple events on the same day. The events with damage search, was limited to wind speed greater than 50 miles per hour. Of the reported events, there was $1,750,000 in total property damage with 7 injuries and no fatalities.

Table 3.5.6. Thunderstorm Summary for Cerro Gordo County

Hazard Type	Total Events	Events with Damage	Property Damage	Injuries	Fatalities
Lightning	8	8	$161,000	0	0
Windstorms	104	103	$1,589,000	7	0
Totals	98	83	$1,750,000	7	0

Source: NCDC

Lightning

Some of the more notable damaging lightning events are described in additional detail below. Information on these events is from NCDC:

- **May 15, 2017 –** A lightning strike to home energized a telephone line and spread to roofing materials and insulation. Smoke was initially reported in the attic and flames on the roof line.
- **May 8, 2017 –** In the Clear Lake area, a family reported seeing a red and orange fireball before realizing their neighbor's home was on fire. A tall tree behind the home appeared to have been struck on fire as well.
- **August 12, 2002 –** Early morning thunderstorms rumbled through the Cerro Gordo County area. Lightning struck a hog containment building near Rockwell. An 8x8 section of the 48x72 foot structure was removed by lightning. Fire fighters were called to the scene and put the fire out quickly.

Thunderstorm Winds

Some of the more notable damaging thunderstorm wind events are described in additional detail below. Information on these events is from NCDC:

- **June 6, 2017 –** A strong thunderstorm system rolled through north Iowa in the A.M. hours. The strong winds impacted Plymouth bringing down large tree limbs, power lines, large trees and damaged chicken and hog facilities causing $100,000 of property damage.
- **July 1, 2011 –** Winds of 60-70 mph were reported at various locations in the county. There were numerous reports of trees and power lines downed by the high winds. A boat was blown from a dock into a house in Clear Lake. Windows were also blown out of a house in the Clear Lake area. Power was knocked out to about 1000 customers in the Mason City, Clear Lake areas.
- **June 23, 1998 –** Winds of 65-80 mph were common in the area. Wind damage at a farm near Clear Lake allowed a herd of cattle to escape. A man driving a van on U.S. Highway 18 hit and killed six of the cattle. Damage from around the Clear Lake area was placed at nearly $1,000,000.

The National Weather Service (NWS) will issue a Severe Thunderstorm Warning whenever a thunderstorm is forecasted to produce wind gusts to 58 miles per hour (50 knots) or greater and/or hail size one inch (quarter-size) diameter which can produce significant damage

(source: https://www.weather.gov/lwx/WarningDefine#ThunderstormWarning).
Table 3.5.7. shows the number of Severe Thunderstorm Watches and Warnings issued by NOAA's National Weather Service. The data is kept on Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, (http://mesonet.agron.iastate.edu/vtec/search.php).

Table 3.5.7. National Weather Service Severe Thunderstorm Watch and Warning Issued in Cerro Gordo County, IA, 2007-2017

Year	Severe Thunderstorm Watches	Severe Thunderstorm Warnings
2017	8	22
2016	10	12
2015	3	6
2014	8	11
2013	3	18
2012	8	11
2011	6	9
2010	12	14
2009	10	8
2008	7	16
2007	8	7

Table 3.5.8 Crop Losses in Cerro Gordo County from Windstorms, 2006-2017

Crop Year	Damage Cost
2017	$0.00
2016	$0.00
2015	$0.00
2014	$1,000
2013	$0.00
2012	$25,000
2011	$0.00
2010	$0.00
2009	$0.00
2008	$0.00
2007	$35,000
2006	$15,000

Source: NCDC

Probability of Future Occurrence
NCDC-reported damaging lightning events occurred 8 times from 1996 thru 2013. Since lightning accompanies thunderstorms, it can be assumed that lightning occurs more often than damages are reported. These rates of occurrence are expected to continue in the future.

Vulnerability
In general, assets in Cerro Gordo County are vulnerable to thunderstorms winds and lightning including people, crops, vehicles, and built structures. According to the 2013 Iowa Hazard Mitigation Plan, of the 8 hazards for which data was available to estimate annualized losses, thunderstorm with lightning and winds ranked 4th with $30 million in annualized losses based on data spanning a 17-year period. Although this hazard results in high annual losses, generally private property insurance and crop insurance cover the majority of losses. Considering insurance coverage as a recovery capability and therefore mitigation of devastating impacts to the economy, the overall impact on jurisdictions is reduced; therefore, this hazard's magnitude score to the planning area is "limited".

Potential Losses to Existing Development
Most lightning damages occur to electronic equipment located inside buildings. But structural damage can also occur when a lightning strike causes a building fire. In addition, lightning strike can cause damages to crops if fields light on fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes. There have not been any fatalities in Cerro Gordo County from lightning strikes.
Thunderstorm winds can cause damage to property, vehicles, trees, and crops.

Future Development
The Cerro Gordo County Economic Development Commission encourages new businesses in the County and with new businesses it is likely to increase vulnerability to wind and lightning. Additional development means more households and businesses vulnerable to damages from severe thunderstorms, lightning and wind.

3.5.5 Ice Storms

Weighted Hazard Score	
Weighted Score	Level
2.38	Moderate

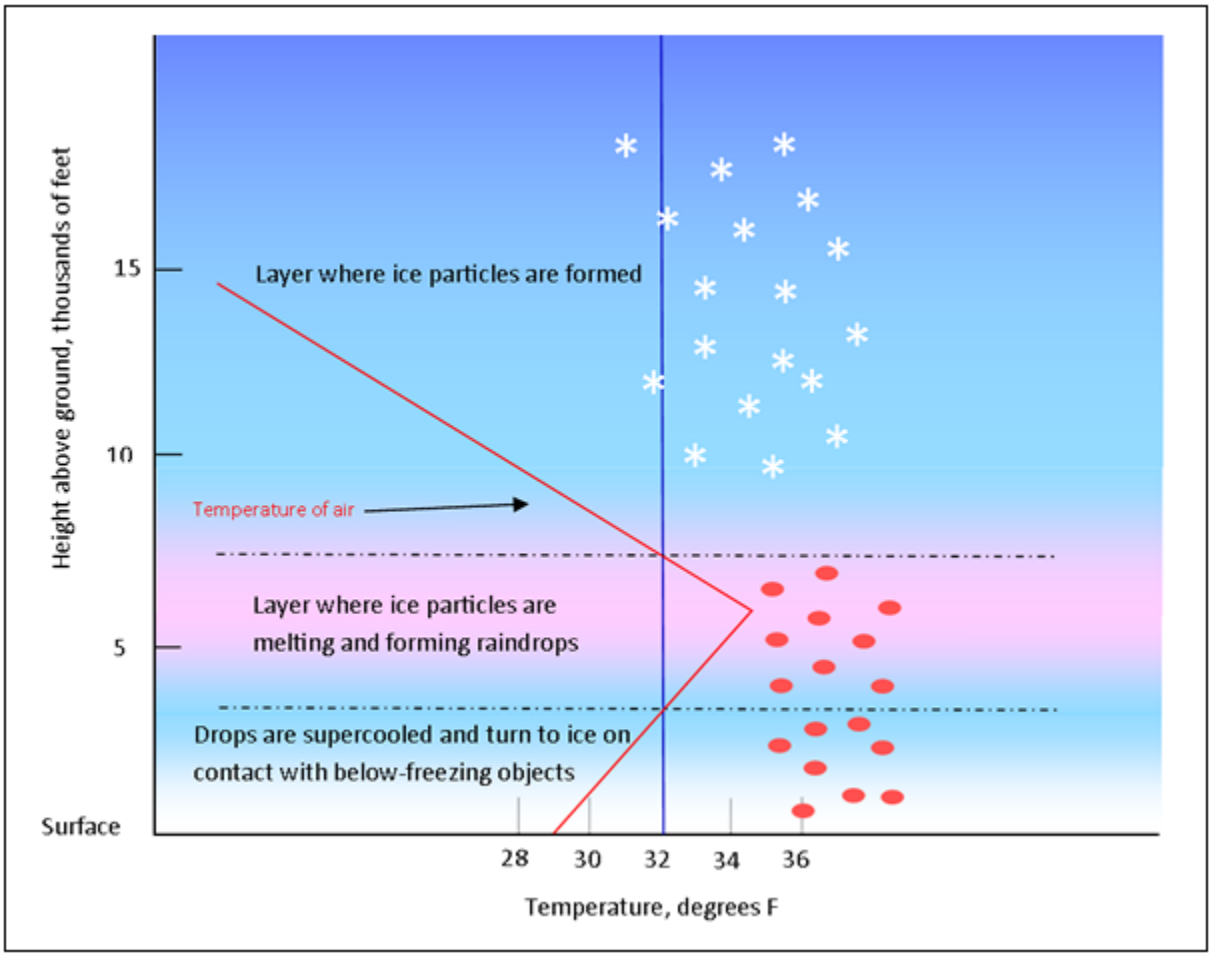
Profile

Hazard Description
One type of winter storm that can be particularly damaging is the ice storm – a storm in which freezing rain occurs and glazes roads and other exposed surfaces.

Freezing rain occurs when rain forms in a relatively warm (above freezing) layer of air and falls through a shallow layer of air that is below freezing. The rain is "super cooled" (still liquid) as it falls through the cold layer near the surface of the earth. When the super cooled, but still liquid, raindrops strike the ground or an object below freezing, they freeze on contact. The resulting

coating of ice is commonly known as glaze. How freezing rain is formed is shown in **Figure 3.5.5.a.**

Figure 3.5.5.a. Formation of Freezing Rain



Geographic Location/Extent

The entire State of Iowa is vulnerable to winter storms that can produce freezing rain. Generally these storms occur between the months of November and March, but can occur as early as October and as late as April.

Previous Occurrences

Between 1996 and 2017 according to the NCDC there were ten ice storms in Cerro Gordo County resulting in no deaths or injuries and $666,280 property damages, as shown in **Table 3.5.9**.

Table 3.5.9. Ice Storms in Cerro Gordo County, 1996-2017

Date	Property Damage
11/14/1996	$0
01/04/1998	$20,400
03/17/1998	$5,880
02/11/1999	$5,000
03/08/2002	$25,000
04/04/2003	$5,000
01/01/2005	$5,000
12/23/2009	$500,000
02/20/2011	$50,000
01/27/2013	$50,000
Totals:	$666,280

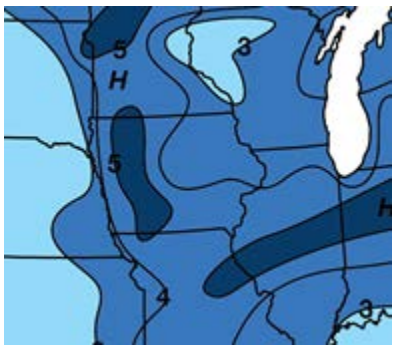
Source: NCDC

Another severe winter storm not recorded by the NCDC occurred in North Iowa on February 24, 2007. The storm began as an intense ice storm followed by blizzard conditions for the next two days. The ice storm brought down power lines causing a power outage for 8,000 Alliant Energy customers in the Mason City area. Roads became very dangerous bringing traffic to a standstill, including mail delivery from Waterloo to the Mason City Post Office.

Probability of Future Occurrence

The Midwest and Northeast United States are prime areas for freezing rain events. The western portion is in a high frequency band for ice storm occurrences. As shown in **Figure 3.5.5.b.** our planning area has an average annual of four days with freezing rain.

Figure 3.5.5.b. Annual Average of Freezing Rain in Cerro Gordo County



Source: Changnos and Karl, 2003

Vulnerability

Ice storms are a common winter weather pattern for our planning area and it is probable that there will be at least one event in each year. Since weather patterns are the same for the entire planning areas, all areas are equally susceptible to ice storms.

Potential Losses to Existing Development

A heavy accumulation of ice can topple power and telephone lines, radio and television towers, and trees. Highways become impossible to travel on, and even stepping outdoors on foot can be extremely dangerous.

The severity of an ice storm (that is, the amount of damage) depends on:

- The amount of rain and this icing taking place;
- The strength of the wind;
- Whether the storm strikes an urban or rural area.

Urban areas tend to suffer more economic and physical damage than rural areas because of the concentration of utilities and transportation systems-all of which may be affected to a great degree by the ice storm. Trees and power lines, in particular, can be heavily damaged. A half inch of ice on a tree branch or on power lines can add hundreds of pounds of weight. In the more severe ice storms, broadcast towers and similar structures hundreds of feet high can be crumpled by the weight of the ice.

Future Development
An increase in development in the planning area will increase the vulnerability to these types of storms.

3.5.6 Blizzard

Weighted Hazard Score	
Weighted Score	Level
2.34	Moderate

Profile

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

- **Blizzard**-Winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.

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

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

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

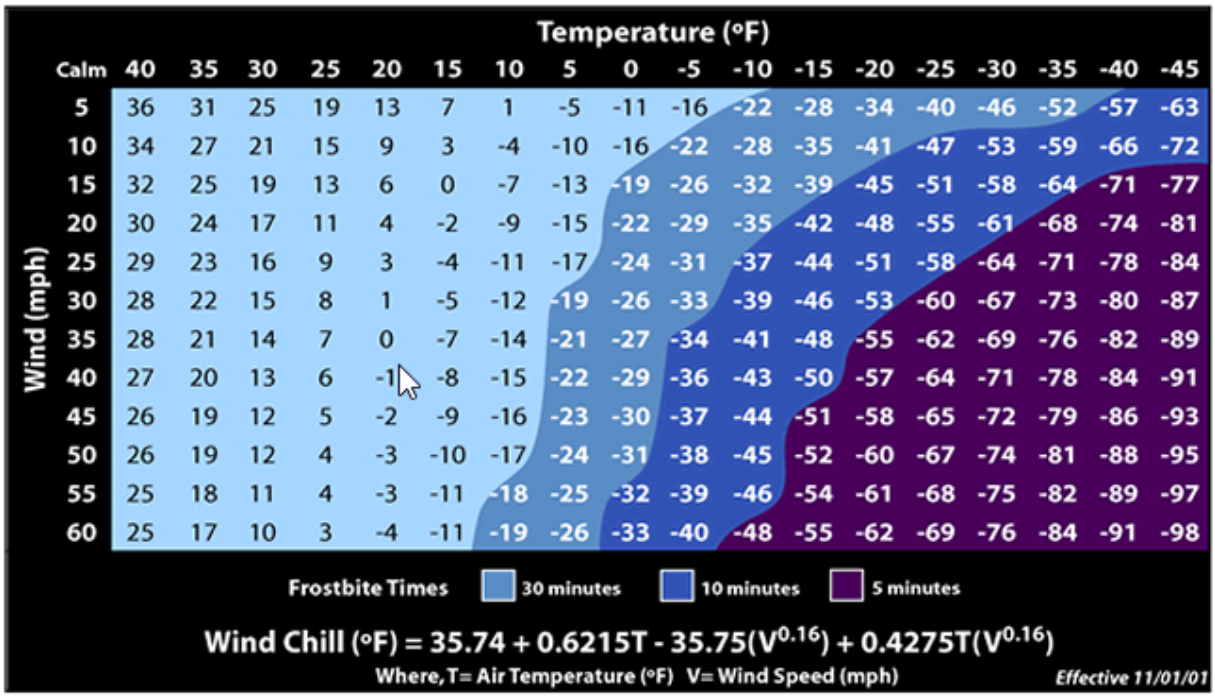
Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people who are exposed to the weather without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipes to freeze and rupture. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is extremely hazardous to health and safely.

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

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

Wind can greatly amplify the impact of cold ambient air temperatures. Provided by the National Weather Service, **Figure 3.5.6.a.** below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Figure 3.5.6.a. Wind Chill Chart



Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Source: National Weather Service

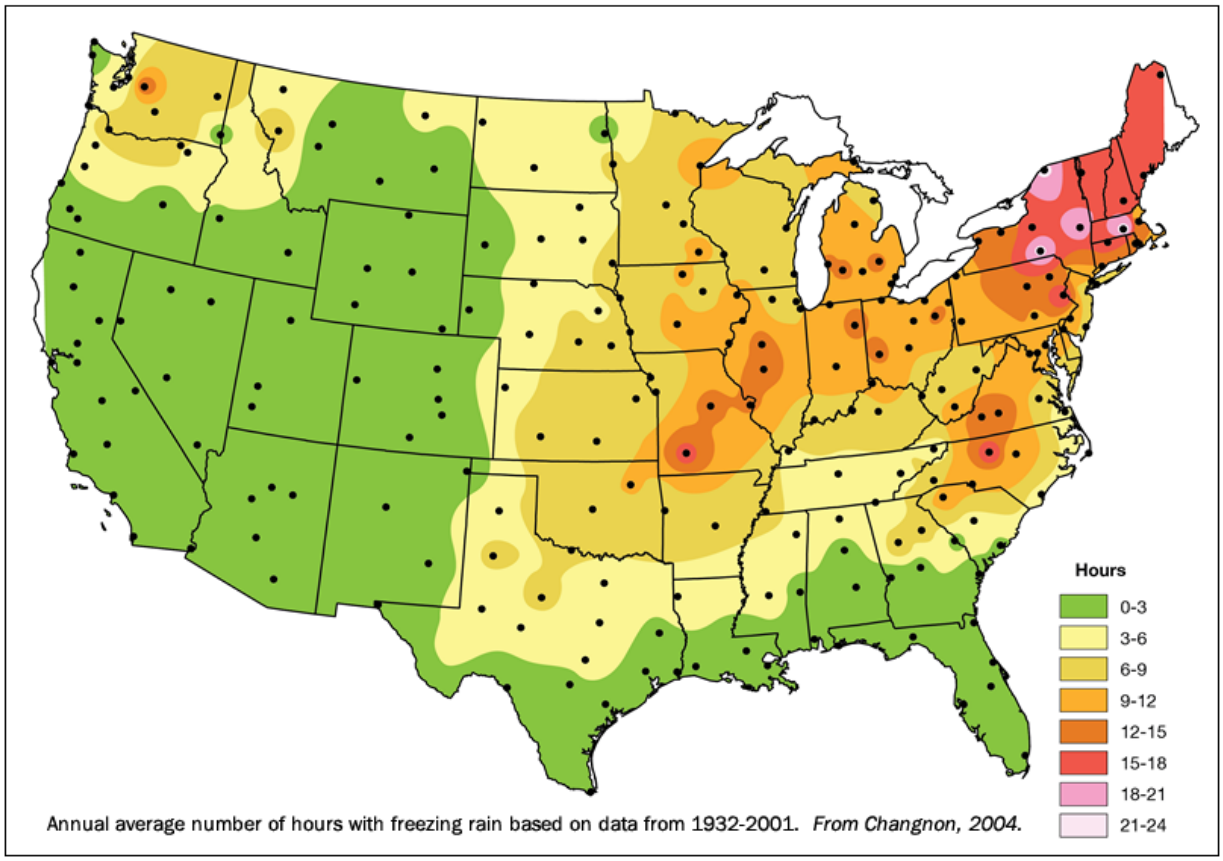
Geographic Location/Extent

According to United States Climate data, the planning area had an average winter (December-March) high temperature normal of 31 degrees (F), the winter low temperature normal of 13.5 degrees (F) and the annual average snowfall of 41 inches.

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

Figure 3.5.6.b. shows that the entire planning area (approximated within the red square) is in the orange-shaded area that receives 9-12 hours of freezing rain per year.

Figure 3.5.6.b. Hours of Freezing Rain



Source: American Meteorological Society. "Freezing Rain Event in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf

Previous Occurrences

Historically, there have been no Presidential Disaster Declarations for Blizzards or Severe Winter Storm that included Cerro Gordo County.

From 1996 thru 2017, the National Climatic Data Center reports 27 blizzard events, 17 heavy snow events, 21 winter storm events, and 4 wind chill events for a total of 69 winter events that impacted the planning area during this 22 year time-period. This translates to an average of 3 winter storm events each year. The total property damage for these 69 events was a conservative $1,290,450.

NOAA's National Weather Service has issued 296 Advisory, Watch, and/or Warnings concerning winter weather phenomena between 2008 and 2017 (**Table 3.5.11).** The data is kept with Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, (http://mesonet.agron.iastate.edu/vtec/search.php).

Table 3.5.11 National Weather Service Issuances for Winter Weather in Cerro Gordo County, IA between 2008-2017.

Phenomena	Significance	Number Issued between 2008 and 2017
Blizzard	Watch	8
Blizzard	Warning	17
Blowing Snow	Advisory	4
Snow	Advisory	4
Snow and Blowing Snow	Advisory	2
Wind Chill	Advisory	89
Wind Chill	Watch	1
Wind Chill	Warning	17
Winter Storm	Watch	34
Winter Storm	Warning	30
Winter Weather	Advisory	107
Total		**313**

Source: Environmental Mesonet, Iowa State University Department of Agronomy website

The following section provides additional information for some of the winter storm and blizzard events that have impacted Cerro Gordo County:

- January 29, 2008 – Northwest winds by mid-day were sustained in the 25 to 35 mph range, with frequent gusts of 40 to 50 mph. Once new snow began to fall, visibility dropped to under one quarter of a mile quickly, with numerous reports of visibility no more than a few feet. In addition to blizzard conditions, temperatures fell to around zero during the event with wind chills in the 20 to 30 below zero range. The low visibility caused numerous school and business closings and made travel very difficult.
- January 25-26, 2010 – Up to 6 inches of light fluffy snow fell in the night of the 24th into the day on the 25th. A prolonged period of strong winds of 25 to 35 mph with gusts 45 to 55 mph resulted in visibility ranging from zero to ¼ mile with significant blowing and drifting snow. Roads drifted shut and plows were pulled off many highways and county roads due to the futility and life-threatening effort to clear roads. Many motorists were stranded in their vehicles. Interstate 35 was closed from Ames, Iowa to the Minnesota border along with U.S. Highway 65 from U.S. Highway 20 to the Minnesota border. Emergency responders were pulled off the road and only responded to the most critical accidents.

Probability of Future Occurrence

According to NCDC, during the 10 year period from 2008 thru 2017, the planning area experienced 37 total blizzards, winter storms, heavy snow and extreme cold events. This translates to an annual probability of approximately 3.7 blizzard, winter storm, or extreme cold events per year.

Vulnerability

The entire planning area is vulnerable to the effects of winter storms and blizzards. Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents and can impact the response of emergency vehicles. The leading cause of death during winter storms is transportation accidents. About 70 percent of winter-related deaths occur in automobiles due to traffic accidents and about 25 percent are from people caught outside in a

storm. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as for feed, water and shelter for livestock are unable to be met. The probability of utility and infrastructure failure increases during winter storms due to freezing rain accumulation on utility poles and power lines. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity (shoveling snow, digging out vehicles, or assisting stranded motorists), or are the elderly. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizen's use of kerosene heaters and other alternative forms of heating may create other hazards such as structural fires and carbon monoxide poisoning.

According to the 2013 Iowa Hazard Mitigation Plan, of the 8 hazards for which data was available to estimate annualized losses, severe winter storm ranked 6th with $2.2 million in annualized losses based on data spanning a 13-year period.

Potential Losses to Existing Development

Vulnerable Buildings, Infrastructure, and Critical Facilities

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

Loss of Use

Overhead power lines and infrastructure are also vulnerable to damages from winter storms; in particular ice accumulation during winter storm events can cause damages to power lines due to the ice weight on the lines and equipment as well as damage caused to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses would include cost of repair or replacement of damaged facilities, and lost economic opportunities for businesses.

Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. According to FEMA standard values for loss of service for utilities reported in the 2009 Benefit Cost Analysis Reference Guide, the economic impact as a result of loss of power is $126 per person per day of lost service.

Property Losses

The total property losses reported by the NCDC for a total of 37 winter events that impacted the planning area during the 10 year time-period from 2008 thru 2017 were $700,000.

Increased Risk Populations

Elderly populations are considered to be at increased risk to Winter Storms and associated extreme cold events.

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

3.5.7 Hazardous Material Incident – Transportation

Weighted Hazard Score	
Weighted Score	Level
2.19	Moderate

Profile

Hazard Description
A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in increasing types and quantities. Each year over 1,000 new synthetic chemicals are introduced and as many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals". Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area.

Transportation Hazardous Materials Incident
A transportation hazardous materials incident is the accidental release of chemical substances or mixtures during transport. Transportation Hazardous Materials Incidents in Cerro Gordo County can occur during rail transport or highway transport. Accidents involving rail shipments of hazardous materials typically fall into four general categories: track deterioration, equipment failures, human error, and other causes. Highway accidents involving hazardous materials pose a great potential for public exposures. Both nearby populations and motorists can be impacted and become exposed by accidents and releases. Generally speaking, the volume of hazardous materials transported is greater in rail transport than highway transport due to the higher capacity in rail cars.

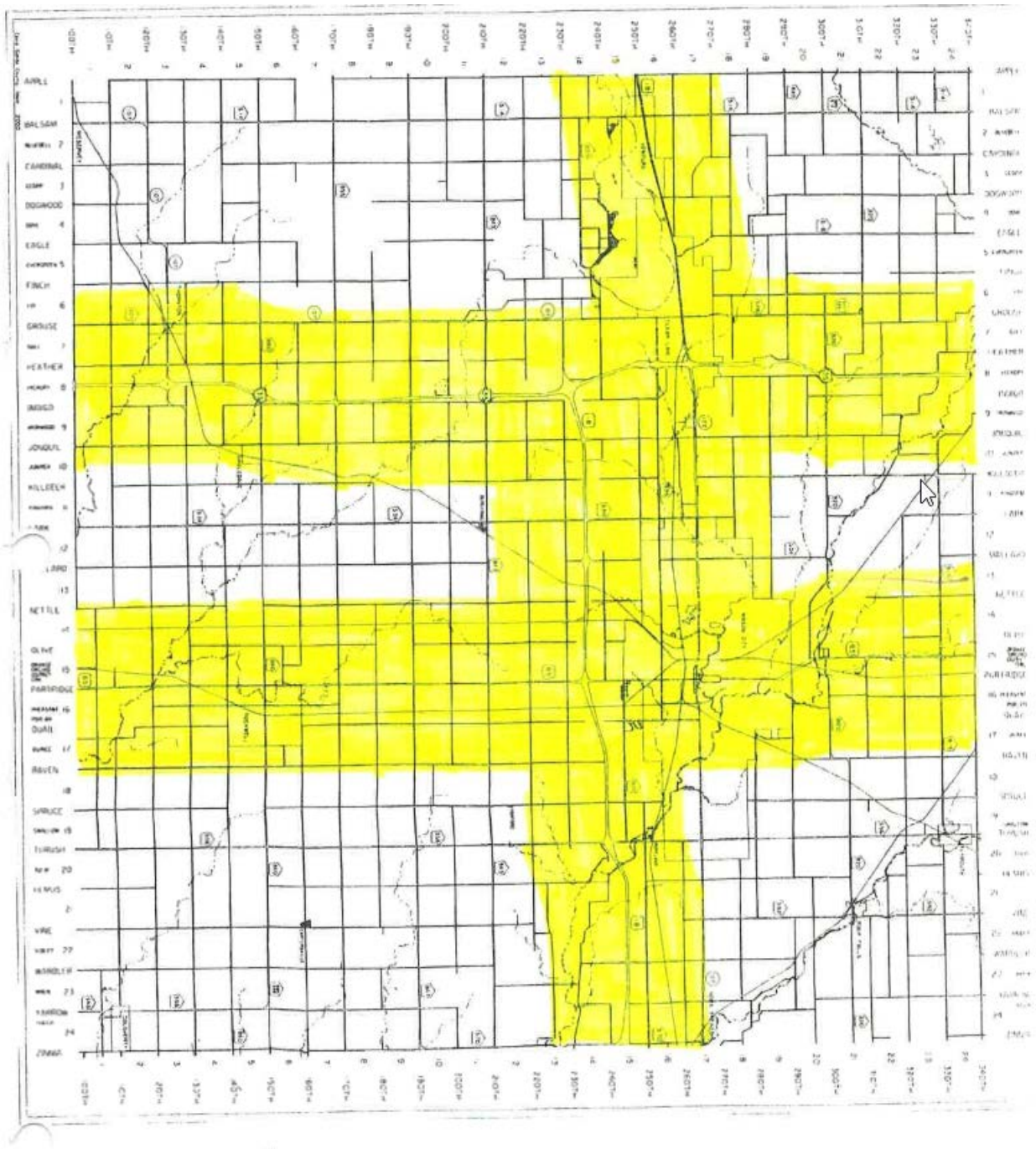
Pipeline Incident
A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak to a large rupture where an explosion is possible. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those near the pipelines.

Geographic Location/Extent
This section provides geographic locations within Cerro Gordo County impacted by each type of potential hazardous materials incident.

Transportation Hazardous Materials Incident
The transport of hazardous materials in Cerro Gordo County occurs via trucks on the highways/roads, train on the railroads in the county, as well as via airplanes. A Commodity Flow Study, including Cerro Gordo County in the study area was developed for ten counties in north Iowa including Cerro Gordo.

The purpose of a Hazardous Material Commodity Flow Analysis is to examine chemical transportation via local transportation modes for the purpose of identifying and quantifying hazardous substances moved along a specific transportation route, through or past a geographical point aid in the planning for and response to possible hazardous materials incidents. This study while several years old still provides valuable planning information. The Regional HAZMAT Commission has contracted for a new study but completion of the project will not be in time for inclusion in this plan. Vulnerable zones for major transportation routes in Cerro Gordo County are displayed in **Figure 3.5.7.a**.

Figure 3.5.7.a Transportation Vulnerable Zones: Highway's 65, 18, 122 and Interstate 35 in Cerro Gordo County



The Hazardous Commodity Flow Analysis is an examination hazardous material transportation through the region via highway and rail transportation routes. The specific transportation routes or carriers that have been examined as a part of this study for Cerro Gordo County are as follows:

Highways

- Highway 18 – Impacting the communities of Clear Lake, Ventura, and Mason City.
- Highway 65 – Impacting the communities of Mason City and Rockwell.
- Highway 122 – Impacting the communities of Mason City and Clear Lake.
- Interstate 35 – Impacting the communities of Clear Lake, Swaledale, and Thornton.

Materials transported on these identified highways will eventually have an impact on all other communities as they are diverted to county highways for distribution to these communities.

Railroads

- I and M Rail Link – These routes now owned by Canadian Pacific Rail Road. This line goes through the communities of Clear Lake, Mason City, and Plymouth.
- Union Pacific – This line goes through the community of Mason City.
- Iowa Northern – This line goes through the community of Plymouth.

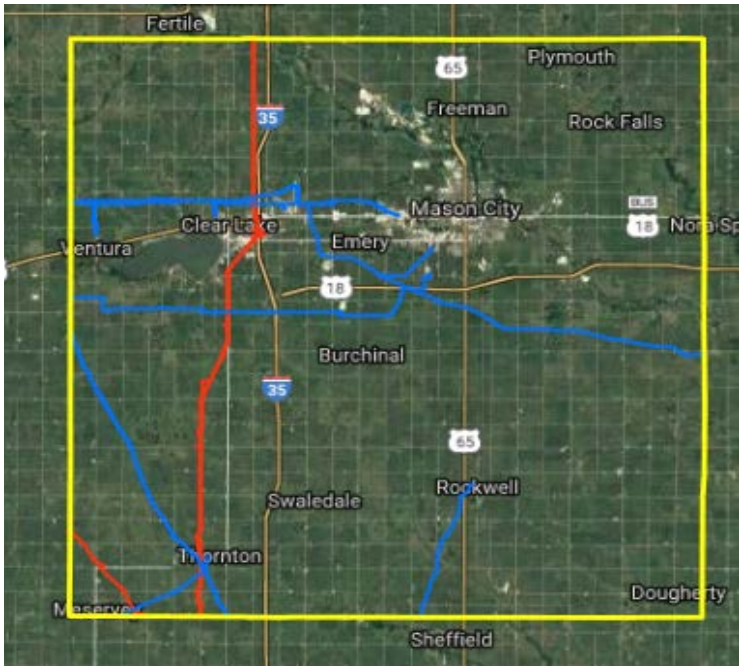
Air Freight

- There is one public airport in Cerro Gordo County just east of the city of Clear Lake, the Mason City Municipal Airport. The primary risk of air-related hazardous materials incidents is related to crop-dusting. Crop dusters carry insecticides, fertilizer, fungicides and herbicides to spray on crops. A crash or other incident involving one of these plans could also be hazardous.

Pipeline Incident

Figure 3.5.7.b. provides locations of pipelines in Cerro Gordo County. The data for this map consists of gas transmission pipelines and hazardous liquid pipelines. It does not contain gathering or distribution pipelines, such as lines which deliver gas to a customer's home. Therefore, not all pipelines in the County will be visible.

Figure 3.5.7.b. Pipelines in Cerro Gordo County



Legend

Gas Transmission Pipelines

Hazardous Liquid Pipelines

Source: National Pipeline Mapping System

Previous Occurrences

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

According to the DNR database, from January 2008 to December 2017 (10 years), there have been 76 transportation hazardous materials spills reported in Cerro Gordo County. Of the 76 spills, 2 were air releases, 0 affected ground water, 70 were on land, and 2 affected surface water. Please note: some spills had multiple mediums of release.

Pipelines

The National Transportation Safety Board (NTSB) maintains a database of pipeline incidents. According to the Pipeline Accident Reports, there has been one significant pipeline incidents in Cerro Gordo County from 1969-2017.

Probability of Future Occurrence

Based on the annual average of 76 spills per year reported to Iowa DNR since January 2008 (76 reported from January 2008 to December 2017 – 10 years), the probability of future occurrence of hazardous materials incidents is determined to be “Likely”.

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

Most of the hazardous materials incidents are localized and are quickly contained or stabilized. Depending on the characteristics of the hazardous material or the volume of product involved, the affected area can be as small as the incident site or as large as 1 square mile or more. Many times, areas near the incident may be evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as river, lake, or aquifer. The previous transportation hazardous materials incidents in the planning area have been generally localized and quickly contained or stabilized. With these factors in mind, magnitude was determined to be "negligible".

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

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

Future Development
Interstate 35 is one the United States' most important freight corridors for North/South movements. This Interstate is projected to experience substantial growth in freight traffic over the coming years. Interstate 35 is a significant roadway in the United States.

The number and types of hazardous chemicals transported through Cerro Gordo County will likely continue to increase. As populations grow, this also increases the number of people vulnerable to the impacts of hazardous materials spills. Population and business growth along major transportation corridors increases the vulnerability to transportation hazardous materials spills.

3.5.8 Pandemic

Weighted Hazard Score	
Weighted Score	Level
2.12	Moderate

Profile

Hazard Description
A pandemic is an epidemic of infectious disease that has spread through human populations across a large region; for instance multiple continents, or even worldwide.

A widespread endemic disease that is stable in terms of how many people are getting sick from it, is not a pandemic.

Throughout history, there have been a number of pandemics, such as smallpox and tuberculosis. The most recent pandemics include the HIV pandemic as well as the 1918 and 2009 H.N. pandemics.

Geographic Location/Extent
Due to the high mobility of our society, diseases that create pandemics can move quickly across the county, state, and nation within a matter of days and weeks. Disease outbreaks have affected all ages, gender, race and social sector and are not isolated to any one location.

Influenza happens every year in nearly all the countries in the world. It spreads through a population for a few months and then will disappear or move to another area of the world.

Previous Occurrences
Some of the more prominent pandemic occurrences that have affected the United States within the last 100 years are:

- The "Spanish Flu", occurring 1918-1919 was a worldwide pandemic, causing 675,000 deaths in the United States and 50 million worldwide.

- H2N2 virus ("Asian Flu") occurred 1957-1958, causing 70,000 deaths in the United States.

- H3N2 virus ("Hong Kong Flu") occurred 1968-1969, causing 34,000 deaths in the United States.

- The HIV virus spread to the United States in 1966 and is currently a pandemic globally. Aids is the final stage of HIV and is the 6th leading cause of deaths among 25 to 44 year olds in the United States.

Probability of Future Occurrence
Public Health experts believe we are at greater risk than ever of experiencing large-scale outbreaks and global pandemics like those we've seen before: SARS, Swine flu, Ebola and Zika.

Factors that are contributing to this higher probability of occurrence are: growing populations and urbanization, encroachment into new environments, climate change, global travel and fewer doctors and nurses in outbreak regions. Experts also believe another influenza pandemic will occur, although it is difficult to predict when or where it will appear, or how severe it will be. Sources: CNN-"Seven reasons we're at more risk than ever of a global pandemic", http://www.cnn.com/2017/04/03/health/pandemic-risk-virus-bacteria/index.html and HHS Public Access, "The Next Influenza Pandemic: Can it Be Predicted?" http://www.ncbi.nlm.gov/pmc/articles/PMC2504708/

Future Pandemic concerns are:

- Viral hemorrhagic fevers such as Ebola virus disease, and Marburg Virus.
- SARS (Severe Acute Respiratory Syndrome).
- Influenza H5N1 Avian Flu.
- Zika Virus

Source: https://en.wikipedia.org/wiki/Pandemic

Vulnerability

From Ebola in West Africa to Zika in South America to MERS in the Middle East, dangerous outbreaks are on the rise around the world. The number of new diseases per decade has increased nearly fourfold over the past 60 years, and since 1980, the number of outbreaks per year has more than tripled.

Some recent outbreaks registered in the U.S. as no more than a blip in the news, while other, like Ebola, triggered an intense but temporary panic. And while a mutant bug that moves from chickens in China to humans in cities around the world faces from H7N9-and countless other pathogens with the potential to cause enormous harm-isn't science fiction.

The U.S. Centers for Disease Control and Prevention (CDC) ranks H7N9 as the flu strain with the greatest potential to cause a pandemic-an infectious-disease outbreak that goes global. If a more contagious H7N9 were to be anywhere near as deadly as it is now, the death toll could be in the tens of millions.

Potential Losses to Existing Development

Disease outbreaks can contribute to death, hospitalization, and lost work days. Individuals can experience financial losses due to medical care costs and lost income caused by missed work days.

In 2016, the Commission on a Global Health Risk Framework for the Future estimated that pandemic disease events would cost the global economy over $6 trillion in the 21st century – over $60 billion per year.

The 1918 influenza pandemic killed roughly 675,000 people in the United States and between 50 and 100 million people worldwide. The less deadly, but still catastrophic, 1957 and 1968 pandemics caused more than 60,000 and 34,000 deaths, respectively. And though modern medicine has seen a decline in pandemic-related deaths, economist Steven Weisbat claims that a severe influenza pandemic today could cause some $155 billion in death claims.

The consequences of a major pandemic would be world-changing. The 1918 flu pandemic killed 50 million to 100 million people, more than the combined total casualties of World Wars I and II and for a slew of reasons; humans are arguably more vulnerable today than they were 100 years ago. First of all, there are simply more of us. The number of people on the planet has doubled in the past 50 years, which means more humans to get infected and to infect others, especially in densely populated cities. Because people no longer stay in one place, nearly 4 billion trips were taken by air last year-neither do diseases. An infection in all but the most remote corner of the world can make its way to a major city in a day or less.

3.5.9 Terrorism

Weighted Hazard Score	
Weighted Score	Level
2.07	Moderate

Profile

Hazard Description

This hazard encompasses the following sub-hazards: enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, and public disorder. Although not considered an act of terrorism under the federal definition, the planning committee made the decision to include active shooter as an active hazard under this heading. This decision was made based on the rising number of incidents in the United States and the unique impact it has on communities and the many aspects that mirror terrorist attacks. These hazards can occur anywhere and demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion or ransom in violation of criminal laws of the United States. These actions may cause massive destruction and/or extensive casualties. The threat of terrorism, both international and domestic, is ever present, and an attack is likely to occur when least expected.

Enemy attack is an incident that could cause massive destruction and extensive casualties throughout the world. Some areas could experience direct weapons' effect: blast and heat; others could experience indirect weapons' effect. International political and military activities of other nations are closely monitored by our federal government and the State of Iowa would be notified of any escalating military threats.

The use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom can be described as biological terrorism. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point of line sources such as munitions, covert deposits and moving sprayers. Biological agents vary in the amount of time they pose a threat. They can be a threat for hours to years depending upon the agent and the conditions in which it exists.

Agro-terrorism consists of acts in intentionally contaminate, ruin, or otherwise make agricultural products unfit or dangerous for consumption or further use. Agriculture is an important industry

in Iowa and Cerro Gordo County. The introduction of a biological agent into the population of 3.9 million cattle and calves or the 13.7 billion acres of corn in Iowa would be financially devastating and would have a major impact on the food supply of the state and the nation. A major attack involving the nation's food supply could be launched in a rural area that has little capacity to respond. Potential terrorists' targets for livestock disease introduction would be concentration points, such as the state's licensed feedlots or livestock markets.

Chemical terrorism involves the use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Effects of chemical contaminants are similar to biological agents.

Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidations, coercion, or ransom is conventional terrorism. Hazard affects are instantaneous; additional secondary devices may be used, lengthening the time duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences and incremental structural failures. Conventional terrorism can also include tactical assault or sniping from remote locations.

Mass demonstrations, or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes are examples of public disorder. These are assembling of people together in a manner to substantially interfere with public peace to constitute a threat, and with use of unlawful force or violence against another person, or causing property damage or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target or institution. Most events are within the capacity of local law enforcement.

The Southern Poverty Law Center reported in 2017 there were three active hate groups in Iowa:

- ACT for America (Anti-Muslim),
- The Daily Stormer (Neo-Nazi),
- Gallows Tree Wotansvolk Alliance (Neo-Nazi)

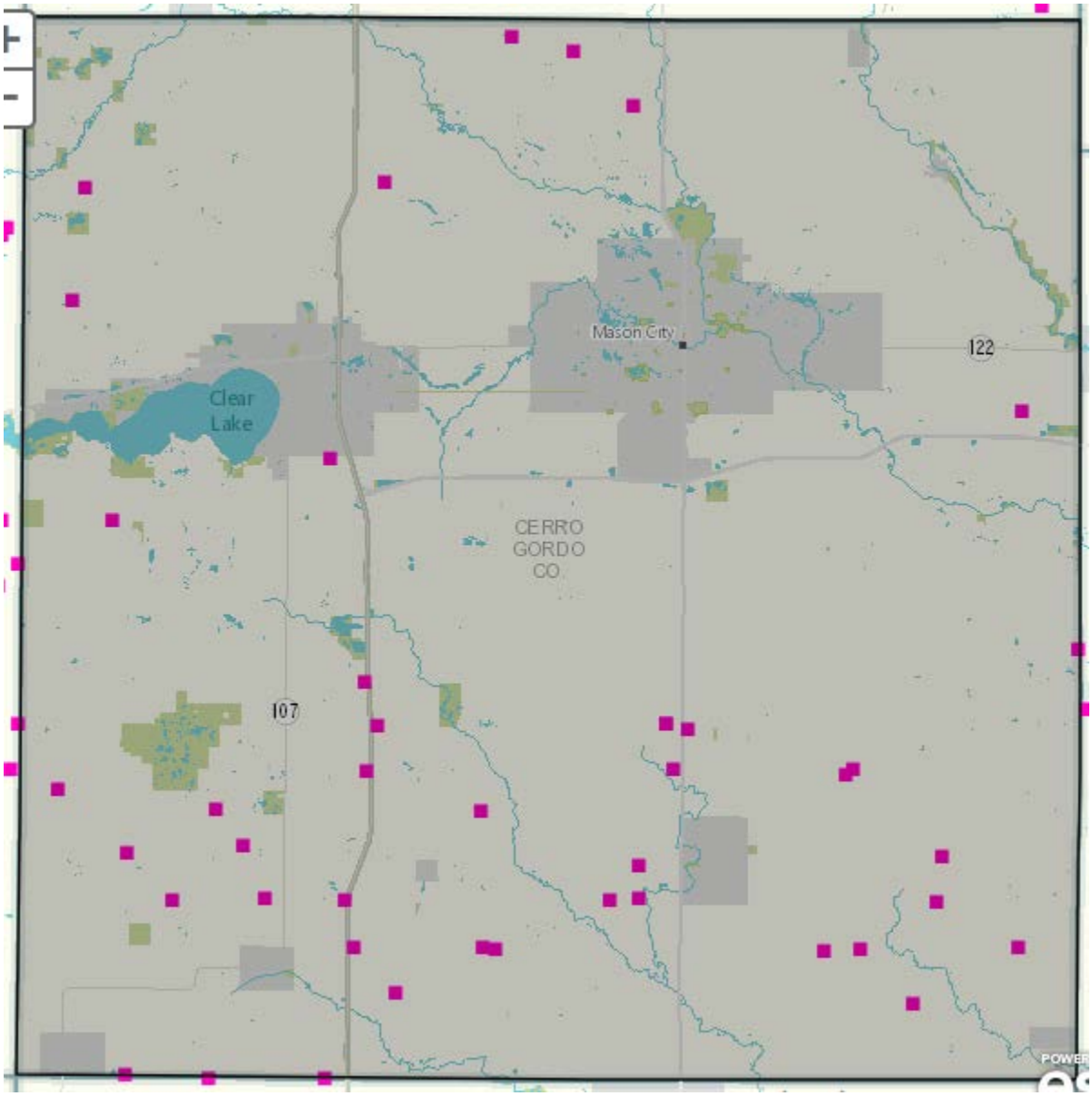
The agreed upon definition of an "active shooter" by United States government agencies is "an individual actively engaged in killing or attempting to kill people in a confined and populated area." The FBI identified 200 active shooter incidents between 2000 and 2015.

Geographic Location/Extent

The entire planning area has a low potential for terrorist activity. However, there are several events throughout the Cerro Gordo County that include assembly of large crowds of people. Any venue with a large gathering of people could be a potential target for terrorists.

For agro-terrorism planning, **Figure 3.5.9.a.** shows the locations of animal feeding operations in Cerro Gordo County that have greater than 200,000 lbs live weight animals.

Figure 3.5.9.a. Locations of Animal Feeding Operations in Cerro Gordo County, IA



Source: Iowa Department of Natural Resources, https://facilityexplorer.iowadnr.gov/facilityexplorer/default.aspx

Previous Occurrences

There have not been any large-scale enemy attacks or acts of radiological terrorism in Iowa. In Iowa there have been biological and chemical agent threats, animal rights activists' vandalism and many bomb threats. In 2002, pipe bombs were found in 18 states including Iowa and six people were injured in the bombings in Iowa and Illinois. In 2005 and 2006, pipe bombs were used in attempted murder cases in two Iowa cities.

The Iowa Department of Public Safety issued an Iowa Hate Crime by Jurisdiction Report, 1991-2007 and Cerro Gordo County has a total of seven reported. Two were reported by the Cerro

Gordo County Sheriff's Office and one was reported by the Clear Lake Police Department both in 1994 and four by Mason City Police Department, one in 1997, one in 2002, and two in 2006.

According to statistics released to the FBI by United States law enforcement agencies, there were six reported hate crimes in Iowa in 2015 and seventeen reported in 2016.

Probability of Future Occurrence
While difficult to estimate, the probability for a terrorist event is "**Unlikely**" within the next 10 years in Cerro Gordo County. The overall crime rate is relatively high in Cerro Gordo County. According to the Iowa Division of Criminal Investigation, Cerro Gordo County has had an average of 1,490 criminal investigations during the fiscal years of 2010 through 2016. The Clear Lake, Mason City and Rockwell Police Departments and the Sheriff's Office provide law enforcement protection.

Vulnerability
A terrorism event could occur in either limited area of a jurisdiction or over the entire jurisdiction at once. This hazard has the ability to directly cause substantial structural losses and potentially loss of life. An active shooter incident will typically be contained in jurisdiction with extremely high potential for loss of life and limited structural losses.

Potential Losses to Existing Development
Potential losses from Terrorism include all infrastructure, critical facilities, crops, humans and animals. The degree of impact would be directly related to the type of incident and the target. Potential losses could include cost of repair or replacement of damaged facilities, lost economic opportunities for businesses, loss of human life, injuries to persons, loss of food supplies, disruption of the food supply chain, and immediate damage to the surrounding environment. Secondary effects of infrastructure failure could include public safety hazards, spread of disease, increased morbidity and mortality among the local and distant populations, public panic and long-lasting damage to the environment. Terrorism events are rare occurrences and specific amounts of estimated losses for previous occurrences are not available due to the complexity and multiple variables associated with these types of hazards. In some instances, information about these events is secure and unavailable to the public in order to maintain national security and prevent future attacks.
As discussed previously, it is difficult to quantify potential losses in terms of the jurisdictions most threatened by CBRNE (chemical, biological, radiological, nuclear, and high yield explosive) attack events due to the many variables and human element. To obtain some approximations of potential loss, the committee used hypothetical situations based on events in the jurisdiction that occur as an annual event and those that are not regularly planned events. The events and potential estimated losses are shown in **Table 3.5.12**. To simplify the process, only one mechanism of disruption was used and at two levels. Explosive device in a small transport vehicle and an improved device such as the "pressure cooker" explosives used in the Boston Marathon attack.

Table 3.5.12

Event	Location	Estimated Attendance	Estimated Injuries – Large Device	Estimated Injuries – Small Device	Estimated Fatalities – Large Device	Estimated Fatalities – Small Device
North Iowa Band Festival **Annual**	Mason City	10-12,000	200 – 300	100 – 150	50 – 75	20+
4th of July Celebration **Annual**	Clear Lake	20,000	200 – 300	100 – 150	50 – 75	20+
Pyrotechniques Guild Internation Convention **Runs Multiple Days**	North Iowa Events Center-Mason City	4,000 attendees & 6,000 during public displays	300 – 400	150 – 200	100+	50+

Source: Planning Committee

Although not considered by definition as terrorism, the committee felt very strongly that active shooter should be considered within the terrorism hazard planning. The following data was obtained from www.fbi.gov. The total active shooter incidents across the country in 2013 were 17. There were 20 incidents in each of 2014 and 2015.

The FBI defines an active shooter as "one or more individuals actively engaged in killing or attempting to kill people in a populated area."

Active Shooter Statistics:

- The 40 incidents in 2014 and 2015 occurred in 26 states.
- In the 2014-2015 incidents, 92 were killed and 139 wounded including 4 law enforcement officers killed and 10 wounded.
- Active Shooter incidents often occur in small and medium communities where police departments are limited by budget constraints and small workforces.
- Two percent of the shooters bring IED's (improvised explosive device) as an additional weapon.

Future Development

As public events are held at North Iowa Speedway, North Iowa Event Center, schools, and the Surf Ballroom, and multiple other events, the potential may exist for these locations to become targets of attack. With human-caused hazards such as this that can have multiple variables involved, increases in development is not always a factor in determining risk, although the physical cost of the event may increase with the increased or newly developed areas.

3.5.10 Hazardous Materials Incident – Fixed Facility

Weighted Hazard Score	
Weighted Score	Level
2.05	Moderate

Profile

Hazard Description

A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in increasing types and quantities. Each year over 1,000 new synthetic chemicals are introduced and as many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals". Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous material incidents generally affect a localized area.

Fixed Hazardous Materials Incident

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

Geographic Location/Extent

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

According to the Iowa Department of Natural Resources, as of 2016, there were 87 sites in Cerro Gordo County that because of the volume or toxicity of the materials on site were designated as Tier II Facilities under the Superfund Amendments and Reauthorization Act. Of these 87 facilities, 70 have reported materials on site that are considered to be "Extremely Hazardous Substances" (EHS).

Table 3.5.13 provides the number of Tier II Facilities, as well as the number with EHS for each jurisdiction in the planning area.

Table 3.5.13 Number of Tier II Facilities and EHS Facilities by Jurisdiction

Jurisdiction	Tier II Facilities	EHS Facilities
Cerro Gordo County	15	13
Clear Lake	10	7
Dougherty	2	2
Mason City	44	32
Meservey	1	1
Plymouth	3	3
Rock Falls	0	0
Rockwell	5	5
Swaledale	1	1
Thornton	4	4
Ventura	2	2

Source: Iowa Department of Natural Resources

Previous Occurrences

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

According to the DNR database, from January 2008 to December 2017 (10 years), there have been 185 hazardous materials spills reported in Cerro Gordo County. **Table 3.5.14** provides a summary of the reported spills during this time period for each jurisdiction indicated in the database.

Table 3.5.14 Cerro Gordo County Hazardous Materials Spills Reported to Iowa DNR, January 2008 –December 2017

Location	Reported Spills
Cerro Gordo County	9
Clear Lake	39
Dougherty	1
Mason City	102
Meservey	5
Plymouth	1
Rock Falls	1
Rockwell	11
Swaledale	2
Thornton	7
Ventura	7
Total	185

Source: Iowa Department of Natural Resources, http://www.iowadnr.gov/InsideDNR/RegulatoryLand/EmergencyPlanningEPCRA/SpillReporting.aspx, retrieved 4/22/2014

Another source consulted to report previous Hazardous Materials Incidents is the Environmental Protection Agency's Toxics Release Inventory (TRI). This inventory tracks the management of over 650 toxic chemicals that pose a threat to human health and the environment. U.S. facilities in certain industry sectors that manufacture, process, or otherwise use these chemicals in amounts above established levels must report how each chemical is managed through recycling, energy recovery, treatment, and releases to the environment. A "release" of a chemical means that it is emitted to the air or water, or placed in some type of land disposal. The information submitted by facilities to the EPA and states is compiled annually as the Toxics Release Inventory or TRI, and is stored in a publicly accessible database in Envirofacts.

TRI data are available for all facilities that have submitted a Form R or Form A to EPA since the program began in 1987. TRI facilities are legally required to report to EPA by July 1st of each year. **Table 3.5.15** provides the TRI on-site and off-site reported disposed of or otherwise released report for industries in Cerro Gordo County that have TRI reporting requirements for 2008-2012.

Table 3.5.15 TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), for All Industries, for All Chemicals, Cerro Gordo County, Iowa 2013-2015

Chemical	Type On-site Disposal or Other Releases	Total Off-site Disposal or Other Releases	Total of both On and Off site
2015			
1,2,4-Trimethylbenzene	20,000	0	20,000
Acetaldehyde	12,616	0	12,616
Acrolein	3,305	0	3,305
Chromium	0	7	7
Chromium Compounds	2,117	0	2,117
Copper Compounds	5,002	0	5,002
Formaldehyde	666	0	666
Hydrochloric Acid	17,912	0	17,912
Lead	0	1,836	1,836
Lead Compounds	20,898	0	20,898
Manganese	9	255	264
Manganese Compounds	675	0	675
Mercury Compounds	173	0	173
Methanol	19,501	0	19,501
N-Hexane	107,224	0	107,224
Nickel	0	41	41
Nickel Compounds	321	0	321
Nitric Acid	0	5	5
Styrene	19,000	0	19,000
Toluene	9,500	0	9,500
Zinc Compounds	5	1,400	1,405
2014			
1,2,4-Trimethylbenzene	18,000	0	18,000
Acetaldehyde	4,494	0	4,494
Acrolein	2,711	0	2,711
Benzene	0	0	0
Benzo (G, H, I) Perylene	0	0	0
Chromium	1	245	255
Chromium Compounds	1,180	0	1,180
Copper Compounds	3,392	0	3,392
Diisocyanates	274	0	274
Formaldehyde	861	0	861
Hydrochloric Acid	13,500	0	13,500
Lead	0	599	599
Lead Compounds	11,641	0	11,641
Manganese	12	500	512
Manganese Compounds	474	0	474
Mercury Compounds	122	0	122
Methanol	4,878	0	4,878
N-Hexane	88,775	0	88,775
Nickel	0	39	39
Nickel Compounds	179	0	179
Nitrate Compounds	0	1,186	1,186
Nitric Acid	0	5	5
Polycyclic Aromatic Compounds	0	0	0

Styrene	15,000	0	15,000
Toluene	9,400	0	9,400
Zinc Compounds	5	1,912	1,917
2013			
Acetaldehyde	9,282	0	9,282
Acrolein	4,762	0	4,762
Ammonia	0	0	0
Benzene	0	0	0
Chromium	2	251	253
Chromium Compounds	1,155	0	1,155
Copper	0	7	7
Copper Compounds	0	0	0
Formaldehyde	2,441	0	2,441
Hydrochloric Acid	14,000	0	14,000
Lead Compounds	11,386	0	11,386
Manganese	11	255	266
Manganese Compounds	571	0	571
Mercury Compounds	146	0	146
Methanol	8,702	0	8,702
N-Hexane	69,594	0	69,594
Nickel	2	258	260
Nitrate Compounds	0	2,069	2,069
Nitric Acid	0	5	5
Styrene	15,000	0	15,000
Toluene	9,400	0	9,400
Zinc Compounds	5	910	915

Source: Environmental Protection Agency Toxics Release Inventory (TRI), http://iaspub.epa.gov/triexplore/trirelease.chemical, retrieved 5/8/2014

TRI data reflect releases and other waste management activities of chemicals, not whether (or to what degree) the public has been exposed to those chemicals. Release estimates alone are not sufficient to determine exposure or to calculate potential adverse effects on human health and the environment. TRI data, in conjunction with other information, can be used as a starting point in evaluating exposures that may result from releases and other waste management activities which involve toxic chemicals. The determination of potential risk depends upon many factors, including the toxicity of the chemical, the fate of the chemical, and the amount and duration of human or other exposure to the chemical after it is released.

Probability of Future Occurrence

Based on the annual average of 18.5 spills per year reported to Iowa DNR since January 2008 (185 reported from January 2008 to December 2017 – 10 years), the probability of future occurrence of hazardous materials incidents is determined to be “Occasional”.

Vulnerability

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

Most of the hazardous materials incidents are localized and are quickly contained or stabilized. Depending on the characteristic of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as river, lake, or aquifer. The previous hazardous materials incidents in the planning area have been generally localized and quickly contained or stabilized. However, spills are costly to clean up due to the specialized equipment and training, and disposal sites that are necessary. With these factors in mind, magnitude was determined to be "Limited".

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

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

Future Development
The number and types of hazardous chemicals stored and transported through Cerro Gordo County will likely continue to increase. As populations grow, this also increases the number of people vulnerable to the impacts of hazardous materials spills. Population and business growth along major transportation corridors increases the vulnerability to transportation hazardous materials spills.

3.5.11 Flooding

Weighted Hazard Score	
Weighted Score	Level
1.87	Low

Profile

Hazard Description
Flooding has been a significant problem for many of the communities in Cerro Gordo County. Many of the communities were settled and developed largely because of their proximity to water resources. A flood is partial or complete inundation of normally dry land areas. Heavy precipitation can cause flooding either in the region of precipitation or in areas downstream. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the

day and freezing at night. There are two main types of flooding in the planning area: riverine flooding and flash flooding which includes ice jam flooding.

Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during raped runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms "base flood" and "100-year flood" refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

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

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

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 measure to be taken by those in its path. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animals, than slower developing river and stream flooding.
In some cases, flooding may not be directed attributable to a river, stream, or lake overflowing its banks. Rather, it may simply by the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations-areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow.

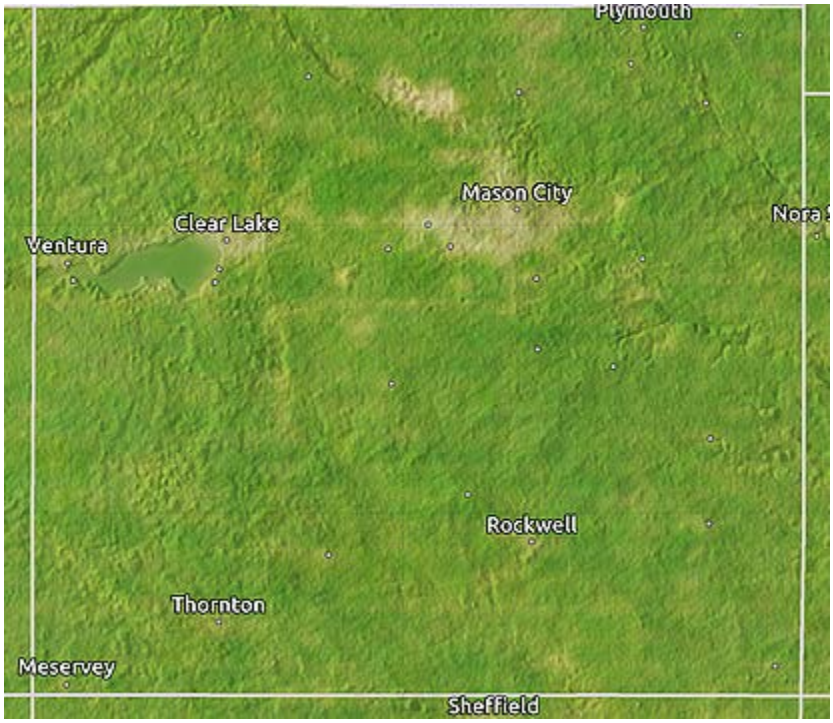
In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with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

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

Geographic Location/Extent

Most of Cerro Gordo County is still mostly rural with the primary land use being agriculture. The major streams in the county flow through relatively flat land with broad floodplains. Cerro Gordo County has two significant rivers within its borders. The Shell Rock River enters on the northern border of the county just north of Plymouth. The Shell Rock flows through the cities of Plymouth and Rock Falls before existing the county on the east border into the city of Nora Springs in Floyd County. The Shell Rock path takes it through relatively flat farm land interrupted by section of high limestone bluffs. The Winnebago River enters the county on the north border crossing under Interstate 35. The Winnebago River flow, takes it mostly through rural land with Mason City as the only community it passes through. Like the Shell Rock River, the Winnebago's path fluctuates between relative flat land and limestone bluffs.
Figure 3.5.11.a. displays the shaded topography relief of Cerro Gordo County.

Figure 3.5.11.a. Topography Relief of Cerro Gordo County



Cerro Gordo County crosses four watersheds. A list of these watersheds with the cities contained within each is provided below.

- 07080202 Shell Rock – Plymouth, Rock Falls and Unincorporated County.
- 07080203 Winnebago – Mason City and Unincorporated County.
- 07080204 West Fork Cedar – Rockwell and Unincorporated County.
- 07080207 Upper Iowa - Unincorporated County.

Figure 3.5.11.b. Cerro Gordo County, Iowa Watersheds

(Cerro Gordo County is red square)

For purposes of this hazard profile and vulnerability analysis, the geographic location/extent for river flooding will be considered as those areas at risk to the 100-year flood (also known as the 1-percent annual chance flood). The 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes.

Determining "Best Available Data" To Depict the 1-Percent Annual Chance Flood
With the availability Digital Flood Insurance Rate May (DFIRM) as well as detailed parcel data with assessed values, analysis of these two layers was determined to be the preferred approach for the Flood Risk Assessment. This will allow for analysis of actual structures and values by type that fall within the boundaries of the regulatory floodplain. A Level I HAZUS analysis, which can provide loss estimate according to the depth-damage function is considered to be less accurate since census block data is used and aggregated and the HAZUS approximated floodplain considers only those streams that drain 10 square miles or more.

Jurisdictional Flood Hazard Maps

Figure 3.5.11.c. to **Figure 3.5.11.o.** provide the DFIRM 1-percent annual chance floodplain for all jurisdictions in the planning area. The county-level map is provided first and the remaining maps are provided in alphabetical order by city.

Figure 3.5.11.c. Cerro Gordo County Rivers

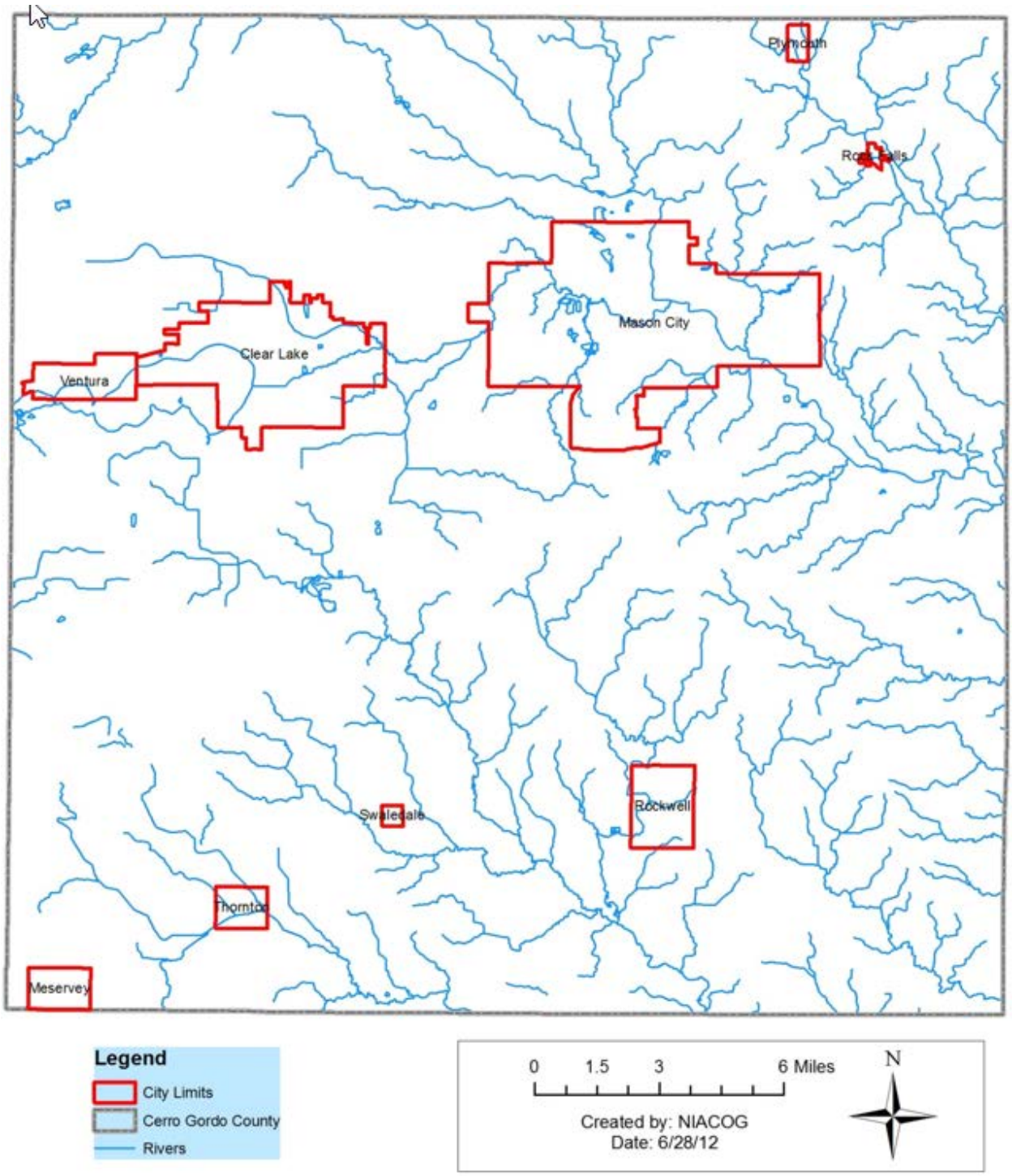


Figure 3.5.11.d. City of Clear Lake Flood Zone Map

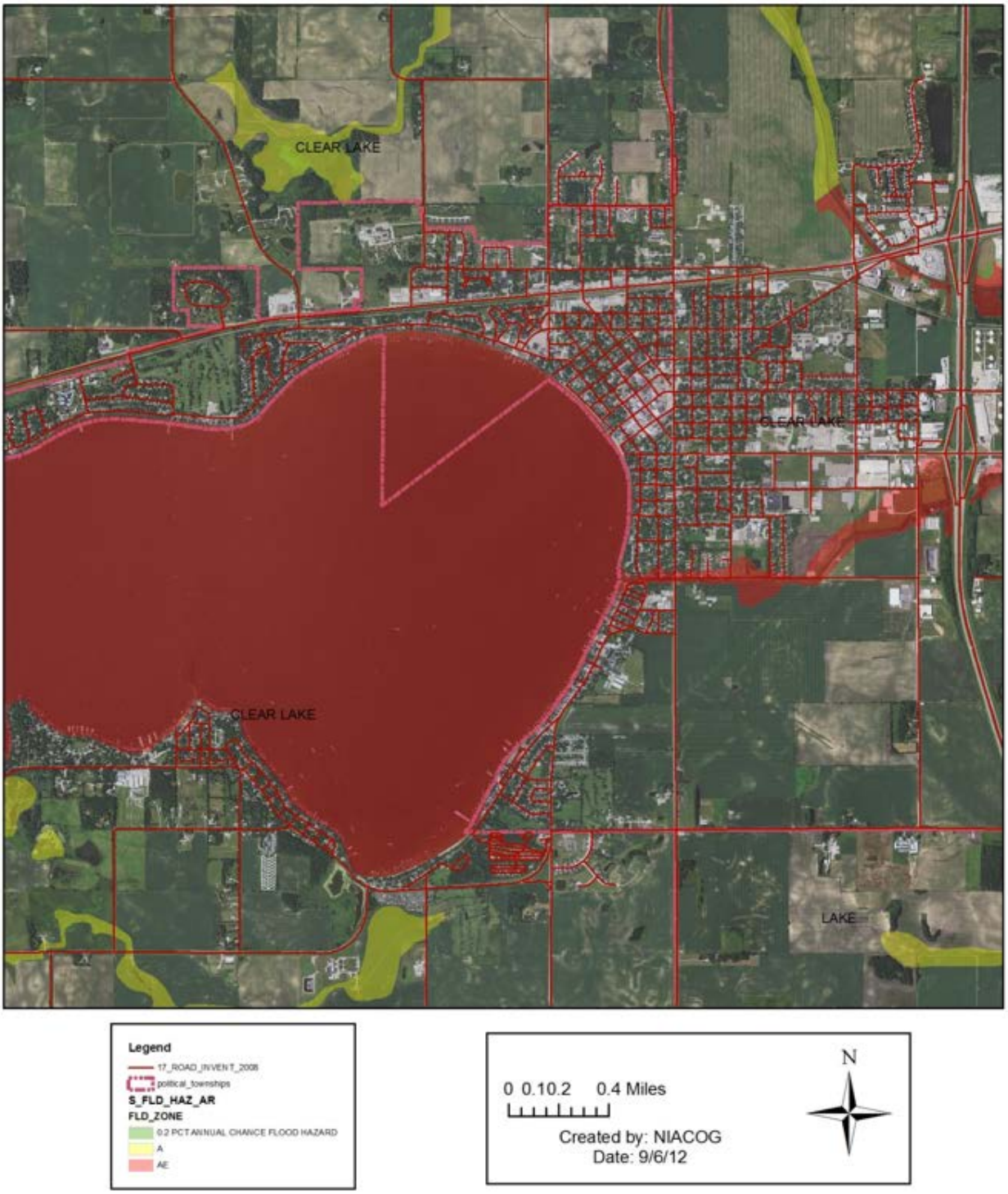


Figure 3.5.11.e. City of Dougherty Flood Zone Map

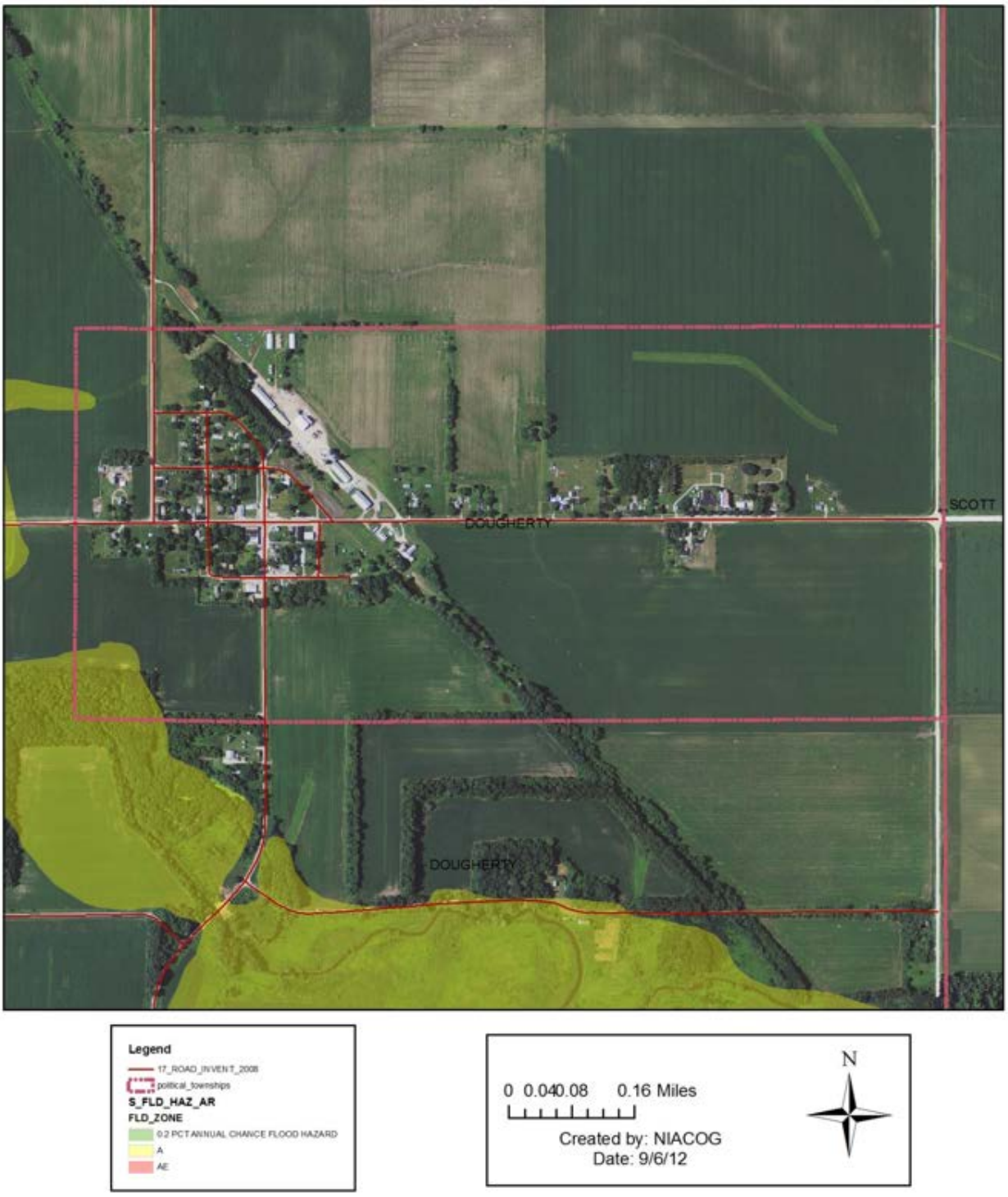


Figure 3.5.11.f. City of Mason City Flood Zone Map

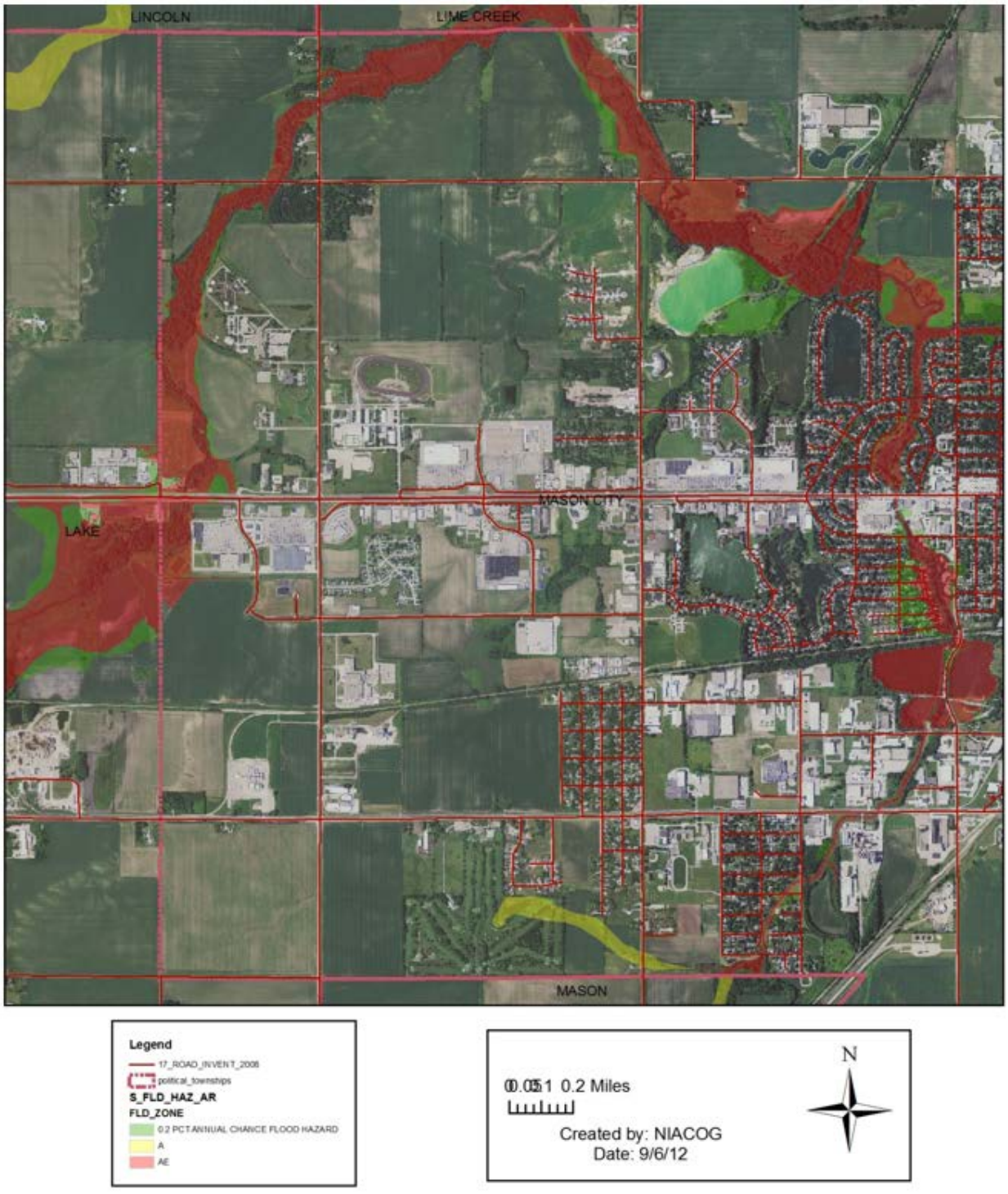


Figure 3.5.11.g. City of Mason City Flood Zone Map

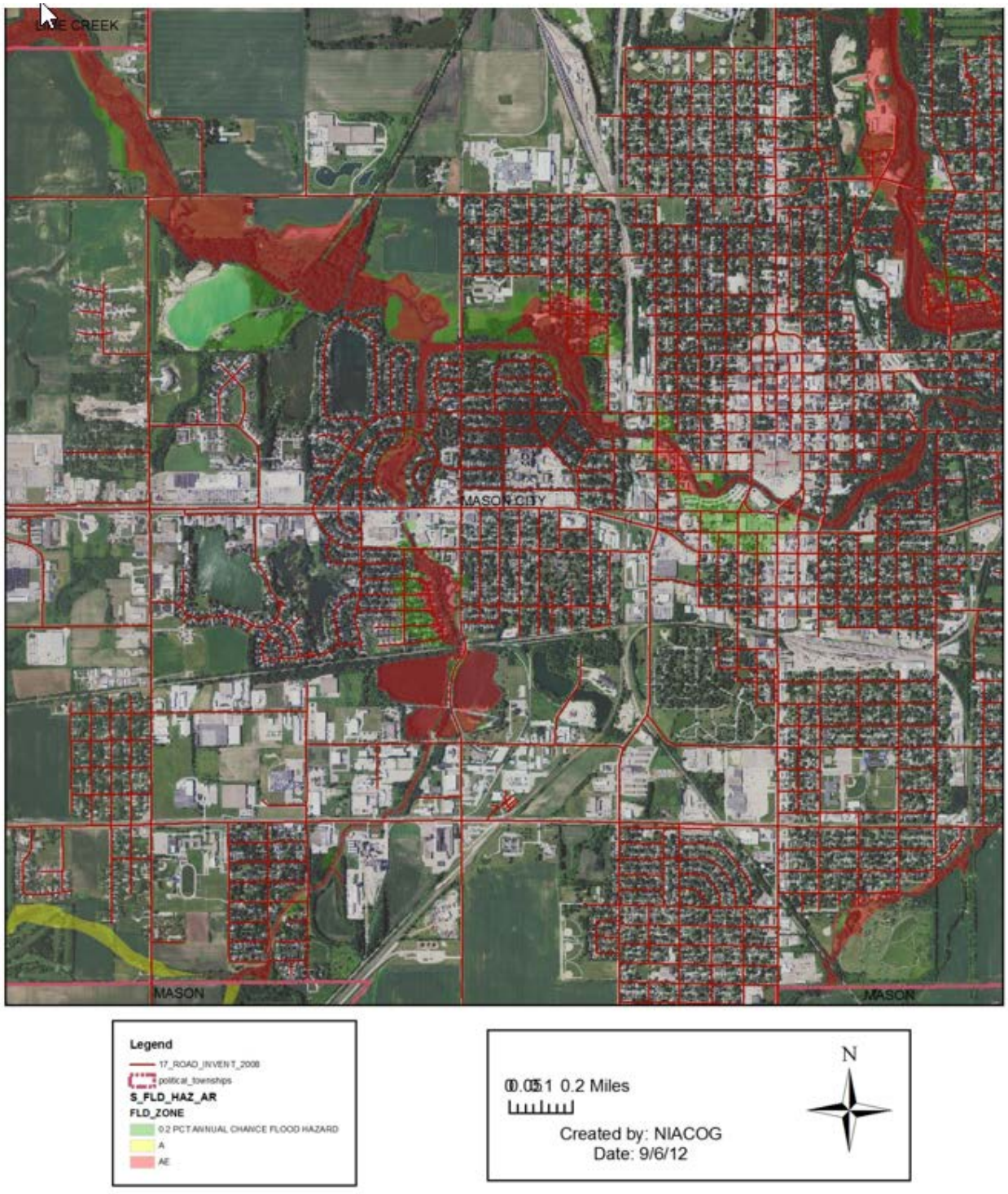


Figure 3.5.11.h. City of Mason City Flood Zone Map

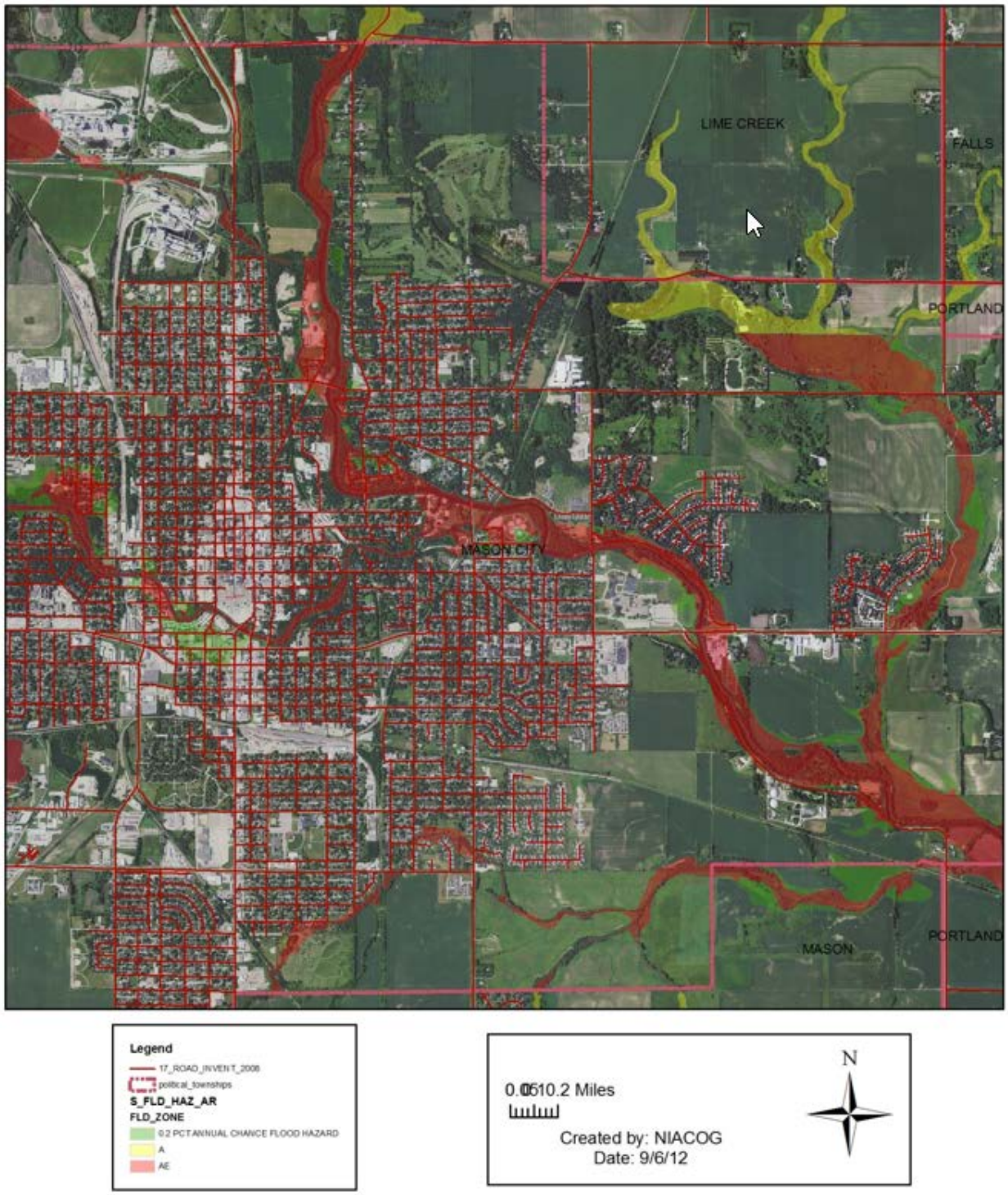


Figure 3.5.11.i. City of Meservey Flood Zone Map

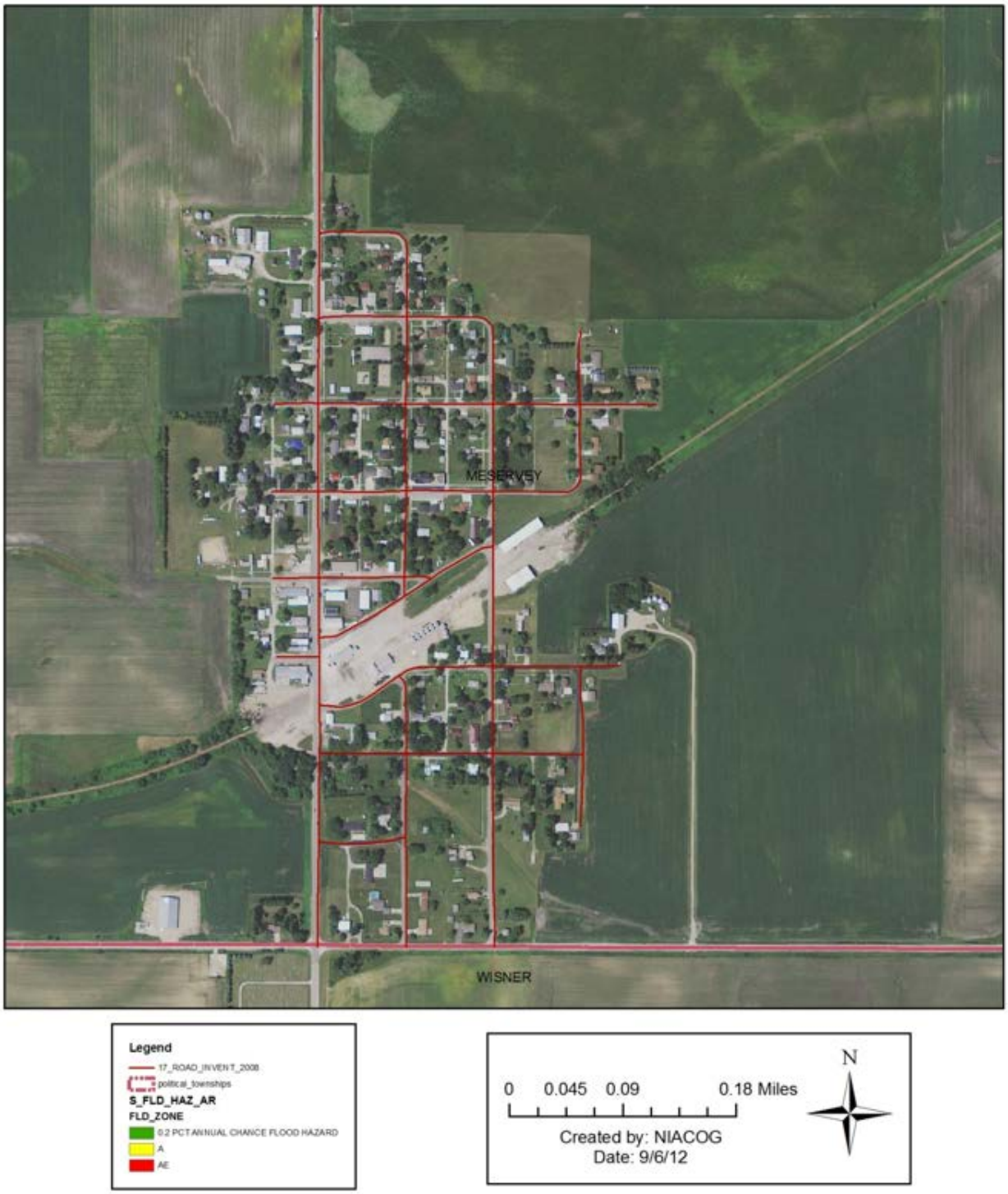


Figure 3.5.11.j. City of Plymouth Flood Zone Map

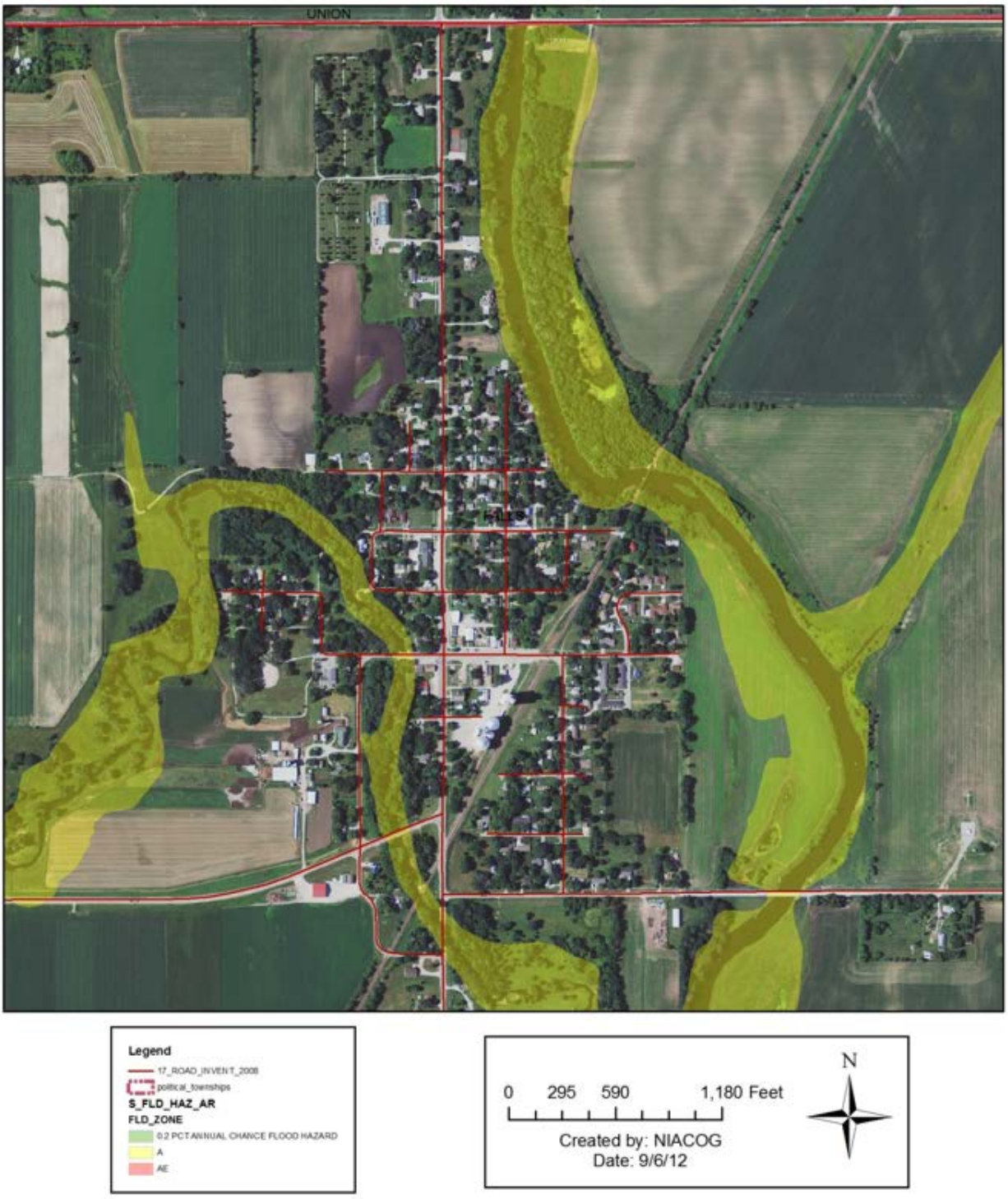


Figure 3.5.11.k. City of Rock Falls Flood Zone Map

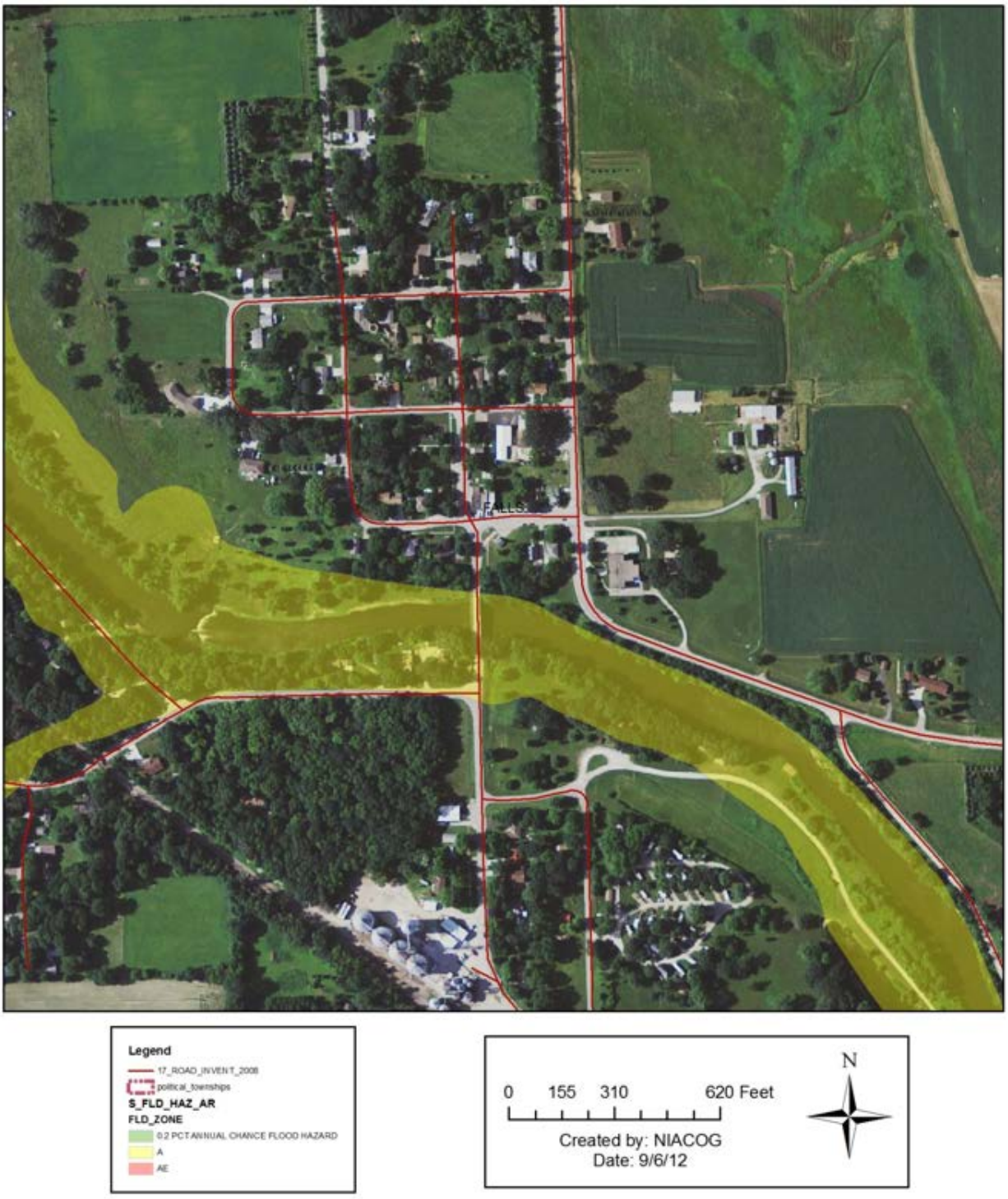


Figure 3.5.11.l. City of Rockwell Flood Zone Map

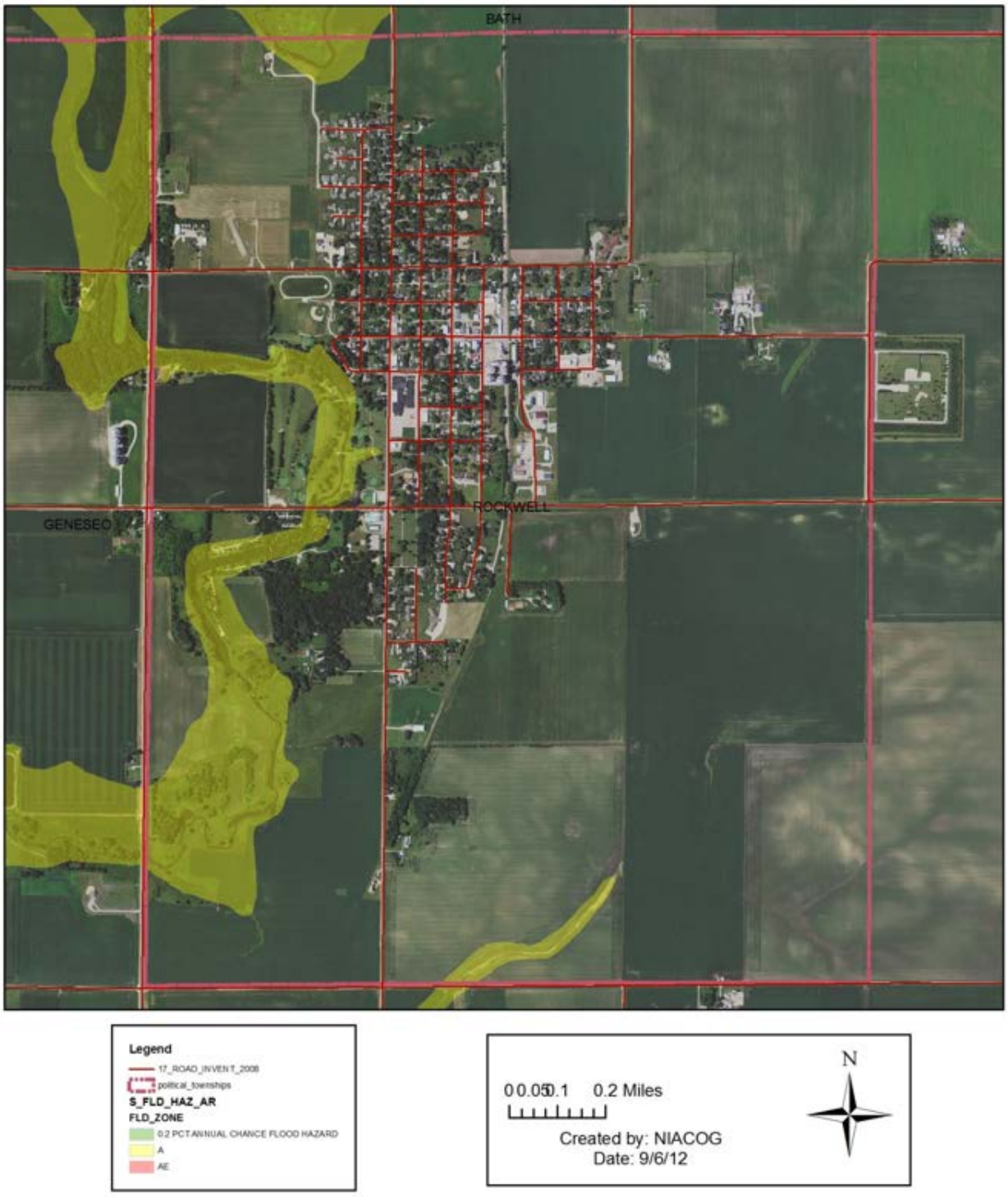


Figure 3.5.11.m. City of Swaledale Flood Zone Map

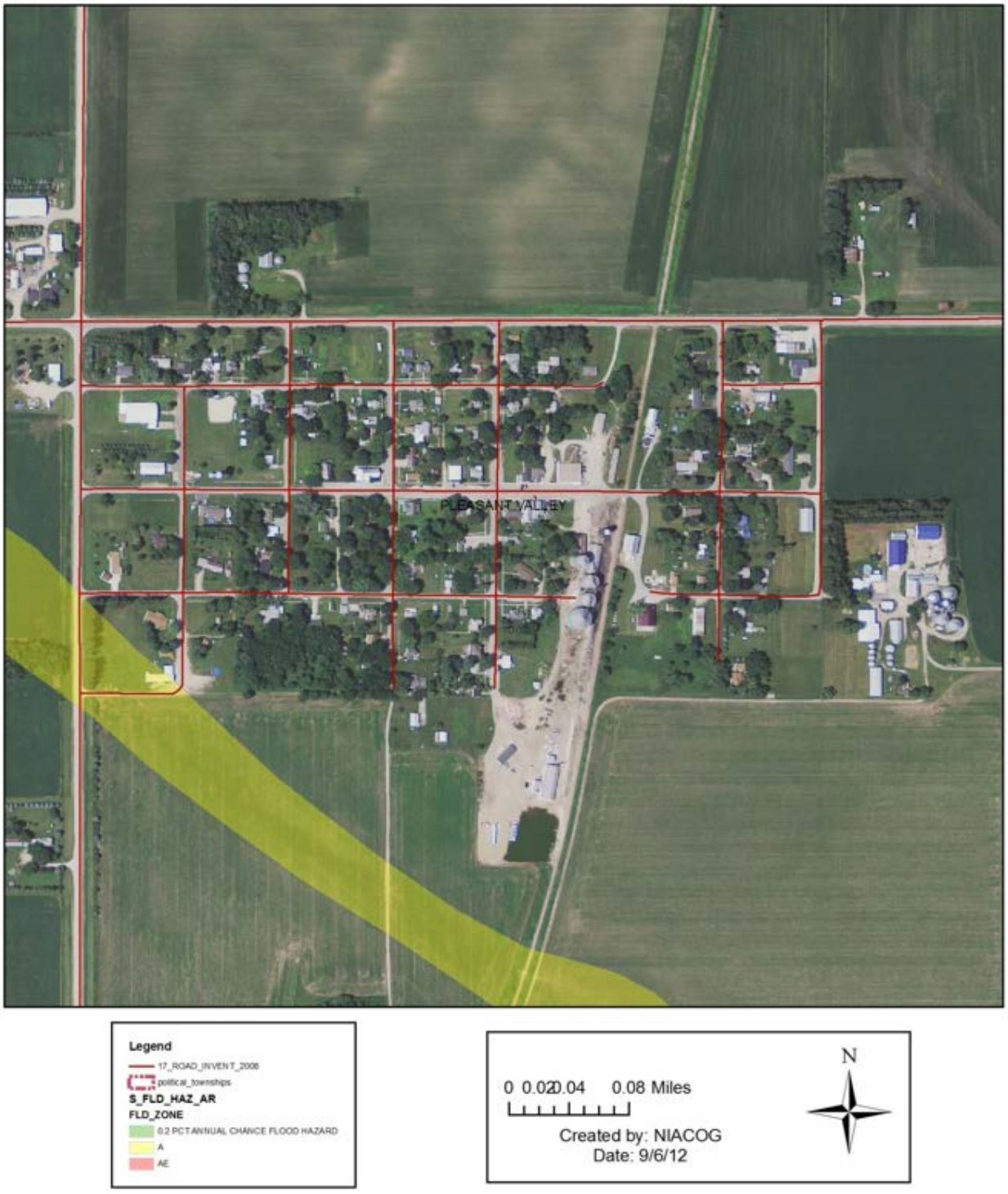


Figure 3.5.11.n. City of Thornton Flood Zone Map

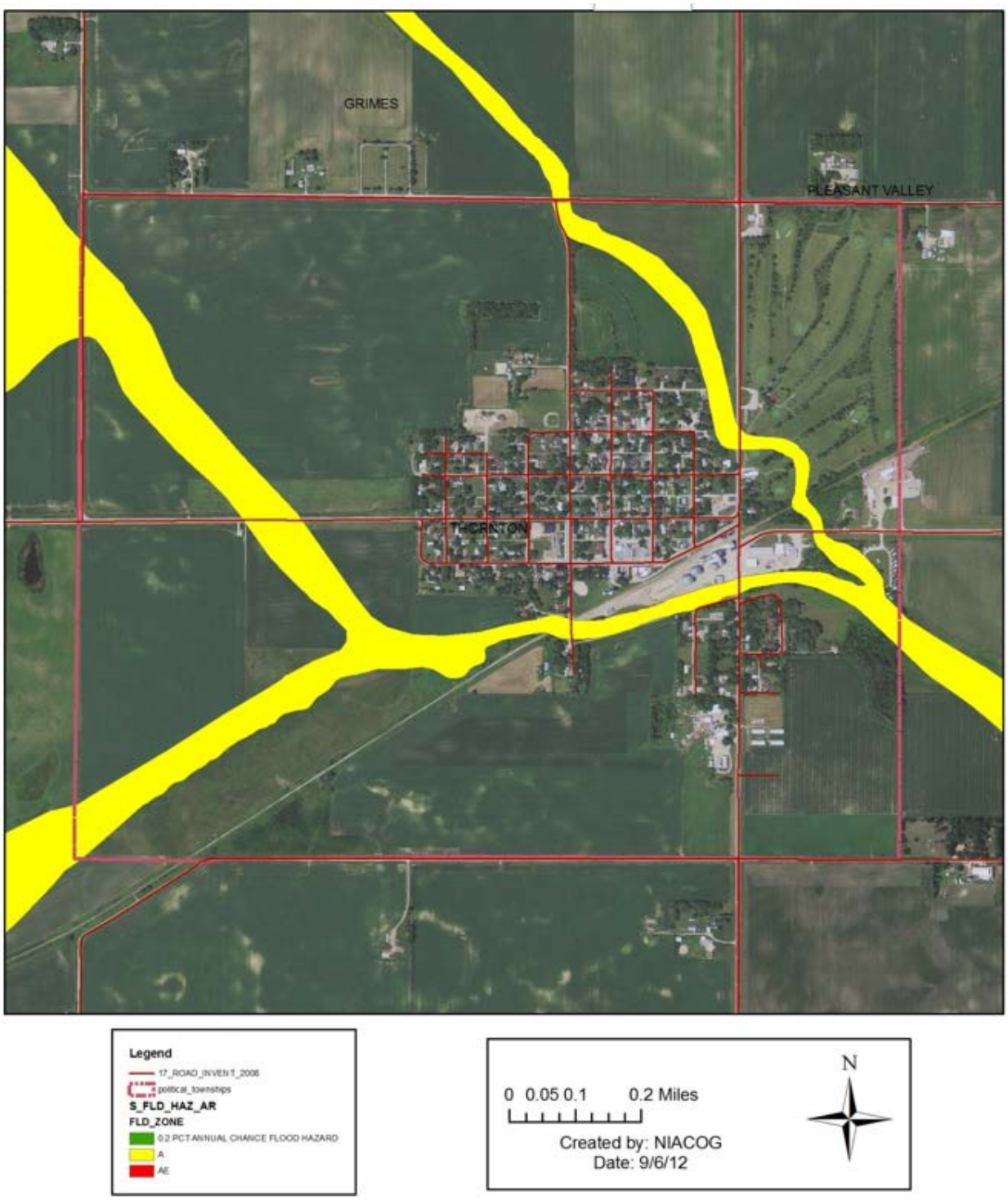
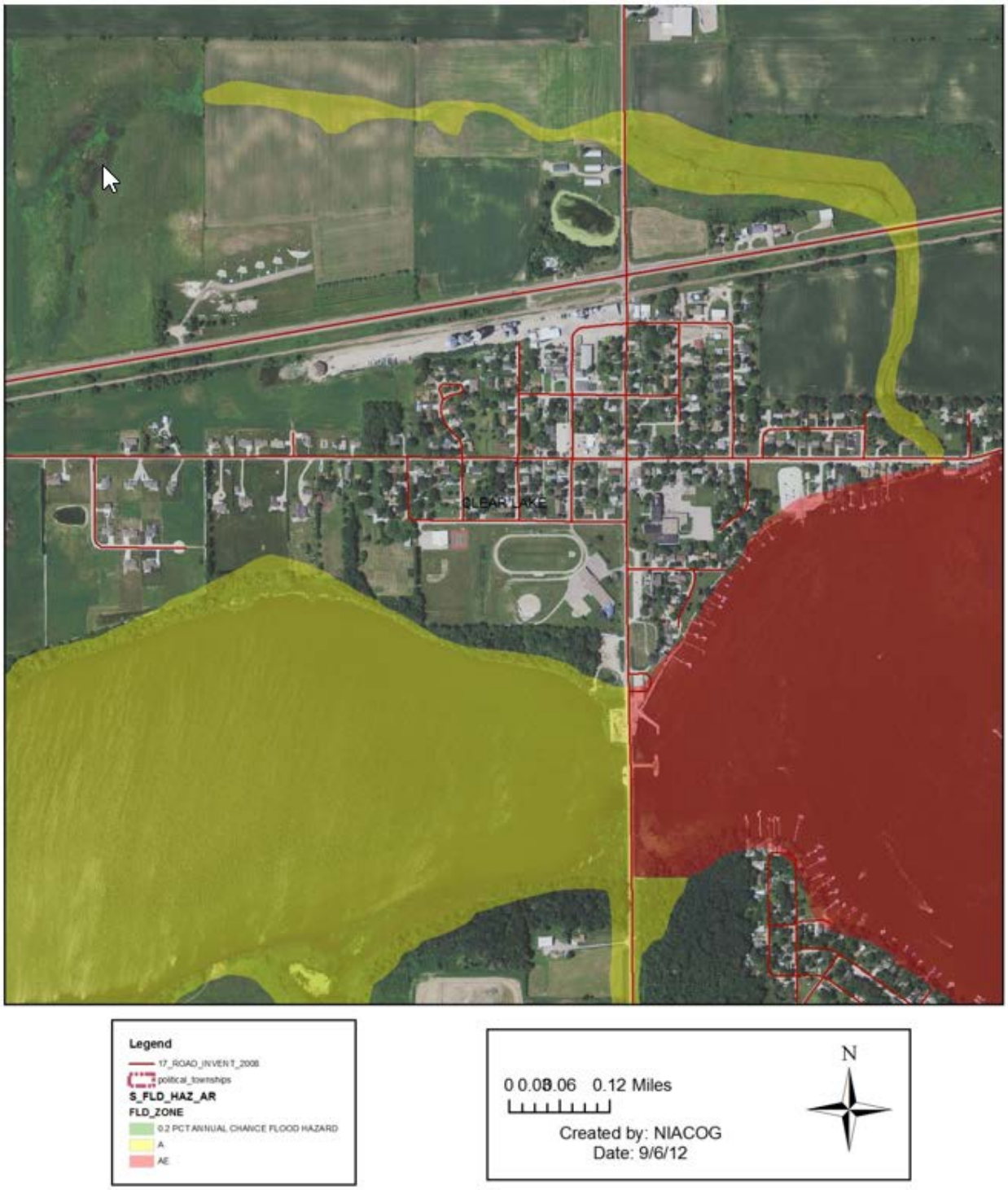


Figure 3.5.11.o. City of Ventura Flood Zone Map



Flash flooding occurs in those locations of the planning area that are low-lying and/or do not have adequate drainage to carry away the amount of water that falls during intense rainfall

events. According to NCDC, the following jurisdictions have a history of flash flooding events: unincorporated Cerro Gordo County, City of Mason City, City of Clear Lake, and City of Rockwell.

Specific areas reported in NCDC flash flood narratives or provided by planning committee members are provided by jurisdiction below:

- 2008 – Heavy rains lead to flash flooding of small creeks and rivers in the area. The resulting flash flooding lead to the evacuation of Autumn Park Apartments in Mason City and the Camp of the Woods Campground northwest of Rock Falls.
- 2010 – Flash flooding of a creek in Mason City caused basements to be flooded and street closings in the neighborhood of Winnebago Heights.
- 2012 – Flash flooding of the Shell Rock River led to the evacuations of Camp of the Woods Campground northwest of Rock Falls and Wilkinson Campgrounds in Rock Falls.
- 2016 – Flash flooding of a small stream near Rockwell cause Highway 65 to be closed.

The National Weather Service has various flash flooding products that are issued to the public to provide information regarding upcoming and current flash flood threats (see **Table 3.5.16.**).

Table 3.5.16. National Weather Service Flood and Flash Flooding Products

Product	What is Means
Flash Flood Warning	A Flash Flood Warning is issued to inform the public, emergency management, and other cooperating agencies that flash flooding is in progress, imminent, or highly likely. Flash Flood Warnings are urgent messages as dangerous flooding can develop very rapidly, with a serious threat to life and/or property. Flash Flood Warning are usually issued minutes to hours in advance of the onset of flooding.
Flood Warning	A Flood Warning is issued to inform the public of flooding that poses a serious threat to life and/or property. A Flood Warning may be issued hours to days in advance of the onset of flooding based on forecast conditions. Floods occurring along a river usually contain river stage (level) forecasts.
Flood Advisory	A Flood Advisory is issued when a flood event warrants notification but is less urgent than a warning. Advisories are issued for conditions that could cause a significant inconvenience, and if caution is not exercised, could lead to situations that may threaten life and/or property.
Flash Flood Watch	A Flash Flood Watch is issued to indicate current or developing conditions that are favorable for flash flooding. The occurrence is neither certain nor imminent. A watch is typically issued within several hours to days ahead of the onset of possible flash flooding.
Flood Watch	A Flood Watch is issued to indicate current or developing conditions that are favorable for flooding. The occurrence is neither certain nor imminent. A watch is typically issued within several hours to days ahead of the onset of possible flooding. In situations where a river or stream is expected to be the main source of the flooding, forecast confidence may allow for a Flood Watch to be issued several days in advanced.
Areal Flood Warning	The threat of Flash Flooding is over, but there is still significant standing water in the affected area.

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

Previous Occurrences
Presidential Declarations for Flooding in Planning Area

Since 2008 there has been only one Presidential Disaster Declaration that included flooding in the planning area: DR Number 1763 – May 25, 2008 to August 13, 2008.

Table 3.5.17. provides details regarding for flash flood and areal flood watches and warnings issued for Cerro Gordo County and the Cerro Gordo County forecast zone by the National Weather Service office. Areal flooding is a type of flash flooding that is generally over a large area usually due to the amount and duration of rainfall.

Table 3.5.17. Flash Flood-Related National Weather Service Watches and Warnings Issued for Cerro Gordo County and Cerro Gordo County, Iowa Forecast Zone (January 2008 – December 2017)

Year	NWS Product	# of Times Issued
2008	Flash Flood Watch	0
2008	Flash Flood Warning	6
2008	Areal Flood Advisory	1
2008	Areal Flood Advisory	8
2008	Flood Warning	6
2009	Flash Flood Watch	0
2009	Flash Flood Warning	0
2009	Areal Flood Advisory	3
2009	Areal Flood Warning	0
2009	Flood Warning	2
2010	Flash Flood Watch	0
2010	Flash Flood Warning	2
2010	Areal Flood Advisory	3
2010	Areal Flood Warning	0
2010	Flood Warning	3
2011	Flash Flood Watch	0
2011	Flash Flood Warning	1
2011	Areal Flood Advisory	0
2011	Areal Flood Warning	1
2011	Flood Warning	2
2012	Flash Flood Watch	0
2012	Flash Flood Warning	0
2012	Areal Flood Advisory	0
2012	Areal Flood Warning	0
2012	Flood Warning	0
2013	Flash Flood Watch	0
2013	Flash Flood Warning	3
2013	Areal Flood Advisory	0
2013	Areal Flood Warning	2
2013	Flood Warning	0
2014	Flash Flood Watch	0
2014	Flash Flood Warning	4
2014	Areal Flood Advisory	0
2014	Areal Flood Warning	2
2014	Flood Warning	0
2015	Flash Flood Watch	0
2015	Flash Flood Warning	1
2015	Areal Flood Advisory	0

2015	Areal Flood Warning	1
2015	Flood Warning	0
2016	Flash Flood Watch	0
2016	Flash Flood Warning	8
2016	Areal Flood Advisory	0
2016	Areal Flood Warning	1
2016	Flood Warning	2
2017	Flash Flood Watch	0
2017	Flash Flood Warning	1
2017	Areal Flood Advisory	0
2017	Areal Flood Warning	0
2017	Flood Warning	0

Source: NCDC

As discussed in the Description Section, flash flooding can be caused by intense rainfall over a brief period. **Table 3.5.18.** provides heavy rainfall events of four inches or greater Cerro Gordo County from 2008-2017.

Table 3.5.18. Heavy Rainfall Events for Cerro Gordo County, Iowa (2008-2017)

Date	Location
7/16/2010	Ventura
8/23/2014	(MCW)Mason City MUNI
8/23/2014	Mason City
7/23/2015	(MCW)Mason City MUNI
7/24/2015	Clear Lake
7/24/2015	Clear Lake
7/24/2015	Clear Lake
7/24/2015	Clear Lake
12/13/2015	(MCW)Mason City MUNI
6/14/2016	Freeman
6/21/2016	(MCW)Mason City MUNI
6/21/2016	Mason City
7/16/2016	Mason City
7/17/2016	Clear Lake
7/17/2016	(MCW)Mason City MUNI
7/30/2016	Thornton
8/23/2016	Mason City
9/06/2016	Clear Lake JCT
9/06/2016	Mason City
9/06/2016	Portland
9/06/2016	Mason City
9/06/2016	(MCW)Mason City MUNI
9/06/2016	Freeman
9/06/2016	Clear Lake
9/06/2016	Clear Lake
9/21/2016	(MCW)Mason City MUNI
9/21/2016	Mason City
9/21/2016	Mason City
9/21/2016	Clear Lake
9/21/2016	Mason City
9/21/2016	Swaledale
9/21/2016	Portland

9/21/2016	Clear Lake
9/21/2016	Mason City
9/22/2016	(MCW)Mason City MUNI
4/19/2017	Clear Lake
4/19/2017	Mason City
4/19/2017	(MCW)Mason City MUNI
4/19/2017	Mason City

Source: NCDC

Information from the NCDC was obtained from January 2008 to December 2017 to determine previous occurrences for flood and flash flood in the planning area. During this time-frame, there were no injuries or deaths reported. Additionally, there was $2,705,000 in damages reported to crops. **Table 3.5.19** provides a summary of the NCDC data.

Table 3.5.19 Flash Flood Events for Cerro Gordo County January 2008 – December 2017

Date	Location	Type
6/07/2008	Freeman	Flash Flood
6/08/2008	Mason City	Flash Flood
6/08/2008	Mason City	Flash Flood
6/08/2008	Mason City	Flash Flood
3/12/2010	Mason City	Flash Flood
6/12/2013	Plymouth	Flash Flood
6/12/2016	Mason City	Flash Flood
8/23/2014	Mason City	Flash Flood
7/24/2015	Clear Lake	Flash Flood
6/10/2016	Winnebago Heights	Flash Flood
6/14/2016	Portland	Flash Flood
6/14/2016	Portland	Flash Flood
7/17/2016	Mason City	Flash Flood
9/21/2016	Freeman	Flash Flood
9/21/2016	Rockwell	Flash Flood
9/21/2016	Mason City	Flash Flood
9/22/2016	Rockwell	Flash Flood
5/15/2017	Swaledale	Flash Flood
Flood		

Source: NCDC

Table 3.5.20. Flood Events in Cerro Gordo County January 2008 – December 2017

Date	Location	Type
3/14/2008	Portland	Flood
4/25/2008	Portland	Flood
5/30/2008	Portland	Flood
6/07/2008	Portland	Flood
3/11/2010	Portland	Flood
6/12/2010	Clear Lake	Flood
3/22/2011	Portland	Flood
9/22/2016	Freeman	Flood

Source: NCDC

Probability of Future Occurrence

The frequency of past events is used to gauge the likelihood of future occurrences. The events from NCDC that occurred on the same day were combined to determine the total number of 18

flash flooding events and 8 flood events in the planning area over the 10-year period from 2008 to 2017. This translates to the likelihood of a flooding event will happen somewhere in the planning area in every given year.

Vulnerability Overview Flash Flooding
Water over low-lying roads and bridges are the most frequent types of impacts associated with flash flooding that has occurred in the planning area. This can cause wash out of bridge abutments and erosion/scour damage on roads. There is potential for loss of life if motorists drive into moving water. However, public education campaigns have helped to educate citizens about not driving through moving water. Building damage is generally limited to water in basements where rain is too intense for drainage systems and natural drainage to carry water away from the structure. In addition, when combined storm/sanitary sewer systems are overloaded, this can result in sewer back-up. Generally, flash-flooding is short in duration and government services and business operations are not impacted.

Vulnerability Overview Flooding
The Floods of 2008 and the ongoing recovery from the losses associated with it as well as the devastating flooding that occurred in 1993 continuously stress the importance of mitigation against river flooding in the State of Iowa and Cerro Gordo County.

The most recent serious flooding event in June 2008 resulted in a Presidential declared disaster for Cerro Gordo County. Given the history of river flooding in Iowa and Cerro Gordo County, it is likely that there will be many minor events in any given year and a high likelihood that a major flooding event requiring federal assistance will occur in the next 5 years.

Table 3.5.21. Represents the impact a 100-year flood could have on the residential, commercial, and industrial structures within Cerro Gordo County. The total dollar impact includes the potential damages to structures and contents.

Table 3.5.21. Structures and Content

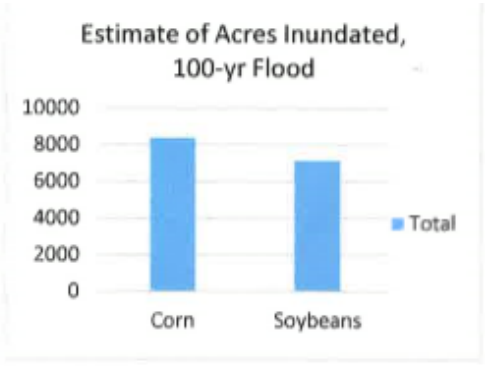
Location		Agriculture	Residential	Commercial	Industrial	Total

Cerro Gordo County	#	28	81	33	3	145
	$	$81,800	$3,920,700	$1,802.000	$112,200	$5,916,800
Clear Lake	#	0	5	11	0	16
	$	0	$157,487	$233,312	0	$390,799
Mason City	#	2	60	13	3	78
	$	$8,781	$801,351	$618,461	$112,234	$3,837,254
Rock Falls	#	0	3	0	0	3
	$	0	$51,244	0	0	$51,244
Thornton	#	1	1	0	0	2
	$	$2,656	$22,237	0	0	$27,891
Plymouth	#	0	4	0	0	4
	$	0	$93,094	0	0	$93,094
Ventura	#	0	0	2	0	2
	$	0	0	$8,616	0	$8,616

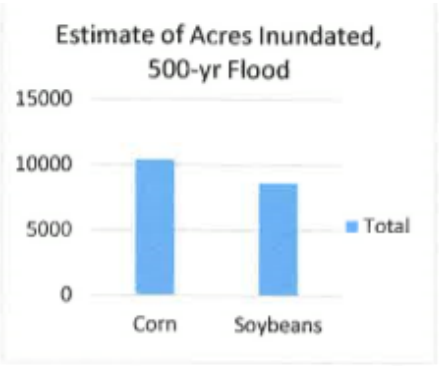
Source: Cerro Gordo County and Mason City Assessor's Office. Iowa Flood Center

HAZUS Level II Results – Agriculture

Agriculture damages (in the form of lost revenue) are calculated as a function of cultivated area, price per bushel, yield, flood duration, and time of year. Projected crop prices for 2017 are $3.96/bushel corn and $10.19/bushel soybean (Risk Management Agency). Soil productivity estimates for the county were provided by the Soil Survey Geographic Database (SSURGO), and land-cover in agriculture was provided by the 2011 National Land-Cover Database (NLCD).



Corn: 8400 acres
Soybeans: 7200 acres



Corn: 10400 acres
Soybeans: 8600 acres

	Lost Revenue from Agriculture by Flood Duration, 100-yr flood			
Date	0-Day	1-Day	3-Day	14-Day
15-Mar	0	0	0	0
21-Apr	0	0	0	$3,110,000
7-Jun	0	0	$6,912,000	$6,912,000
7-Jul	0	$5,184,000	$6,912,000	$6,912,000
15-Sep	0	$5,184,000	$6,912,000	$6,912,000
21-Oct	0	$5,184,000	$6,912,000	$6,912,000

Source: HAZUS Model – Individual Output Analysis

Agricultural Impacts

Additionally, USDA crop insurance claims for excess moisture/precipitation and flood conditions for the ten-year-period from 2004-2013 totaled $8,423,922. Considering that 90.5 percent of insurable crops are insured in Iowa (2013 Iowa Crop Insurance Profile, USDA, RMA), the adjusted losses calculate to $9,359,913 for all insurable crops for the period. This results in moisture/precipitation/rain and flood conditions affecting agriculture.

Critical Facilities and Infrastructure at Risk

To analyze critical facilities at risk in the planning area, the planning committee reviewed and updated the inventory of critical and essential facilities and infrastructure in the planning area that was compiled in 2011 as part of the development of the 2011 Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan. After the critical facilities were validated and revised as part of this plan update effort, a comparison was made with the Effective DFIRM layer to determine those facilities that would be damaged in a 1-percent annual chance flood event. This analysis revealed 12 critical or essential facilities that are in the 1-percent annual chance floodplain and one critical facility in the 0.2-percent annual chance floodplain.

Appendix E provides the list of critical facilities in the 1-percent annual chance floodplain that could be damaged in the event of a 1-percent annual chance flood. This Appendix is "For Official Use Only". To obtain access for official use, contact the Cerro Gordo County Emergency Management Coordinator.

Future Development
Any future development in floodplains would increase risk in those areas. For those communities that participate in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas. However, even if structures are mitigated, evacuation may still be necessary due to rising waters. In addition, floods that exceed mitigated levels may still cause damages.

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

3.5.12 Major Fire - Structural

Weighted Hazard Score	
Weighted Score	Level
1.82	Low

Profile

Hazard Description
A structural fire is an uncontrolled fire in populated areas that threatens life and property and is beyond normal day-to-day response capability. Structural fires present a far greater threat to life and property and the potential for much larger economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved fire-fighting equipment, training, and techniques lessen the chance and impact of a major urban fire. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of the material involved. Nearly all are quickly extinguished by on-site personnel or local fire departments.

Geographic Location/Extent
All structure within the planning area is susceptible to fire at anytime. In some communities, structure fires are a yearly occurrence.

Previous Occurrences

For this plan, the committee focused on major structural types of fires (Commercial, Industrial, Apartments) and exclude, nuisance fires, single-family residential and vehicle fires. From 2007 thru 2016, there were 12 fatalities due to fires in Cerro Gordo County. **Table 3.5.22.** shows a list of major structure fires (Apartment, Commercial, and Industrial) for the years 2008-2017 in Cerro Gordo County totaling $6,191,000 in damages and 7 injuries.

Table 3.5.22. Major Structure Fires for Cerro Gordo County, IA (2008-2017)

Date	Jurisdiction	Total Estimated Damage Costs	Injuries	Deaths
12/30/2008	Mason City	$67,000	1	0
7/26/2009	Mason City	$78,000	0	0
3/08/2010	Mason City	$480,000	0	0
4/20/2010	Mason City	$35,000	0	0
2/01/2013	Clear Lake	$450,000	0	0
2/21/2013	Mason City	$350,000	0	0
6/24/2013	Clear Lake	$130,000	0	0
12/02/2013	Clear Lake	$135,000	0	0
1/22/2014	Mason City	$500,000	0	0
4/21/2014	Mason City	$70,000	0	0
5/04/2015	Mason City	$55,000	0	0
11/07/2015	Mason City	$25,000	0	0
11/27/2015	Mason City	$29,000	0	0
11/30/2015	Clear Lake	$945,000	0	0
1/11/2016	Mason City	$400,000	1	0
1/12/2016	Rockwell	*	*	*
6/14/2016	Clear Lake	$250,000	0	0
7/02/2016	Clear Lake	$125,000	0	0
10/02/2016	Clear Lake	$175,000	0	0
11/09/2016	Clear Lake	$325,000	0	0
4/08/2017	Mason City	$30,000	3	0
6/22/2017	Mason City	$6,000	2	0
7/23/2017	Clear Lake	$750,000	0	0
8/10/2017	Mason City	$643,000	0	0
10/10/2017	Mason City	$100,000	0	0
10/10/2017	Clear Lake	$120,000	0	0
12/15/2017	Mason City	$350,000	0	0
Totals		**$6,191,000**	**7**	**0**

Source: Cerro Gordo County Fire Department's records
* Information not available

Probability of Future Occurrence

As stated earlier, structure fires are a yearly occurrence in some communities. Most communities have strong fire prevention programs and code enforcement. Even with the increase in efforts in these areas both residential and non-residential fires will continue to occur.

Vulnerability

Older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Combustible building materials obviously are more vulnerable that 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, smaller, or otherwise inadequate water distribution infrastructure such as water mains and hydrants are also at significant risk. The fire death risk for the elderly and children under 5 years is more than two times that of the average population.

Potential Losses to Existing Development/Future Development
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 materials 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.

3.5.13 Hail Storm

Weighted Hazard Score	
Weighted Score	Level
1.74	Low

Profile

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

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

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

Based on the information provided by the Tornado and Storm Research Organization, **Table 3.5.23.** below describes typical damage impacts of the various sizes of hail.

Table 3.5.23. Hailstorm Intensity Scale

TORRO Hailstorm Intensity Scale

H	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-**15**	>20	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

* Approximate range (typical maximum size in bold), since other factors (e.g. number and density of hailstones, hail fall speed and surface wind speeds) affect severity.

Hail Scale

The scale extends for H0 to H10 with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The characteristic damage associated with each increment in Britain is listed in the table but may need to be modified for other countries to reflect differences in building materials and types; e.g. whether roofing tiles are predominantly slate, shingle or concrete.

An indication of equivalent hail kinetic energy ranges (in joules per square metre) has now been added to the first six increments on the scale, and this may be derived from radar reflectivities or from hail pads. The International Hailstorm Intensity Scale recognizes that hail size alone is insufficient to accurately categories the intensity and damage potential of a hailstorm, especially towards the lower end of the scale. For example, without additional information, an event in which hail of up to walnut size is reported (hail size code 3: hail diameter of 21-30 mm) would be graded as a hailstorm with a minimum intensity of H2-3. Additional information, such as the ground wind speed or the nature of the damage the hail caused, would help to clarify the intensity of the event. For example, a fall of walnut-sized hail with little or no wind may scar fruit and sever the stems of crops but would not break vertical glass and so would be ranked H2-3. However, if accompanied by strong winds, the same hail may smash many windows in a house and dent the bodywork of a car, and so be graded an intensity as high as H5.

However, evidence indicates that maximum hailstone size is the most important parameter relating to structural damage, especially towards the more severe end of the scale. It must be noted that hailstone shapes are also an important feature, especially as the “effective” diameter of non-spheroidal specimens should ideally be an average of the co-ordinates. Spiked or jagged hail (see photographs on the TORRO web Gallery) can also increase some aspects of damage.

The TORRO Hailstorm Intensity Scale (H0 to H10) in relation to typical damage and hail size codes. Size codes are presented in **Table 3.5.24**.

Table 3.5.24.

Hail size and diameter in relation to TORRO Hailstorm Intensity Scale.

Size code	Maxmimum Diameter mm	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > Soft ball
9	91-100	Grapefruit
10	>100	Melon

The Size Code is the maximum reported size code accepted as consistent with other reports and evidence.

Thunderstorms that generate hail usually develop rather rapidly. Duration is less than 6 hours and with modern forecasting warning time is generally 6 to 12 hours.

Geographic Location/Extent
Thunderstorms and the associated hail impact the entire Cerro Gordo County with relatively similar frequency.

The land area affected by individual hail events is not much smaller than that of the parent thunderstorm, an average of fifteen miles in diameter around the center of the storm. Damage to property, facilities, and infrastructure is usually limited to broken windows and damaged roofs.

Agricultural crops, such as corn and soybeans are particularly vulnerable to hailstorms, stripping the crops of their leaves.

Previous Occurrences
The NCDC reported 58 hail events for the Cerro Gordo County planning area from January 2008 through December 2017. The events with damage search, was limited to hail size of at least ¾ ″ in diameter. Of the reported events, there was $135,000 in total property damage and $112,000 in crop damage, with no injuries or deaths. **Table 3.5.25.** shows the hail summary for Cerro Gordo County.

Table 3.5.25. Hail Summary for Cerro Gordo County

Total Events	Events with Damage	Damage Costs	Injuries	Fatalities
58	27	$135,000	0	0

Source: NCDC

Table 3.5.26. shows the number of hail events of 0.75 inches and larger by the size of the hail.

Hail Size (inches)	# of Events 2008-2017
1.75	5
1.50	3
1.25	5
1.00	31
.88	9
.75	5

Source: NCDC

Crop losses for Cerro Gordo County as a result of hail damage from 2008 to 2017 totaled $112,000.

Probability of Future Occurrence
Based on NCDC data, there have been 58 separate hail events in a 10 year period, producing an average of 5.8 hail events each year in Cerro Gordo County. When limiting the probability analysis to hail events producing hail 1″ or larger, there have been 44 separate events in a 10 year period. Based on this history, there can be a severe hail event every year making the probability for damaging hail possible in any given year.

Vulnerability
In general, assets in Cerro Gordo County are vulnerable to hail damage, including crops, vehicles and structures. Hailstorms cause nearly $1billion dollars annually in property and crop damage in the United States. According to the 2013, Iowa Hazard Mitigation Plan, of the hazards for which data was available to estimate annualized losses, thunderstorms with lightning and hail ranked 4th with $30 million in annualized losses based on data spanning a 17 year period. Although this hazard results in high annual losses, generally private property insurance and crop insurance cover the majority of losses. Considering insurance coverage as a recovery capability and therefore mitigation of devastating impacts to the economy, the overall impact on jurisdictions is reduced.

Potential Losses to Existing Development
With the regularity to these types of storms it can be expected that each year there will be loss due to hail. With the majority of these incidents covered by insurance, losses will be minimal.

Future Development
Future development will increase vulnerability to this hazard. Proper insurance for property and crops will be of high importance to residents.

3.5.14 Drought

Weighted Hazard Score	
Weighted Score	Level
1.57	Low

Profile

Hazard Description

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

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

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

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

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

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

media, observers and other sources. NDMC's website is found at http://www.drought.unl.edu/. Specific drought impacts by county are recorded at http://droughtreporter.unl.edu/.

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

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

Geographic Location/Extent

The entire planning area in Cerro Gordo County is at risk to drought and 92 percent of the surface land in the county is for agriculture purposes.

According to U.S. Climate Data, the planning area receives an average of 35.21 inches of rainfall per year. In average years, this represents enough rainfall to prevent drought; however, it is the result of successive years of below-average rainfall that cause drought impacts in the planning area.

Previous Occurrences

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

According to NCDC, during the 20-year period from January 1998 thru December 2017, Cerro Gordo County listed 6 drought impacts. These are listed in **Table 3.5.27**.

Table 3.5.27. Event – Drought for Cerro Gordo County, IA (1998-2017)

Date	Type	Property Damage	Crop Damage
8/01/2001	Drought	$0	$11,350,000
8/01/2003	Drought	12,650,000	$0
7/01/2012	Drought	$0	$45,000,000
8/01/2012	Drought	$0	$6,000,000
9/01/2012	Drought	$0	$0
10/01/2012	Drought	$0	$0
Totals:		**$12,650,000**	**$62,350,000**

Source: NCDC

Impacts of recent drought periods in Iowa that affected Cerro Gordo County are provided below. Unless otherwise indicated, these impacts are from the Drought Impact Reporter.

- **October 15, 2013 –**Bur oak blight and emerald ash borer have made considerable progress in damaging Iowa's ash and bur oak trees due to drought in 2012, which weakened trees and made them more susceptible to pests and disease. The emerald ash borer has been found in Des Moines, Cedar, Allamakee and Jefferson counties in 2013 and is expected to continue spreading throughout the State.
- **September 5, 2013** –Drought conditions are worsening across the State and spreading across the State.
- **October 12, 2012 –**Iowa State University agriculture experts advised farmers to test forages for quality this fall because variable nutrient levels and high nitrate levels can occur in forages grown during drought.
- **September 25, 2012 –** The U.S. Drought Monitor on this data shows the severity of the statewide drought conditions. Cerro Gordo County was in Severe Drought conditions.
- **July 1-30, 2012 –** Very warm and dry weather that began in the spring continued into the summer. Rainfall was in short supply across the State. Much of the State recorded less than 50 percent of normal rainfall for July. Rapid deterioration of the corn and soybean crop took place with several periods of temperatures in excess of 100 degrees. By the end of July, officials estimated that 32 percent of the corn yield had been lost to the drought. At the current price, the loss total was in excess of $4.5 billion state-wide.
- **August 3, 2003** – Dry conditions that began in September 2002 and continued through 2003, manifesting into a moderate to severe drought at the start of August 2003 which is a crucial time for soybean development and corn in filling out the ears with large kernels. According to the Iowa State Climatologist, August 2003 was the driest on record with a statewide average of only 0.96 inches of rainfall which was 3.23 inches below the normal for August.

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

The following are the indices:

- **Palmer Z Index** monitors short-term monthly moisture conditions when depart from normal,
- **Palmer Drought Severity Index** measures the duration and intensity of the long-term (meteorological) drought patterns,
- **Palmer Hydrological Drought Index** measures hydrological impacts of drought.

In the past 30 years, there have been six years of recorded damages from drought conditions in Cerro Gordo County resulting in a probability rating of 20 percent. The Cerro Gordo County Hazard Mitigation Planning Team believes that the current trend of warmer climate conditions will continue and that the probability rating is "Unlikely".

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

Cerro Gordo County has 844 farms in the County that cover 336,732 acres of land. This translates to 92 percent of the surface land in the County being used for agriculture. Therefore, the planning area has a high exposure to this hazard. Aside from agricultural impacts, other losses related to drought include increased costs of fire suppression and damage to roads and structural foundations due to the shrink dynamic of expansive soils during excessively dry conditions. Drought also presents hazards to public health in extreme cases, where drinking water production cannot keep up with demand. Water wells become less productive during drought and a failure of remaining productive wells (due to power outage, etc.) can cause public drinking water supplies to become compromised.

According to the 2013 Iowa Hazard Mitigation Plan, of the 8 hazards for which data was available to estimate annualized losses, drought ranked 2nd with $424 million in annualized losses based on data spanning an 18-year period. Although losses associated with this hazard can be very high, particularly associated with agriculture; crop insurance coverage mitigates the adverse economic impacts somewhat. Considering the planning area's capabilities to withstand a portion of the impacts associated with drought, the magnitude was determined to be "Negligible".

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

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

4 MITIGATION STRATEGY

44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section presents the mitigation strategy updated by the Hazard Mitigation Planning Committee (HMPC) 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 disaster impacts as well as specific mitigation actions that can be put in place to directly reduce vulnerability to hazards and losses. The following definitions are based upon those found in FEMA publication 386-3, Developing a Mitigation Plan (April 2003):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are usually long-term, broad, policy-type statements.
- **Mitigation Actions** are specific actions that help achieve goals.

4.1 Goals

44 CFR Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

This planning effort is an update to an existing hazard mitigation plan. Therefore, the goals from the 2013 Cerro Gordo County Hazard Mitigation Plan were reviewed to determine if they are still valid. Cerro Gordo County Emergency Management facilitated a discussion session with the HMPC to review and update the plan goals. To ensure that the goals are comprehensive and support State goals, the 2013 State Hazard Mitigation Plan goals were reviewed. Cerro Gordo County Emergency Management also presented common categories of mitigation goals from other plans.

The goals for this plan update are provided below:

1. Minimize vulnerability of the people and their property in Cerro Gordo County to the impacts of hazards.

2. Protect critical facilities, infrastructure and other community assets from the impacts of hazards.

3. Improve education and awareness regarding hazards and risk in Cerro Gordo County.

4. Strengthen communications among agencies and between agencies and the public.

4.2 Identification and Analysis of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

During meetings of the HMPC, and individual jurisdictions, the results of the risk assessment update were provided for review and the key issues were identified for the high-ranked hazards. Each meeting concluded with an introduction to mitigation actions to prompt discussions within and among the jurisdictions about any new mitigation actions as well as on-going actions from the existing plans.

The focus of following meetings, and through email correspondence, was to update the mitigation strategy. For a comprehensive range of mitigation actions to consider, the HMPC reviewed the following information during the meetings and through the email:

- Existing Actions submitted in the previous mitigation plan,
- Key Issues from Risk Assessment (top 14 hazards),
- State Priorities for Hazard Mitigation Assistance Grants.

In development of each jurisdictions final mitigation strategy for submission to the plan, the jurisdictions were encouraged to review the details of the risk assessment to address vulnerabilities specific to their jurisdiction.

The mitigation strategy update included a thorough review and status update of the existing actions. **Table 4.1** provides a summary of the number of actions that each jurisdiction identified in the previous plan. Please note that West Fork School District was not included as officially participating jurisdiction in the previous plan. As a result, there are no previous actions for West Fork.

Table 4.1 (2013) Cerro Gordo County, IA Identified Actions

Jurisdiction	# of Actions
Cerro Gordo County	5
Clear Lake	10
Dougherty	4
Mason City	13
Meservey	3
Plymouth	6
Rock Falls	3
Rockwell	6
Swaledale	3
Thornton	5
Ventura	7
Clear Lake School	3
Mason City Schools	3

National Flood Insurance Program

Cerro Gordo County has identified special flood hazard areas by the Federal Emergency Management (FEMA). Cerro Gordo County does have a FEMA issued Flood Insurance Rate Maps (FIRM) with an effective date of 5/16/12. Cerro Gordo County's community ID number issued by FEMA is #19033C. Regularly updating the zoning codes, Cerro Gordo County plans to continue to prevent development within floodplains. The recommendation of the plan is to continue participation in the NFIP.

Table 4.3 NFIP Status of Jurisdictions

Jurisdiction	CID#	Effective Map Date	NFIP Participating
Cerro Gordo County	19033C	5/16/2012	Yes
Clear Lake	190059	5/16/2012	Yes
Dougherty	190689	5/16/2012	No
Mason City	190060	5/16/2012	Yes
Meservey	190777	5/16/2012	No
Plymouth	190061	5/16/2012	Yes
Rock Falls	190351	5/16/2012	Yes
Rockwell	190352	5/16/2012	Yes
Swaledale	190809	5/16/2012	No
Thornton	190062	5/16/2012	Yes
Ventura	190674	5/16/2012	Yes

Table 4.4 Repetitive Loss Properties by Jurisdiction

Jurisdiction	Mitigated ?	Insured ?	Occupancy	Losses	As of Date
Clear Lake	No	No	Single Family	2	12/31/2017
Mason City	No	No	Single Family	3	12/31/2017
Mason City	No	No	Single Family	2	12/31/2017
Mason City	No	No	Single Family	2	12/31/2017
Mason City	No	No	Single Family	5	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	3	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	3	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017
Mason City	Yes	No	ASSMD Condo	5	12/31/2017
Mason City	Yes	No	Single Family	2	12/31/2017

4.3 Mitigation Measures Feasibility

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

The committee and each jurisdiction were given the list of current mitigation measures for review. It was determined that the current measures would remain, with the addition of measure 23. The committee and each jurisdiction were instructed to complete one of the following status choices for each previously submitted action.

- Completed,
- Not Started/Continue in Plan Update,
- In Progress/Continue in Plan Update, or
- Delete

The mitigation measures are categorized as follows:

1. **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
2. **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
3. **Structural:** Actions that involve the construction of structures to reduce the impact of hazards.
4. **Natural resource protection:** Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural systems.
5. **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential way to mitigate them.

The planning committee reviewed the hazards that had been identified as well as the mitigation measure goals and categories with regards to the identified hazards. Anyone on the committee and in attendance at the meetings could verbally submit a mitigation measure to be considered in the plan, and then each mitigation measure was discussed, placing particular emphasis on new and existing buildings and infrastructure. Through much discussion of a comprehensive range of alternatives the planning committee achieved consensus on the measures to include in the plan. Each jurisdiction has respective measures that were important to them. Each jurisdiction would be willing to accomplish and/all measure(s), if funds were secured. The measures are listed here for reference.

Analysis of Mitigation Measures

1. **Develop/update/publicize emergency management plans, including preparedness, response, recovery, operations, long term recovery, and mitigation plans and maintain data inventory.**
   This measure will allow the jurisdiction to produce required and relevant plans that are up to date and are working documents that the community can use.

2. **Electrical Utility Retrofit/Hardening**
   This measure will allow the jurisdiction with the cooperation of the local utility company to upgrade and harden electrical lines and facilities in order to withstand hazardous events.

3. **Construct, retrofit, or maintain drainage/water supply/dry hydrant systems to provide adequate and proper functioning systems to include sewage, water and fire suppression systems and retention and detention systems.**
   This measure will allow the jurisdiction to construct proper drainage and sewer systems in order to prevent infiltration of silt, soil, and other foreign materials into their sewage systems causing backup into homes and businesses. This measure also allows a jurisdiction to construct proper water supply systems and dry hydrant systems to address fire suppression issues.

4. **Acquire flood prone properties and convert to open space/green space; or elevate to or above base flood elevation.**
   This measure will allow the jurisdiction the option to acquire flooded properties in order to prevent the continued flooding of structures located in a flood plain, or elevate structures avoid the threat of repeated flooding to the subject property.

5. **Construct public safe rooms for government facilities, critical facilities, recreational areas, manufactured home parks, schools, and day care centers.**
   This measure will allow the jurisdiction to construct safe rooms that will protect the public during extremely hazardous events, i.e., tornado, thunderstorms and lightning, severe winter storm, etc. The school districts in Cerro Gordo County would like to have tornado safe rooms as a part of their facilities in order to protect the children and other occupants during hazardous weather. Right now the children go to the hallway during a tornado warning which has been proven as unsafe. This measure would ensure that the children and others that are in the school building are protected during a tornadic event. This measure is supported by the school districts as well as the school but also the community as a whole. Many residents will also benefit from the safe room.

6. **Replace or retrofit bridges and culverts to meet capacity requirements.**
   This measure will allow the jurisdiction the ability to prevent damage from flash floods with additional capacity to handle large amounts of water from heavy rains.

7. **Purchase/install backup power generators.**
   This mitigation measure assures that county critical facilities as designated by the Board of Supervisors, Emergency Management Coordinator, Sheriff's Department, etc., have adequate backup power supply to carry on the critical mission of the county during a disaster.

8. **Develop and implement watershed studies and implement watershed plans and conduct hydrology studies of groundwater problems, support of siltation removal.**
   This measure will allow the jurisdiction to look into the watershed to see what the jurisdiction can do to help maintain proper drainage into the watershed that the jurisdiction lies in.

9. **Install soil stabilization, drainage and erosion protection measures.**
   This measure will allow the jurisdiction to prevent erosion of river and creek banks. The proper drainage that allows water to drain properly and at a controlled rate into a creek or river will lessen the chances of erosion and possible flooding.

10. **Non-structural retrofit of public structures.**
    Retrofitting public structures to prevent damages from hazardous events will ultimately protect the occupants and protect the limited budgets of local jurisdictions by lessening the damage from the hazardous events.

11. **Construct, retrofit or maintain levees, dams, floodwalls, culverts, and floodgates to ensure adequate capacity and protection levels for property and critical facilities.**
    This measure will allow the jurisdiction in Cerro Gordo County the option of updating their culverts to meet the capacity requirements of a heavy rainstorm.

12. **Reduce injury and property damage from domestic terrorism and active shooter events.**
    This measure will allow the jurisdictions to protect their citizens from domestic terrorist and active shooter incidents through the education of citizens and training of response personnel, and by properly equipping responders to allow them to mitigate these incidents quickly and effectively.

13. **Develop and promote comprehensive cost-effective recommendation for adoption and enforcement of land use, ordinances and regulations, promote legislation, zoning, and building codes that regulate construction, and decrease risk in areas susceptible to hazards.**
    This measure will allow jurisdictions the option of putting into place proper ordinances and building codes to prevent or lessen the damage from hazardous events.

14. **Ensure that proper security measures are in place for critical facilities.**
    This measure will ensure that security measures at noted critical facilities will be in place to prevent damage and protect those that rely on the function of those critical facilities.

15. **Establish natural vegetation buffers and removal of dead vegetation next to sensitive lands and forestry improvements/tree planting.**
    This measure will prevent many hazardous events like flooding, grass or wild land fires, etc. This measure will ensure safety and property protection of Cerro Gordo County residents and property owners.

16. **Encourage communities to include severe repetitive loss and repetitive loss strategy in all-hazard mitigation plans and comprehensive plans and educate communities on these properties in their jurisdiction and measures which may be used to reduce future damages.**
    This measure will encourage the communities of Cerro Gordo County to continue to recognize repetitive loss claims and educate the communities to continue doing what they are doing to prevent these properties from becoming damaged and possibly removing them from the hazardous areas.

17. **Complete FIRM (Flood Insurance Rate Map) and encourage NFIP community and individual participants, and survey of flood prone areas, and river channel studies, and update of existing flood maps.**
    This action ensures the safety and property protection of Cerro Gordo County residents and property owners. This action also encourages communities to continue their participation and compliance in the NFIP and encourages communities not participating to begin participation.

18. **Relocate critical facilities for flood protection.**
    By relocating critical facilities out of the areas that are prone to flooding ensures that these facilities can be relied upon during times of hazardous events when they are most likely to be needed.

19. **Construct/elevate wastewater lift stations.**
    The construction and elevation of a sewage lift station will allow the jurisdiction to prevent the flooding of the wastewater sewage system and hopefully prevent the backup seen in many homes in the past.

20. **Construct floodwalls.**
    The construction of floodwalls will protect the jurisdiction from floods and also protect critical functions of the jurisdiction to ensure the proper functioning of the city.

21. **Install and maintain protective measures for the safety and security of critical facilities.**
    This measure will allow a jurisdiction to fully protect its critical facilities from a wide range of hazardous events to prevent damage, theft, and loss of function.

22. **Employ construction measures that direct water away from structures.**
    This measure will prevent the flooding of structures and protect property owners from flooding.

23. Develop measures to prevent threats from cyber-attacks.
This measure will protect IT systems from intrusion and attacks from outside sources.

Table 4.5 identifies the goal(s), hazard addressed, action category(ies) and the priority.

Table 4.5 – Mitigation Measures and Goals

Measure	Goals	Hazard Addressed	Action Category
1. Develop/update/publicize emergency management plans, including preparedness, response, recovery, operations, long term recovery, and mitigation plans and maintain data inventory.	1,2, 3,4	All hazards	Prevention Public Education & Awareness
2. Electrical Utility Retrofit/Hardening.	2	Thunderstorms and Lightning, Infrastructure Failure, Tornado, Severe Winter Storm, Windstorm	Property Protection, Structural
3. Construct, retrofit, or maintain drainage/water supply/ dry hydrant systems to provide adequate and proper functioning systems to include sewage, water and fire suppression systems and retention and detention systems.	1,2	Flash Flooding, River Flooding, Severe Winter Storms, Infrastructure Failure	Property Prevention, Structural, and Natural Resource Protection
4. Acquire flood prone properties and convert to open space/green space; or elevate to or above base flood elevation.	1,2,3	Flash Flooding, River Flooding	Prevention, Property Protection
Measure	**Goals**	**Hazard Addressed**	**Action Category**
5. Construct public safe rooms for government facilities, critical facilities, recreational areas, manufactured home parks, schools, and day care centers.	1,2,3	Thunderstorms and Lightning, Tornado, Severe Winter Storms, Extreme Heat, Windstorm	Prevention, Property Protection, Structural
6. Replace or retrofit bridges and culverts to meet capacity requirements.	2	Flash Flooding, River Flooding	Structural
7. Purchase/install backup power generators.	2	Thunderstorms and Lightning, Severe Winter Storms, Infrastructure Failure	Property Protection
8. Develop and implement watershed studies and implement watershed plan and conduct hydrology studies of groundwater problems, support of siltation removal projects, and creation of retention basins.	1	Flash Flooding, River Flooding	Natural Resource Protection
9. Install soil stabilization, drainage and erosion protection measures.	1	Flash Flooding, River Flooding, grass or wild land fire	Natural Resource Protection
10. Non-structural retrofit of public structures.	2	All Hazards	Property Protection
11. Construct, retrofit or maintain levees, dams, floodwalls, culverts, and floodgates to ensure adequate capacity and protection			Property Protection,

levels for property and critical facilities.	1.2	Flash Flooding, River Flooding	Structural
12. Reduce injury and property damage from domestic terrorism and active shooter events.	1,3,4	Terrorism	Prevention, Public Education and Awareness, Property Protection
13. Develop and promote comprehensive cost-effective recommendation for adoption and enforcement of land use, ordinances and regulations, promote legislation, zoning, and building codes that regulate construction, and decrease risk in areas susceptible to hazards.	3	All Hazards	Prevention, Public Education & Awareness
14. Ensure that proper security measures are in place for critical facilities.	2,4	Hazardous Materials, Human Disease, Terrorism	Property Protection, Public Education & Awareness
15. Establish natural vegetation buffers and removal of dead vegetation next to sensitive lands and forestry improvements/tree planting.	1	Grass and Wild Land Fire	Property Protection, Natural Resource Protection
16. Encourage communities to include severe repetitive loss and repetitive loss strategy in all-hazard mitigation plans and comprehensive plans and educate communities on these properties in their jurisdiction and measures which may be used to reduce future damages.	1,3	Flash Flooding, River Flooding	Prevention, Property Protection, Public Education & Awareness
17. Complete FIRM (Flood Insurance Rate Maps) and encourage NFIP community and individual participants, and survey of flood prone areas, and river channel studies, and update of existing flood maps.	3,4	Flash Flooding, River Flooding	Prevention, Property Protection, Public Edu. & Awareness
Measure	**Goals**	**Hazard Addressed**	**Action Category**
18. Relocate critical facilities for flood protection.	2	Flash Flooding, River Flooding	Property Protection, Structural
19. Construct/elevate wastewater lift stations.	1,2	Flash Flooding, River Flooding, Infrastructure Failure	Structural
20. Construct floodwalls.	1,2	Flash Flooding, River Flooding	Structural
21. Install and maintain protective measures for the safety and security of critical facilities.	2	Terrorism	Property Protection, Structural
22. Employ construction measures that direct water away from structures.	1,2	Flash Flooding, River Flooding	Property Protection, Structural
23. Develop measures to prevent threats to cyber security.	1,2,3, 4	Cyber Threats	Public education and Awareness,

			Prevention, Property Protection, Data Protection

4.4 Implementation of Mitigation Actions

Requirement §201.6(c)(3)(iii): [The mitigation strategy shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Jurisdictions were encouraged to meet with others in their community to review identified hazard risks within their community, the hazards probability of occurrence, historical occurrences, severity, location and vulnerability, and then to identify and finalize the mitigation actions to be submitted to the mitigation strategy. Actions were prioritized based on a review of hazard related data, committee's personal knowledge of hazards, and the majority rule voting method. Throughout the discussion of the types of projects that the committee would include in the mitigation plan, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act regulations state that benefit-cost review is the primary method by which mitigation projects should be prioritized. Cost-effectiveness will be considered in additional detail when seeking FEMA Hazard Mitigation Assistance grant funding for eligible projects identified in this plan. At that time, additional information will be researched to provide for a quantitative benefit-cost analysis. This information has been compiled into Table 4.6 below.

Table 4.6 – Implementation of Mitigation Actions Chart

Jurisdiction	Measure Number	Mitigation Action	Completion Time Frame	Benefit Compared to Cost	Potential Funding Source(s)	Action Priority	Person/Department Responsible
Cerro Gordo County	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County, EMPG	High	County EMA
	5	Construct Tornado safe room at County Campgrounds and Fairgrounds	3-5 years	Medium	HMGP	Low	Supervisors County EMA
	7	Back-up Generator for Courthouse	1-3 years	High	County, HMGP	High	Supervisors IT Dept.
	13	Development of land use ordinances & regulations	5 years	Medium	County	High	Planning & Zoning
	14	Increase/enhance security systems at all county facilities	5 years	High	County	High	Supervisors
	23	Develop IT security plan and recovery plan; IT security training for employees	5 years	High	County	High	IT Dept.
	12	Obtain needed equipment for deputies to allow adequate response to tactical operations; provide tactical training; train staff to respond to active shooter situations	5 years	High	County, HSGP	High	Sheriff
	21	Develop county-wide outdoor warning sirens	5 years	High	County, HMGP	Medium	Supervisors County EMA
Clear Lake		Maintain all					

	1	emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	3	Updating of sewer & drainage systems, extension of water mains	5 years	High	City	High	Public Works
	21	Upgrade outdoor warning sirens	3 years	High	City, HMGP	High	City Council Police Chief
	7	Back-up generator for City Hall & Police Dept.	3 years	Medium	City, HMGP	High	City Council
	11	Construct floodwall on lake outlet	2-3 years	Medium	City, HMGP	Medium	City Council Public Works
	12	Obtain needed equipment & training for PD & Fire office's for response to active shooters	5 years	High	City, HSGP	High	Police Chief
Dougherty	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	5	Construct safe room incorporating City Hall and Fire Dept.	5 years	Medium	HMGP	High	City Council
	7	Back-up generator for City Hall	1-3 years	High	HMGP	High	City Council
	3	Installation of Community Sewer System	5 years	High	City, HMGP,FMA	High	City Council

Mason City		Maintain all					

	1	emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	13	Flood plain management ordinance	1-3 years	High	City	High	Flood Plain Manager
	3	Replace 100 fire hydrants annually	5 years	High	City	Medium	City Water Dept.
	2	Extend life of above ground power grid	5 years	High	Utility Company	High	Utility Company
	3	Highway 122 storm sewer project	1-2 years	High	City	High	City Engineer
	6	Replacement of 12th St. N.W. bridge	1-2 years	High	City	High	City Engineer
	12	Obtain needed equipment & training for PD & Fire office's for response to active shooters	5 years	High	City, HSGP	High	Police & Fire Chiefs
	21	Upgrade outdoor warning sirens	3 years	High	City, HMGP	Medium	City Council Fire Chief
	23	Secure all IT systems through hardware & software protection and employee education	5 years	High	City	High	IT Dept. City Council
Meservey	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	3	Storm sewer improvements	3-5 years	High	City, HMGP, FMA	High	City Council

Plymouth		Maintain all					

	1	emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	5	Construct safe room to be used as community room	5 years	Medium	City, HMGP	Medium	City Council
	6	Replace bridge on Main Street	3-5 years	High	City	Medium	City Council
	7	Purchase back-up generator to support city services	1-2 years	Medium	City	Medium	City Public Works
	21	Install outside lighting for city building security	1-3 years	Medium	City	Medium	City Public Works
Rock Falls	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	7	Purchase back-up generator to support city services	3-5 years	Medium	City, HMGP	Medium	City Council
Rockwell	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	5	Construction of safe room incorporating fire dept.	1-3 years	Medium	City, HMGP	High	City Council, Fire Chief
	21	Upgrade outdoor warning sirens	3 years	High	City, HMGP	High	City Council

Swaledale		Maintain all					

	1	emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	3	Purchase of transfer pump for support of storm sewer	1-3 years	High	City	High	City Council
	5	Construct safe room to be used as community center	5 years	Medium	City, HMGP	Medium	City Council
	7	Purchase back-up generator to support city systems	1-3 years	High	City, HMGP	High	City Council
Thornton	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	5	Construct safe room to be used as community center	5 years	Medium	City, HMGP	Low	City Council
	7	Purchase back-up generator to support city systems	2-5 years	High	City, HMGP	High	City Council
	6	Replace two bridges	1-2 years	High	County	High	County Engineer
Ventura	1	Maintain all emergency plans. Management & training of weather spotters.	Yearly	High	County	High	County EMA
	3	Construction of water treatment plant	3-5 years	High	City, HMGP	High	City Council
	7	Purchase back-up generators for city's facilities	3-5 years	High	City, HMGP	High	City Council
	5	Construction of fire station/safe room	5 years	Medium	City, HMGP	High	Fire Chief
Clear Lake Schools		Maintain all emergency plans.					

	1		Yearly	High	School District	High	School Board
	12	Train staff to respond to active shooter incidents	1-2 years	High	School District	High	School Board
	21	Continue to install security systems in all schools	1-3 years	High	School District, HMGP	High	School Board
	5	Install safe room at High School	5 years	Medium	School District, HMGP	Medium	School Board
Mason City Schools	1	Maintain all emergency plans.	Yearly	High	School District	High	School Board
	5	Construct safe room at Lincoln/Roosevelt campus	5 year	High	School District	Medium	School Board
	21	Addition of video systems and secure entrances at all schools	1-3 years	High	School District	High	School Board
	12	Prepare staff & students for active shooter incidents	1-3 years	High	School District	High	School Board
West Fork Schools	1	Maintain all emergency plans.	Yearly	High	School District	High	School Board
	5	Construct safe room at Rockwell facility	1-3 years	High	School District, HMGP	High	School Board
	12	Prepare staff & students for active shooter incidents	1-3 years	High	School District	High	School Board
	21	Install additional security systems in all schools	1-3 years	High	School District, HMGP	High	School Board

5 PLAN MAINTENANCE PROCESS

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6 (c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Hazard Mitigation Planning Committee (HMPC)

With adoption of this plan, the HMPC will be tasked with plan monitoring, evaluation and maintenance. The participating jurisdictions and agencies, led by the Cerro Gordo County Emergency Management Coordinator, agree to:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low-or-no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the Cerro Gordo County Board of Supervisors and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The HMPC is an advisory body and can only make recommendations to county, city, town, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

5.1.2 Plan Maintenance Schedule

The HMPC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Cerro Gordo County Emergency Management Coordinator will be responsible for initiating the plan reviews and will invite members of the HMPC to the meeting.

In coordination with the other participating jurisdictions, a five-year written update of the plan will be submitted to the Iowa Homeland Security and Emergency Management Division and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

5.1.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to action implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will follow the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting on an annual basis to the jurisdictional HMPC member on action status and providing input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional HMPC member will determine what additional measures may be implemented, and an assigned individual will

be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the Cerro Gordo County HMPC deems appropriate and necessary, and as approved by the Cerro Gordo County Board of Supervisors and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement 201.6 (c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. Based on the capability assessments of the participating jurisdictions, communities in Cerro Gordo County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- General or master plans of participating jurisdictions;
- Ordinances of participating jurisdictions;
- Cerro Gordo County Emergency Operations Plan;
- Capital improvement plans and budgets;
- Other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans;
- School Plans; and
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

HMPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The HMPC is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Hazard Mitigation Plan, The Cerro Gordo County Emergency Management Coordinator will provide the updated Mitigation Strategy with current status of each mitigation action to the County Supervisors as well as all mayors, City Clerks, and School District Superintendents requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms.

5.3 Continued Public Involvement

44 CFR Requirement 201.6 (c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted in the Globe Gazette, and on the County website following each annual review of the mitigation plan. When the HMPC reconvenes for the update, it will coordinate with all stakeholders participating in the planning process, including those who joined the HMPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.

APPENDIX A: REFERENCES

- Cerro Gordo County Assessor's Office
- Cerro Gordo County Conservation Board
- Cerro Gordo County Department of Public Health
- Cerro Gordo County Digital Flood Insurance Rate Maps
- Cerro Gordo County Emergency Management
- Cerro Gordo County GIS Department
- Cerro Gordo County Hazardous Materials Flow Analysis
- Cerro Gordo County Multi-jurisdictional Hazard Mitigation Plan (February 2013)
- Clear Lake Fire Department
- Data Collection Guides completed by each jurisdictions
- Environmental Protection Agency
- FEMA
- FEMA Local Mitigation Planning Handbook (March 2013)
- Factfinder.gov
- Hazards U.S. (HAZUS)
- Iowa Department of Agriculture and Land Stewardship
- Iowa Department of Natural Resources, Tier II data
- Iowa Department of Public Health
- Iowa Homeland Security and Emergency Management Department
- Iowa State Fire Marshall Division
- Iowa State University Department of Agronomy, Environmental Mesonet
- Iowa Utilities Board
- Iowa Hazard Mitigation Plan (November 2013)
- Mason City Assessor's Office
- Mason City Fire Department
- Mason City Planning & Zoning
- National Drought Mitigation Center Drought Reporter
- National Institute of Building Science Multi-Hazard Mitigation Council 2005
- National Oceanic and Atmospheric Administration's National Climate Data Center
- National Weather Service, Des Moines
- National Severe Storms Laboratory
- National Transportation Safety Board
- Oklahoma Climatological Survey 1999
- Pipeline and Hazardous Materials Safety Administration
- U.S. Census Bureau
- U.S. Department of Agriculture
- U.S. Department of Health and Human Services
- U.S. Department of Transportation
- U.S. Fish and Wildlife Service
- U.S. Geological Survey

APPENDIX B: PLANNING PROCESS

B. 1 Jurisdiction Mitigation Priorities
B. 2 Meeting Notifications, Agendas, Sign-in Sheets
B. 3 Data Collection Guide
B. 4 Announcement for Final Public Comment Period

B.1 Jurisdiction Mitigation Priorities

Cerro Gordo County

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	2	1	2	3	1.80	Low
Cyber attack	2	3	4	4	2.80	Moderate
Drought	1	1	1	4	1.30	Low
Flooding	2	2	4	3	2.40	Moderate
Hailstorm	2	1	3	2	1.85	Low
Hazardous Materials Incident-Facility	2	2	4	3	2.40	Moderate
Hazardous Materials Incident-Transportation	3	1	4	2	2.45	Moderate
Ice Storm	2	1	3	3	1.95	Low
Major Structure Fire	1	1	4	2	1.55	Low
Pandemic	2	3	1	4	2.35	Moderate
Power Outage	2	2	4	2	2.30	Moderate
Severe Summer Storms	3	2	3	3	2.70	Moderate
Terrorism	1	1	4	4	1.75	Low
Tornado	2	3	4	4	2.80	Moderate

Clear Lake

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	4	2	1	2	2.75	Moderate
Cyber attack	2	3	4	2	2.60	Moderate
Drought	2	1	1	4	1.75	Low
Flooding	1	2	1	3	1.50	Low
Hailstorm	3	1	2	1	2.05	Moderate
Hazardous Materials Incident-Facility	1	1	3	1	1.30	Low
Hazardous Materials Incident-Transportation	1	1	3	1	1.30	Low
Ice Storm	4	2	1	2	2.75	Moderate
Major Structure Fire	1	1	3	1	1.60	Low
Pandemic	1	4	1	4	2.20	Moderate
Power Outage	3	3	4	2	3.05	High
Severe Summer Storms	4	3	2	1	3.10	High
Terrorism	1	2	4	2	1.85	Low
Tornado	1	3	4	4	2.35	Moderate

Dougherty

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	3	1	2	1	2.04	Moderate
Cyber attack	1	1	4	2	1.55	Low
Drought	1	1	4	1	1.45	Low
Flooding	1	1	4	1	1.45	Low
Hailstorm	2	1	4	1	1.90	Low
Hazardous Materials Incident-Facility	1	1	4	1	1.45	Low
Hazardous Materials Incident-Transportation	2	1	4	1	1.90	Low
Ice Storm	3	1	2	1	2.05	Moderate
Major Structure Fire	1	1	4	1	1.45	Low
Pandemic	1	1	4	1	1.45	Low
Power Outage	3	1	4	1	2.35	Moderate
Severe Summer Storms	3	1	4	1	2.35	Moderate
Terrorism	1	1	4	1	1.45	Low
Tornado	2	1	4	3	2.10	Moderate

Mason City

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	3	1	2	1	2.05	Moderate
Cyber attack	3	2	4	3	2.85	Moderate
Drought	2	1	1	4	1.75	Low
Flooding	2	2	3	3	2.25	Moderate
Hailstorm	2	1	3	1	1.75	Low
Hazardous Materials Incident-Facility	2	2	4	1	2.20	Moderate
Hazardous Materials Incident-Transportation	3	1	4	1	2.35	Moderate
Ice Storm	2	3	3	3	2.55	Moderate
Major Structure Fire	1	2	4	1	1.75	Low
Pandemic	2	3	1	4	2.35	Moderate
Power Outage	2	2	4	2	2.30	Moderate
Severe Summer Storms	3	2	2	1	2.35	Moderate
Terrorism	2	3	4	2	2.60	Moderate
Tornado	2	3	4	3	2.70	Moderate

Meservey

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	1	4	2	2	2.15	Moderate
Cyber attack	4	4	4	4	4.00	High
Drought	2	3	2	2	2.30	Moderate
Flooding	1	1	2	1	1.15	Low
Hailstorm	1	1	2	3	1.35	Low
Hazardous Materials Incident-Facility	4	4	4	4	4.00	High
Hazardous Materials Incident-Transportation	4	4	4	4	4.00	High
Ice Storm	1	1	2	2	1.25	Low
Major Structure Fire	3	3	4	2	3.05	High
Pandemic	4	3	3	4	3.55	High
Power Outage	2	1	3	1	1.75	Low
Severe Summer Storms	1	1	1	1	1.00	Low
Terrorism	4	4	4	4	4.00	High
Tornado	2	1	1	1	1.45	Low

Plymouth

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	2	2	2	3	2.10	Moderate
Cyber attack	2	3	4	4	2.80	Moderate
Drought	1	1	1	4	1.30	Low
Flooding	2	2	4	3	2.40	Moderate
Hailstorm	2	1	3	2	1.85	Low
Hazardous Materials Incident-Facility	2	2	4	2	2.30	Moderate
Hazardous Materials Incident-Transportation	2	2	4	2	2.30	Moderate
Ice Storm	2	3	3	3	2.55	Moderate
Major Structure Fire	1	1	4	1	1.45	Low
Pandemic	1	3	1	4	1.90	Low
Power Outage	2	2	4	2	2.30	Moderate
Severe Summer Storms	3	2	3	2	2.60	Moderate
Terrorism	1	1	4	3	1.65	Low
Tornado	2	3	4	4	2.80	Moderate

Rock Falls

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	3	1	2	2	2.15	Moderate
Cyber attack	1	1	4	4	1.75	Low
Drought	1	1	1	4	1.30	Low
Flooding	2	2	4	3	2.40	Moderate
Hailstorm	2	1	4	2	2.00	Moderate
Hazardous Materials Incident-Facility	1	1	4	2	1.55	Low
Hazardous Materials Incident-Transportation	2	1	4	2	2.00	Moderate
Ice Storm	3	2	2	3	2.55	Moderate
Major Structure Fire	1	1	4	1	1.45	Low
Pandemic	1	3	1	4	1.90	Low
Power Outage	3	2	4	2	2.75	Moderate
Severe Summer Storms	3	2	2	2	2.45	Moderate
Terrorism	1	1	4	3	1.65	Low
Tornado	2	3	4	4	2.80	Moderate

Rockwell

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	4	1	1	3	2.55	Moderate
Cyber attack	1	1	4	4	1.75	Low
Drought	2	1	1	4	1.75	Low
Flooding	3	1	3	3	2.40	Moderate
Hailstorm	2	1	4	2	2.00	Moderate
Hazardous Materials Incident-Facility	2	1	4	2	2.00	Moderate
Hazardous Materials Incident-Transportation	2	1	4	2	2.00	Moderate
Ice Storm	3	1	3	3	2.40	Moderate
Major Structure Fire	2	3	4	2	2.60	Moderate
Pandemic	1	3	1	4	1.90	Low
Power Outage	2	2	4	3	2.40	Moderate
Severe Summer Storms	4	1	3	3	2.85	Moderate
Terrorism	1	1	4	3	1.65	Low
Tornado	2	3	4	3	2.70	Moderate

Swaledale

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	3	2	2	2	2.55	Moderate
Cyber attack	2	1	4	4	2.20	Moderate
Drought	2	1	1	4	1.75	Low
Flooding	2	3	2	3	2.40	Moderate
Hailstorm	3	2	3	2	2.60	Moderate
Hazardous Materials Incident-Facility	2	2	4	2	2.30	Moderate
Hazardous Materials Incident-Transportation	2	2	4	2	2.30	Moderate
Ice Storm	2	3	3	3	2.55	Moderate
Major Structure Fire	2	1	4	1	1.30	Low
Pandemic	1	3	1	4	1.90	Low
Power Outage	3	3	4	2	3.05	High
Severe Summer Storms	2	3	3	2	2.45	Moderate
Terrorism	1	2	4	3	1.95	Low
Tornado	2	4	4	4	3.10	High

Thornton

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	2	2	2	2	2.00	Moderate
Cyber attack	1	3	4	4	2.35	Moderate
Drought	1	1	1	4	1.30	Low
Flooding	2	2	3	3	2.25	Moderate
Hailstorm	2	1	3	1	1.75	Low
Hazardous Materials Incident-Facility	1	1	4	1	1.45	Low
Hazardous Materials Incident-Transportation	1	1	4	1	1.45	Low
Ice Storm	3	2	3	3	2.70	Moderate
Major Structure Fire	3	1	4	1	2.35	Moderate
Pandemic	1	3	1	4	1.90	Low
Power Outage	3	2	4	2	2.75	Moderate
Severe Summer Storms	2	2	3	1	2.05	Moderate
Terrorism	1	2	4	3	1.95	Low
Tornado	1	3	4	4	2.35	Moderate

Ventura

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	3	2	2	2	2.45	Moderate
Cyber attack	1	3	4	4	2.35	Moderate
Drought	1	1	1	4	1.30	Low
Flooding	2	2	4	3	2.40	Moderate
Hailstorm	2	2	4	2	2.30	Moderate
Hazardous Materials Incident-Facility	1	1	4	2	1.55	Low
Hazardous Materials Incident-Transportation	2	1	4	2	2.00	Moderate
Ice Storm	3	3	2	3	2.85	Moderate
Major Structure Fire	1	1	4	1	1.45	Low
Pandemic	1	3	1	4	1.90	Low
Power Outage	3	3	4	2	3.05	High
Severe Summer Storms	3	2	2	2	2.45	Moderate
Terrorism	1	3	4	3	2.25	Moderate
Tornado	1	3	4	4	2.35	Moderate

Clear Lake School District

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	4	2	1	2	2.75	Moderate
Cyber attack	2	3	4	2	2.60	Moderate
Drought	2	1	1	4	1.75	Low
Flooding	1	2	1	3	1.50	Low
Hailstorm	3	1	2	1	2.05	Moderate
Hazardous Materials Incident-Facility	1	1	3	1	1.30	Low
Hazardous Materials Incident-Transportation	1	1	3	1	1.30	Low
Ice Storm	4	2	1	2	2.75	Moderate
Major Structure Fire	1	1	1	1	1.00	Low
Pandemic	1	3	1	4	1.90	Low
Power Outage	3	3	4	2	3.05	High
Severe Summer Storms	4	3	2	1	3.10	High
Terrorism	1	2	4	2	1.85	Low
Tornado	1	3	4	1	2.05	Moderate

Mason City School District

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	4	2	1	3	2.85	Moderate
Cyber attack	4	4	4	4	4.00	High
Drought	4	1	1	1	2.35	Moderate
Flooding	4	3	1	4	3.25	High
Hailstorm	4	2	2	3	3.00	High
Hazardous Materials Incident-Facility	1	2	4	2	1.85	Low
Hazardous Materials Incident-Transportation	4	2	4	2	3.20	High
Ice Storm	4	2	2	3	3.00	High
Major Structure Fire	4	2	4	4	3.40	High
Pandemic	4	1	1	4	2.65	Moderate
Power Outage	4	3	4	2	3.50	High
Severe Summer Storms	4	3	2	1	3.10	High
Terrorism	4	1	4	2	2.90	Moderate
Tornado	4	4	4	4	4.00	High

West Fork School District

Hazard	Probability	Magnitude/ Severity	Warning Time	Duration	Weighted Score	Level
Blizzard	4	1	1	3	2.55	Moderate
Cyber attack	1	1	4	4	1.75	Low
Drought	2	1	1	4	1.75	Low
Flooding	3	1	3	3	2.40	Moderate
Hailstorm	3	1	4	2	2.45	Moderate
Hazardous Materials Incident-Facility	1	1	4	3	1.65	Low
Hazardous Materials Incident-Transportation	1	1	4	3	1.65	Low
Ice Storm	4	1	3	3	2.85	Moderate
Major Structure Fire	2	3	4	4	2.80	Moderate
Pandemic	1	1	1	1	1.00	Low
Power Outage	2	1	4	3	2.10	Moderate
Severe Summer Storms	4	1	3	3	2.85	Moderate
Terrorism	1	1	4	3	1.65	Low
Tornado	2	3	4	3	2.70	Moderate

B.2 Meeting Notifications, Agendas, Sign-in Sheets.

Cerro Gordo County Hazard Mitigation Planning

Major Jurisdiction Planning Meeting

July 26, 2016 1:00 PM

Cerro Gordo County Emergency Management Office

AGENDA

I. Introductions
II. Overview of the Plan Review/Revision Process
III. Review the Mitigation Strategy
    a. Review Goals
    b. Current actions
    c. New actions
IV. Review of Hazards
V. County-wide kick off meeting September
VI. Next Steps

Cerro Gordo County

Hazard Mitigation Planning Committee

Review/Revision Planning Meetings, 2016-2017

Meeting Date: July 26, 2016 **Start Time:** 1300 **Ending Time:** 1430

NAME	REPRESENTING
Tom Dreycimski	Cerro Gordo County
Scott Flory	City of Clear Lake
Brent Trout	City of Mason City

CERRO GORDO COUNTY EMERGENCY MANAGEMENT

78 South Georgia Avenue • Mason City, Iowa 50401
Phone 641-421-3665 • Fax 641-421-3662

August 2016

Dear Community Leaders,

The Cerro Gordo County Multi-Jurisdictional Hazard Mitigation Plan is up for review per Federal and State requirements. We are calling a partners meeting for all the communities of Cerro Gordo County to go over what is required for a review and what each community and its partners need to do to complete this review and revision. Our plan must be reviewed and revised and submitted to the state by February of 2018. The items to be discussed this evening will be:

- Data gathering and analysis
- Coordinating with other agencies
- Engaging the public
- What were the results of implemented actions based on the current plan
- Where actions cost effective
- Listing of actions that were slow to implement or not implemented
- Determine why actions worked or did not work
- Determine what new actions need to be included in the revised plan

We hope that mayors, city council members, city planners, emergency services, schools and others you feel should attend will be able to join us. We will be meeting at Muse Norris Conference Center at the NIACC Campus, rooms D-F on September 29th beginning at 6:30 PM. We look forward to working with all of you.

Steve O'Neil

Coordinator

Cerro Gordo County Emergency Management

Cerro Gordo County Hazard Mitigation Planning

County Kick-Off Meeting

September 29, 2016 6:30 PM

North Iowa Area Community College

AGENDA

I. Introductions – Steve O'Neil, Coordinator Cerro Gordo Emergency Management
II. Overview of the Plan Review Purpose/Requirements
III. Updating the Mitigation Strategy
    a. Review Updated Plan Goals
    b. Status of Previous Actions
    c. Development of New Actions
IV. Review of Hazards
V. Plan Maintenance
VI. Next Steps

Cerro Gordo County

Hazard Mitigation Plan Revision Meeting

September 29, 2016

North Iowa Area Community College

NAME	REPRESENTING
Heather Hahn	Sheriff - Dispatch
Joe Bowden	MCPS
Brent Trout	City of Mason City
Matt Klunder	CGSO
Doug Janssen	MCFD
Tricia Sandahl	City of Mason City
Mike Webb	Cerro Gordo Co. Cons.
Michelle Dyyg	City of Thornton
Brian Crowell	City of Thornton
Steve Nelson	Mercy
Jodi Willemsen	CGC Public Health
Jim Bill	Rockwell
Tom Drzycimski	Cerro Gordo County
Kevin Moker	CL Sanitary District
Cheri Collins	Mercy Mercer-NI
Robert Berggren	M.C. maintenance
John Robbins	Cerro Gordo County
MIKE PENCE	Mason City Schools
Jessy Willadsen	Mason City GIS
PAULA LEMKE	CERRO GORDO COUNTY

Cerro Gordo County

Hazard Mitigation Plan Revision Meeting

September 29, 2016

North Iowa Area Community College

NAME	REPRESENTING
Andy Flagge	CGCH - I.T.

Cerro Gordo County Hazard Mitigation Planning

County Planning Meeting

March 23, 2017 9:00 AM

Emergency Management Office

AGENDA

I. Critical Facility Lists
II. Review Demographic Material/County Statistical Information
III. New Actions review

Cerro Gordo County Hazard Mitigation Planning

March 23, 2017

Printed Name	Representing	Signature
John Robbins	County Planning & Zoning	John Robbins
Ryan Fisen	CG County IT	Ryan Fisen
Mike Webb	Conservation	Mike Webb
[redacted]		
Jodi Williamson	CGC Public Health	Jodi Williamson
Mary Kelly	GGL Sec Roads	Mary Kelly
Kevin Pals	Cerro Gordo County	Kevin Pals
Pete Roth	clear Lake PD	
Paula Lemke	CGCo GIS	Paula Lemke

Cerro Gordo County Hazard Mitigation Planning

City of Rockwell Planning Meeting

April 5, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

City of Rockwell

Hazard Mitigation Plan Review/Revise Meeting

April 5, 2017

NAME	REPRESENTING	EMAIL
Dan Dalley		
Jay Siefkas	City of Rockwell	ctyrckwl@netins.net
Tom Hensley	City of Rockwell	
Zach Clemens	Media	zachclemens.map@gmail.com
LARRY WENTZ	CITY COUNCILMAN	LARRY.WENTZ.III@GMAIL.COM
Tom Worley	City Council	worleys@netins.net
Tim Brown	city council	tearinc@gmail.com
James Bills	Mayor	
Lorna Weir	City of Rockwell / Westfork Schools	rockwell clerk@netins.net
Brian Kaab	City Council	brian.kaab@hotmail.com
Andy Johnson	City Council	

Cerro Gordo County Hazard Mitigation Planning

City of Rock Falls Planning Meeting

May 8, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

City of Rock Falls

Hazard Mitigation Plan Review/Revise Meeting

May 8, 2017

NAME	REPRESENTING	EMAIL
Rick Wyborny		rijowyb@myomnitel.com
Mark Brosz	City of Rock Falls (Council)	mbrosz@gmail.com
Randy Dodd	City of Rock Falls (mayor)	jollydodd@hotmail.com
Tracy Ward	city of Rock Falls (clerk)	tward@myomnitel.com
Jessica Pruzak	" "	jespruzake hotmail.com
Jodi Wyborny	" " Council	jwyborny@niacog.org
Tim Dodd	Council	fulltimersixtynine@gmail.com

Cerro Gordo County Hazard Mitigation Planning

City of Rockwell Planning Meeting

September 13, 2017

AGENDA

I. Review updated information
II. Review Revised actions
III. Review maintenance plan
IV. Discuss West Fork Project

City of Rockwell

Hazard Mitigation Planning Meeting

September 13, 2017

Please Print

NAME	REPRESENTING	EMAIL
James Bills	City of Rockwell	
Lorna Wren	City of Rockwell	
Brian Knob	City of Rockwell	
LARRY WENTZ	CITY OF ROCKWELL	
Andy Johnson	City of Rockwell	
Tom Worley	City of Rockwell	
Caitlin Ware	The Pioneer Enterprise	
Darrin Strike	West Fork CSD.	darrin.strike@westforkschool.org
Debbie Bills	Rockwell Library	deb.k.bills@gmail.com
Margaret Nuehring	Five Star Coop	margaret.nuehring@fivestarcoop
Mark Waite	Rockwell Nursing Home	
Rick Whitney	Rockwell Police	RockwellPD@hotmail.com
Jason Dick	Rockwell Telephone Coop	
Janelle Nuehring	Lion Grove Country Club	
Mark Love	Rockwell Fire Dept Rockwell Lions Club	marklove73@ychoo.com

City of Rockwell

Hazard Mitigation Planning Meeting

September 13, 2017

Please Print

NAME	REPRESENTING	EMAIL
Adam Wedmore	Rockwell-Swaledale EMT's	adam.Wedmore@niacc.edu
Dianne Poole	Rockwell Community Nursing Home	rcnh@netins.net

Cerro Gordo County Hazard Mitigation Planning

County Planning Meeting

September 27, 2017 10:00 AM

Emergency Management Office

AGENDA

I. Updated Information From Departments
II. Demographic Material/County Statistical Information Corrections/Updates
III. Review Maintenance Plan

County of Cerro Gordo

Hazard Mitigation Planning Meeting

September 27, 2017

Please Print

NAME	DEPARTMENT	EMAIL
John Robbins	P&Z	jrobbins@co...
Ryan Fiser	IT	rfiser@co.cerro-gordo.ia.us
Kevin Pals	Sheriff's Office	kpals@co.cerro-gordo.ia.us
Mike Webb	Conservation	mwebb@co.cerro-gordo.ia.us
Paula Lemke	Auditor/GIS	plemke@co.cerro-gordo.ia.us
Jodi Willemsen	Public Health	jwillemsen@cghealth.com
Mary Kelly	Engineer's	mkelly@co.cerro-gordo.ia.us

Cerro Gordo County Hazard Mitigation Planning

City of Thornton Planning Meeting

October 2, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

City of Thornton

Hazard Mitigation Planning Meeting

October 2, 2017

Please Print

NAME	REPRESENTING	EMAIL
Michelle Duff - City Clerk	Thornton	mduff@thornton-iowa.com
Brian Crowell - Mayor	Thornton	mayor@thornton-iowa.com
Randy Bohman - Councilman	Thornton	rbohman@frontier.com
Rob Duff - Councilman	THORNTON	rmduff1984@yahoo.com
Michael Younge - Councilman	Thornton	youngeze@frontiernet.net
Travis Fischer - Media	N. A American Publishing	
	Thornton	
	Thornton	mmoeller@cltel.net
Betty Jensen	Thornton	jensenmb4@yahoo.com
Shelby Steenlund-Councilman	Thornton	steenlund@frontiernet.net

Cerro Gordo County Hazard Mitigation Planning

City of Plymouth Planning Meeting

October 5, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

City of Plymouth

Hazard Mitigation Planning Meeting

October 5, 2017

Please Print

NAME	REPRESENTING	EMAIL
Shirley Martin	City Clerk, Plymouth	Plymouth@myomnitel.com
Gary Clark	City Council	ALClark@myomnitel.com
Wade Eastman	City Council	Eastman17@hotmail.com
Amy Barding	City Council	amybarding7713@gmail.com
JEFF ROBAK	CITY COUNCIL	jdrobak@yahoo.com
Ben Tangeman	Plymouth resident	
CECIL KUHLERS	PLYMOUTH, IOWA	candbkuhlers@myomnitel.com

Cerro Gordo County Hazard Mitigation Planning

City of Swaledale Planning Meeting

October 23, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

Swaledale Hazard Mitigation Planning Meeting

October 23, 2017

Please Print

NAME	REPRESENTING
TROY SMEBY	City Council
John Bonker	C.Ty Co
Greg Meier	Public Works
Julie Meier	Business Owner
Jalynn Eddy	city council
JOHN DRURY	MAYOR
[illegible]	City Clerk

Cerro Gordo County Hazard Mitigation Planning

City of Thornton

November 6, 2017

This was a special meeting of the Thornton City Council held as a workshop specifically for the mitigation planning.

Thornton, City of

November 6, 2017 Hazard Mitigation Planning
Sign-in Sheet

Tom [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
Betty Jensen
Michelle [illegible]

Cerro Gordo County Hazard Mitigation Planning

Mason City Planning Meeting

November 13, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

Mason City Hazard Mitigation Planning Meeting

November 13, 2017

NAME	REPRESENTING
DAVE Johnson	MCFD
MARK RAHM	CITY OF MASON CITY, ENGINEERING
Curt Sauve	City of Mason City, Development Services
KEVIN E JACOBSON	CofMC - FINANCE
William P Stangl	City of MC O and M
Jeff Brinkley	Mason City PD
Steven J. Van Steenhuyse	City of MC

Cerro Gordo County Hazard Mitigation Planning

Clear Lake Planning Meeting

December 1, 2017

AGENDA

I. Introductions
II. Review Purpose/Requirements
III. Community Survey Results
IV. Updating the Mitigation Strategy
    a. Review Plan Goals
    b. Previous Actions
    c. Develop New Actions
    d. Critical Facilities
V. Email correspondence for required information

Clear Lake Hazard Mitigation Planning Meeting

December 1, 2017

NAME	REPRESENTING
[illegible]	Clear Lake Fire Dept
Justin Morrow	Clear Lake Water Dept.
MIKE RITTER	CLEAR LAKE PUBLIC WORKS
Pete Rott	CLPD
Joe Weigel	Public Works
Nelson Crabb	City Hall
Jim Sholly	Clear Lake Watershed

B.3 Data Collection Guide.

Mitigation Capabilities for Cerro Gordo County and Incorporated Cities

PLANNING CAPABILITIES	YES	NO	PLANNING CAPABILITIES	YES	NO
Comprehensive Plan			Economic Development Plan		
Builder's Plan			Transportation Plan		
Capital Improvement Plan			Land-Use Plan		
Local Emergency Plan			Flood Mitigation Plan		
County Emergency Plan			Watershed Plan		
Local Recovery Plan			School Mitigation Plan		
County Recovery Plan			Critical Facilities Plan		
Local Mitigation Plan					
County Mitigation Plan					
Debris Management Plan					
POLICIES/ORDINANCE	**YES**	**NO**	**POLICIES/ORDINANCE**	**YES**	**NO**
Zoning Ordinance			Storm Water Ordinance		
Building Code			Drainage Ordinance		
Floodplain Ordinance			Site Plan Review Requirements		
Subdivision Ordinance			Historic Preservation Ordinance		
Tree Trimming Ordinance			Landscape Ordinance		
Nuisance Ordinance			Iowa Wetlands and Riparian Areas Conservation Plan		
PROGRAMS	**YES**	**NO**	**PROGRAMS**	**YES**	**NO**
Zoning/Land Use Restrictions			Land Use Program		
Codes Building Site/Design			Public Education/Awareness		
National Flood Insurance Program (NFIP) Participant-Nondelegated			Property Acquisition		
NFIP Participant-Delegated			Planning/Zoning Boards		
NFIP Community Rating System Participating Community			Stream Maintenance Program		
Building Code Effectiveness Grading			Tree Trimming Program		
ISO Fire Rating			Engineering Studies for Streams		
Economic Development Program			Mutual Aid Agreements		
STUDIES/REPORTS/MAPS	**YES**	**NO**	**STUDIES/REPORTS/MAPS**	**YES**	**NO**
Hazard Analysis/Risk Assessment (Local)			Evacuation Route Map		
Hazard Analysis/Risk Assessment (County)			Critical Facilities Inventory		
Flood Insurance Maps			Vulnerable Population Inventory		
FEMA Flood Insurance Study (Detailed)			Land Use Map		

STAFF/DEPARTMENT	YES	NO	STAFF/DEPARTMENT	YES	NO
Building Code Official			Bomb Squad		
Building Inspector			County Emergency Management Commission		
Mapping Specialist (GIS)			Sanitation Department		
Engineer			Transportation Department		
Development Planner			Economic Development Department		
Public Works Official			Housing Department		
Emergency Management Coordinator			Planning Consultant		
NFIP Floodplain Manager			Regional Planning Agencies		
Hazardous Materials Expert			Historic Preservation		
Local Emergency Planning Committee					
NON-GOVERMENTAL ORGANIZATIONS (NGOs)	**YES**	**NO**	**NON-GOVERMENTAL ORGANIZATIONS (NGOs)**	**YES**	**NO**
American Red Cross			Homeowner Associations		
Salvation Army			Neighborhood Associations		
Veterans Groups			Chamber of Commerce		
Environmental Organization			Community Organizations (Lions, Kiwanis, etc.)		
FINANCIAL RESOURCES	**YES**	**NO**	**FINANCIAL RESOURCES**	**YES**	**NO**
Apply for Community Development Block Grants			Incur debt through general obligation bonds		
Fund projects through Capital Improvements funding			Incur debt through special tax bonds		
Authority to levy taxes for specific purposes			Incur debt through private activities		
Fees for water, sewer, gas, or electric services			Withhold spending in hazard prone areas		
Impact fees for new development					

ADDITIONAL CAPABILITIES	YES	NO	COMMENTS
Outdoor Warning Sirens			
Other Warning Systems			
Tornado Safe Rooms			
Current Mitigation Projects			

B. 4 Announcement for Final Public Comment.

Cerro Gordo County, Iowa

Multi-Jurisdictional Hazard Mitigation Plan

Contact: Steve O'Neil

641-421-3665

Cerro Gordo County Planning Committee Seeks Public Input

Cerro Gordo County, IA – The public is encouraged to review and comment on the Cerro Gordo County Multi-Jurisdictional Hazard Mitigation Plan Update before it is finalized. The Plan includes an updated strategy to reduce damage and losses caused by hazard events. The final draft of the plan will be available online and in hard-copy from February 02-06, 2018. The purpose is to provide information to the public on the Multi-Jurisdictional Hazard Mitigation Plan Update as well as gain public input.

Taxpayers pay billions of dollars each year for disaster recovery. Some events are predictable, and often, damages can be reduced or eliminated. The Federal Disaster Mitigation Act of 2000 requires communities to develop an approved local hazard mitigation plan to remain eligible for certain federal funding.

The Cerro Gordo County Emergency Management Coordinator, Steve O'Neil, invited representatives from County departments, the incorporated cities, and public school districts to work together to develop this plan update. The planning committee addressed 14 hazards-ranging from flooding and tornadoes to hazardous materials and blizzards-and considered the impacts of these events on local communities. Based on the results of an updated risk assessment of the hazards, committee members updated the strategies for their jurisdictions to reduce damages caused by the various hazards.

The planning committee would like input from the public on the updated strategy to lessen impacts of future disasters on people and property in Cerro Gordo County. The Plan will be sent to the Iowa Homeland Security and Emergency Management Department (IA HSEMD) and FEMA after this public comment period. Public comments will be considered by the committee and incorporated into the plan, as appropriate.

From February 02-06 2018, the final draft will be available for your review at the following locations:

Online at: https://www.cgcounty.org/departments/county-emergency-mitigation-plan-draft

In hard-copy during operating hours at: Mason City Police Department

The final plan must be approved by the governing body of each participating jurisdiction, IA HSEMD, and FEMA before becoming official.

For more information on this planning effort, or to provide comments, please contact Cerro Gordo County Emergency Management at 641-421-3665 or soneil@cgcounty.org.

APPENDIX C: ADOPTION RESOLUTIONS

RESOLUTION
No. 2018-22

Resolution Adopting the Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan

Whereas, the Cerro Gordo County Board of Supervisors recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, The U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards; and

Whereas, the Disaster Mitigation Act made available hazard mitigation grant programs; and

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, Cerro Gordo County fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, the Iowa Homeland Security and Emergency Management Department and the Federal Emergency Management Agency Region VII officials have reviewed the "Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

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

Whereas, adoption by the Board of Supervisors for Cerro Gordo County demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan,

Now, therefore, be it resolved, that the Cerro Gordo County Board of Supervisors adopts the "Cerro Gordo County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

Be it further resolved, the Cerro Gordo County Board of Supervisors will submit this Adoption Resolution to the Iowa Homeland Security and Emergency Management Department and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

PASSED AND ADOPTED THIS 20TH DAY OF FEBRUARY, 2018.

Ayes: Latham, Watts, Callanan
Nays: None
Absent/Not Voting: None

Casey M. Callanan, Chairman
Board of Supervisors
Cerro Gordo County

ATTEST:

Becky Kirchgatter, Deputy Auditor
Cerro Gordo County