



POWESHIEK
C O U N T Y

2021 HAZARD

MITIGATION PLAN

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Two Rivers Emergency Management, LLC is pleased to submit this Hazard Mitigation Plan (the “Deliverable”) to the Poweshiek County Emergency Management Agency (the “Client”). The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of other organizations. This Deliverable was developed with input from, and in collaboration with, the Client. It is subject to the terms of the contract dated April 1, 2020 between Two Rivers Emergency Management, LLC and the Client, and constitutes the entire agreement between them. The Contract includes any and all representations, warranties, indemnifications, and remedies on which the Client may rely. Because of the specialized knowledge of the Client about how this Deliverable is to be used, it should be used only by the Client and its affiliates, in a manner that relies on the Client’s discretion and expertise, and only for the purposes contemplated by the Contract. This Deliverable is not to be used in any other manner or relied upon by any other person.

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Glossary

BGM SD – Brooklyn-Guernsey-Malcom School District
BRIC – Building Resilient Infrastructure and Communities
CDBG – Community Development Block Grant Program
CRS – Community Rating System
EAP – Emergency Action Plan
EMA – Emergency Management Agency
EOC – Emergency Operations Center
FEMA – Federal Emergency Management Agency
FMA – Flood Mitigation Assistance Grant Program
GN SD – Grinnell-Newburg School District
HMA – Hazard Mitigation Assistance
HMGP – Hazard Mitigation Grant Program
HMP – Hazard Mitigation Plan
IA HSEMD – Iowa Homeland Security and Emergency Management Division
NADM – North American Drought Monitor
NFHL – National Flood Hazard Layer
NFIP – National Floodplain Insurance Program
NID – National Inventory of Dams
NOAA – National Oceanic and Atmospheric Administration
NWS – National Weather Service
PDM – Pre-Disaster Mitigation Grant Program
SD – School District
SFHA – Special Flood Hazard Area
TREM – Two Rivers Emergency Management
USACE – United States Army Corps of Engineers
USCB – United State Census Bureau
USDA – United States Department of Agriculture
USGS – United States Geological Survey
WUI – Wildland Urban Interface

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Section 1 – Plan Development

Plan Purpose

The 2021 Poweshiek County Hazard Mitigation Plan (HMP) revision is threefold in its purpose. Strictly speaking, the Poweshiek County Hazard Mitigation Plan provides guidance to substantially and permanently reduce Poweshiek County and its communities' vulnerability to natural hazards.

This plan revision encompasses the continuation and updating of this original mission by incorporating new GIS technologies, improving its risk assessment methodologies, and recalibrating its mitigation strategies based on an assessment of the previous plan, approved in February of 2016, and the previous plan's usefulness over the past five years.

Secondly, participation in and the adoption of this plan grants the adopting entity the ability to apply for multiple grant funding programs through the Federal Emergency Management Agency (FEMA).

Additionally, a tertiary purpose of the plan is to promote sound public policy and support other local, regional, and state planning efforts which have the effects of protecting citizens, critical facilities, infrastructure, private property, and the natural environment. The development of this plan revision does so by increasing public awareness and education, collaborating with other planning organizations and governments engaged in planning efforts, serving as a reference and resource for the public, various governments, and other entities.

Plan Organization

The Poweshiek County Hazard Mitigation Plan was developed and organized within the rules and regulations established under the 44 Code of Federal Regulation 201.6. This plan contains sections detailing the planning process, Poweshiek County's communities, other participating entities and the planning area, a hazard vulnerability and risk assessment, capabilities assessment, and a mitigation strategy designed for the purpose of guiding Poweshiek County and the plan's participants to become more disaster-resilient communities.

Plan Financing

The Poweshiek County Hazard Mitigation Plan has been financed by Poweshiek County and a FEMA Hazard Mitigation Grant Program (HMGP) Grant administered through the State of Iowa's Homeland Security and Emergency Management Division (IA HSEMD), and matching contributions by IA HSEMD. The federal grant provided 75% of the total plan's cost while Poweshiek County contributes 15% and IA HSEMD provides 10%.



Plan Participation

The Poweshiek County Hazard Mitigation Plan was developed as the result of an ongoing collaborative effort between the full range of stakeholders in the planning area, local authorities, public school district, municipal jurisdictions, and the State of Iowa. This effort was led by the Poweshiek County Emergency Management Agency.

Concerns, capabilities, interests and historical data were gathered through interviews with stakeholders from within the communities, along with a number of electronic datasets, and ongoing planning committee work sessions. The public were granted opportunities to provide their input, influence, share knowledge, and be active participants in the plan's development. This was accomplished through a number of public outreach campaigns in the form of an on-site meeting and internet accessible surveys. Any comments, questions, and discussions resulting from these activities were given consideration in the development of this plan.

Approval & Adoption

The Poweshiek County Hazard Mitigation Plan was submitted for review to IA HSEMD on September 21st, 2020. Following the state's review, the plan was submitted to the FEMA Region VI office for federal review. FEMA Region VII granted "Approval Pending Adoption" on April 20th, 2021.

This plan has officially been adopted by all participating municipalities and school districts.

1.1 – Planning Process

Poweshiek County's revision process began when it issued a request for proposals to write their hazard mitigation plan update. Two Rivers Emergency Management (TREM) was selected to facilitate the plan's development under a performance contract.

Three planning events were held throughout the planning process. Plan development kicked-off on May 13th, 2020. Stakeholders from every municipality, school district, and members of the public were invited to attend and participate. Additionally, neighboring EMAs were invited. The meetings were advertised for period of two weeks in advance.

This meeting delivered an understanding of the planning processes and steps required to update, including the organizing of resources, assessment of hazards, development of a mitigation plan, and steps to implementing the plan and monitoring its progress. All municipal and school district in the county actively participated in the process through solicitation, providing input, or participation in meetings. Details and documentation of stakeholder participation can be found in Section 1.2 and Appendix A – Plan Participation.

A second meeting was held on October 1st, 2020 to further strengthen the plan and enhance the mitigation strategy portion. This was held during Poweshiek County's biannual LEPC meeting.

The third planning event was held electronically due to COVID-19 restrictions. From January 13th through January 27th, 2021, Poweshiek County EMA held a draft review and comment period that was open to the public. Advertisements were made on social media accounts and an ad was put out in the Grinnell Herald for two weeks. The plan was made available online in PDF format. No members of the public inquired about the plan. The plan draft was also distributed to the plan's primary stakeholders for review.

Throughout the process the public was given opportunities to review plan drafts, ask questions, and provide input on hazards. They were also invited to provide feedback on mitigation project prioritization, hazard identification, and hazard ranking. This was accomplished through their inclusion in the on-site meetings as well as an extensive online outreach campaign that yielded 97 responses. Details and documentation of the public's participation can be found in Section 1.3 and Appendix A – Plan Participation.

The 2021 Poweshiek County Hazard Mitigation Plan encompasses the following 11 jurisdictions:

Poweshiek County

City of Deep River

City of Guernsey

City of Malcom

City of Searsboro

City of Brooklyn

City of Grinnell

City of Hartwick

City of Montezuma

Grinnell-Newburg School District

Montezuma School District

1.2 – Stakeholder Engagement

The Poweshiek County Hazard Mitigation Plan includes the governmental and education entities within Poweshiek County working together for the development and ongoing maintenance of this plan. The participants are grouped into four categories.

Municipalities

This group consists of representatives from municipal governments within the planning area.

Education Entities

This group consists of representatives from the school districts serving Poweshiek County.

Other Stakeholders

This group consists of representatives from the local community, regulatory authorities, emergency services, commercial interests, neighboring EMAs, and other relevant organizations.

The Public

FEMA requires this planning effort to be open to constant input from interested citizens in compliance with the Sunshine Laws. In Iowa, public meetings must comply with Iowa Open Meetings Law, unless established by statutory exemption. Therefore, any individual citizens who wish to be involved in this effort to mitigate future disasters were encourage to attend the on-site meetings and complete the online mitigation survey to solicit relevant comments and concerns to be incorporated into the content of this plan.

Representatives from each group took part in periodic planning meetings, public meetings and events and individual meetings with TREM and the Poweshiek County Emergency Management Agency. Their specific involvement included activities such as collection and development of planning information, providing input into the planning process, reviewing draft editions of the plan and providing written documentation demonstrating their commitment to mitigation and intent to adopt the final approved plan. All neighboring county EMAs (Iowa, Jasper, Keokuk, Mahaska, and Tama) were invited, but only the Mahaska County EMA attended.

Each participating entity was expected to attend at least one of the on-site meetings, submit required data as requested, participate in the development of general information for the plan as well as their own individual planning information, mitigation strategies and initiatives, participate in a public review process, and submit the plan for formal adoption through their respective governing body. Information was kept on attendance, input and providing requested documentation. In the event an entity did not provide representation to a meeting, individual outreach was conducted to garner their inclusion.

1.2 – Stakeholder Engagement

The following table details the plan participants who participated in the hazard mitigation planning process. This list contains relevant local and state agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, and any appropriate neighboring communities that chose to participate in the plan.

Table 1.1 – Stakeholders

Name	Organization	Position
Tony Gertz	Two Rivers Emergency Management	Mitigation Planning Manager
Brian Paul	Poweshiek County Emergency Management Agency	Emergency Management Coordinator
Jason Roudabush	Poweshiek County Board of Supervisors	Chair
Diana Dawley	Poweshiek County Board of Supervisors	Supervisor
Merle Doty	Poweshiek County Board of Supervisors	Supervisor
Carl Tubbs	City of Brooklyn	Mayor
Sherry Sharer	City of Brooklyn	City Clerk
Casey Pierce	City of Deep River	Mayor
Dan Agnew	City of Grinnell	Mayor
Russ Behrens	City of Grinnell	City Manager
Ann Wingerter	City of Grinnell	City Clerk
Daniel Sicard	City of Grinnell Fire Department	Fire Chief
Roger Steffen	City of Guernsey	Mayor
Marty Block	City of Hartwick	Mayor
Dawn Hamilton	City of Malcom	Mayor
Jacki Bolen	City of Montezuma	Mayor
Justin Flander	City of Searsboro	Mayor
Shirley Tremmel	City of Searsboro	City Clerk
Janet Stutz	Grinnell-Newburg Community School District	Superintendent
Nathan Wood	Montezuma Community School District	Superintendent (Current)
Dave Hoeger	Montezuma Community School District	Superintendent (Former)
Heather Cox	Grinnell College	Emergency Coordinator
Jamey Robinson	Mahaska County Emergency Management Agency	Emergency Management Coordinator
Amanda Accola		
Jason Burt		
Kim Bushong		
Marilyn Kennett		
Matt Hansen		
Mike Schipper		
Sarah Smith		
Stacie Cameron		

1.3 – Public Engagement

The Poweshiek County Emergency Management Agency provided the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process. The public was notified of open meetings via Poweshiek County’s website, facebook page, twitter account, and a local newspaper, The Grinnell Herald. Additionally, advertisements for the online public survey were put out on their website and Facebook advertisements.

Relevant federal, state, and local governments, private, non-profit, regional organizations, and agencies with the authority to regulate development were invited to provide input and technical expertise through the public notices. They were contacted directly when their expertise was deemed necessary to the success of the plan.

At the public zoom meetings, TREM presented and outlined the mitigation plan update process to stakeholders and the public. TREM also discussed stakeholder participation and expectations. In this meeting, the public and other stakeholders were encouraged to ask questions and provide their input. The final draft of this plan was available for public review via a TREM hosted website for the project for a period of two weeks. Any and all questions asked were answered.

Continued Public Involvement

Poweshiek County is dedicated to involving the public in the continual shaping of its hazard mitigation plan and development of its mitigation projects and activities.

The Poweshiek County Emergency Management Agency will continue to keep the public informed about its hazard mitigation projects and activities through its website. Additionally, it will work to update its website and eventually provide a “comments/suggestions” option for the public to submit their input.

In the event that this hazard mitigation plan undergoes any major developmental changes over its 5-year life cycle, the Poweshiek County Emergency Management Agency will inform the public of these changes via a publicized and open forum meeting.

Copies of the Poweshiek County Hazard Mitigation Plan will be available on their website for public distribution.

1.4 – Planning Resources

This plan's content includes and was influenced by numerous documents and technical resources provided by the plan's stakeholders and other relevant entities. The following documents and technical resources were reviewed for applicable information to the development of this plan:

Documentation Resources

Comprehensive Plans

The City of Grinnell, City of Malcom, and Poweshiek County have comprehensive plans pertaining to its zoning and other ordinances. These plans were reviewed and laid part of the groundwork for this plan's mitigation strategy. It did so by providing insight into planning and development direction of the planning area and its local governments.

County and City Municipal Codes

Each municipality's local ordinances have been reviewed for provisions relevant to hazard mitigation. This information has been incorporated throughout Section 4 of this plan.

Iowa Comprehensive Emergency Plan – Part B. Iowa Hazard Mitigation Plan (2018)

The State of Iowa's current hazard mitigation plan was reviewed for general guidance in the cases of their comparative statewide risk assessment, their initial selection of at-risk hazards, and local planning technical assistance and development strategy.

Poweshiek County Hazard Mitigation Plan (2016)

Poweshiek County was covered by a FEMA approved local hazard mitigation plan. The plan was thoroughly reviewed and components have been updated and incorporated throughout.

Technical Resources

FEMA National Flood Hazard Layer (NFHL)

FEMA's NFHL data was used in mapping floodplain locations and estimating potential flood impacts and loss estimates.

National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC)

Weather data and historical events and their narratives were primary provided by NOAA's NCDC.

North American Drought Monitor (NADM)

Since 1999, the USDA, NOAA, and the National Drought Mitigation Center at the University of Nebraska-Lincoln have partnered to centralize nationwide drought monitor maps, situation reports, drought status, and publish historical data on drought severity. The NADM was the primary source for historical drought data and drought severity assessment used in this plan.

USACE National Inventory of Dams (NID)

The USACE NID is a congressionally authorized database which documents dams in the U.S. and its territories. This database attempts to maintain centralized data for all private and public dams. The NID was consulted and showed no high hazard dams in the planning area.

United States Census Bureau (USCB)

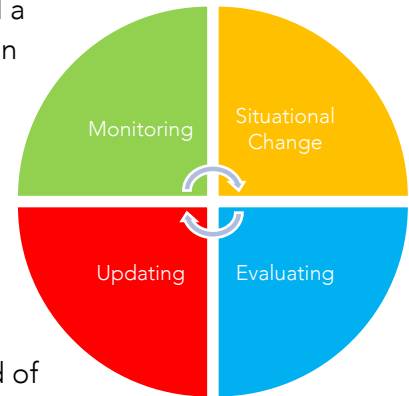
The USCB publicly publishes a number of GIS datasets that were used in developing the basemap layers used throughout this plan.

United States Department of Agricultural (USDA) Statistics Service

The USDA provided GIS data that was used in depicting land cover and the agricultural statistics used in developing the planning area's risk to droughts and grass and wildland fires.

1.5 – Plan Maintenance

The Poweshiek County Emergency Management Agency has developed a method to ensure monitoring, evaluation, and updating of its HMP. Upon adoption of the Poweshiek County HMP, the Poweshiek County Emergency Management Agency will form a subcommittee within its LEPC on mitigation projects comprised of volunteer members. The chair of the subcommittee will be held by the position of the EMA Coordinator. Additional members may be added based on necessity. The sub-committee will file an annual report with the EMA Coordinator.



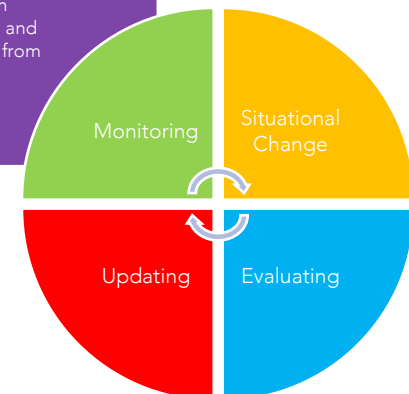
Please see the Poweshiek County HMP Quarterly Report form at the end of this section.

The Poweshiek County EMA Coordinator may request a non-scheduled report on the monitoring, evaluation, or updating of any portion of the HMP due to irregular progress on mitigation actions and or projects, in the aftermath of a hazard event, or for any reason deemed appropriate.

Plan Monitoring

Plan monitoring can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives. In the more limited approach, monitoring may focus on tracking projects and the use of the agency's resources. In the broader approach, monitoring also involves tracking strategies and actions being taken by partners and non-partners, and figuring out what new strategies and actions need to be taken to ensure progress towards the most important results.

- Regularly report on mitigation actions' and projects' progress from start to finish.



A monitoring report will be written and filed with the Poweshiek County EMA annually or when triggered by a situation change. The monitoring report will answer the following questions:

- Is the mitigation project under, over, or on budget?
- Is the mitigation project behind, ahead of, or on schedule?
- Are there any changes in Poweshiek County's capabilities which impact the HMP?
- Are there any changes in Poweshiek County's hazard risk?
- Has the mitigation action been initiated or its initiation planned?
- If applicable, has participation in a mitigation action's collaboration been regular?
- If any, what plan updates occurred, why they occurred, and what is their impact?

The plan maintenance process is cyclical and maintenance items can operate simultaneously within the process.

Plan Evaluating

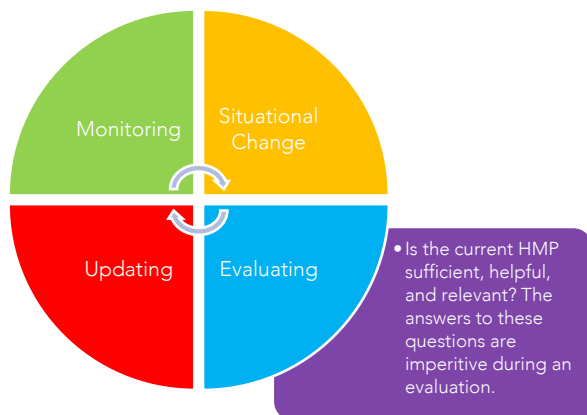
A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making.

An evaluation report will be written and filed within the Poweshiek County EMA when the situation dictates. The following situations are typical examples of when an evaluation will be necessary:

- Post hazard event
- Post training exercise
- Post tabletop or drill exercise
- Significant change or completion of a mitigation project
- Significant change or completion of a mitigation action

An evaluation report will ask the following questions in response to the previously listed events:

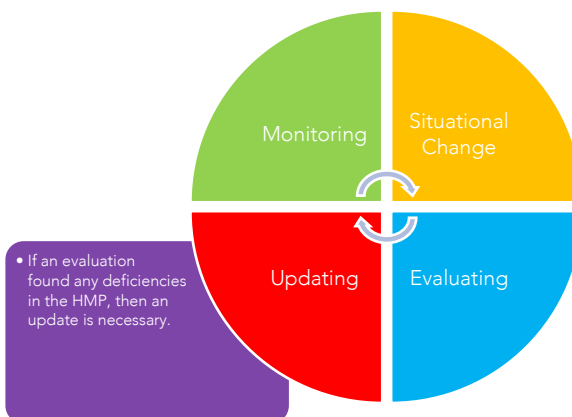
- Do the mitigation objectives and goals continue to address the current hazards?
- Are there new or previously unforeseen hazards?
- Are current resources appropriate for implementing a mitigation project?
- Was the outcome of a mitigation action/project expected?
- Are there implementation problems?
- Are there coordination problems?



Plan Updating

Typically, a HMP update is initiated upon the completion of a plan evaluation and even then, only when the evaluation determines an update is appropriate. Additionally, when new hazard data becomes available it will be added to the HMP. New data will be confirmed or denied along with the annual HMP report. For whatever reason, a HMP update can be written anytime it is deemed necessary by the Poweshiek County EMA.

Poweshiek County will begin their update process three years from this plan's adoption according to FEMA DMA2000 guidelines on local mitigation plan updates under the direction of the Poweshiek County EMA.



**Poweshiek County Mitigation Planning Committee
Poweshiek County Hazard Mitigation Plan
Annual Report**

Hazard Mitigation Plan Sub Committee Chair:

Meeting Date:

Plan Approval Date:

Plan Expiration Date:

Have there been any disasters or training events since the last report? If so, list them below:

Disaster Number/Training Event	Hazard Type(s)	Was the hazard expected or unforeseen?	Is a plan update required?
Example: DR-1000	Volcanic Eruption	Unforeseen	Yes
Example: Annual Training	Flash Flooding	Expected	No

Mitigation Projects:

Project Name	Participating Jurisdictions	Proposed/Schedules/In Progress/Completed	Behind/Ahead/On-Schedule	Estimated Completion Date
Example: Floodproofing	Grinnell	In Progress	On-Schedule	1/1/2020

Miscellaneous Notes:

Section 2 – Community Profiles

This section provides a broad perspective, brief history, socio economic, geographical, and development information on Poweshiek County, its municipalities, and its public-school districts. Poweshiek County, Iowa was founded in 1843 and is named for the Chief of the Fox Tribe who ended the Black Hawk War. It is largely considered of a plains topography, sparsely wooded, with numerous rivers and streams. The county in full occupies a total area of 586 square miles.



Its population growth has been stagnant since the development of its last mitigation plan in 2016 and as a whole decreasing since 2010.

Geographically it is located in east-central Iowa roughly 60 miles east from Des Moines.

The U.S. Census Bureau estimates the July, 2019 population of the planning area totals 19,306 people occupying 8,984 residential housing units. The building stock of the planning area is heavily dominated by older constructed buildings. Roughly 89% of the planning area's building stock was constructed prior to 1999.

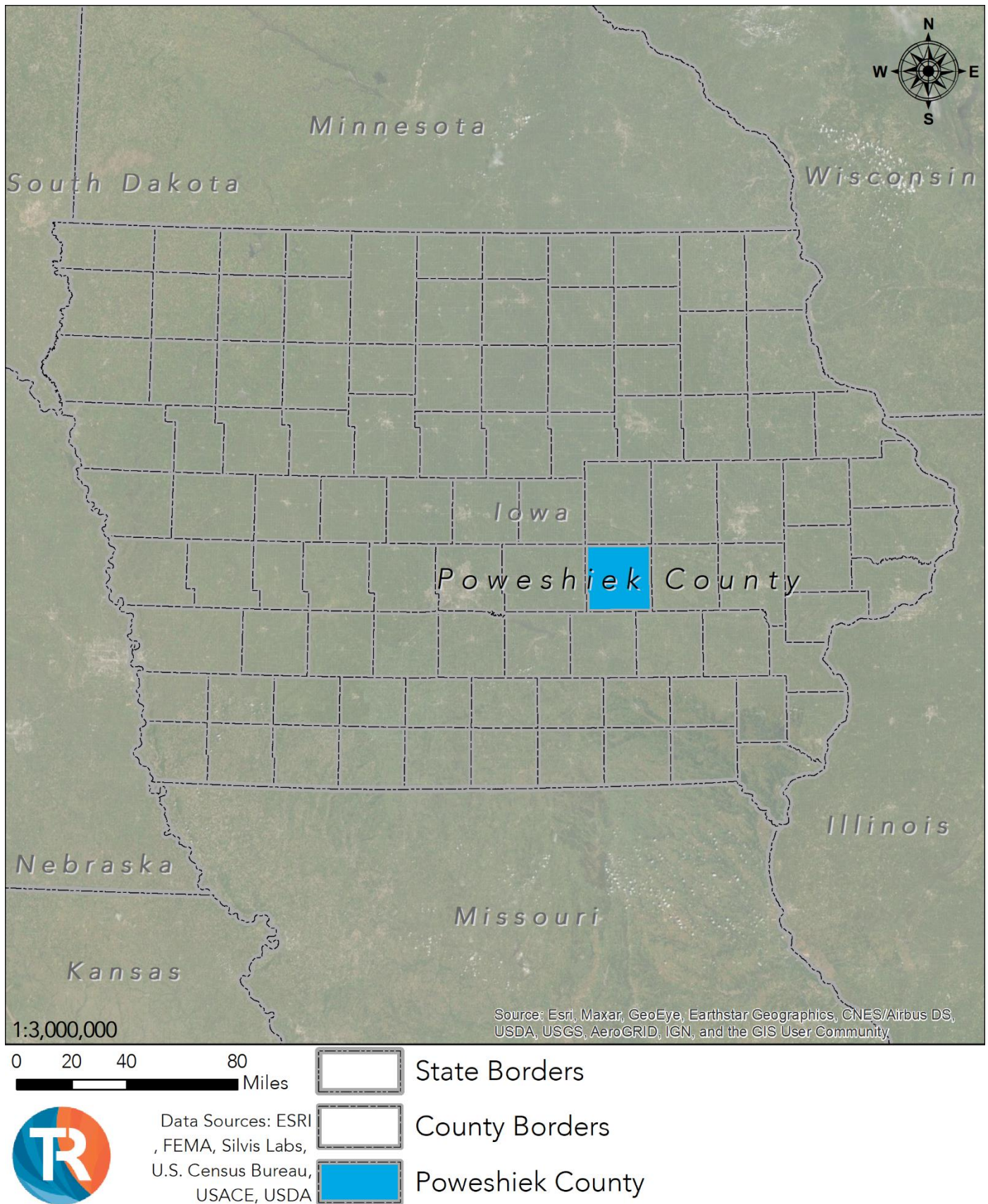
The countywide population has experienced a small level of population decline over the last decade in every single community. Due to the decrease in population and stagnant levels since the development of the last plan, there have been no measurable or known increases in hazard vulnerability due to demographic trends due to population changes.

Table 2.1 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	18,925	-	-
2016	18,279	- 3.41%	-
2019	18,504	- 2.22%	1.23%

**The data are from the U.S. Census Bureau.*

Map 2.1 – Community Profile, Iowa



The planning area contains an estimated \$2,667,294,000 worth of municipal structural inventory broken down into six different structural type classes. The following table shows this breakdown.

Table 2.2 – Structural Inventory, Countywide

Structure Class	Structures	Total Class Value
Agricultural	293	\$69,755,000
Commercial	580	\$399,966,000
Government	26	\$20,208,000
Industrial	176	\$156,958,000
Residential	7,787	\$1,739,992,000
Multi-Unit Residential*	120	\$280,415,000
Total =	8,982	\$2,667,294,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the Federal Emergency Management Agency.

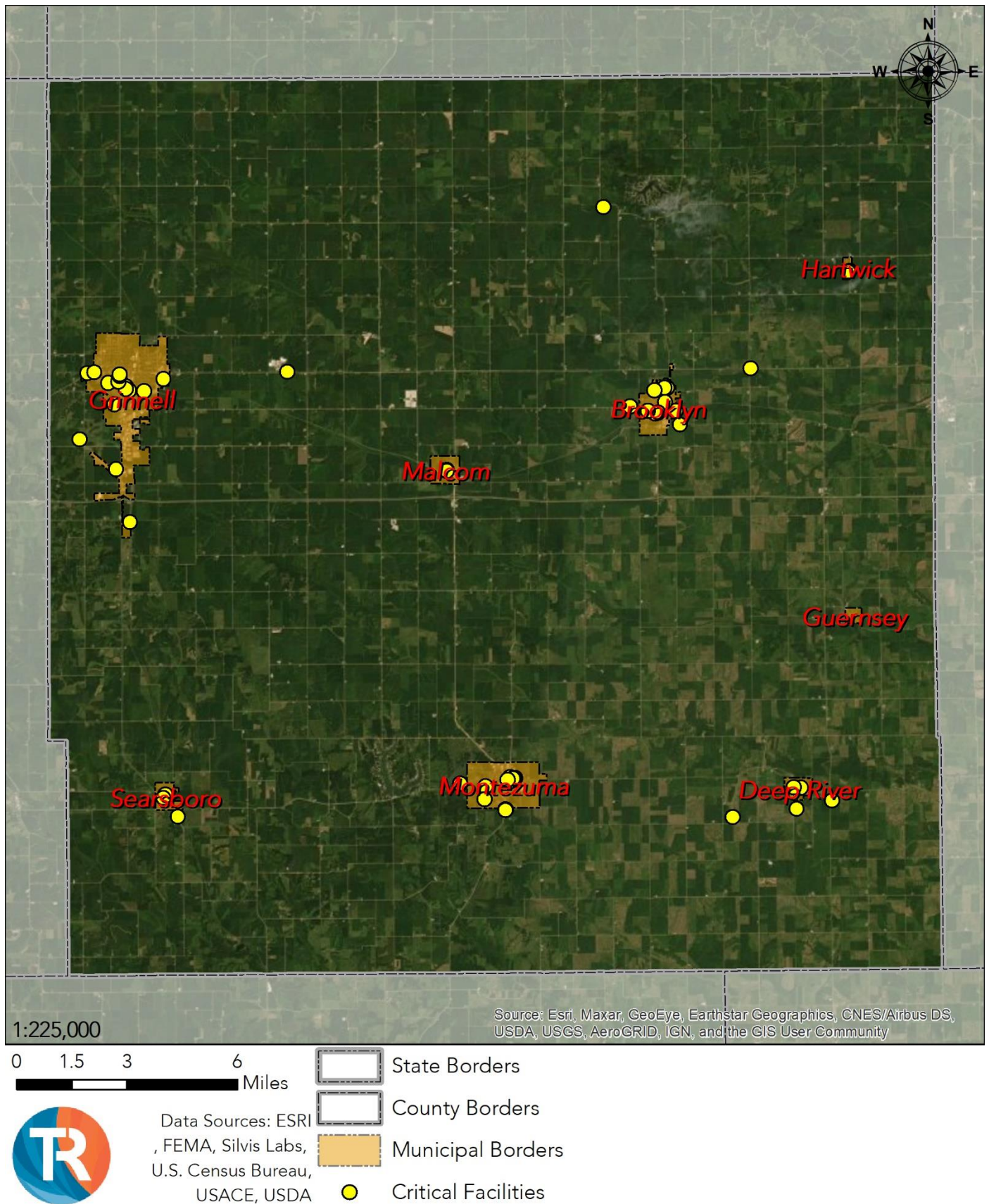
The Poweshiek County EMA and this plan’s stakeholders have identified a total of 54 critical facilities throughout the planning area. These facilities are deemed critical either by the nature in which they maintain basic services or that they house a high density of vulnerable populations. A breakdown by facility type of the 54 critical facilities is listed in the table below and shown in the map on the following page.

Table 2.3 – Critical Facilities, Countywide

Facility Type	Critical Facility Count
Airport/Heliport	1
Assisted Living/Healthcare	6
Education	2
Electric Utility	13
Fire Prevention/EMS	7
Hospital	1
Law Enforcement	2
Local Government	11
Public Works	2
Water Utility	9
Total =	54

*The data are from the Poweshiek County EMA and the participating jurisdictions.

Map 2.2 – Critical Facilities, Countywide



2.1 – Poweshiek County (Unincorporated)

The unincorporated portions of Poweshiek County have experienced a significantly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 5,747 people living in unincorporated Poweshiek County occupying 3,360 housing units. The unincorporated county contains 3,723 identified structures valued at \$932,288,000.

Table 2.4 – Population Change, Poweshiek County (Unincorporated)

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	5,911	-	-
2016	5,691	- 3.72%	-
2019	5,747	- 2.77%	0.98%

**The data are from the U.S. Census Bureau.*

Table 2.5 – Structural Inventory, Poweshiek County (Unincorporated)

Structure Class	Structures	Total Class Value
Agricultural	240	\$55,681,000
Commercial	178	\$88,169,000
Government	2	\$2,331,000
Industrial	79	\$41,493,000
Residential	3,211	\$725,273,000
Multi-Unit Residential*	13	\$19,341,000
Total =	3,723	\$932,288,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

2.1 – Poweshiek County (Unincorporated)

Of the 54 critical facilities within the planning area, 12 are geographically located within unincorporated portions of Poweshiek County. The following table lists these facilities.

Table 2.6 – Critical Facilities by Location, Poweshiek County (Unincorporated)

Name	Type	Owner
Brooklyn Substation - IPL	Electric Utility	Private
Brooklyn Substation - REC	Electric Utility	Private
Brooklyn Substation - Rural	Electric Utility	Private
Deep River Substation	Electric Utility	Private
English Farms Substation	Electric Utility	Private
Grinnell Wastewater Treatment	Water Utility	Grinnell
Madison Substation	Electric Utility	Private
Malcom Substation	Electric Utility	Private
Montezuma Water Treatment Pump	Water Utility	Montezuma
Poweshiek County EOC	Local Government	County
Poweshiek Sheriff's Office	Law Enforcement	County
Poweshiek Substation	Electric Utility	Private

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

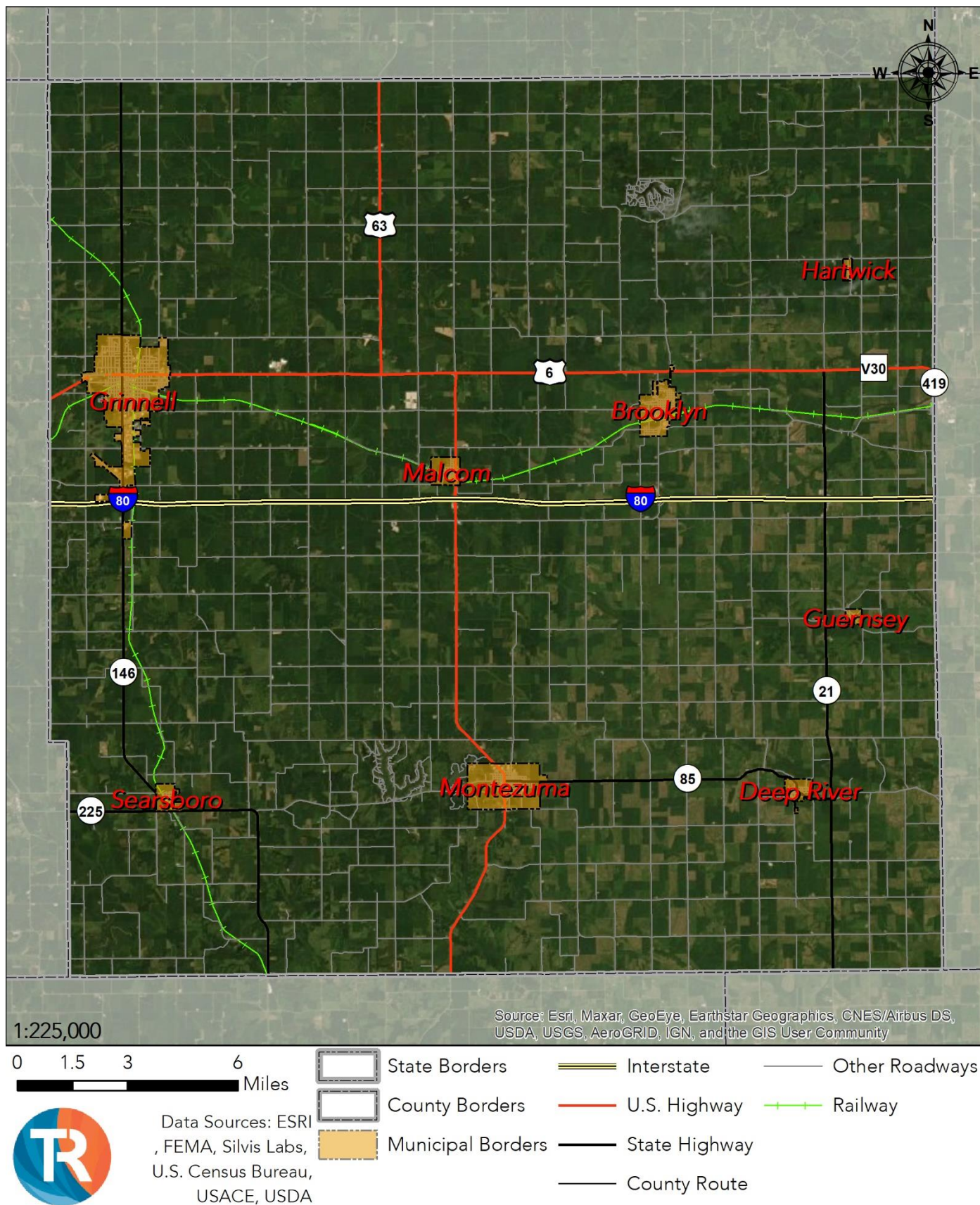
Of the 54 critical facilities within the planning area, 3 are owned and operated by the Poweshiek County Government. The table below lists all of these facilities and which geographic location they reside.

Table 2.7 – Critical Facilities by Owner, Poweshiek County (Unincorporated)

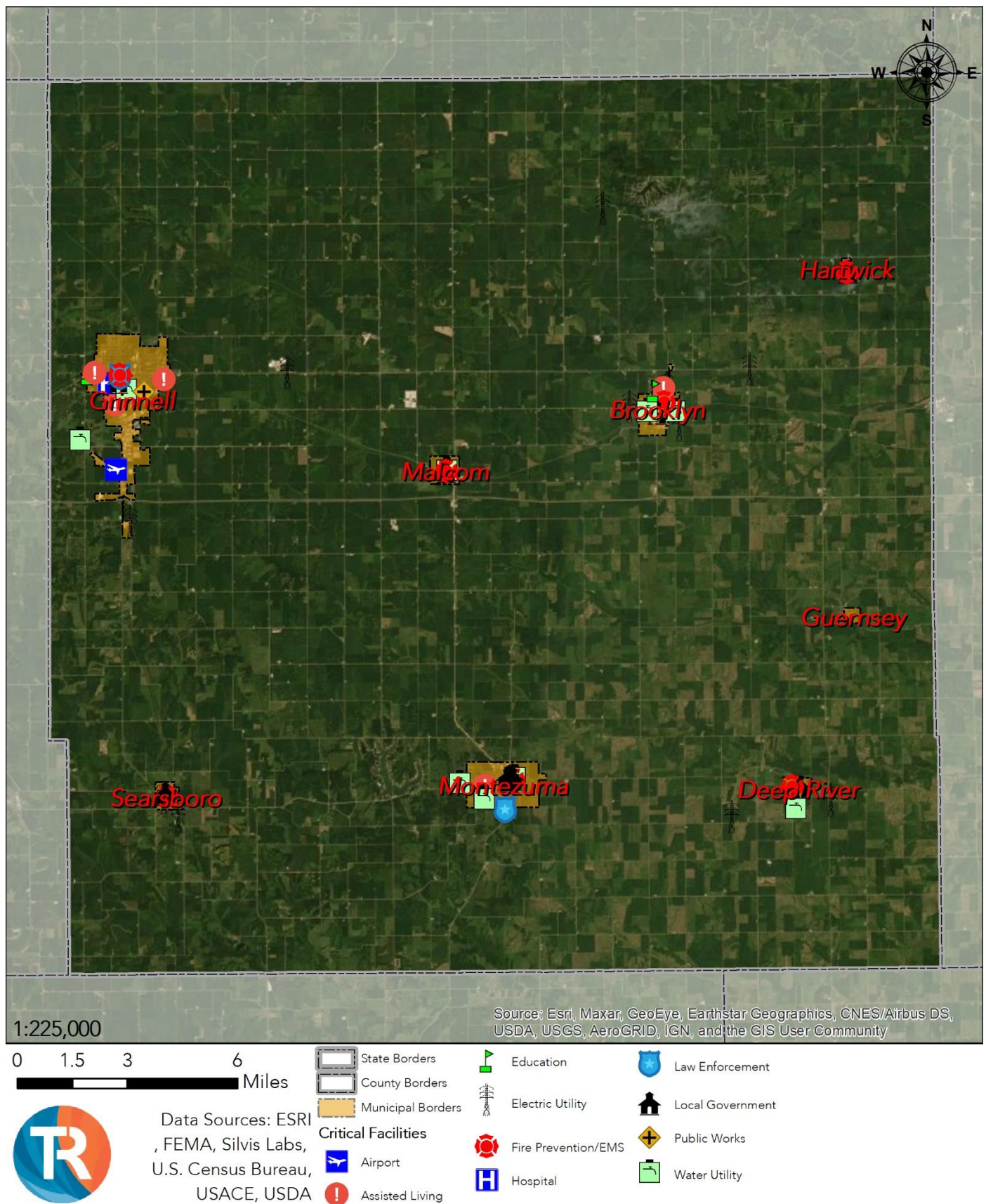
Name	Type	Location
Poweshiek County Courthouse	Local Government	Montezuma
Poweshiek County EOC	Local Government	County
Poweshiek Sheriff's Office	Law Enforcement	County

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.3 – Community Profile, Poweshiek County (Unincorporated)



Map 2.4 – Critical Facilities, Poweshiek County (Unincorporated)



2.2 – Brooklyn

The City of Brooklyn has experienced a significantly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 1,400 people living in Brooklyn occupying 665 housing units. The city contains 678 identified structures valued at \$178,734,000.



Table 2.8 – Population Change, Brooklyn

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	1,475	-	-
2016	1,399	- 5.15%	-
2019	1,400	- 5.08%	0.07%

*The data are from the U.S. Census Bureau.

Table 2.9 – Structural Inventory, Brooklyn

Structure Class	Structures	Total Class Value
Agricultural	10	\$2,062,000
Commercial	46	\$27,713,000
Government	2	\$731,000
Industrial	17	\$11,549,000
Residential	595	\$120,434,000
Multi-Unit Residential*	8	\$16,245,000
Total =	678	\$178,734,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the Federal Emergency Management Agency.

Of the 54 critical facilities within the planning area, 8 are geographically located within Brooklyn. The following table lists these facilities.

Table 2.10 – Critical Facilities by Location, Brooklyn

Name	Type	Owner
Brooklyn City Hall	Local Government	Brooklyn
Brooklyn Community Estate	Assisted Living	Private
Brooklyn Fire Department	Fire Prevention/EMS	Brooklyn
Brooklyn Street Department	Public Works	Brooklyn
Brooklyn Substation	Electric Utility	Private
Brooklyn Wastewater Treatment	Water Utility	Brooklyn
Brooklyn Water Tower	Water Utility	Brooklyn
Brooklyn-Guernsey-Malcom CSD Campus	Education	CSD

*The data are from the Poweshiek County EMA and the participating jurisdictions.

2.2 – Brooklyn

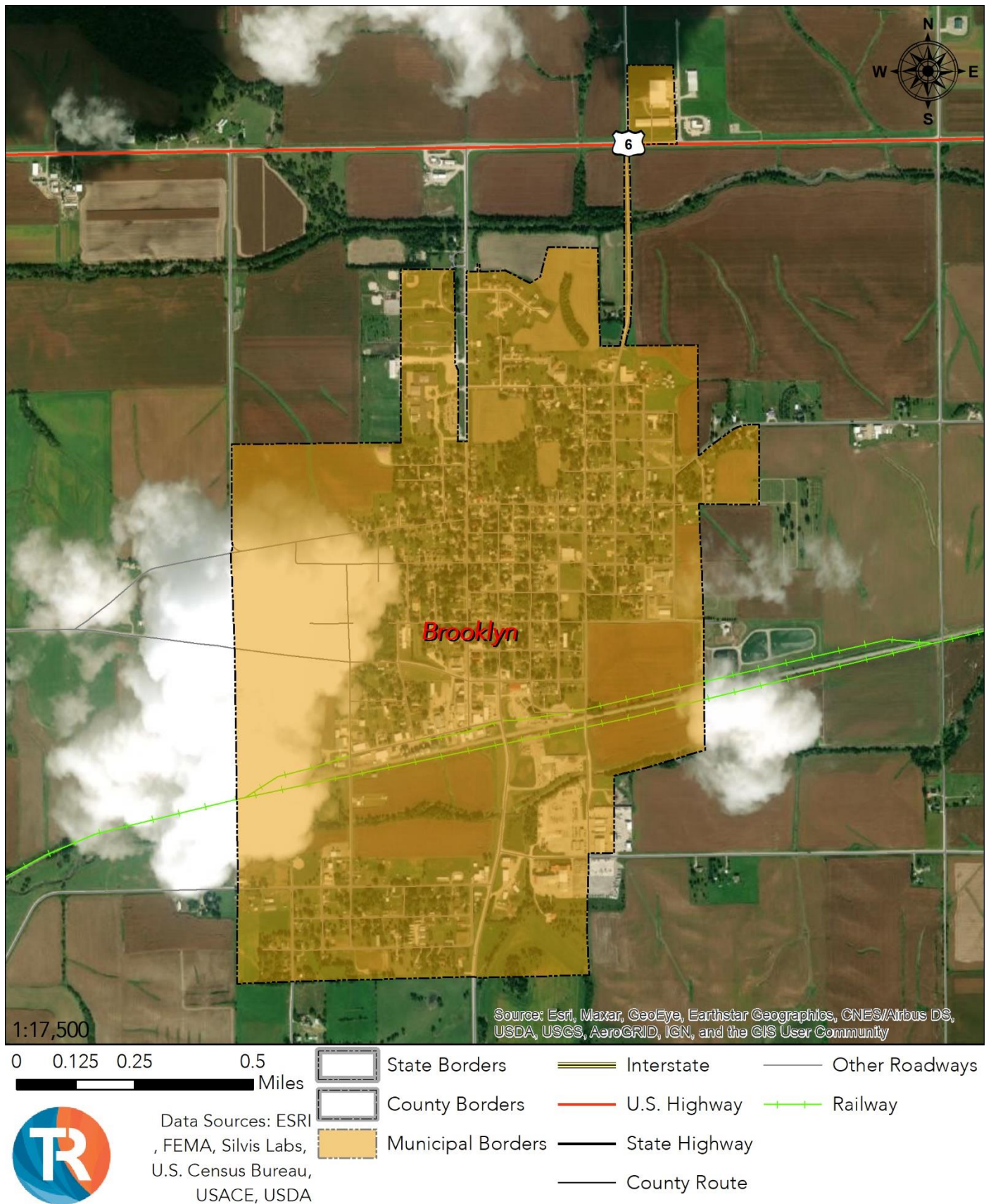
Of the 54 critical facilities within the planning area, 5 are owned and operated by Brooklyn. The table below lists all of these facilities and which geographic location they reside.

Table 2.11 – Critical Facilities by Owner, Brooklyn

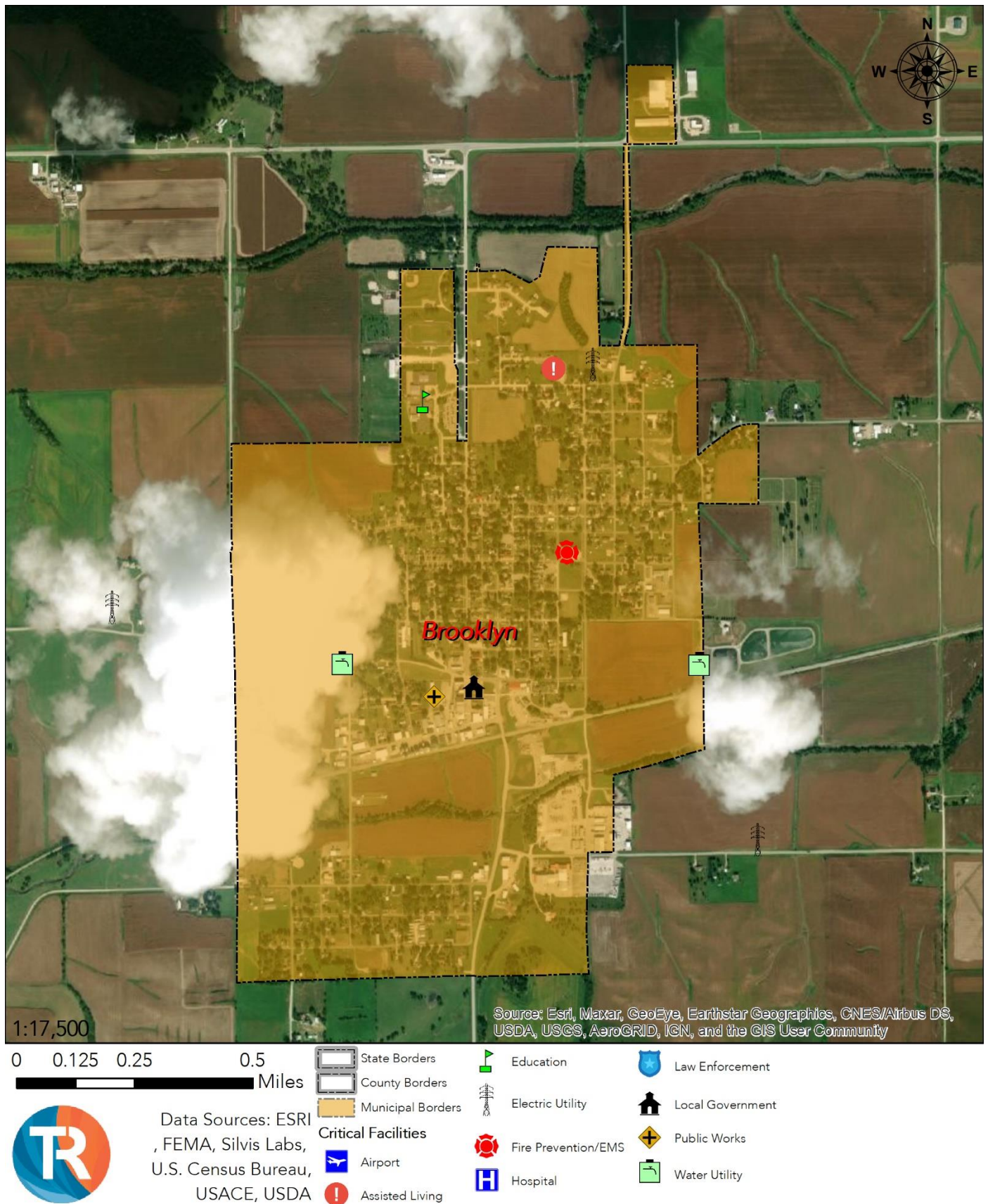
Name	Type	Location
Brooklyn City Hall	Local Government	Brooklyn
Brooklyn Fire Department	Fire Prevention/EMS	Brooklyn
Brooklyn Street Department	Public Works	Brooklyn
Brooklyn Wastewater Treatment	Water Utility	Brooklyn
Brooklyn Water Tower	Water Utility	Brooklyn

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.5 – Community Profile, Brooklyn



Map 2.6 – Critical Facilities, Brooklyn



2.3 – Deep River

The City of Deep River has experienced a significantly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 270 people living in Deep River occupying 130 housing units. The city contains 153 identified structures valued at \$28,192,000.

Table 2.12 – Population Change, Deep River

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	279	-	-
2016	267	- 4.30%	-
2019	270	- 3.23%	1.12%

**The data are from the U.S. Census Bureau.*

Table 2.13 – Structural Inventory, Deep River

Structure Class	Structures	Total Class Value
Agricultural	3	\$576,000
Commercial	8	\$2,834,000
Government	1	\$234,000
Industrial	3	\$1,925,000
Residential	138	\$22,623,000
Multi-Unit Residential*	0	\$0
Total =	153	\$28,192,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

Of the 54 critical facilities within the planning area, 3 are geographically located within Deep River. The following table lists these facilities.

Table 2.14 – Critical Facilities by Location, Deep River

Name	Type	Owner
Deep River City Hall	Local Government	Deep River
Deep River Fire Station	Fire Prevention/EMS	Deep River
Deep River Wastewater Treatment	Water Utility	Deep River

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

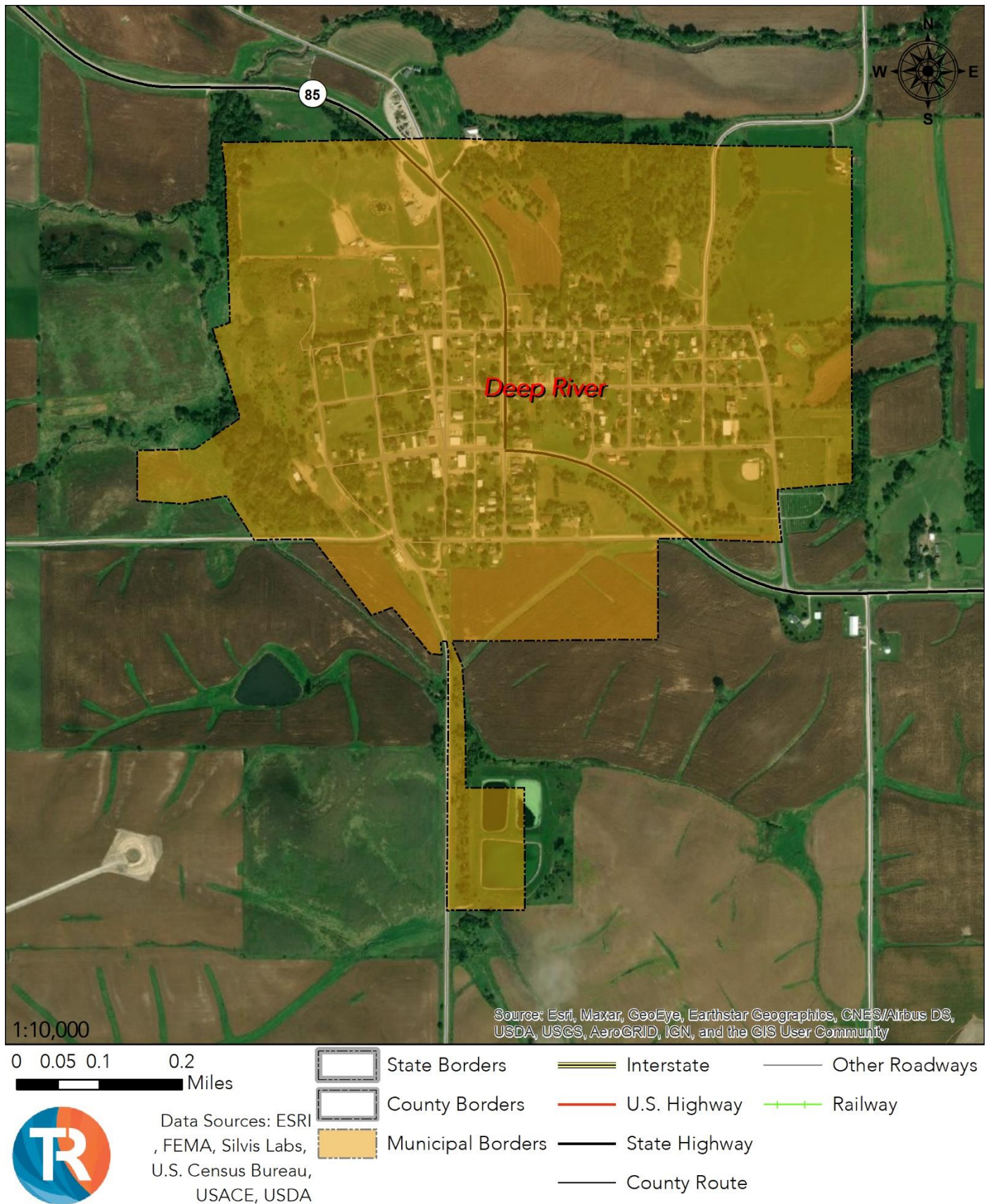
Of the 54 critical facilities within the planning area, 3 are owned and operated by Deep River. The table below lists all of these facilities and which geographic location they reside.

Table 2.15 – Critical Facilities by Owner, Deep River

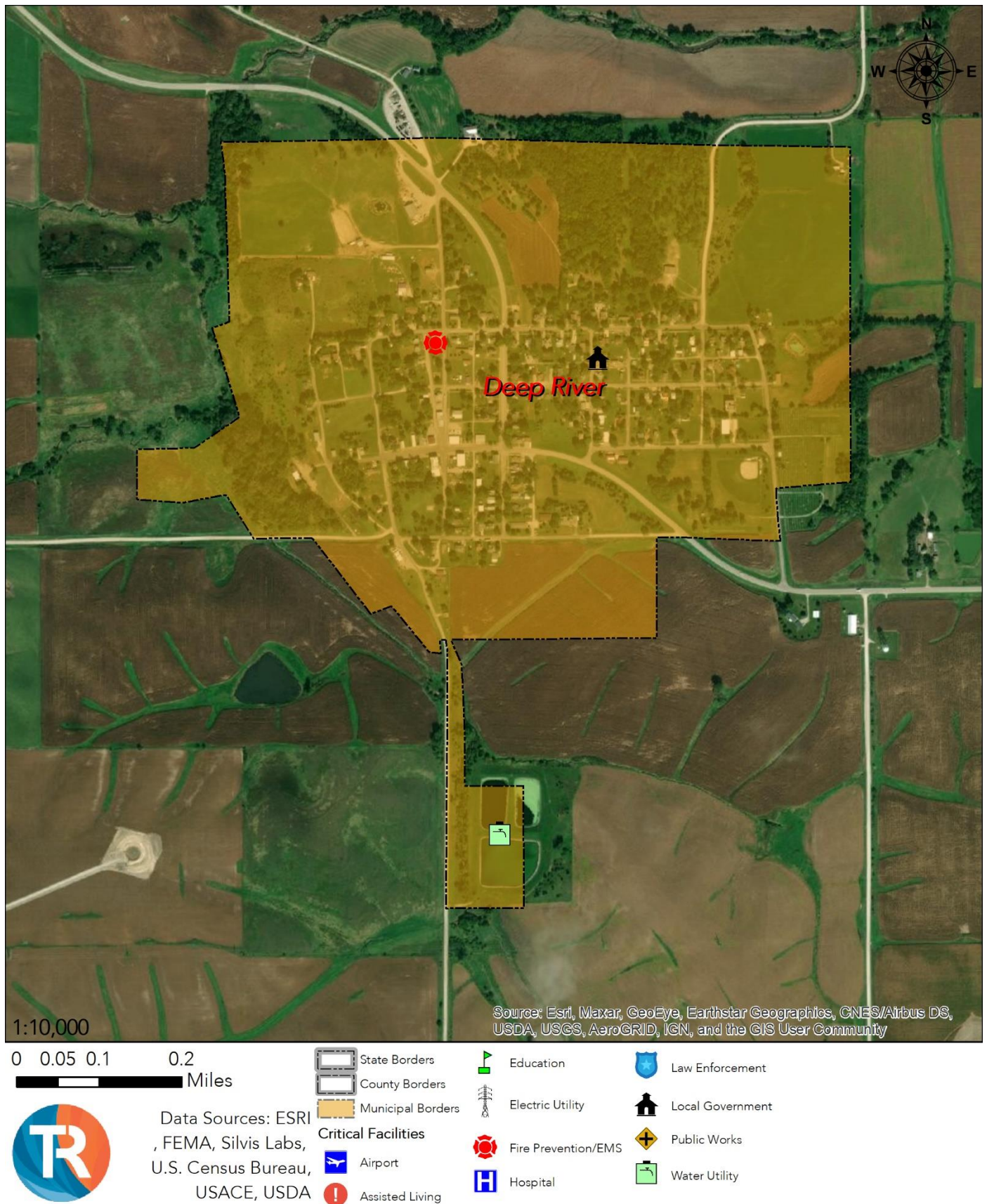
Name	Type	Location
Deep River City Hall	Local Government	Deep River
Deep River Fire Station	Fire Prevention/EMS	Deep River
Deep River Wastewater Treatment	Water Utility	Deep River

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.7 – Community Profile, Deep River



Map 2.8 – Critical Facilities, Deep River



2.4 – Grinnell

The City of Grinnell has experienced a declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 9,116 people living in Grinnell occupying 3,845 housing units. The city contains 3,364 identified structures valued at \$1,204,303,000.



Table 2.16 – Population Change, Grinnell

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	9,222	-	-
2016	8,963	- 2.81%	-
2019	9,116	- 1.15%	1.71%

*The data are from the U.S. Census Bureau.

Table 2.17 – Structural Inventory, Grinnell

Structure Class	Structures	Total Class Value
Agricultural	29	\$8,954,000
Commercial	264	\$219,168,000
Government	9	\$8,171,000
Industrial	54	\$65,855,000
Residential	2,916	\$668,050,000
Multi-Unit Residential*	92	\$234,105,000
Total =	3,364	\$1,204,303,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the Federal Emergency Management Agency.

Of the 54 critical facilities within the planning area, 14 are geographically located within Grinnell. The following table lists these facilities.

Table 2.18 – Critical Facilities by Location, Grinnell

Name	Type	Owner
Billy Robinson Field	Airport	Private
Brookside Assisted Living	Assisted Living	Private
Central Iowa Christian School	School	Private
Grinnell Fire Department	Fire Prevention/EMS	Grinnell
Grinnell Health Center	Assisted Living	Private
Grinnell Police Department	Law Enforcement	Grinnell
Grinnell Public Services Department	Public Works	Grinnell
Grinnell Regional Medical Center	Hospital	Private
Grinnell South Substation	Electric Utility	Private
Grinnell Substation	Electric Utility	Private
Grinnell Water Tower	Water Utility	Grinnell
Grinnell City Hall	Local Government	Grinnell
Mayflower Community	Assisted Living	Private
St. Francis Manor & Seeland Park	Assisted Living	Private

*The data are from the Poweshiek County EMA and the participating jurisdictions.

2.4 – Grinnell

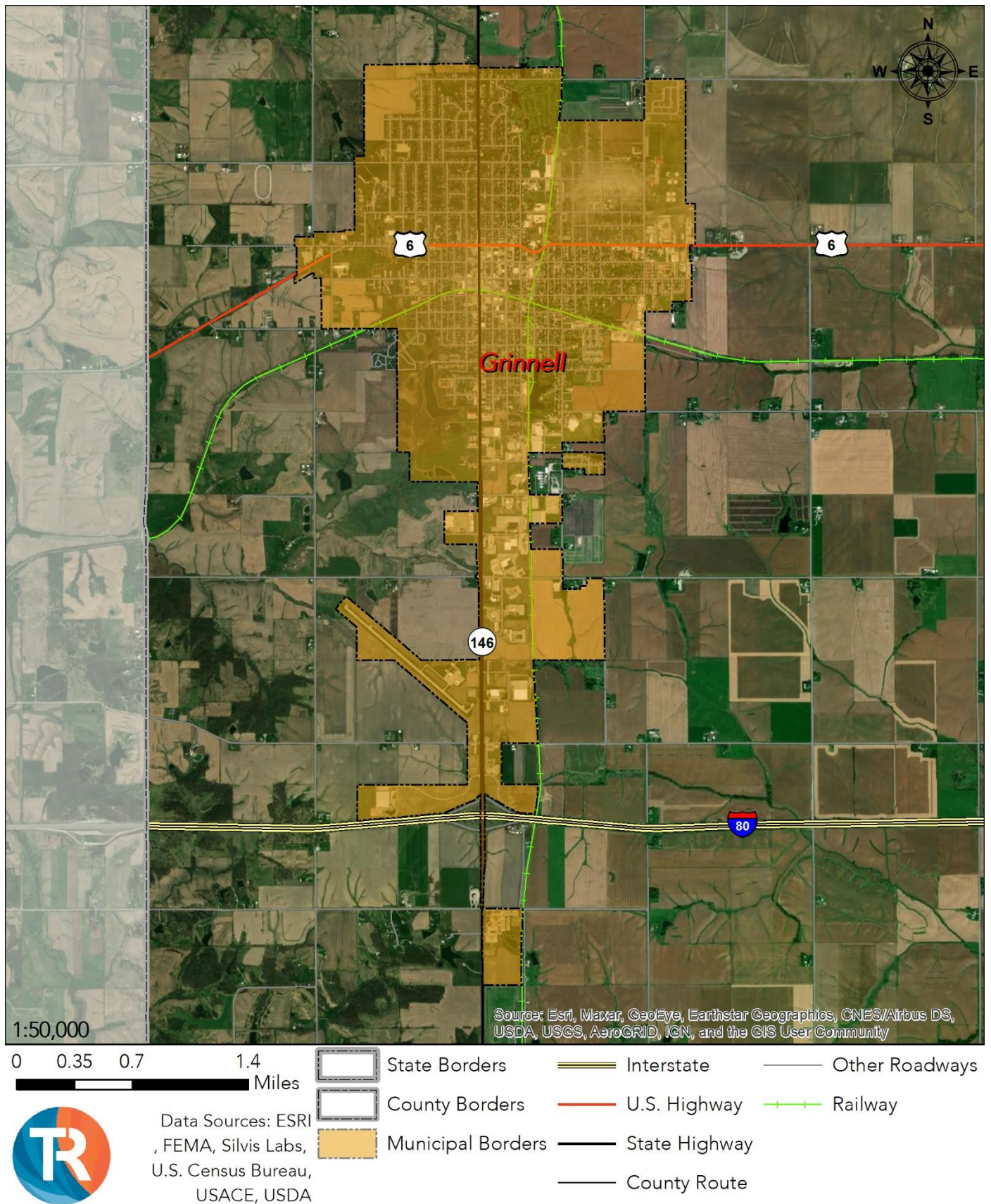
Of the 54 critical facilities within the planning area, 6 are owned and operated by Grinnell. The table below lists all of these facilities and which geographic location they reside.

Table 2.19 – Critical Facilities by Owner, Grinnell

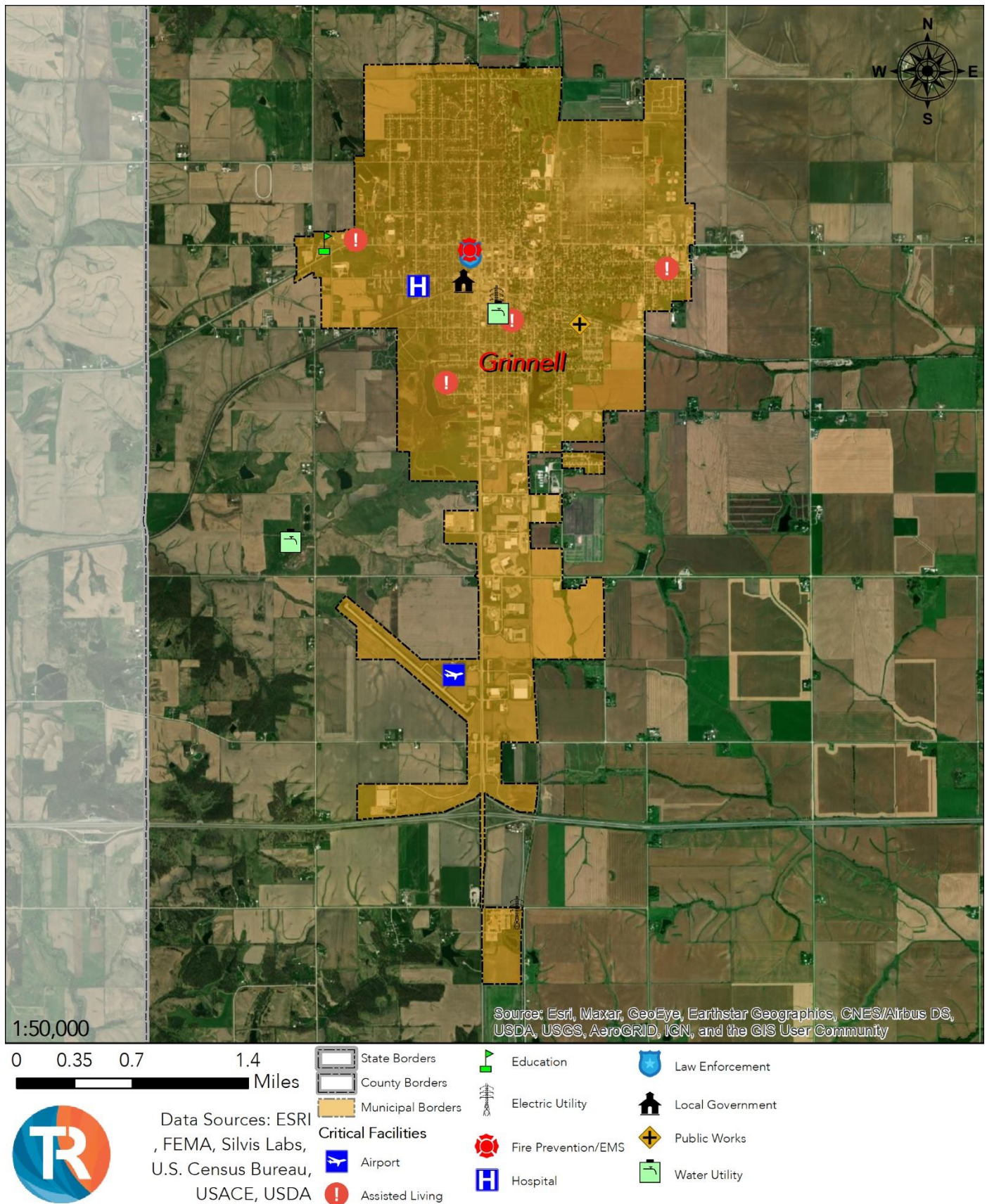
Name	Type	Location
Grinnell Fire Department	Fire Prevention/EMS	Grinnell
Grinnell Police Department	Law Enforcement	Grinnell
Grinnell Public Services Department	Public Works	Grinnell
Grinnell Wastewater Treatment	Water Utility	County
Grinnell Water Tower	Water Utility	Grinnell
Grinnell City Hall	Local Government	Grinnell

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.9 – Community Profile, Grinnell



Map 2.10 – Critical Facilities, Grinnell



2.5 – Guernsey

The City of Guernsey has experienced a declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 60 people living in Guernsey occupying 32 housing units. The city contains 38 identified structures valued at \$6,677,000.

Table 2.20 – Population Change, Guernsey

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	63	-	-
2016	62	- 1.59%	-
2019	60	- 4.76%	- 3.23%

**The data are from the U.S. Census Bureau.*

Table 2.21 – Structural Inventory, Guernsey

Structure Class	Structures	Total Class Value
Agricultural	0	\$0
Commercial	3	\$597,000
Government	1	\$211,000
Industrial	2	\$672,000
Residential	32	\$5,197,000
Multi-Unit Residential*	0	\$0
Total =	38	\$6,677,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

Of the 54 critical facilities within the planning area, none are geographically located in Guernsey or are owned by Guernsey.

Map 2.11 – Community Profile, Guernsey



2.6 – Hartwick

The City of Hartwick has experienced a declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 80 people living in Hartwick occupying 40 housing units. The city contains 45 identified structures valued at \$11,129,000.

Table 2.22 – Population Change, Hartwick

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	86	-	-
2016	80	6.98%	-
2019	80	6.98%	0.00%

**The data are from the U.S. Census Bureau.*

Table 2.23 – Structural Inventory, Hartwick

Structure Class	Structures	Total Class Value
Agricultural	1	\$372,000
Commercial	2	\$1,216,000
Government	1	\$117,000
Industrial	0	\$0
Residential	41	\$9,424,000
Multi-Unit Residential*	0	\$0
Total =	45	\$11,129,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

Of the 54 critical facilities within the planning area, 2 are geographically located within Hartwick. The following table lists these facilities.

Table 2.24 – Critical Facilities by Location, Hartwick

Name	Type	Owner
Hartwick City Hall	Local Government	Hartwick
Hartwick Fire Department	Fire Prevention/EMS	Hartwick

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Of the 54 critical facilities within the planning area, 2 are owned and operated by Hartwick. The table below lists all of these facilities and which geographic location they reside.

Table 2.25 – Critical Facilities by Owner, Hartwick

Name	Type	Location
Hartwick City Hall	Local Government	Hartwick
Hartwick Fire Department	Fire Prevention/EMS	Hartwick

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.12 – Community Profile, Hartwick



Map 2.13 – Critical Facilities, Hartwick



0 0.0425 0.085 0.17
Miles



Data Sources: ESRI
, FEMA, Silvix Labs,
U.S. Census Bureau,
USACE, USDA

- State Borders
- County Borders
- Municipal Borders
- Critical Facilities**
- Airport
- Assisted Living

- Education
- Electric Utility
- Fire Prevention/EMS
- Hospital
- Law Enforcement
- Local Government
- Public Works
- Water Utility

2.7 – Malcom

The City of Malcom has experienced a significantly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 272 people living in Malcom occupying 143 housing units. The city contains 161 identified structures valued at \$49,294,000.

Table 2.26 – Population Change, Malcom

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	287	-	-
2016	271	- 5.57%	-
2019	272	- 5.23%	0.37%

**The data are from the U.S. Census Bureau.*

Table 2.27 – Structural Inventory, Malcom

Structure Class	Structures	Total Class Value
Agricultural	2	\$618,000
Commercial	11	\$4,273,000
Government	3	\$1,604,000
Industrial	1	\$10,179,000
Residential	143	\$31,577,000
Multi-Unit Residential*	1	\$1,043,000
Total =	161	\$49,294,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

Of the 54 critical facilities within the planning area, 3 are geographically located within Malcom. The following table lists these facilities.

Table 2.28 – Critical Facilities by Location, Malcom

Name	Type	Owner
Malcom City Hall	Local Government	Malcom
Malcom Fire Department	Fire Prevention/EMS	Malcom
Malcom Water Tower	Water Utility	Malcom

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

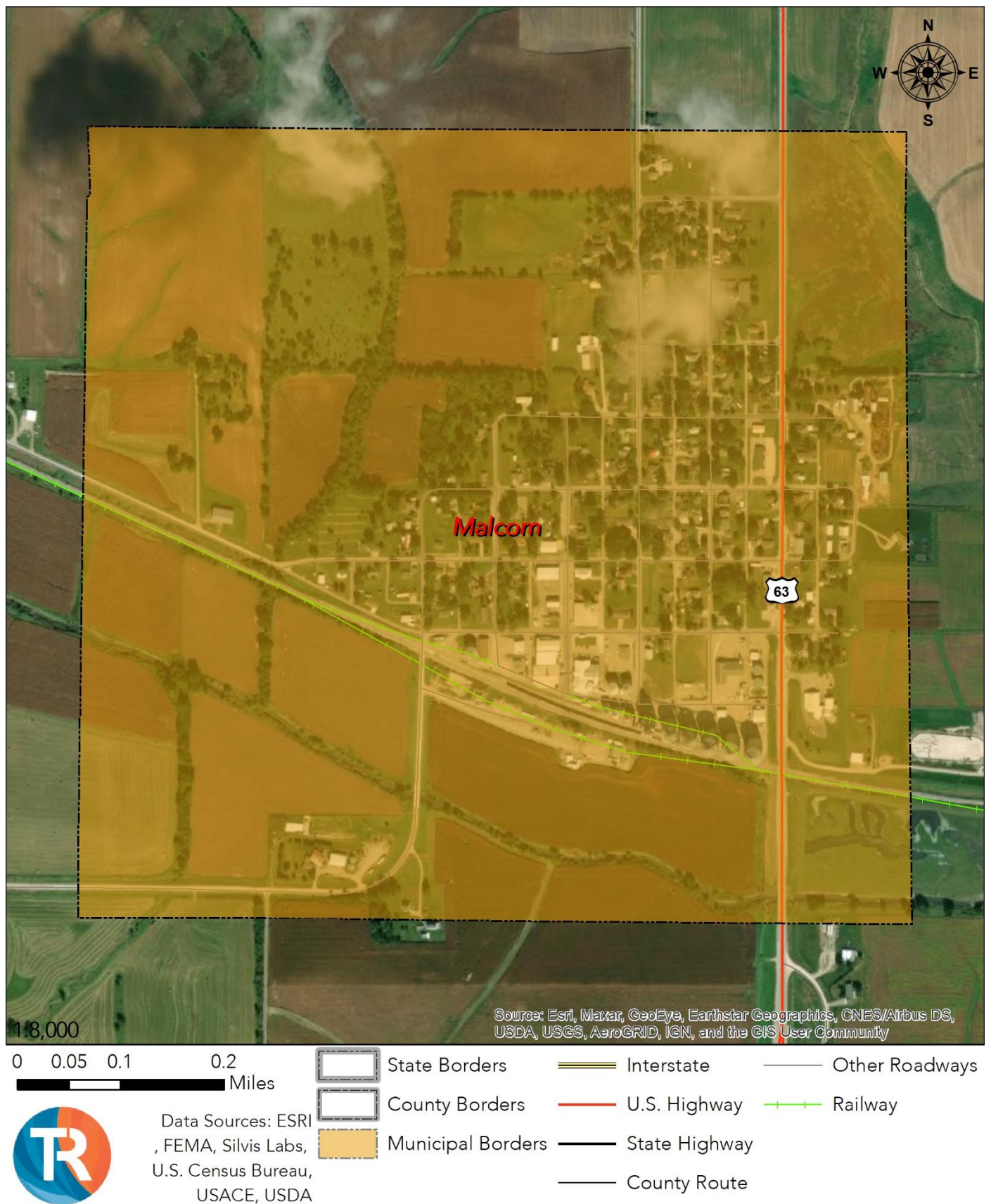
Of the 54 critical facilities within the planning area, 3 are owned and operated by Malcom. The table below lists all of these facilities and which geographic location they reside.

Table 2.29 – Critical Facilities by Owner, Malcom

Name	Type	Location
Malcom City Hall	Local Government	Malcom
Malcom Fire Department	Fire Prevention/EMS	Malcom
Malcom Water Tower	Water Utility	Malcom

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.14 – Community Profile, Malcom



Map 2.15 – Critical Facilities, Malcom



2.8 – Montezuma

The City of Montezuma has experienced a slightly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 1,412 people living in Montezuma occupying 692 housing units. The city contains 738 identified structures valued at \$237,694,000.



Table 2.30 – Population Change, Montezuma

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	1,454	-	-
2016	1,402	- 3.58%	-
2019	1,412	- 2.89%	0.71%

*The data are from the U.S. Census Bureau.

Table 2.31 – Structural Inventory, Montezuma

Structure Class	Structures	Total Class Value
Agricultural	7	\$1,385,000
Commercial	66	\$55,618,000
Government	5	\$5,126,000
Industrial	19	\$25,186,000
Residential	635	\$140,698,000
Multi-Unit Residential*	6	\$9,681,000
Total =	738	\$237,694,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the Federal Emergency Management Agency.

Of the 54 critical facilities within the planning area, 9 are geographically located within Montezuma. The following table lists these facilities.

Table 2.32 – Critical Facilities by Location, Montezuma

Name	Type	Owner
Montezuma City Hall	Local Government	Montezuma
Montezuma Fire Department	Fire Prevention/EMS	Montezuma
Montezuma Memorial Hall	Local Government	Montezuma
Montezuma Power Plant	Electric Utility	Private
Montezuma Sewage Treatment	Water Utility	Montezuma
Montezuma Specialty Care	Assisted Living	Private
Montezuma Water Tower	Water Utility	Montezuma
Poweshiek County Courthouse	Local Government	County
Presbyterian Family Center	Local Government (Community Center)	Private

*The data are from the Poweshiek County EMA and the participating jurisdictions.

2.8 – Montezuma

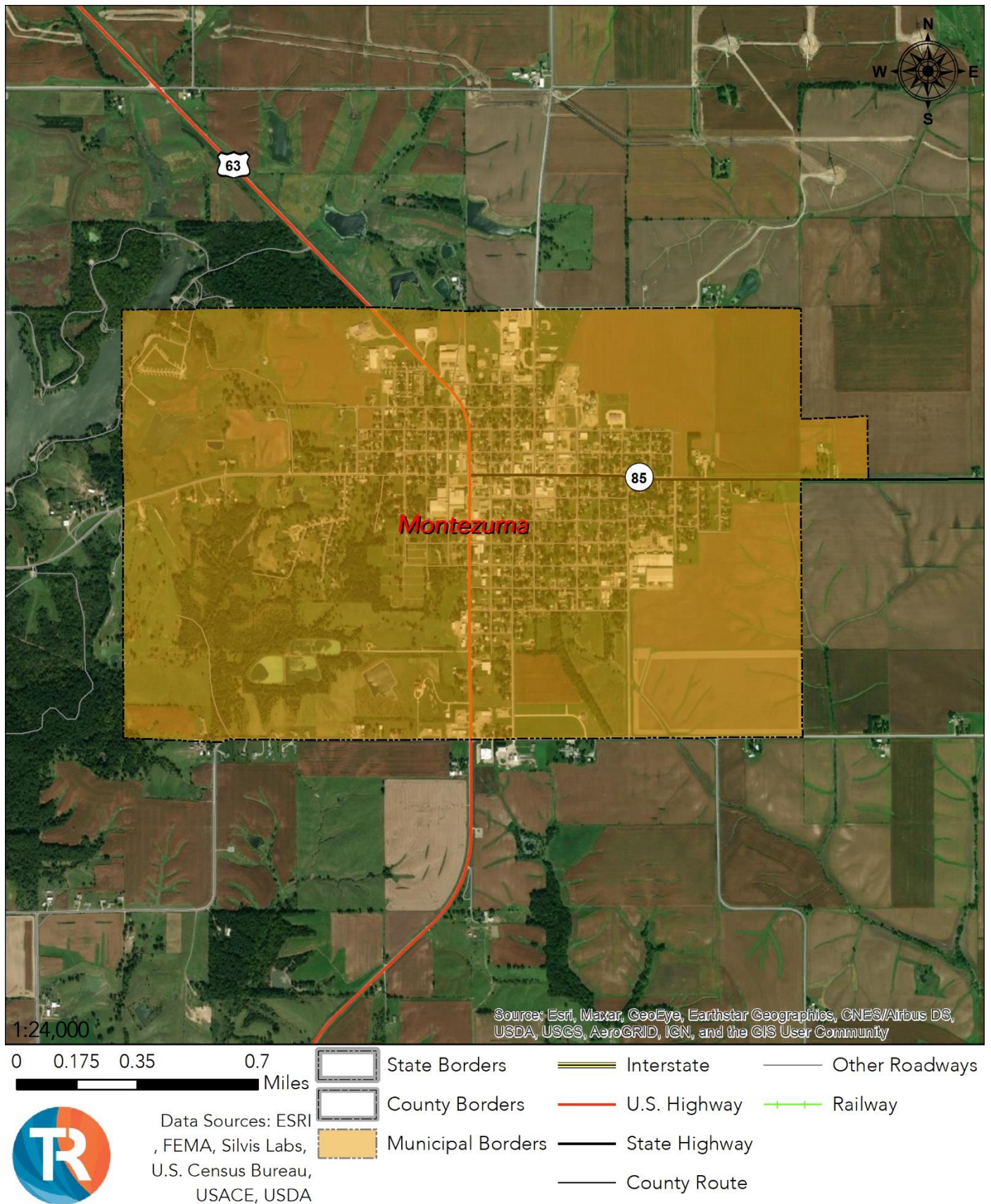
Of the 54 critical facilities within the planning area, 7 are owned and operated by Montezuma. The table below lists all of these facilities and which geographic location they reside.

Table 2.33 – Critical Facilities by Owner, Montezuma

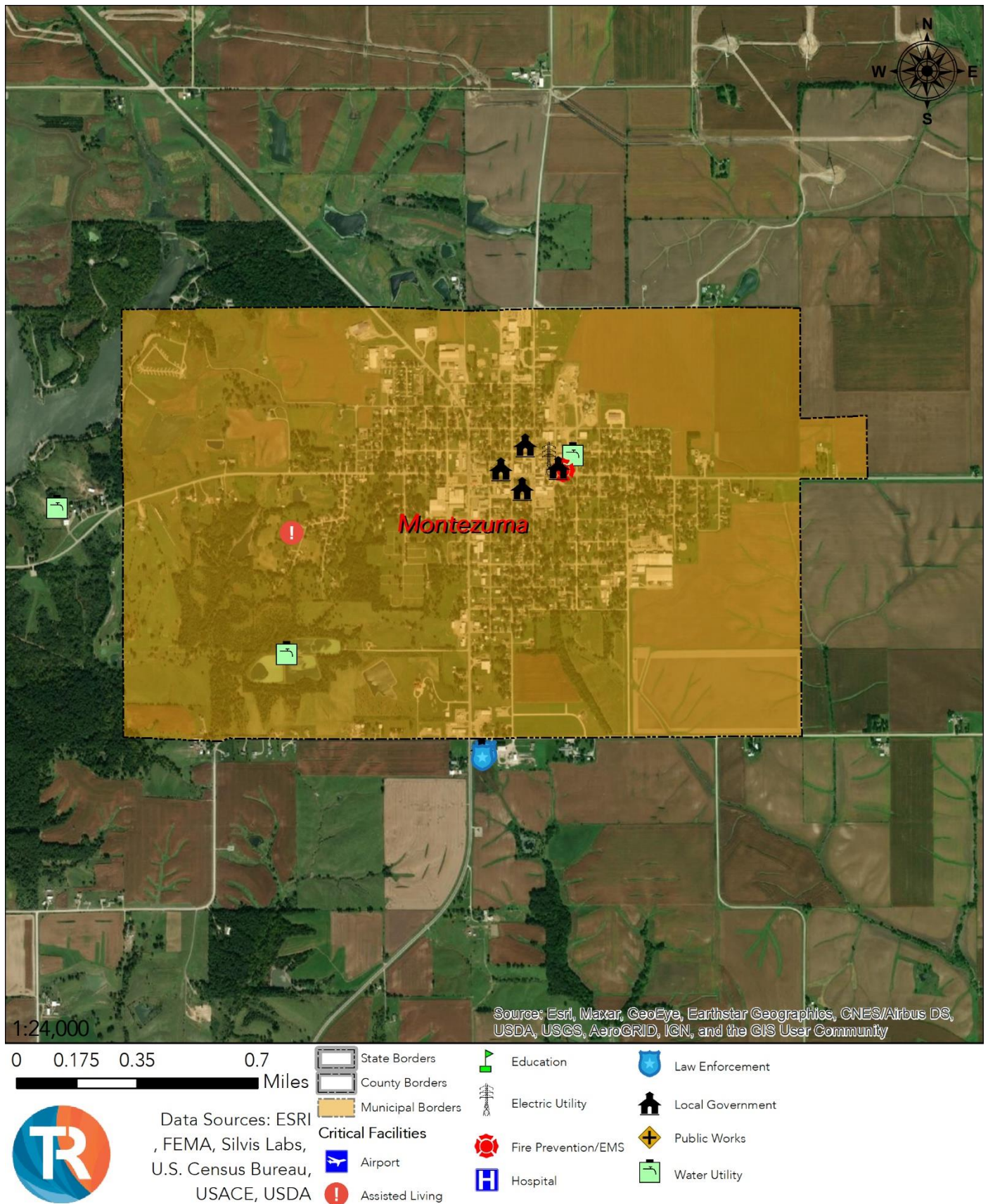
Name	Type	Location
Montezuma City Hall	Local Government	Montezuma
Montezuma Fire Department	Fire Prevention/EMS	Montezuma
Montezuma Memorial Hall	Local Government	Montezuma
Montezuma Police Department	Law Enforcement	County
Montezuma Sewage Treatment	Water Utility	Montezuma
Montezuma Water Tower	Water Utility	Montezuma
Montezuma Water Treatment Pump	Water Utility	County

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.16 – Community Profile, Montezuma



Map 2.17 – Critical Facilities, Montezuma



2.9 – Searsboro

The City of Searsboro has experienced a slightly declining population since 2010 and a slight recovery since the development of its last plan in 2016. The latest Census Bureau estimate places 147 people living in Searsboro occupying 77 housing units. The city contains 82 identified structures valued at \$18,983,000.

Table 2.34 – Population Change, Searsboro

Year	Estimated Population	Percent Change from 2010	Percent Change from 2016
2010	148	-	-
2016	144	- 2.70%	-
2019	147	- 0.68%	2.08%

**The data are from the U.S. Census Bureau.*

Table 2.35 – Structural Inventory, Searsboro

Structure Class	Structures	Total Class Value
Agricultural	1	\$107,000
Commercial	2	\$378,000
Government	2	\$1,683,000
Industrial	1	\$99,000
Residential	76	\$16,716,000
Multi-Unit Residential*	0	\$0
Total =	82	\$18,983,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units.*

***The data are from the Federal Emergency Management Agency.*

Of the 54 critical facilities within the planning area, 3 are geographically located within Searsboro. The following table lists these facilities.

Table 2.36 – Critical Facilities by Location, Searsboro

Name	Type	Owner
Searsboro Community Center	Local Government	Searsboro
Searsboro Fire Department	Fire Prevention/EMS	Searsboro
Searsboro Substation	Electric Utility	Private

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Of the 54 critical facilities within the planning area, 2 are owned and operated by Searsboro. The table below lists all of these facilities and which geographic location they reside.

Table 2.37 – Critical Facilities by Owner, Searsboro

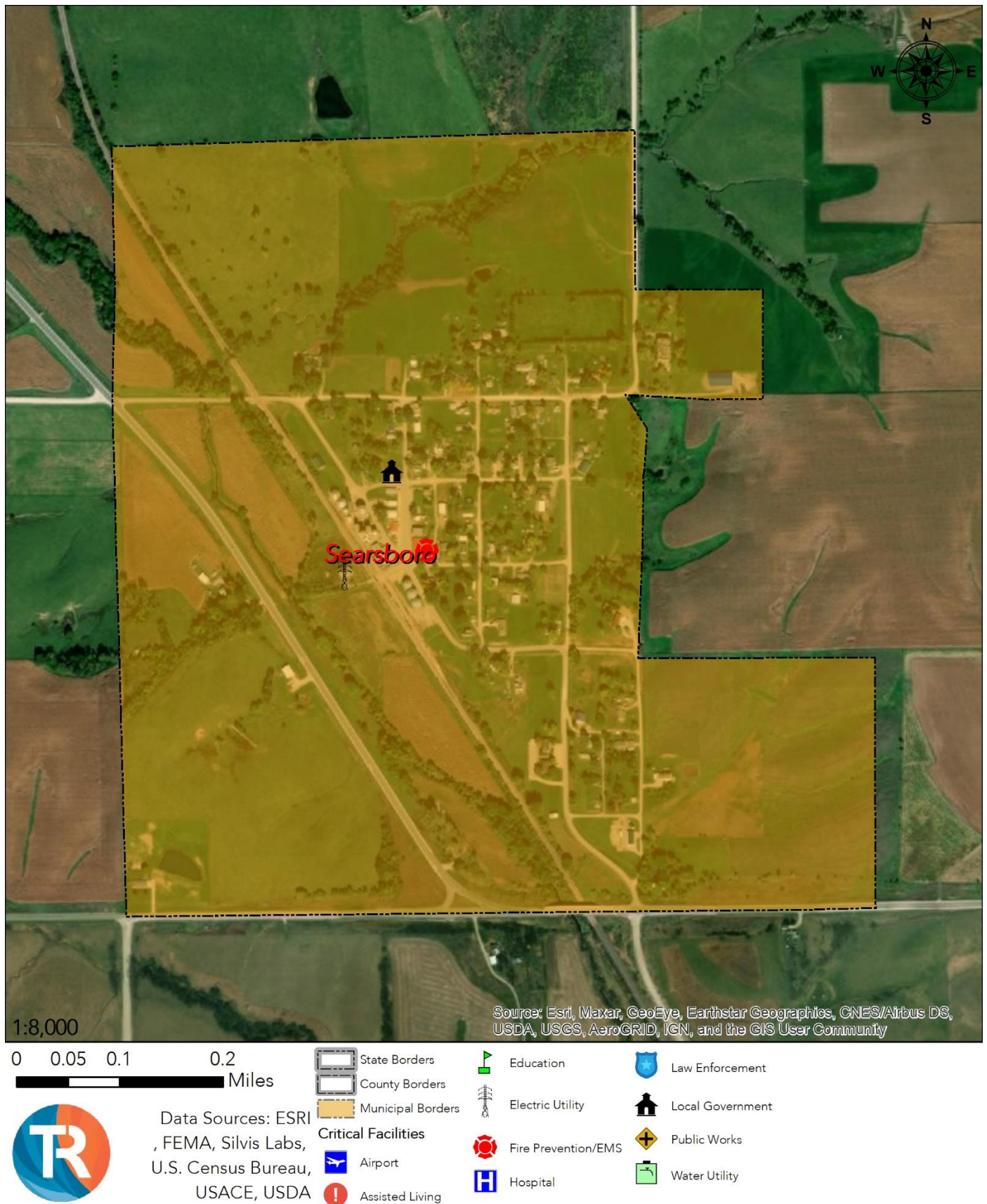
Name	Type	Location
Searsboro Community Center	Local Government	Searsboro
Searsboro Fire Department	Fire Prevention/EMS	Searsboro

**The data are from the Poweshiek County EMA and the participating jurisdictions.*

Map 2.18 – Community Profile, Searsboro



Map 2.19 – Critical Facilities, Searsboro



2.10 – Community School Districts

Poweshiek County is served by 3 community school districts, the Brooklyn-Guernsey-Malcom CSD, Grinnell-Newburg CSD, and the Montezuma CSD. The Brooklyn-Guernsey-Malcom CSD is not profiled in this plan. The 2 participating school districts serve a total of 2,244 students employing 326 faculty and staff. They operate a total of 73 structures that span 6 academic and administrative campuses.

Table 2.38 – School Districts’ Demographic Summary

Community School District	Structures	Staff	Students
Grinnell-Newburg	19	250	1,754
Montezuma	54	76	490
Total =	73	326	2,244

**The data are from each of the school districts.*

The 2 CSD’s structures are valued at a total of \$112,284,755 and are shown in the table below. A full breakdown of each location’s structural value can be found in Appendix B while a per district breakdown per campus can be found at the of this subsection.

Table 2.39 – School Districts’ Structural Summary

Community School District	Contents Value	Structural Value	Total Value
Grinnell-Newburg	\$11,053,123	\$70,221,996	\$81,275,119
Montezuma	\$5,901,475	\$25,108,161	\$31,009,636
Total =	\$16,954,598	\$95,330,157	\$112,284,755

**The data are from each of the school districts.*

Table 2.40 – Grinnell-Newburg Community School District Structural Summary

Campus	Structures	Contents Value	Structural Value	Total Value
Bailey Park Elem.	1	\$783,032	\$4,813,838	\$5,596,870
Davis Elem.	1	\$1,204,583	\$7,382,473	\$8,587,056
Fairview Elem.	2	\$641,307	\$5,308,832	\$5,950,139
High School	13	\$501,424	\$35,188,916	\$35,690,340
Middle School	2	\$3,130,346	\$17,527,937	\$20,658,283
Total =	19	\$11,053,123	\$70,221,996	\$81,275,119

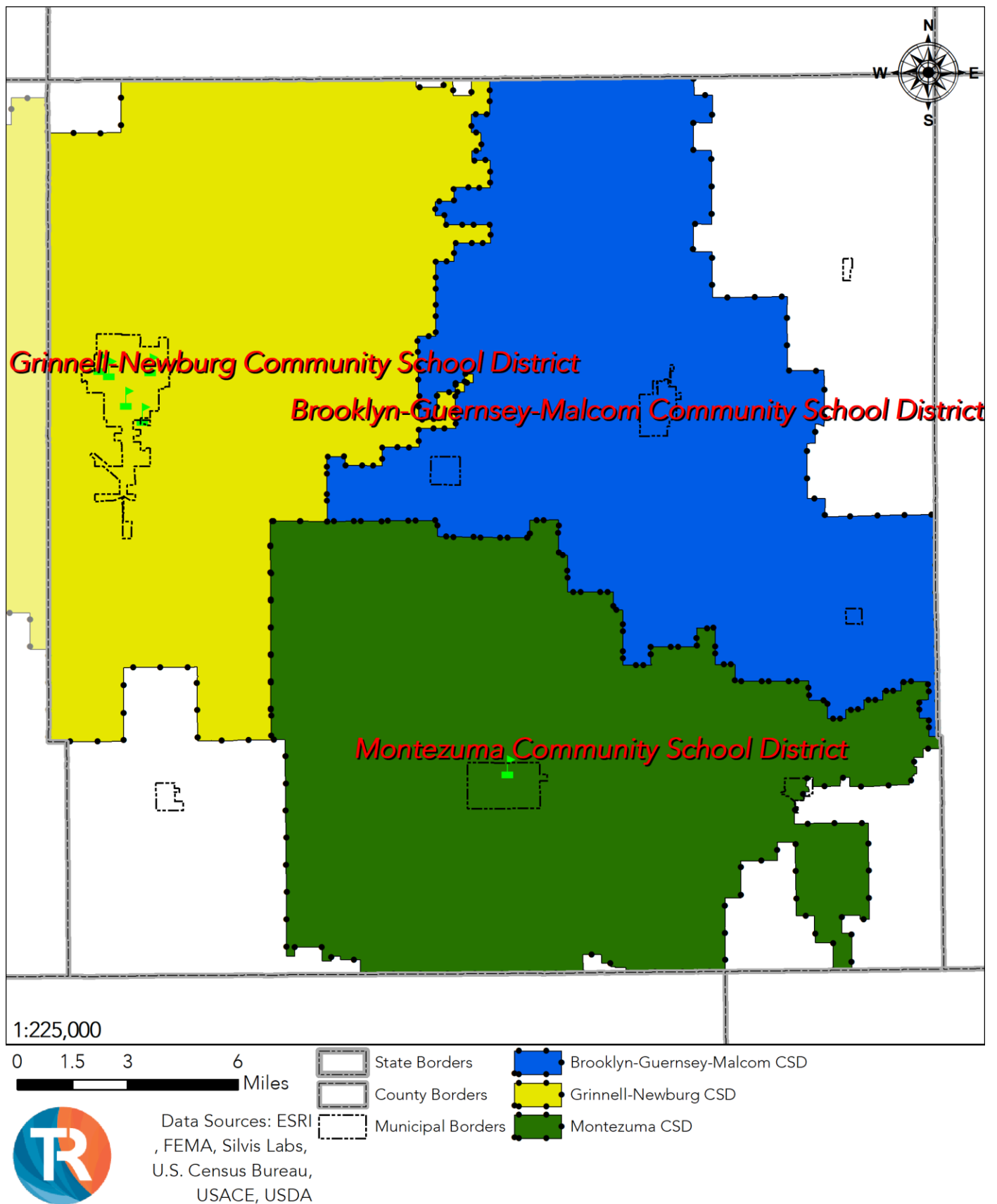
**The data are from the Bald Knob School District.*

Table 2.41 – Montezuma Community District Structural Summary

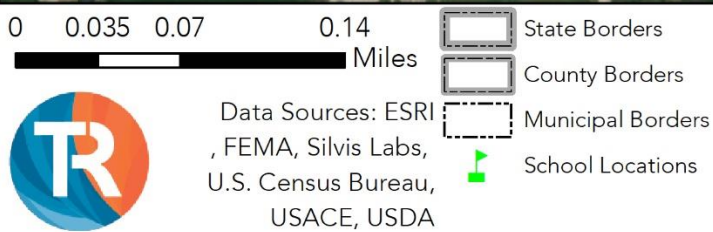
Campus	Structures	Contents Value	Structural Value	Total Value
Main	54	\$5,901,475	\$25,108,161	\$31,009,636
Total =	54	\$5,901,475	\$25,108,161	\$31,009,636

**The data are from the Beebe School District.*

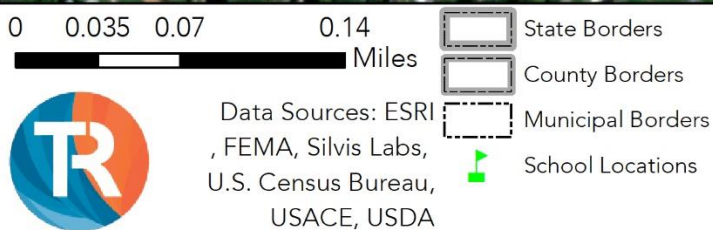
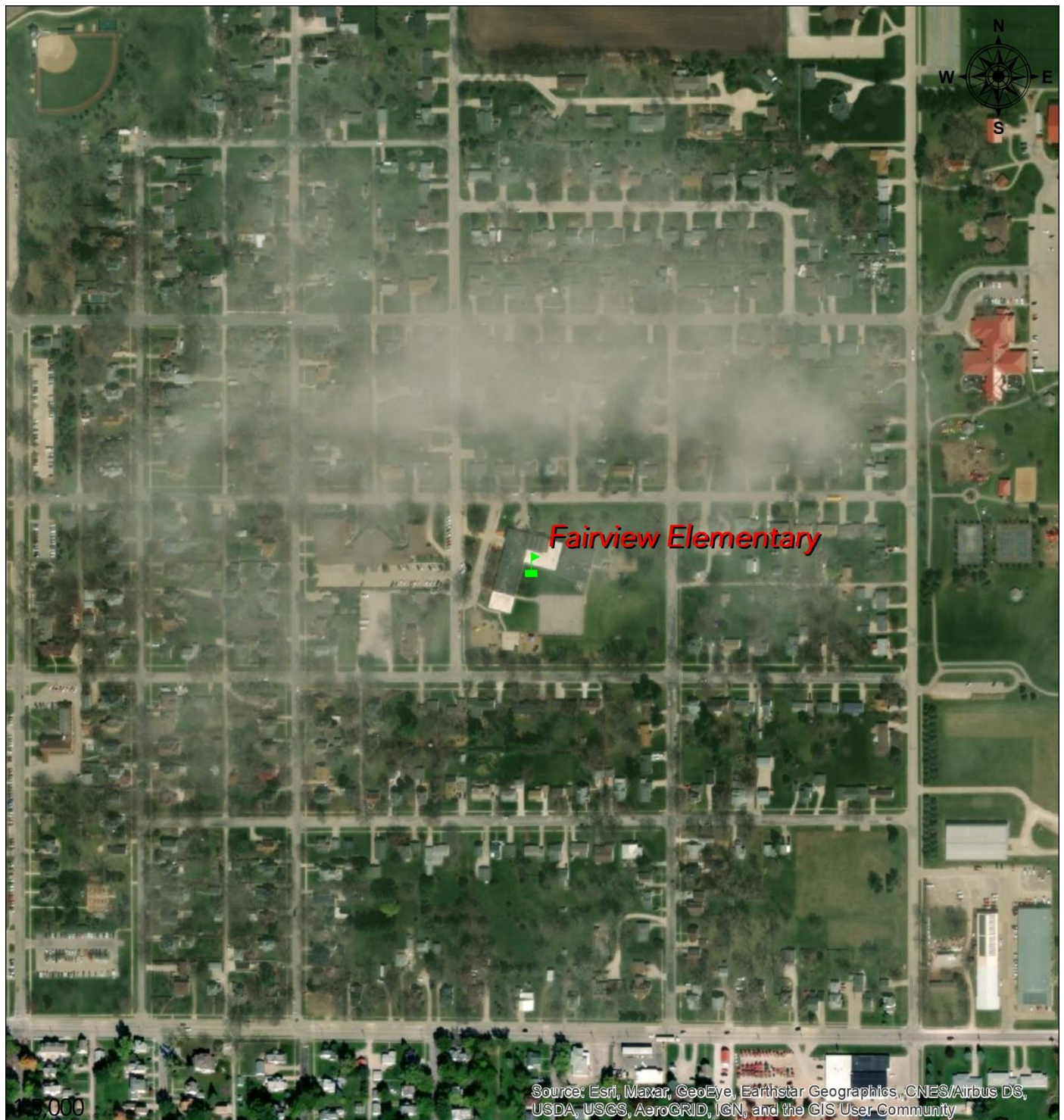
Map 2.20 – Community Profile, Community School Districts



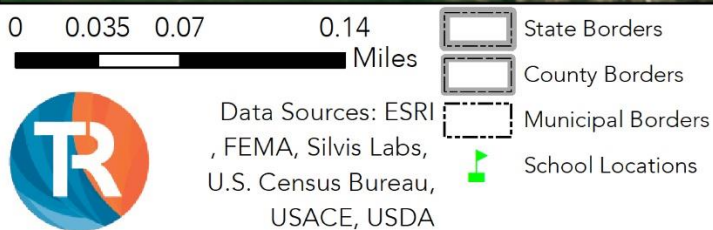
Map 2.21 – Community Profile, Grinnell-Newburg Davis Elementary



Map 2.22 – Community Profile, Grinnell-Newburg Fairview Elementary



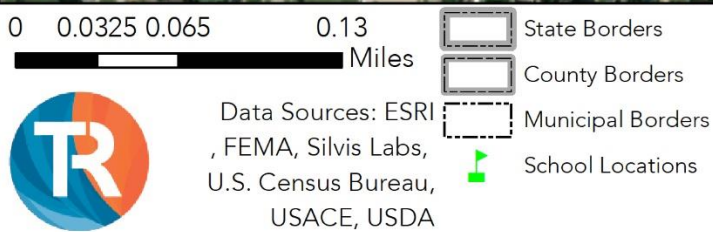
Map 2.23 – Community Profile, Grinnell-Newburg High School & Bailey Park Elementary



Map 2.24 – Community Profile, Grinnell-Newburg Middle School



Map 2.25 – Community Profile, Montezuma Community School District



Section 3 – Risk Assessment

Purpose

This hazard mitigation plan's risk assessment depicts each participating entity's risk to each of the profiled hazards. These calculated risks serve as the justifying basis for the proposed mitigation activities and projects found in Section 4. Additionally, this risk assessment can further serve Poweshiek County and the plan's participating entities by aiding in decision making processes of other planning initiatives.

Intent

The hazards profiled within this section were identified and selected based on their ability to reasonably affect the entire planning area or portions of Poweshiek County and its communities. If a hazard has been excluded or removed, justification has been given.

To properly and accurately depict each hazard's risk, Two Rivers Emergency Management employed various methodologies appropriately tailored by hazard application. Generally, each hazard profile; describes the type, location, and extent the hazard; includes information on previous occurrences of hazard events and estimates on future occurrence; describes a hazard's estimated impact; assesses each participating entity's vulnerability to a hazard; and analyzes how changes in development have affected an area since the development of Poweshiek County's last hazard mitigation plan.

Each hazard profile conforms to FEMA's requirements as set forth in its Local Mitigation Plan Review Guide, Elements B1 through B3, and B4 and D1 where applicable.

3.1 – Methodology

The natural characteristics of each hazard dictate that not one single approach works to accurately depict risk. In general, the hazard profiled in this plan can be categorized as either area-wide hazards or those with discretely identified hazard areas.

Area-Wide Hazards

Area-wide hazards indiscriminately impact the entire planning. Since it is beyond scientific measurement where an area-wide hazard, such as winter storms, will impact, and likely it will impact everywhere, it is reasonable to assume any significant growth and development will increase vulnerability and risk. Additionally, a hazard such as a tornado, will impact a specific path, but we are unable to predict where exactly it will begin. Thus, having any increase in growth or development increases the chance that a tornado will strike a developed segment of a jurisdiction. For this plan, this is relevant for droughts, flash flooding, tornadoes, severe storms, and severe winter storms.

Hazards with Identified Hazard Areas

If a jurisdiction grows or develops into an established dam spillway, floodplain, WUI zone, or an area with greater linear extensibility, that jurisdiction's vulnerability and risk increase by an amount equal to

the development or growth that now exists in that identified hazard area. For this plan, this is relevant for dam failure, earthquakes, riverine flooding, and wildfires.

3.2 – Hazard Selection

Appropriately identifying and selecting which natural hazards will be assessed is the first step in developing a risk assessment. The State of Iowa’s Natural Hazard Mitigation Plan profiles ten natural and two human-caused hazards in its statewide hazard mitigation plan. Of those hazards, this plan profiles six of those hazards.

Poweshiek County has been designated as an affected area by federal declaration 12 times. These declarations show a broad picture of the which hazards pose the greatest threat to the planning area. The table below lists each federal disaster declaration, the hazards which caused the impact, and the dates of the events:

Table 3.1 – Disaster Declarations

Designation	Declaration	Hazards	Start Date	End Date
DR-4557	08/17/2020	Severe Storms (Derecho)	08/10/2020	08/10/2020
DR-4518	04/03/2020	Pandemic	01/20/2020	Continuing
DR-4187	08/05/2014	Flooding, Severe Storms, Tornadoes	06/26/2014	07/07/2014
DR-4126	07/02/2013	Flooding, Severe Storms, Tornadoes	05/19/2013	06/14/2013
DR-1763	05/27/2008	Flooding, Severe Storms, Tornadoes	05/25/2008	08/13/2008
DR-1688	03/14/2007	Winter Storms	02/23/2007	03/02/2007
DR-1518	05/25/2004	Flooding, Severe Storms, Tornadoes	05/19/2004	06/24/2004
DR-1230	07/02/1998	Flooding, Severe Storms, Tornadoes	06/13/1998	07/15/1998
DR-1191	11/20/1997	Winter Storms	10/26/1997	10/28/1997
DR-996	07/09/1993	Flooding, Severe Storms	04/13/1993	10/01/1993
DR-443	06/24/1974	Flooding, Severe Storms	06/24/1974	06/24/1974
DR-269	08/14/1969	Flooding	08/14/1969	08/14/1969

**The data are from the Federal Emergency Management Agency*

Selecting only hazards that pose a reasonable risk to the planning area allows the mitigation strategy found in Section 4 to focus Poweshiek County’s capabilities and resources where they are needed most and can be the most effective. We found those hazards to be: Dam Failures, Droughts, Floods (Riverine and Flash), Severe Storms (Hail, Lightning, Thunderstorms, and Windstorms), Tornadoes, and Winter Storms.

3.2 – Hazard Selection

The table below lists all of the natural hazards included in the statewide plan, whether they are included in this plan, and if excluded, a summary justification of why it has been excluded. A lengthier justification for exclusion can be found later in this section, 3.9 – Excluded Hazards.

Table 3.2 – Hazard Inclusion

Hazard	Determination	Summary Justification
Dam Failures	Included	High Hazard Dam Identified
Droughts	Included	Disaster History
Earthquakes	Excluded	No Reasonable Risk
Expansive Soils	Excluded	No Reasonable Risk
Extreme Heat	Excluded	No Reasonable Risk
Floods	Included	Disaster History
Landslides	Excluded	No Reasonable Risk
Tornadoes	Included	Disaster History
Severe Storms	Included	Disaster History
Sinkholes	Excluded	No Reasonable Risk
Wildfires	Excluded	No Reasonable Risk
Winter Storms	Included	Disaster History

3.3 – Dam Failures

A dam is a barrier across flowing water that obstructs, directs or slows down the flow, often creating a reservoir, lake or impoundments. Most dams have a section called a spillway or weir, over or through, which water flows, either intermittently or continuously.

Dams can fail in a number of ways. A rainy-day failure occurs when heavy rain exceeds the storage capacity of the dam or levee and overflows. A sunny day (or piping) failure occurs due to slope failure, smaller structural faults, or a controlled spillway release done to prevent full failure of overflowing water. Sunny day failures release a dam or levee's water over a period of time based on the size of the leak. In these scenarios, it is assumed the dam or levee is holding its normal water volume. A full or sudden failure caused by a major structural integrity issue is classified as a percentage of the probable maximum precipitation (PMP), i.e. a 50% PMP Breach means there was a sudden release of water while the dam is holding 50% of its maximum volume. In each instance an overwhelming amount of water, and potentially debris, is released.



Common causes for dam and levee failure are:

- Sub-standard construction materials/techniques
- Spillway design error
- Geological instability caused by changes to water levels during filling or poor surveying
- Sliding of a mountain into the reservoir
- Poor maintenance, especially of outlet pipes
- Human, computer or design error
- Internal erosion, especially in earthen dams.
- Earthquakes

Dam failures are rare, but when they occur can cause loss of life, and immense damage to infrastructure and the environment. The planning area contains two USACE designated high-hazard dams, the Lake Cimarron Dam and the Lake Ponderosa Dam.

Location & Extent

Response to a dam failure would be extensive and require wide ranging recovery efforts for reconstruction of the original flood control structures and any damaged property. There is usually little to no warning in the event of a dam or levee failure, depending on what lies below a dam or levee. By definition, both of the high-hazard dams threaten population and structures.

The Lake Cimarron Dam lies upstream of the Lake Ponderosa Dam. The Lake Cimarron Dam at its peak holds 569 acre-feet of water while the Lake Ponderosa Dam holds 5,850 acre-feet of water. Neither the USACE, the State of Iowa, nor any of the participating community governments have inundation studies for the dams.

3.3 – Dam Failures

Numerous topographic, hydrologic, and weather conditions (how much water is stored at a dam or levee based on rainfall) influence the extent and speed of waterflow exiting a failed or damaged dam. However, without a comprehensive hydrological study of either dam, this plan must rely on worst case scenarios for estimating the total possible impacts of a failure.

History & Probability

There have been no failures of high hazard dams in the planning area. Due to the lack of history of such events in the planning area, the probability of experiencing another levee failure event is categorized as 'rare' or under a 1% probability.

Vulnerability of and Impact on Facilities

Facilities within a dam or levee failure inundation area are typically at extreme risk. The water level of a dam or levee failure can range from inches, causing damage similar to small floods, to completely engulfing a structure in water. Additionally, the speed of the flow can cause variations in the impact. A slow flow will cause damage similar to a riverine flood, however, a fast moving, high level flow has the potential to completely destroy a structure, wash it away, and create debris that impacts other structures. See the following tables for a breakdown of the planning area's structural vulnerability and impact from a failure of the Lake Cimarron Dam and the Lake Ponderosa Dam. None of the community school districts' structures are threatened by the high-hazard dams.

Table 3.3 – Vulnerability & Impact of Structures, Lake Cimarron Dam

Structure Class	Structure Count	Total Class Value
Agricultural	1	\$226,000
Commercial	11	\$3,937,000
Government	0	\$0
Industrial	4	\$634,000
Residential	439	\$87,513,000
Multi-Unit Residential*	1	\$898,000
Total =	456	\$93,208,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the U.S. Census Bureau and FEMA.

Table 3.4 – Vulnerability & Impact of Structures, Lake Ponderosa Dam

Structure Class	Structure Count	Total Class Value
Agricultural	0	\$0
Commercial	2	\$896,000
Government	0	\$0
Industrial	1	\$282,000
Residential	21	\$4,556,000
Multi-Unit Residential*	0	\$0
Total =	24	\$5,734,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units.

**The data are from the U.S. Census Bureau and FEMA.

Map 3.1 – High Hazard Dams



Vulnerability of and Impact on Critical Facilities

None of the critical facilities in the planning area are threatened by a dam or levee failure.

Vulnerability of and Impact on Population

Populations within a dam or levee failure inundation area are at extreme risk. Depending on the speed of the water's arrival, a community's population may not have time to evacuate. Additionally, evacuation routes can be blocked by the dam waters. If flood waters arrive quickly, many people can die. Depending on the elevation of the water, a community's population may not have any available shelter to avoid the waters.

The Lake Cimarron Dam threatens unincorporated 367 residents of unincorporated Poweshiek County in 439 housing units (A number of these structures are secondary and vacations homes). The Ponderosa Lake Dam threatens 59 residents of unincorporated Poweshiek County in 21 housing units. None of the other participating municipalities area threatened by a dam failure. None of the community school districts' students, staff, or faculty area threatened by a dam or levee failure.

Vulnerability of and Impact on Systems

A failure of either dam does not threaten any of the planning areas systems.

3.4 – Droughts

Drought is an abnormally dry period lasting months or years when an area has a deficiency of water and precipitation in its surface and or underground water supply. The hydrological imbalance can be grouped into the following non-exclusive categories.

Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops.

Hydrological: When surface and subsurface water levels are significantly below their normal levels.

Meteorological: When there is a significant departure from the normal levels of precipitation.

Socio-Economic: When the water deficiency begins to significantly affect the population.



Droughts are regularly monitored by multiple federal agencies using a number of different indices. Typically, they are seasonal occurring in the late spring through early fall. Drought monitoring focuses on precipitation and temperature. When precipitation is less than normal, and natural water supplied begins to decrease, a drought is occurring.

When below average, little or no rain falls soil can dry out and plants can die. If unusually dry weather persists and water supply problems develop the time period is defined as a drought. Human activity such as over farming, excessive irrigation, deforestation, and poor erosion controls can exacerbate a drought's effects. It can take weeks or months before the effects of below average precipitation on bodies of water are observed. Depending on the region droughts can happen quicker, noticed sooner, or have their effects naturally mitigated. The more humid and wet an area is, the quicker the effects will be realized. A naturally dry region, which typically relies more on subsurface water will take more time to actualize its effects.

Periods of drought can have significant environment, agricultural, health, economic, and social consequences. The effects vary depending on vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. See the list below for the most common effects of droughts.

- Diminished crop growth or yield
- Erosion
- Dust storms
- Ecosystem and environmental damage
- Increased probability of wildfires
- Reduced electricity production due to reduced flow through hydroelectric dams
- Shortages of water for industrial production

Location & Extent

Drought is part of normal climate fluctuations in the United States. According to Poweshiek County's drought history, most drought events affect the county for roughly 2 to 10 weeks in length. It should be noted, though, that climatic variability and the uncertainty of the future could contain dry conditions for

3.4 – Droughts

up to years at a time. Droughts occur over large geographic areas. It is extremely likely that if any part of the planning area is experiencing a drought that the whole planning area will also be experiencing drought conditions.

Historically, droughts have been measured by a number of indices, most notably the Palmer Drought Severity Index. However, NOAA currently uses an updated drought severity classification, the Drought Monitor Scale, shown below. Given the complex nature and unpredictability of droughts, the planning area can be affected by a drought ranging from D0 to D4 on the Drought Monitor Scale.

Table 3.5 – Drought Monitor Scale

	LEVEL	DESCRIPTION	
 Abnormally Dry	D0	• Short-term dryness slowing planting, growth of crops • Some lingering water deficits • Pastures or crops not fully recovered	
 Moderate Drought	D1	• Some damage to crops, pastures • Some water shortages developing • Voluntary water-use restrictions requested	
 Severe Drought	D2	• Crop or pasture loss likely • Water shortages common • Water restrictions imposed	
 Extreme Drought	D3	• Major crop/pasture losses • Widespread water shortages or restrictions	
 Exceptional Drought	D4	• Exceptional and widespread crop/pasture losses • Shortages of water creating water emergencies	

3.4 – Droughts

Drought warning is based on a complex interaction of many different variables, water uses, and consumer needs. Drought warning is directly related to the ability to predict conditions that produce drought, primarily precipitation and temperature. A drought is not official or declared until dry conditions have been met for a period of time, meaning that it is inherent that the planning area would be experiencing drought conditions prior to a drought being officially declared.

History & Probability

Comprehensive data on droughts, drought impacts, and drought forecasting is extremely limited and often inaccurate. Due to the complexity of drought monitoring, the complexity of agricultural and livestock market pricing, and the large areas droughts impact, the USDA and USGS have difficulty quantifying and standardizing drought data. Each of these contributing drought factors has confounding variables within them.

Since 2000, the NADM has recorded 338 weeks of drought in the planning area with an average index of 1.6462. Please see the table below for a breakdown of the severity of the recorded droughts. For a complete list of recorded drought events, please reference Appendix C.

Table 3.6 – Drought History

Drought Severity	Number of Weeks
D0	145
D1	119
D2	102
D3	22
D4	0
Total =	338

**The data are from the NADM.*

Given the historic precedent set by past droughts, it is highly likely that the planning area will experience season-long droughts in the future. As a rough estimate, the planning area should expect to see on average 20.42 weeks of drought per year or roughly 37.31% of each year.

Vulnerability of and Impact on Facilities

Droughts do not have an impact on structures.

Vulnerability of and Impact on Critical Facilities

Droughts do not have an impact on structures.

Vulnerability of and Impact on Population

Droughts do not have a direct impact that threatens injury or death to the planning area's population.

Vulnerability of and Impact on Systems

Drought's primary impact is on agriculture and livestock and thus can have significant effects on a jurisdiction's agricultural and tourist economies. If the precipitation level is below normal, farmers and

3.4 – Droughts

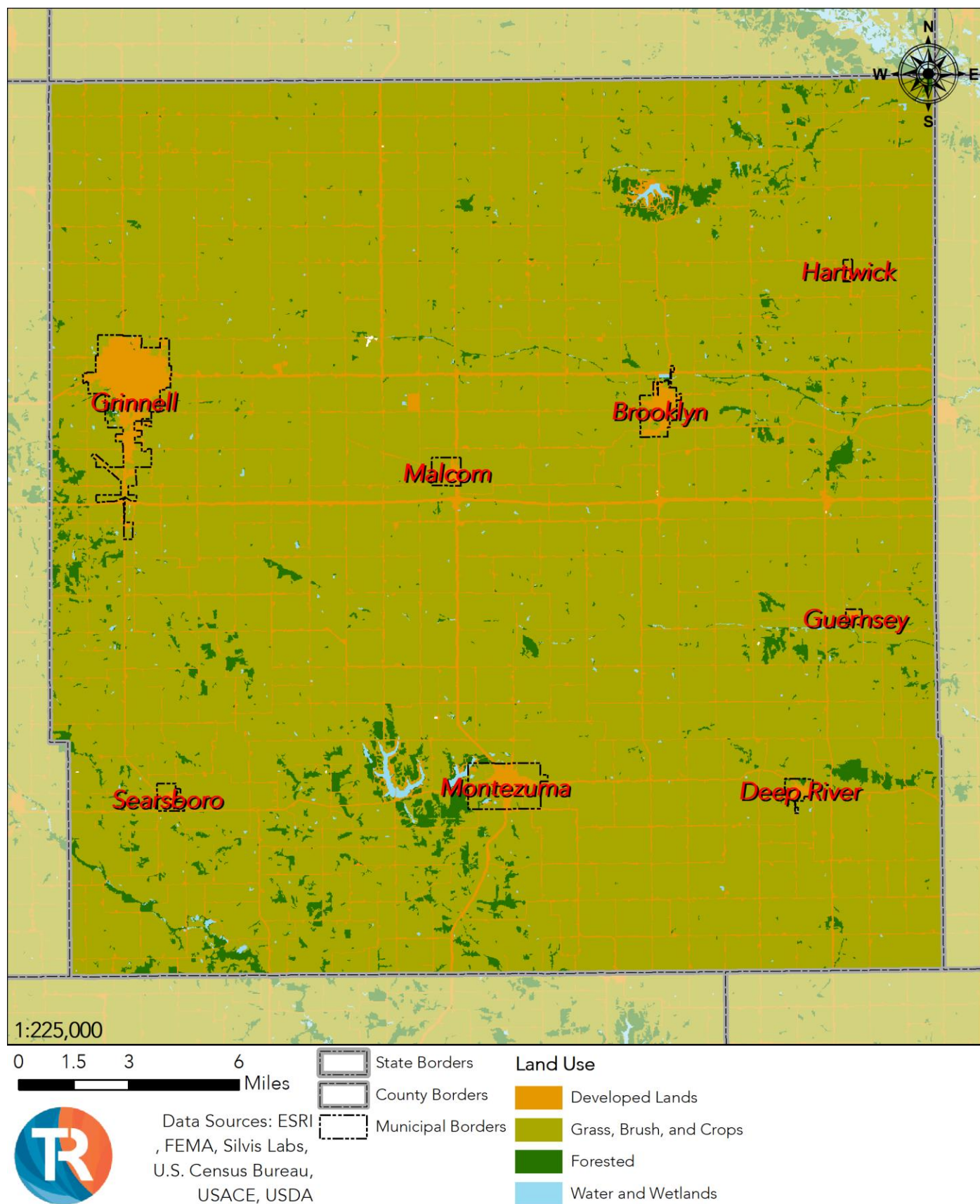
ranchers will struggle to grow their crops and feed their livestock. If rivers, streams, and lakes dry up, tourists will be less likely to enjoy a jurisdiction's amenity resources.

The planning area hosts 852 farms across 339,589 acres of land. The USDA estimates that the total value of products from these farms is \$314,513,000 per year. All of them are considered vulnerable to droughts. An estimate of the land engaged in agricultural activities can be found in the map at the end of this section.

Key Considerations

The entire planning area is at risk to droughts. Even though the direct impact of a drought will likely affect the county at large and tertiary the municipalities, a drought's effects would quickly spread to the interdependent economies. Additionally, a greater population would place various communities at a higher vulnerability to droughts, the usage of water by the population pales in comparison to the amount used by agricultural activities and is largely negated.

Map 3.2 – Land Use, Poweshiek County



3.5 – Floods

Flooding is the most prevalent and costly disaster in the United States. Flooding occurs when water, due to dam failures, rain, or melting snows, exceeds the absorptive capacity of the soil and the flow capacity of rivers, streams or coastal areas. At this point, the water concentration hyper extends the capacity of the flood way and the water enters the floodplain. Floods are most common in seasons of rain and thunderstorms.



Intense rainfall, accompanying the large thunderstorms in the planning area, may result in water flowing rapidly from higher elevations, exceeding river flow capacity, collecting in agricultural areas, inadequate municipal stormwater drainage, or inadequate soil absorption capacity caused by urban and suburban development.

Location & Extent

Various types of floods can happen quickly, under an hour, in the form of a flash flood, or accumulate seasonally over a period of weeks as is the case in a riverine flood. Flooding can occur anytime throughout the year, but typically happens May through August. A variety of factors affect the severity of flash and riverine flooding. These include topography, weather characteristics, development, and geology. Intense flooding will create havoc in any jurisdiction affected. The predicative magnitude of flash and riverine floods varies greatly.

Flash flooding is unpredictable and can occur anywhere throughout the planning area. Poweshiek County, its municipalities, and the community school districts are generally equally likely to experience flash flooding in low-lying areas, areas of poor drainage, or suburban sprawl.

Road closures are common after flooding events. Flooding records show it is extremely common for rural roads and older bridges to be damaged or completely washed away. Some reports details of full waterflow over these highways. Gravel roads have been washed out and there are records of vehicles being washed away by flood waters. In one instance, a bridge that was part of Highway 63, north of Montezuma was completely washed away. There are not many reoccurring areas of flash or riverine flooding throughout the planning area, but the pattern appears that they occur more often in the rural, unincorporated, and undeveloped areas of the county, often covering acres of farmland and causing crop damage.

NOAA flash flood records indicate that rural parts of the planning area have seen up to 6 inches flash flood waters in developed areas, with countless incidents of 6 to 12 inches of water accumulating throughout the rural parts of the county.

Riverine flooding throughout the planning area varies, but is more limited to specific identified floodplains. Special Flood Hazard Areas (SFHA) were identified via effective NFHL maps produced by FEMA and are located later in this hazard profile. FEMA identified floodplains exist in numerous places throughout unincorporated Poweshiek County and every participating municipality.

Table 3.19 – Floodplain Classifications

Zone Class	Description
A	Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
AE	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes. Communities are encouraged to adopt more restrictive requirements for these areas.
B	Areas subject to inundation by 0.2-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.

History & Probability

Since 1996, NOAA has recorded 24 floods (11 flash and 23 riverine) in the planning area. Most flash floods have shown to accumulate under 4 inches, but riverine floods have been recorded 2 feet over flood stage.

These floods have caused no recorded injuries or fatalities in the planning area per NWS and NOAA records as well as local reports. They have however caused \$981,570 from riverine and \$710,000 from flash floods in property damage. For a complete list of NOAA recorded flash and riverine floods, please reference Appendix C.

Based on the data recorded by NOAA, the planning area should expect a notable flash flood at a rate of 0.478 per year. All FEMA identified SFHAs classified as primary zone A floodplains meaning they are subject to inundation at a rate of 1% per year, while those identified as zone B are subject to riverine flood at 0.2% per year. Please see the table above for the various floodplain classifications that exist throughout the planning area.

Vulnerability of and Impact on Facilities

Poweshiek County and the participating jurisdictions have school buildings, agricultural, commercial, industrial, and residential structures in floodplains. Flooding can cause minimal or complete damage to any of these types of facilities taking them offline for days to years depending on the resources available and remediation costs after an event.

The average riverine flood event in Poweshiek County costs \$42,676, while the existing range of a single incident has been from \$0 to \$250,000. The average flash flood costs \$64,545, while the existing range of a single incident has been from \$0 to \$150,000. The planning area has incurred a total of \$981,570 in property damage from riverine floods and \$710,000 in property damage from flash floods.

The planning areas municipal and public-school district structures are valued at \$2,779,578,755 (\$2,667,294,000 municipal, \$112,284,755 community school district). Since flash flooding threatens the entire planning area, all structures are considered exposed and vulnerable. A GIS analysis of FEMA's identified SFHAs puts a total of \$112,779,000 worth of the planning area's municipal structural inventory exposed to riverine flooding. None of the participating community school districts have structures within identified floodplains.

Table 3.20 – Vulnerable Municipal Structures by Count, Riverine Floods

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Poweshiek County (Uni)	7	11	0	6	400	1	425
Brooklyn	0	1	0	2	5	0	8
Deep River	0	0	0	0	0	0	0
Grinnell	0	0	0	0	0	0	0
Guernsey	0	0	0	0	4	0	4
Hartwick	0	0	0	0	0	0	0
Malcom	0	0	0	0	3	0	3
Monetzuma	0	0	0	0	8	0	8
Searsboro	0	0	0	0	11	0	11
Total =	7	12	0	8	431	1	459

*Multi-Unit Residential is defined as a structure with 5 or more residential units

**The data are from the U.S. Census Bureau and FEMA

Table 3.21 – Vulnerable Municipal Structures by Value, Riverine Floods

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Poweshiek County (Uni)	\$1,155,000	\$5,301,000	\$0	\$11,241,000	\$80,937,000	\$898,000	\$99,532,000
Brooklyn	\$0	\$893,000	\$0	\$6,102,000	\$812,000	\$0	\$7,807,000
Deep River	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Grinnell	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Guernsey	\$0	\$0	\$0	\$0	\$650,000	\$0	\$650,000
Hartwick	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Malcom	\$0	\$0	\$0	\$0	\$703,000	\$0	\$703,000
Monetzuma	\$0	\$0	\$0	\$0	\$1,692,000	\$0	\$1,692,000
Searsboro	\$0	\$0	\$0	\$0	\$2,395,000	\$0	\$2,395,000
Total =	\$1,155,000	\$6,194,000	\$0	\$17,343,000	\$87,189,000	\$898,000	\$112,779,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units

**The data are from the U.S. Census Bureau and FEMA

Vulnerability of and Impact on Critical Facilities

Since flash floods have the potential to affect the entire planning area, all of this plan's identified critical facilities are equally vulnerable to flash flooding. Of the planning area's 54 critical facilities, 3 are located within FEMA identified SFHAs. Please see the following table for a list of these facilities.

Table 3.23 – Vulnerable Critical Facilities, Riverine Floods

Facility	Type	Location
Brooklyn Street Department	Public Works	Brooklyn
Brooklyn Substation – REC	Electric Utility	County
Searsboro Substation	Electric Utility	Searsboro

Vulnerability of and Impact on Population

If evacuation is not heeded, or flood waters rise quickly enough, Poweshiek County and its participating jurisdictions' population can drown or become trapped on rooftops or points of high elevations. Depending on the conditions, this will expose them to elements and deprive them of basic needs and services.

As described previously, water that is long lasting and slow to drain will encourage the growth of mold and other bio-hazardous material, rendering a facility unusable until remediation is finished. Extra care, assessment, and sanitization are required before students and staff can re-inhabit a school or university facility, or they may face serious health concerns. Assisted care facilities housing vulnerable populations can take longer to evacuate. Additionally, the potential presence of mold after a flood requires extra care to be taken before their population can re-inhabit an assisted care facility where the inhabitants are at greater risk of infection.

The planning area has incurred no injuries or fatalities from flooding.

The entire population of 18,504 and their 8,984 housing units are considered vulnerable and exposed to flash flooding while 463 residents in 438 housing units are currently identified as exposed and vulnerable to riverine floods. Similarly, all 2,244 of the community school districts' students and their respective 326 staff and faculty are considered vulnerable and exposed to flash flooding. None of the participating community school districts' students, staff or faculty are vulnerable or at risk to riverine flooding.

Table 3.24 – Vulnerable Municipal Populations, Riverine Flooding

Municipality	Population	Housing Units
Poweshiek County (Uni)	388	403
Brooklyn	20	7
Deep River	0	0
Grinnell	0	0
Guernsey	9	4
Hartwick	0	0
Malcom	5	4
Monetzuma	20	9
Searsboro	21	11
Total =	463	438

**The data are from the U.S. Census Bureau and FEMA*

Vulnerability of and Impact on Systems

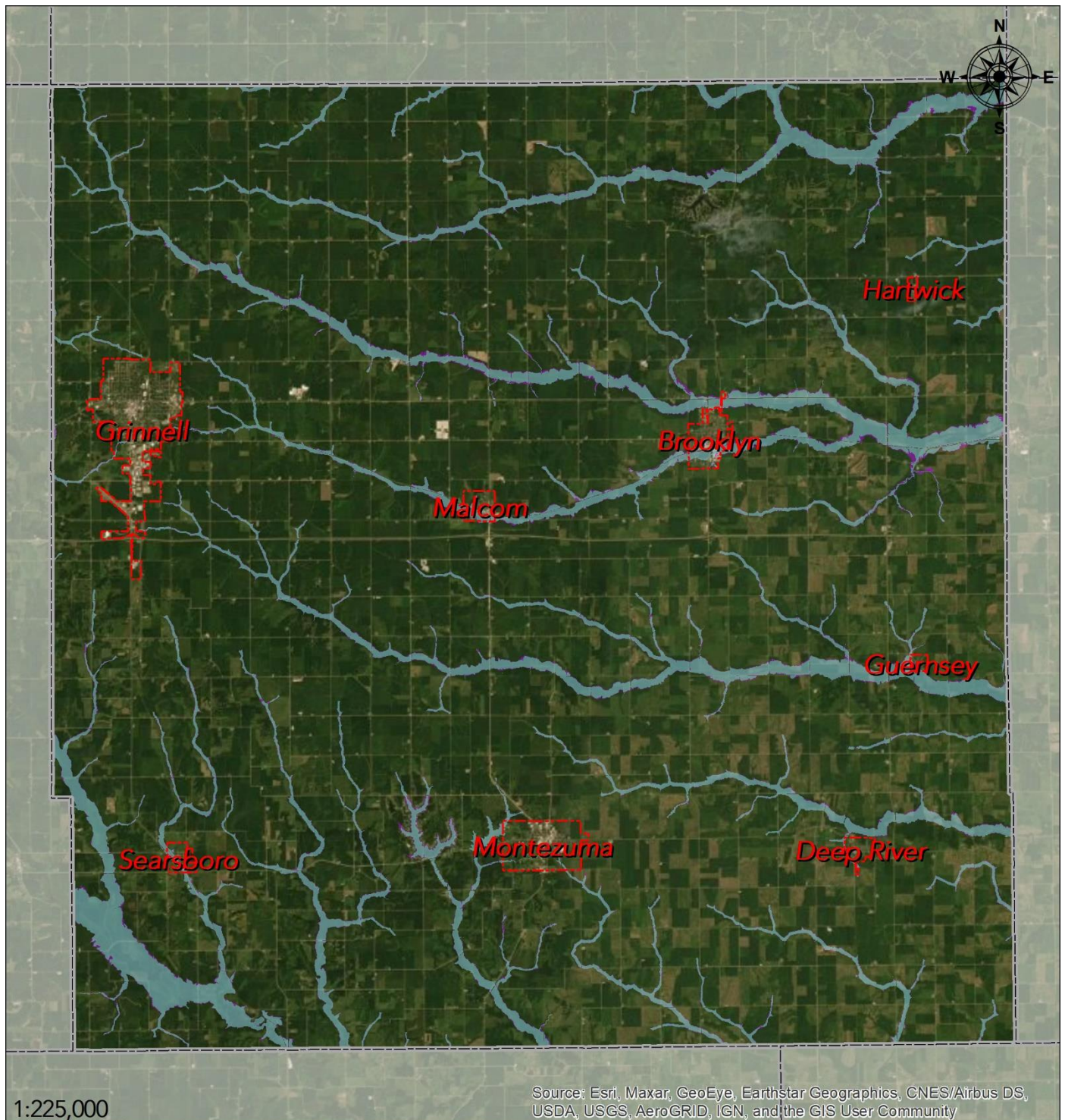
Flash flooding does not often cause widespread damage to property or infrastructure limited its ability to impact systems. Even in the case of a swept away roadway, the problem is often limited to secondary roadways. However, catastrophic riverine flooding can cause significant damage to a community's systems.

Extensive riverine flooding can significantly impact local governments' ability to provide basic goods and services to their communities either by losing essential facilities or by blocked infrastructure. This can take the form of lost law enforcement, fire prevention, medical, or water treatment facilities.

Significant damage to residential and or commercial structures can irrevocably damage a community and its economy creating refugees and economic hardship. If a chemical facility is significantly impacted it is possible the chemicals stored at the facilities can wash away with the flood waters and have detrimental effects on the local environment.

As previously discussed, both riverine and flash flooding has closed down numerous transportation routes within the planning area causing temporary limitations of the planning area's residents and business to go about their daily lives.

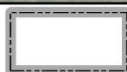
Map 3.3 – Floodplains, Poweshiek County



0 1.5 3 6
Miles



Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA



State Borders



County Borders



Municipal Borders

Floodplains

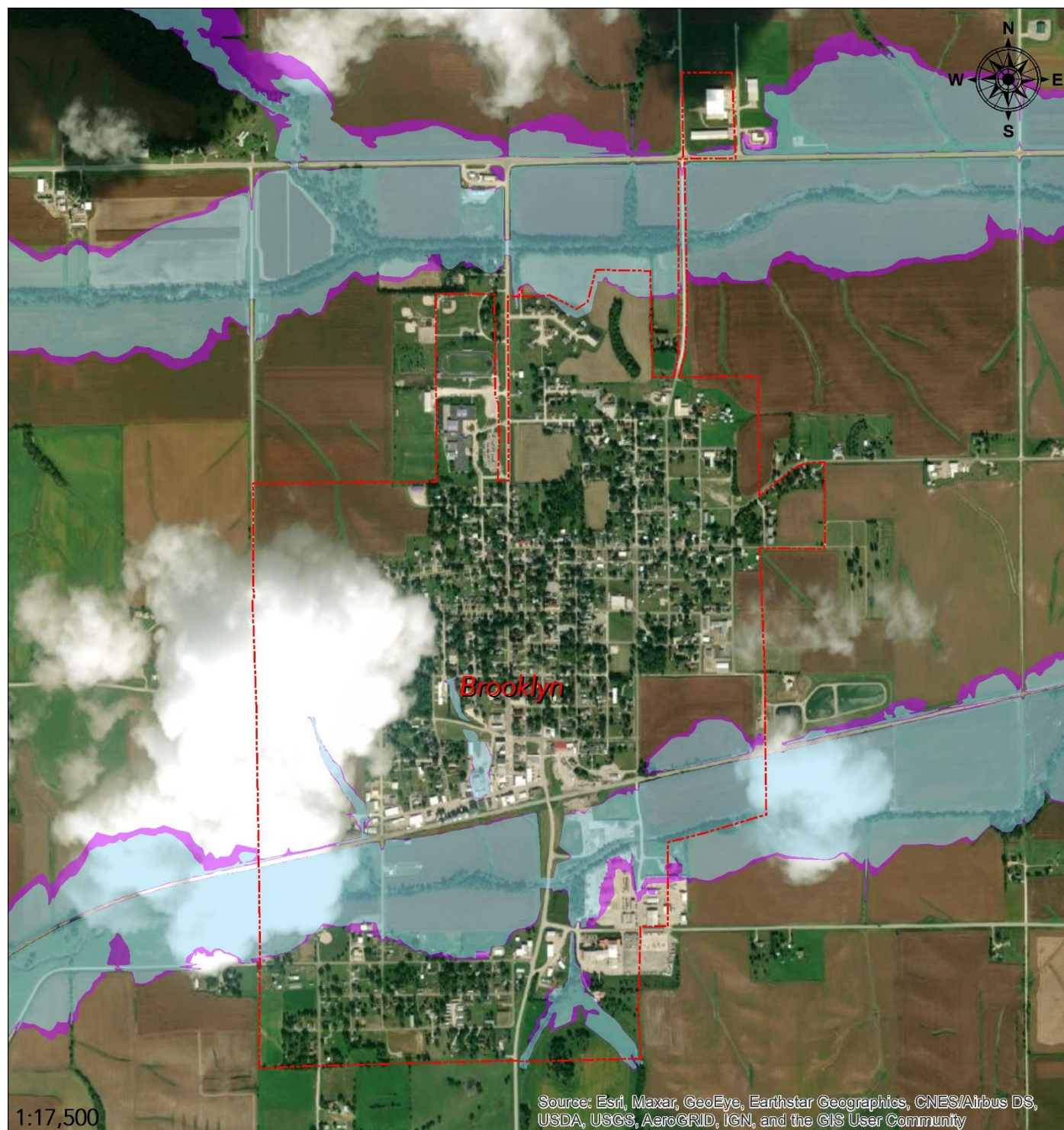


Zone A



Zone B

Map 3.4 – Floodplains, Brooklyn



0 0.125 0.25 0.5 Miles

-  State Borders
-  County Borders
-  Municipal Borders

Floodplains

-  Zone A
-  Zone B



Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA

Map 3.5 – Floodplains, Deep River



0 0.05 0.1 0.2
Miles



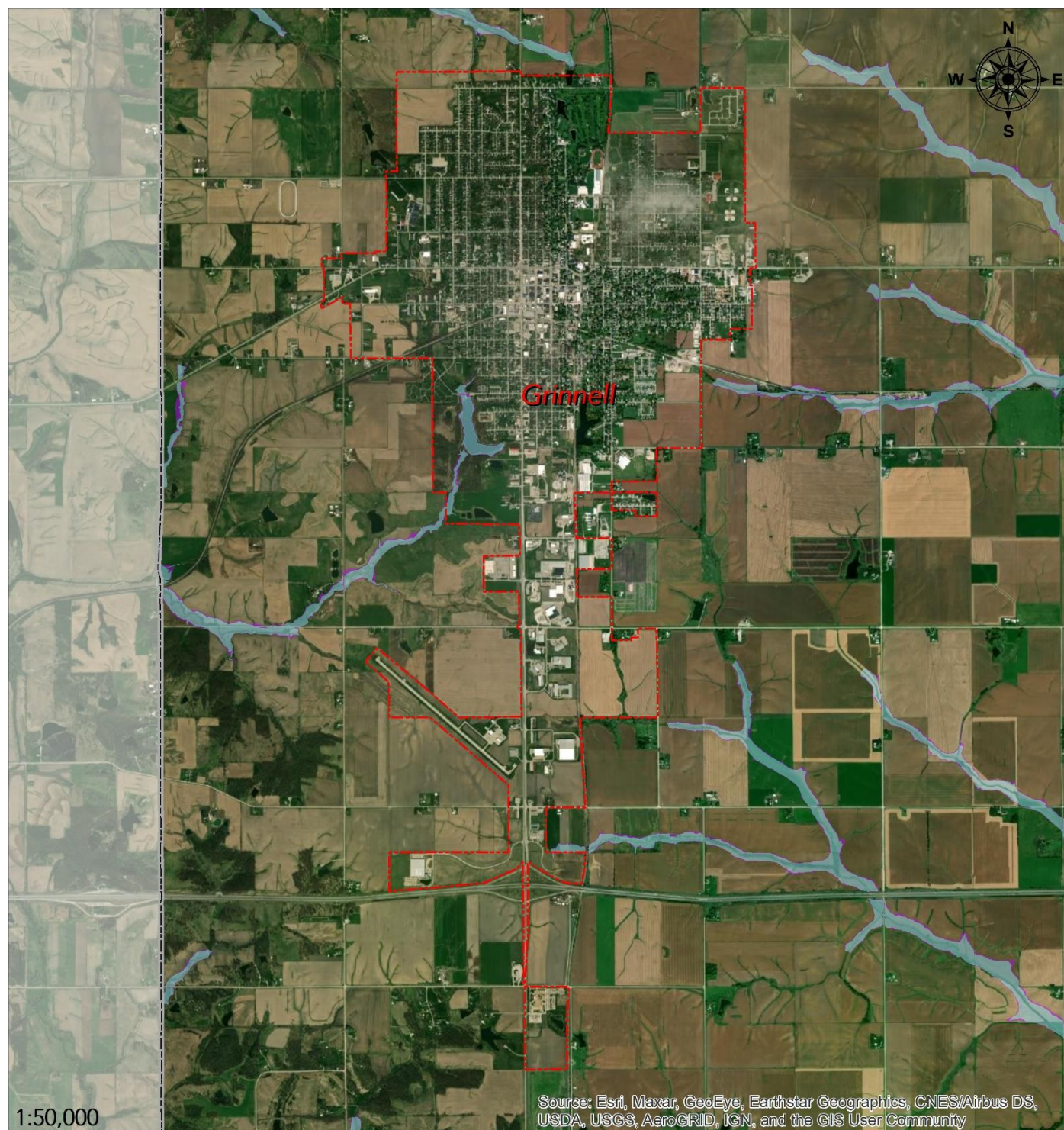
Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA

-  State Borders
-  County Borders
-  Municipal Borders

Floodplains

-  Zone A
-  Zone B

Map 3.6 – Floodplains, Grinnell



0 0.35 0.7 1.4 Miles

- State Borders
- County Borders
- Municipal Borders

Floodplains

- Zone A
- Zone B



Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA

Map 3.7 – Floodplains, Guernsey



0 0.035 0.07 0.14 Miles



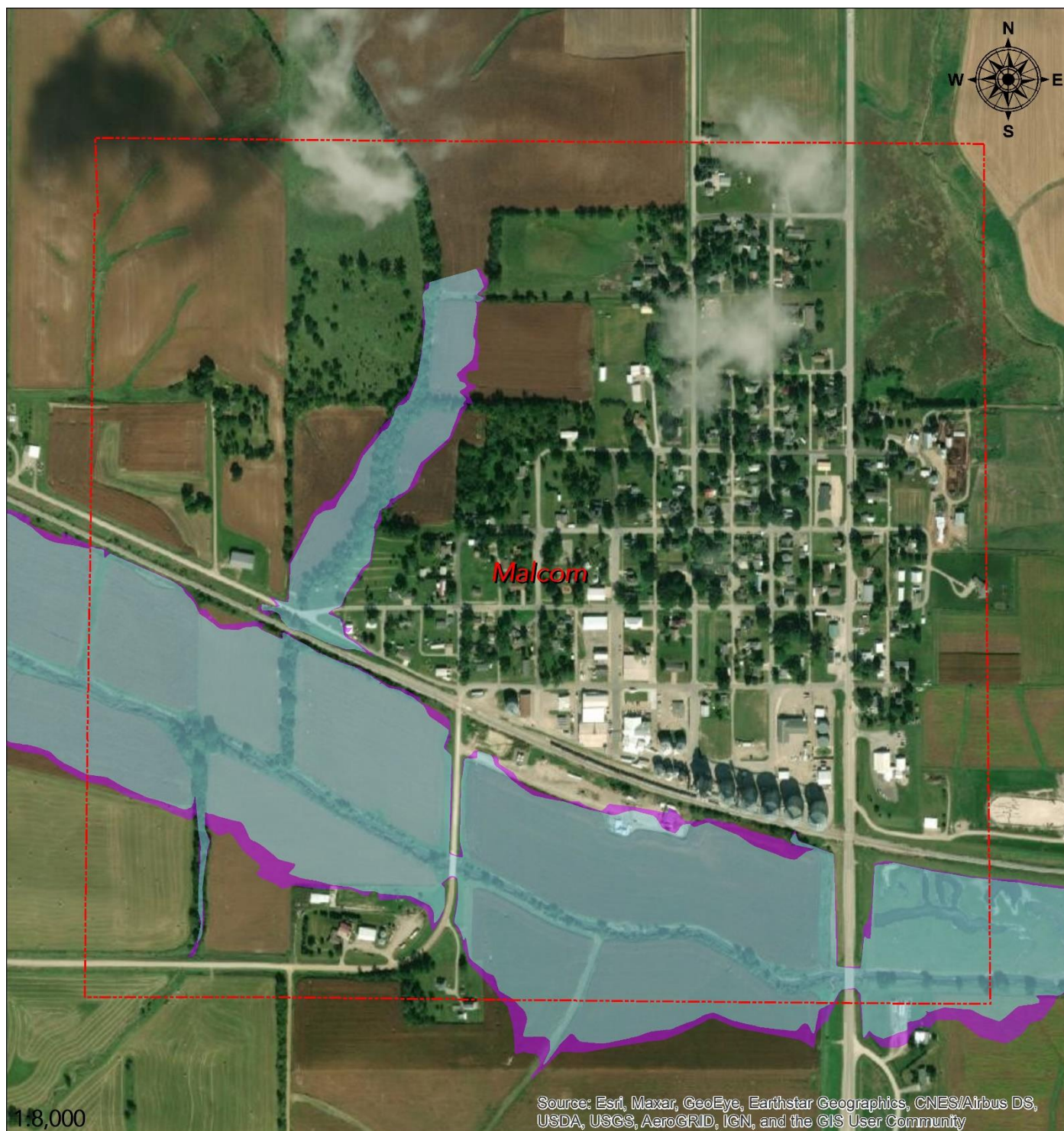
Data Sources: ESRI, FEMA, Silvis Labs, U.S. Census Bureau, USACE, USDA

- State Borders
- County Borders
- Municipal Borders

Floodplains

- Zone A
- Zone B

Map 3.8 – Floodplains, Malcom



0 0.05 0.1 0.2
Miles



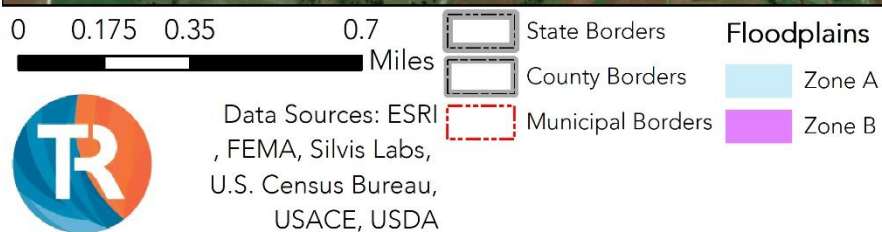
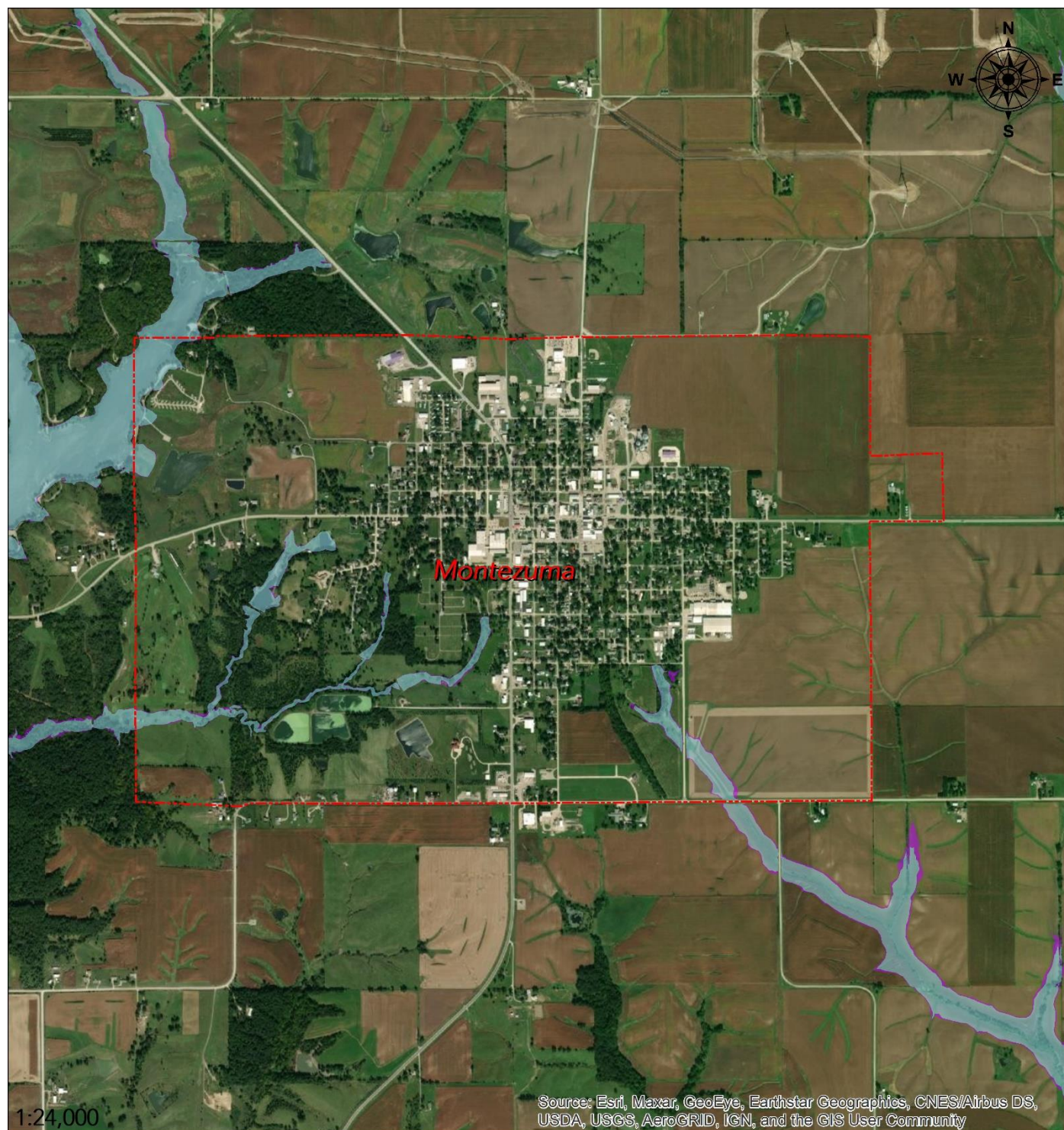
Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA

- State Borders
- County Borders
- Municipal Borders

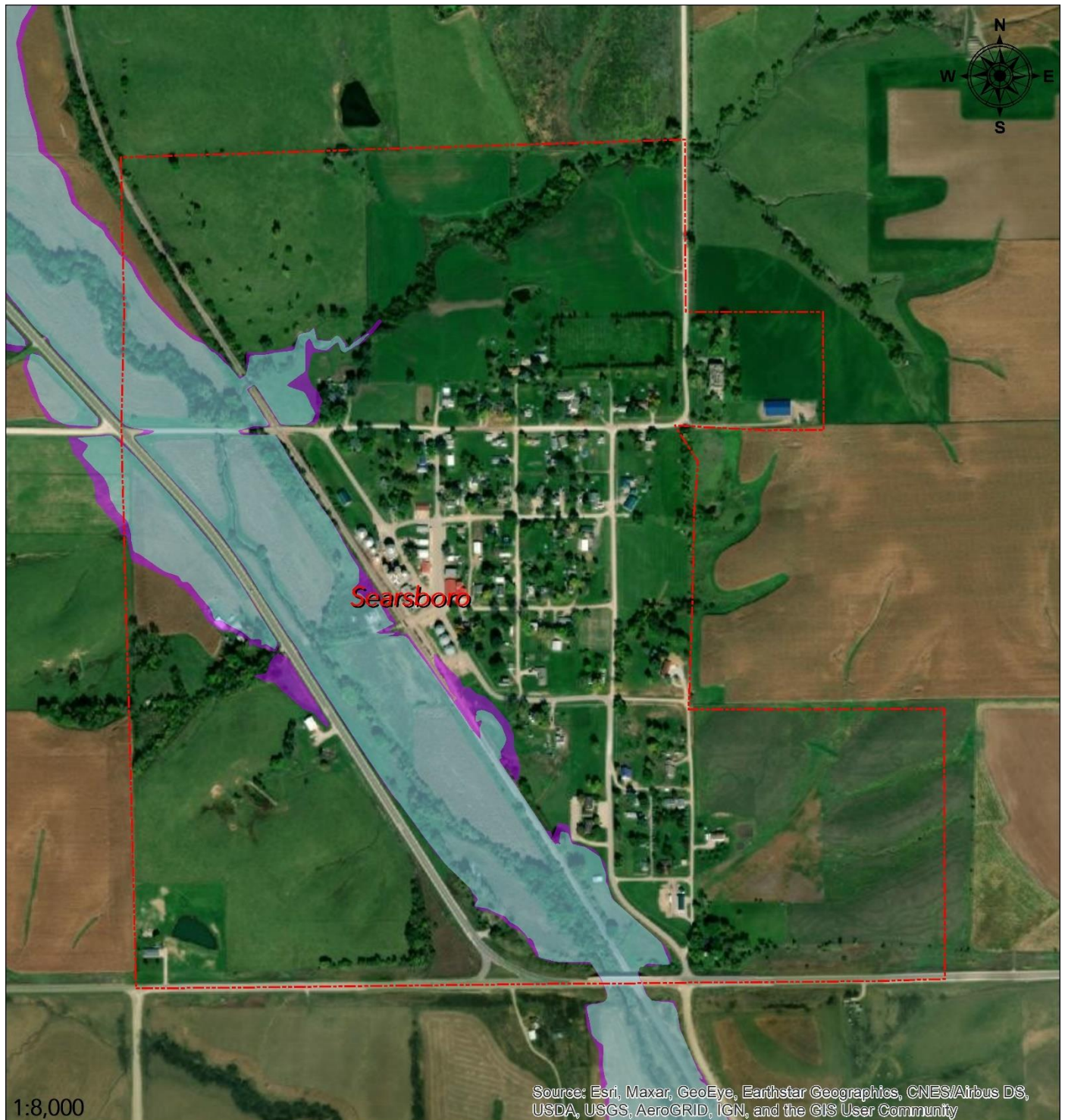
Floodplains

- Zone A
- Zone B

Map 3.9 – Floodplains, Montezuma



Map 3.10 – Floodplains, Searsboro



0 0.05 0.1 0.2
Miles



Data Sources: ESRI
, FEMA, Silvis Labs,
U.S. Census Bureau,
USACE, USDA

- State Borders
- County Borders
- Municipal Borders

Floodplains

- Zone A
- Zone B

3.6 – Severe Storms

Severe storms comprise the hazardous and damaging weather effects often found in violent storm fronts. They can occur together or separate, they are common and usually not hazardous, but on occasion they can pose a threat to life and property.

This plan defines Severe Storms as a combination of the following severe weather effects as defined by NOAA and the NWS.



Hail: Showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.

High/Strong Wind: Sustained wind speeds of 40 miles per hour or greater lasting for 1 hour or longer, or winds of 58 miles per hour or greater for any duration. Often referred to as straight line winds to differentiate from rotating or tornado associated wind.

Lightning: A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.

Thunderstorm Winds: The same classification as high or strong winds, but accompanies a thunderstorm. It is also referred to as a straight-line wind to differentiate from rotating or tornado associated wind.

For consistency with the NWS and NOAA, high and strong winds are shown separate from thunderstorm winds when raw, collected data is displayed. However, for their impacts and probability, they are combined and referred to simply as “wind” events. Undoubtedly, numerous more lightning strikes have occurred in the planning area throughout recorded history. However, for the purposes of assessing the planning area’s vulnerabilities and risk, only the strikes recorded by the NWS and NOAA are considered. The NWS and NOAA records consist of lightning strikes that have caused a significant impact, that is, they damaged property, infrastructure, or harmed people.

Location & Extent

Severe storms are an area-wide hazard as they can strike anywhere in the planning area. Storms, severe or not, are often predicted within a day or multiple days in advance.

The severity of a storm is not as easily predicted and when it is, the window of notification is up to a few hours to under an hour. When a storm is imminent, it is unknown whether or not hail, lightning, or damaging winds will occur until after an incident has been reported. Since severe storms typically affect an area the size of a region, the expected intensity is the same throughout the planning area. Thunderstorms, and the accompanying hail, lightning, and wind, typically last less than an hour. The portions of this timeframe where each storm classification would be considered “severe” should last less than 30 minutes.

3.6 – Severe Storms

Hail regularly falls in the planning area each year and has been recorded up to 2.00 inches in size. A complete hail index with size and typical damages can be found in the table below. Any incidents of hail can cause injury to the planning area's citizens, while anything above 1 inch could cause damage to structures. If windows are broken, some facilities will be rendered unusable until repaired.

Table 3.25 – NOAA/TORRO Hailstorm Intensity Scale

Class	Intensity Category	Diameter (Inches)	Size Comparison	Damage Impacts
H0	Hard Hail	0 – 0.33	Pea	No damage
H1	Potentially Damaging	0.33 – 0.60	Marble/Mothball	Slight damage to crops
H2	Potentially Damaging	0.60 – 0.80	Dime/Grape	Significant damage to crops
H3	Severe	0.80 - 1.20	Nickel to Quarter	Severe damage to crops, damage to glass and plastic, paint and wood scored
H4	Severe	1.20 - 1.60	Half Dollar	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.60 - 2.00	Silver Dollar to Golf Ball	Damage to tiled roofs, significant risk of personal injury.
H6	Destructive	2.00 - 2.40	Egg	Aircraft bodywork dented, brick walls pitted
H7	Very Destructive	2.40 - 3.00	Tennis Ball	Severe roof damage, risk of serious injuries to persons not protected
H8	Very Destructive	3.00 - 3.50	Baseball to Orange	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.50 - 4.00	Grapefruit	Extensive structural damage, risk of severe injury or fatal injuries to persons not protected
H10	Super Hailstorms	4.00 +	Softball and up	Extensive structural damage, risk of severe injury or fatal injuries to persons not protected

It can safely be assumed any severe storm has the potential to cause a lightning strike. It can happen instantly with no warning and happen anytime throughout the storm's passage. A storm's lightning intensity is measured by lightning activity intensity levels outlined in the table on the following page. A strike could damage structures throughout the planning area and render it unusable for a period of time, or cause it to catch fire and damage it beyond repair. Most lightning strikes do not hit structures or people and therefore go unreported. The planning area can and has experienced lightning of all intensities listed in the table below.

Table 3.26 – Lightning Activity Intensity Scale

Level	Description
LAL 1	No activity
LAL 2	Isolated thunderstorms: Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud-to-ground strikes in a 5-minute period.
LAL 3	Widely scattered thunderstorms: Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud-to-ground strikes in a 5-minute period.
LAL 4	Scattered thunderstorms: Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud-to-ground strikes in a 5-minute period.
LAL 5	Numerous thunderstorms: Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud-to-ground strikes in a 5-minute period.

Strong, high, and thunderstorm winds are classified as winds which occur between 40 and 70 miles per hour lasting for 1 hour or greater or of 58 miles per hour for any duration. The Beaufort Scale shown on the next page displays the ranges of wind speed and correlates them with their typical effects. At a level 7 and 8 citizens should remain indoors and anywhere above a level 8 will cause damage to structures. Damage to any amount of structures can cause serious disruption to the participating governments and school district. The scope of damage can range from one residential house up to widespread destruction of homes and reinforced buildings throughout the planning area. The planning area occasionally receives wind events between 50 and 65 miles per hour or a Beaufort level between 9 and 10 and has seen level 12 measured at 90 miles per hour.

Table 3.27 – Beaufort Scale

Beaufort Number	Wind Speed (Mph)	Seaman's Term	Effects
0	Under 1	Calm	Calm, smoke rise vertically
1	1 – 3	Light Air	Smoke drift indicates wind direction, but vanes do not move
2	4 – 7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8 – 12	Gentle Breeze	Leaves, small twigs in constant motion, light flags extended
4	13 – 18	Moderate Breeze	Dust, leaves, and loose paper raised up, small branches move
5	19 – 24	Fresh Breeze	Small trees begin to sway
6	25 – 31	Strong Breeze	Large branches of trees in motion, whistling heard in wires
7	32 – 38	Moderate Gale	Whole trees in motion, resistance felt in walking against the wind
8	39 – 46	Fresh Gale	Twigs and small branches brake off of trees
9	47 – 54	Strong Gale	Slight structural damage occurs, slate blown from roofs
10	55 – 63	Whole Gale	Trees broken, structural damage occurs
11	64 – 72	Storm	Widespread damage
12	73 or Higher	Hurricane Force	Violence and destruction

History & Probability

Since 1996, NOAA has recorded 80 hailstorms in the planning area. In most of these cases the hail remained under 1.25 inches in size. This hailstorm did not cause any deaths, but has injured 6 people in the planning area. NOAA and the NWS have recorded \$957,200 in property damage from hail.

Since 1996, NOAA has recorded 4 significant lightning strike in the planning area. These events have caused no injuries or fatalities. They have inflicted \$590,000 in property damage.

Since 1996, NOAA has recorded 157 wind events in the planning area. Most of these events have been measured at between 40 to 55 miles per hour, but one was measured as high as 90. There are no recorded fatalities and 1 injury from these wind events. Wind events have caused a total of \$5,995,110 in property damage throughout the planning area.

Based on the data recorded by NOAA, the planning area should expect a significant lightning strike in about once every 6 years at 0.16 strikes per year while it should experience a significant hailstorm about

3 times per year at a rate of 3.2 hailstorms per year. Additionally, the planning area should expect just over 6 significant wind events per year or at a rate of 6.54 events per year.

For a complete list of NOAA recorded hail, high wind, lightning, and thunderstorm winds, please reference Appendix C.

Vulnerability of and Impact on Facilities

Structural vulnerability to severe storms is the same throughout the planning area. Hail can be costly by damaging rooftops, outdoor equipment, and windows. Lightning can strike anything with the potential to significantly damage electrical infrastructure or ignite a fire. Wind events create flying debris which can damage infrastructure and buildings. Strong enough wind can cause structure damage to older, less well constructed buildings even toppling or leveling them. A FEMA Code 361 Tornado Safe Room will provide more than sufficient protection and resistance to any form of severe storm as they are designed and constructed above the standard metrics of a severe storm. NOAA records catalog that the planning area regularly reports severe storm damage to roofs and power lines while also uprooting and downing trees. Additionally, weaker structures like barns and garages have been reported destroyed from strong wind gusts impacting the planning area.

Significant changes to national building codes were implemented in 1999, and structures built before then are considered to be more vulnerable than those constructed afterwards. The majority of the planning area's structures were constructed before 1999.

The average hailstorm in the planning area costs \$11,965 according to the NWS and NOAA. The range of a single incident ranges from \$0 to \$500,000.

The average lightning strike in the planning area inflicts \$147,500 in property damage. The range of a single incident ranges from \$0 to \$550,000.

The average wind event in the planning area costs \$43,759, while the existing range of a single incident has been from \$0 to \$3,000,000.

Poweshiek County and its participating jurisdictions' municipal structures are valued at \$2,667,294,000 and their participating community school district structures are valued at \$112,284,755, for a total value of \$2,779,578,755. Since severe storms threaten the entire planning area equally, all municipal and community school district structures are considered exposed and vulnerable.

Vulnerability of and Impact on Critical Facilities

All infrastructure and critical facilities within the planning area are equally vulnerable and at risk since severe storms can affect any portion of the planning area and damage indiscriminately.

Vulnerability of and Impact on Population

In the absence of proper shelter, hail can cause serious injury to an unprotected person. As long as the planning area's citizens stay indoors and away from windows, they will be protected against hail injury and death. Similarly, they can avoid being struck by lightning by staying indoors. Although lightning may strike a structure sheltering people, it is extremely unlikely that the strike itself will directly injure or kill a sheltered person. As long as a structure is able to maintain its integrity during high-speed winds, it will protect people from wind injury or death. However, old or poorly constructed facilities are not good shelters as previously mentioned, flying debris can break windows or cause structural damage. Either of these instances have the potential to seriously injure or kill anyone taking shelter in older, less well constructed building.

Poweshiek County and its municipalities have a total population of 18,504 in 8,984 housing units all of which are vulnerable and at risk to severe storms. Similarly, all of the participating community school districts' 2,244 students and their 326 staff and faculty are vulnerable and at risk.

Historically, there have been 7 injuries and 0 fatalities as a result of severe storms in the planning area.

Vulnerability of and Impact on Systems

The planning area's assets and systems' vulnerability to severe storms is directly correlated to its population density throughout the planning area with its power grid being the most likely to suffer damage. Where there are people, there are power related infrastructure.

Hail damage is typically superficial and does not hamper a community's assets, systems, or activities. Lightning strikes can destroy or damage a community asset, but since their strikes are typically isolated and rarely hit anything, it is unlikely to significantly impact a larger system. Wind events can destroy and damage multiple structures and points of infrastructure. It has the potential to significantly impact a community's power grid compounding the effects of other hazards such as tornadoes, and winter storms.

Key Considerations

Since severe storms strike over large areas and indiscriminately, there is not any particular portion of the planning area that is more likely than another to experience a severe storm. However, there are portions of the planning area that are more vulnerable to hail and wind related damage due to the age of a significant portion of their building stock.

As previously mentioned, the majority of the planning area's structures were built prior to 1999 and thus are more vulnerable and at risk to severe storms.

3.7 – Tornadoes

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud. Often referred to as a twister or a cyclone, they can strike anywhere and with little warning. Tornadoes come in many shapes and sizes, but are typically in the form of a visible condensation funnel, whose narrow end touches the earth and is often encircled by a cloud of debris and dust.



Tornadoes can cause several kinds of damage to buildings. Tornadoes have been known to lift and move objects weighing more than 3 tons, toss homes more than 300 feet from their foundations, and siphon millions of tons of water. However, less spectacular damage is much more common. Houses and other obstructions in the path of the wind cause the wind to change direction. This change in wind direction increases pressure on parts of the building. The combination of increased pressures and fluctuating wind speeds creates stress on the building that frequently causes connections between building components, roofing, siding, windows, etc., to fail. Tornadoes can also generate a tremendous amount of flying debris. If wind speeds are high enough, airborne debris can be thrown at buildings with enough force to penetrate windows, roofs, and walls.

Location & Extent

Many tornadoes only exist for a few seconds in the form of a touchdown. A tornado may arrive with a storm front and touchdown in a matter of seconds without warning. Other times tornado watches and sirens will alert communities of high potential tornado producing weather or an already formed tornado and its likely path.

The most extreme tornados can attain wind speeds of more than 200 mph, stretch more than two miles across, and travel dozens of miles. Tornadoes are an area-wide hazard as they can strike anywhere in the planning area.

Until 2007 the Fujita Tornado Scale ranked the severity of tornadoes. The Fujita scale assigned a numerical F value, F0 through F5, based on the wind speeds and estimated damage. Since 2007 the U.S. switched over to the Enhanced Fujita Scale. The altered scale adjusted the wind speed values per F level and introduced a rubric for estimating damage. Most tornados have wind speeds less than 110 miles per hour, and travel a few miles before dissipating. The planning area should expect to see tornadoes of EF0 or EF3, but should be prepared for a tornado up to an EF5.

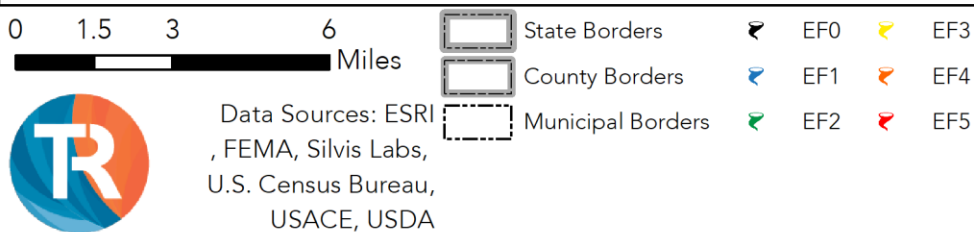
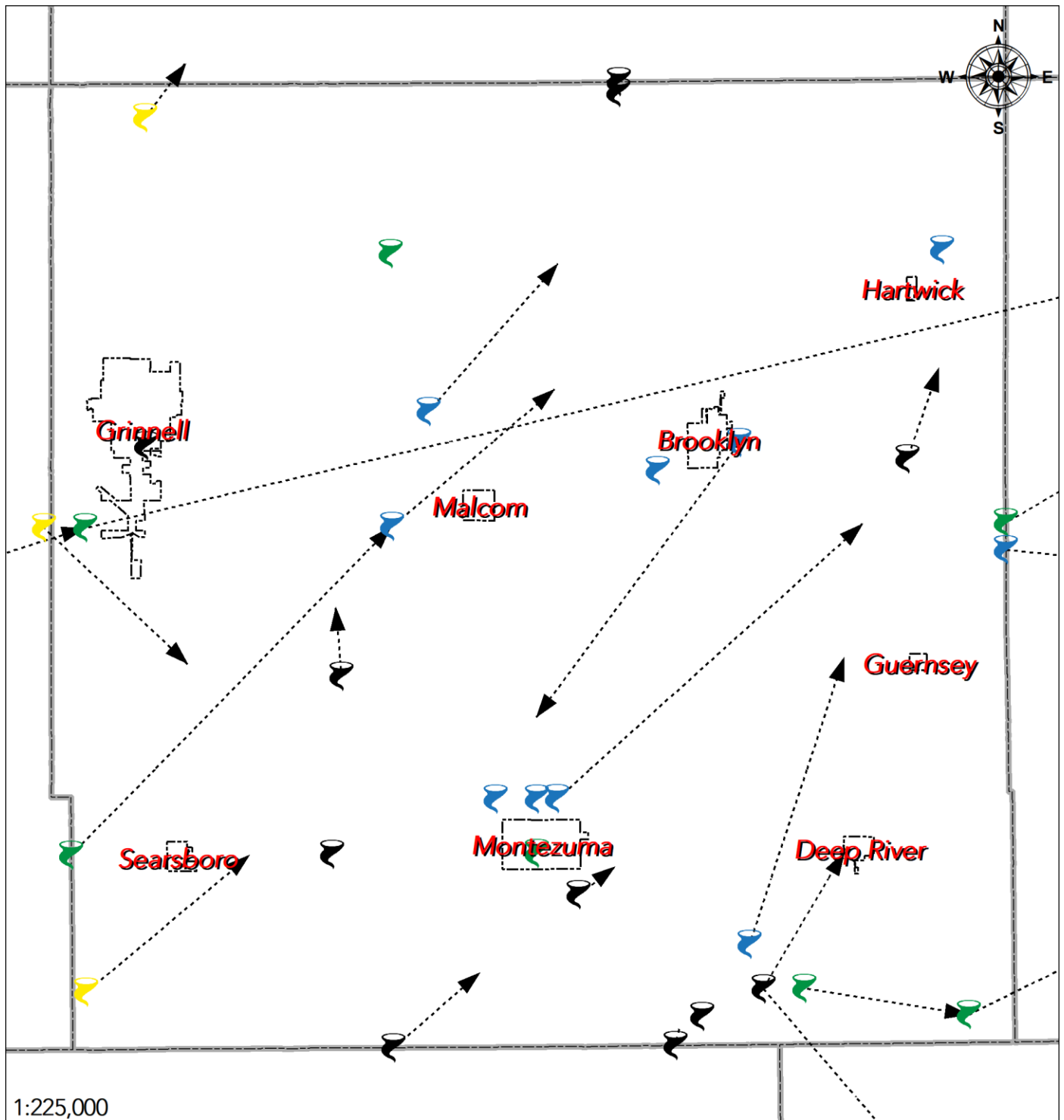
Table 3.28 – Fujita Scale

	SCALE	WIND SPEED	DESCRIPTION
	EF-0	65–85 MPH	'Minor' damage: shingles blown off or parts a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.
	EF-1	86–110 MPH	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.
	EF-2	111–135 MPH	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can tossed.
	EF-3	136–165 MPH	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.
	EF-4	166–200 MPH	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, to story exterior wall of masonry buildings would likely collapse.
	EF-5	> 200 MPH	'Massive/incredible' damage: well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.

History & Probability

Since 1953, the NWS has recorded 33 tornadoes in the planning area. Most have been EF1 or EF2 while the most intense has been an EF3. These tornadoes have caused 53 recorded injuries, 4 deaths, and an estimated \$12,092,000 in property damage. For a complete list of NWS recorded tornadoes, please reference Appendix C.

Map 3.11 – Historical Tornadoes



Based on the data recorded by the NWS, the planning area should expect a tornado at a rate of 0.50 tornadoes per year or a tornado roughly 1 tornadoes every 2 years.

Vulnerability of and Impact on Facilities

Most tornadoes are in the EF1 – EF2 class. Building to modern wind standards and state codes provides significant protection from these hazard events; however, a community in the direct path of a violent, high scale tornado can do little to prevent significant property damage. Designing buildings to protect against extreme wind speeds, such as those associated with an EF4 or EF5 is extremely challenging and cost prohibitive. Anything less than a FEMA Code 361 compliant structure is susceptible to significant damage or complete destruction. A comparison of EF scale to the expected impact on facilities can be seen in the table shown previously in this section.

The average tornado event in the planning costs \$366,424 while the existing range of a single incident has been between and EF0 and EF3 costing between \$0 and \$2,500,000.

Poweshiek County and its participating jurisdictions' municipal and public-school district structures are valued at a total of \$2,779,578,755 (\$2,667,294,000 municipal, \$112,284,755 community school district). Since tornadoes threaten the entire planning area equally, all municipal and community school district structures are considered exposed and vulnerable.

Vulnerability of & Impact on Critical Facilities

All infrastructure and critical facilities within the planning are equally vulnerable and at risk since tornadoes can affect any portion of the planning area and damage indiscriminately.

Vulnerability of and Impact on Population

An EF4 or EF5 tornado has the potential to level the smaller jurisdictions and kill everyone in them while being able to do nearly the same in the larger ones. A lesser magnitude tornado has the ability to kill and injure citizens as it rips off the roofs and walls of its structures while launching airborne missiles born from debris.

Poweshiek County and its participating municipal jurisdictions have a total population of 18,504 in 8,984 housing units all of which are vulnerable and at risk to tornadoes. Additionally, all 2,244 participating community school district students and their 326 staff and faculty are considered vulnerable and at risk.

Vulnerability of and Impact on Systems

All of the planning area's community assets and systems' vulnerability to tornadoes is equal throughout the planning area. A small magnitude tornado will not significantly damage a community and its systems, but a larger magnitude tornado can impact a community for weeks, months, or years and even destroy a city completely. Significant damage to any portion of the planning area would hinder the community's economy and increase its social vulnerability.

Key Considerations

Since tornadoes affect large areas and indiscriminately, there is not any particular portion of the planning area that is more likely than another to experience a tornado. However, there are portions of the planning area that are more vulnerable to wind related damage due to the age of a significant portion of their building stock.

All plan participants retain significant levels of building stock constructed prior to 1999. These buildings were generally constructed to lower wind resistant standards and codes and thus these jurisdictions are considered more vulnerable.

3.8 – Winter Storms

A severe winter storm encompasses multiple effects caused by winter weather. Included ice storms, heavy or prolonged snow, sleet, and extreme temperatures.

This plan defines severe winter storms as a combination of the following winter weather effects as defined by NOAA and the NWS.



Ice Storm: An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.

Heavy Snow: This generally means snowfall accumulating to 4" or more in depth in 12 hours or less; or snowfall accumulating to 6" or more in depth in 24 hours or less. In forecasts, snowfall amounts are expressed as a range of values, e.g., "8 to 12 inches." However, in heavy snow situations where there is considerable uncertainty concerning the range of values, more appropriate phrases are used, such as "...up to 12 inches..." or alternatively "...8 inches or more."

Winter Storm: Hazardous winter weather in the form of heavy snow, heavy freezing rain, or heavy sleet. May also include extremely low temperatures and increased wind.

Location & Extent

Winter storms are an area-wide hazard as they can strike anywhere in the planning area. Winter storms can range from moderate snow over a few hours to blizzard conditions with high winds, freezing rain or sleet, heavy snowfall with blinding wind-driven snow and extremely cold temperatures that last several days.

Winter storms typically form with warning and are often anticipated. Like other large storm fronts, the severity of a storm is not as easily predicted and when it is, the window of notification is up to few hours to under an hour. Although meteorologists estimate the amount of snowfall a winter storm will drop, it is not known exactly how many feet of snow will fall, whether or not it will form an ice storm, or how powerful the winds will be until the storm is already affecting a community.

Poweshiek County and this plan's participants will typically receive 3 to 5 inches of snow during a winter storm, but a single storm in the planning area has managed to accumulate up to a reported 20 inches of snow.

Additionally, Poweshiek County and its participating jurisdictions have seen up to 1 inches of accumulated ice. They should be prepared for the typical average is around just a tenth of an inch of ice during a winter storm.

History & Probability

Since 1996, NOAA has recorded 59 winter storms in the planning area. Most winter storms leave under 6.00 inches of accumulation however, on one occasion the planning area has seen snow accumulation as much as 20 inches. Snowfall from winter storms has varied greatly ranging from just a few inches to greater than a foot of snow accumulation.

These winter storms have not caused any recorded direct injuries or fatalities. The NWS and NOAA have recorded \$2,925,130 in property damage as a result of winter storms. For a complete list of NOAA recorded winter storms, please reference Appendix C.

Based on the data recorded by NOAA, the planning area should expect a severe winter storm at a rate of 2.565 per year.

Vulnerability of and Impact on Facilities

Structural vulnerability to winter storms is the same throughout Poweshiek County and its participating jurisdictions. Heavy snow accumulation can cause roofing to collapse on old or poorly constructed facilities. Ice storms will coat a facility's exterior, but is unlikely to cause anything more than superficial damage. Prolonged, extremely cold temperatures can cause significant damage to poorly insulated or heated facilities. The cold temperatures can cause a facility's water pipes and plumbing systems to freeze. As the water in these systems turns to ice it expands and eventually will cause pipes to burst.

Poweshiek County and its participating jurisdictions' municipal structures are valued at \$2,667,294,000 and their participating community school district structures are valued at \$112,284,755, for a total value of \$2,779,578,755. Since winter storms threaten the entire planning area equally, all municipal and school district structures are considered exposed and vulnerable.

The NWS and NOAA has recorded \$2,925,130 property damage as a result of winter storms ranging from \$0 to \$1,000,000 for a single event. The average cost in property damage per storm is \$49,578.

Vulnerability of and Impact on Critical Facilities

All infrastructure and critical facilities within the planning area are equally vulnerable and at risk since winter storms can affect any portion of the planning area and damage indiscriminately.

Vulnerability of and Impact on Population

Poweshiek County and its participating jurisdictions' population are equally vulnerable throughout the planning area. Poweshiek County and its participating jurisdictions' citizens are at risk from prolonged, cold temperatures if they fail to be sheltered in an adequately heated structure or are unable to reach shelter. Some structures are dependent on electricity or steam for their heating making them vulnerable if a winter storm causes a power outage. Additionally, if a winter storm restricts travel, people may become immobile on roadways and be at the mercy of their vehicle's fuel supply. Exposure

from winter storms in any of these cases can lead to frostbite and hypothermia. Both of these conditions if untreated can lead to death.

Poweshiek County and its participating jurisdictions have a total population of 18,504 in 8,984 housing units all of which are vulnerable and at risk to severe winter storms. Additionally, all 2,244 participating community school district students and their 326 staff and faculty are considered exposed and vulnerable. The community school districts' students, staff, and faculty are considered at slightly lesser vulnerable than the population at-large since winter storms often arrive with warning and school would likely be cancelled.

Historically, there have been no recorded direct fatalities or injuries relating to winter storms across region wide fronts in Poweshiek County and its participating jurisdictions.

Vulnerability of and Impact on Systems

Poweshiek County and its participating jurisdictions' assets and systems vulnerability to severe winter storms is the roughly same throughout the planning area. Winter storms create havoc on roads impacting travel from decreased speeds and traffic jams to an ice storm or blowing snow drifts making any travel impossible or extremely dangerous. Additionally, ice storms and snow accumulation can directly bring down power lines or bring down vegetation onto power lines. From these scenarios, Poweshiek County and its participating jurisdictions can suffer power outages making it difficult to heat structures and exposing its citizens to prolonged cold temperatures. Winter storms can cause a problem for school districts in lost education days and transportation to and from their schools. Winter storms can trap students and staff on roadways exposing them to hazardous conditions and cold temperature.

Key Considerations

Winter storms have ability to affect a portion of or the entire planning area. Unfortunately, there is no way to predict ahead of time which areas will likely be more or less adversely directly affected. In regards to winter storm impacts, the rural municipalities of the planning area are less dense than a metro area and rely on a more decentralized power grid. Residents of these communities stand to last without out power for a greater period of time caused by a debilitating ice storm or blizzard.

3.9 – Excluded Hazards

There exists a slim chance that any type of natural hazard could occur in any location throughout the United States. However, the probability of them occurring is so infinitesimally small and their impact so slight that it is not considered reasonable to develop a fully-profiled risk assessment for them. Additionally, without historical information or data to drive an analysis, it is unlikely that their conclusions would yield functional or practical strategies to mitigate them.

Earthquakes

The State of Iowa has been affected by a few sporadic earthquakes over the last century, it is not considered to be at risk by any reasonable means or the USGS.

Expansive Soils

Although areas of high clay content soils exist throughout Poweshiek County, there is not a history of damage caused by this hazard. Additionally, expansive soils do not directly (and only in a an extremely unlikely scenario, indirectly) threaten lives with injury.

Extreme Heat

Although incidents of extreme heat due occur throughout the planning area, they have never caused any recorded injuries, deaths, or property damage. The heat index levels that do occur, exist within a range or temperatures that are typically expected and known in advance allowing residents of Poweshiek County to take routine precautions.

Landslides

There is not a significant threat from landslides to the planning area or throughout Iowa. There are not any areas that are considered to have steep slopes and the climatic and topographic conditions are not present to consider them a reasonable or measurable threat to people or property.

Sinkholes

According to the Iowa Department of Natural Resources there are no significant sinkholes or sinkhole formations within Poweshiek County. Additionally, a GIS examination of Karst Formations performed by Two Rivers Emergency Management corroborates this claim.

Wildfires

Although small brush fires do occur, there is not a history of significant wildfires in Poweshiek County.

3.10 – Risk Summary

The table below outlines each participating jurisdiction's general risk to this plan's profiled hazards. The rankings are based on a composite evaluation of this plan's risk assessment, namely, a hazard's probability of occurring in the future, the vulnerability of a jurisdiction to a particular hazard, the intensity of past hazard impacts, and a joint evaluation of local experts and stakeholders.

Each participating jurisdiction was assessed against each hazard on a scale of 0 to 6, 0 meaning there is no reasonable risk, 1 being the lowest level of reasonable risk, and 6 being the highest level of risk.

Table 3.20 – Hazard Risk Summary

Jurisdiction	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Poweshiek County	1	2	4	5	5	3
Brooklyn	0	1	4	5	5	3
Deep River	0	1	2	5	5	3
Grinnell	0	1	2	5	5	3
Guernsey	0	0	3	5	5	3
Hartwick	0	1	2	5	5	3
Malcom	0	1	3	5	5	3
Montezuma	0	1	4	5	5	3
Searsboro	0	1	4	5	5	3
GN SD	0	0	2	5	5	3
Montezuma SD	0	0	2	5	5	3

Section 4 – Mitigation Strategy

A mitigation strategy is a set of mitigation actions meant to prevent the potential impacts of hazards. There are several types of mitigation actions with a different method of reducing vulnerability.

Poweshiek County and this plan's stakeholders have identified the sustained, proposed, and completed mitigation actions for each of the hazards identified as having the potential to affect the jurisdiction. For proposed mitigation actions, the planning team in each jurisdiction considered each type of mitigation action before identifying mitigation actions to include their final mitigation strategy. The mitigation strategy of each jurisdiction is included in this section of the plan.

4.1 – Mitigation Capabilities

Each type of stakeholder provides a set of capabilities, in some cases broad and in some cases narrow, by which they can increase the planning area's resiliency. The broadest form of mitigation capabilities come from the county and the municipal governments. Their inherent legal authority allows them to institute the greatest regulatory and developmental changes.

The public-school districts have broad authority over their campuses and although budgets may be tight, they are more far reaching than some of the smaller organizations. Additionally, the necessity to protect the planning area's children grants them greater influence and political capital to institute change.

Fiscal Capability

The planning area's municipal governments are not unique in the issues felt by small governments to retain the staff and resources necessary to accomplish the strategies necessary to mitigate hazards. However, they are aware of potential diverse funding sources available to communities for, assisting in the fiscal needs required to implement local hazard mitigation plans, including both government and private programs.

While federal and state programs carry out the bulk of disaster relief programs that provide funds for mitigation, local governments are able to search for alternative funding sources to supplement the local hazard mitigation budget. The participants in the mitigation planning process are aware that before effective mitigation strategies can be applied, stable funding sources and effective incentives must be established on a per project basis to encourage participation by the private and public sectors.

Poweshiek County and this plan's municipal governments should seek out FEMA grant funding from the Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance Grant Program (FMA). Given the size of the municipalities involved in this plan and the pocketed areas of significant flood risk, municipal governments should have access to the United States Department of Housing and Urban Development's Community Development Block Grant Program (CDBG) which occasionally will award grants to assist with projects that fall under hazard mitigation.

4.1 – Mitigation Capabilities

The community school districts have the potential to receive additional funding via the PPEL and SAVE dollars to offset the local match required by FEMA grants. Additionally, the community school districts can raise additional funding to self-fund or to assist in grant matching via debt bonding.

Institutional Capability

Poweshiek County as a whole community is capable of implementing the strategies identified herein. In addition, they are capable of promoting the mitigation process and educating the public about the hazards prevalent to their area, as well as mitigation process necessary to mitigate those hazards.

In an emergency, the county and each municipality's response is an extraordinary extension of responsibility and action, coupled with normal day-to-day activity. Normal governmental duties will be maintained, with emergency operations carried out by those agencies assigned specific emergency functions.

Political Capability

During the process of the development of this plan, opposition to mitigation measures was not evident in any the plan's participants. The primary limiting factor is funding, which is made more difficult by the current situation in the local, state, and national economies.

The county, cities, and their partnerships with the participating agencies are well-organized and responsive to community needs. Leadership is informed and remains up-to-date on the hazards that threaten the area. Citizens who did participate in the public meetings and presentations showed an interest in doing things to promote a safer community. Therefore, the county and cities (the governing board, staff, and citizen population) appear willing to promote the economic efficiency and social utility of the mitigation measures contained in this plan, if appropriate funding can be identified.

Most of the participating municipalities and community school districts undergoes budget reviews between November and December with the exception of Malcom which undergoes them in January and Montezuma which undergoes them in May.

General Authority & Regulations

State of Iowa law provides the legal authority for local governments to implement regulatory measures. The basis for much of this authority is the local government power designed to protect public health, safety and welfare. This authority enables local government to enact and enforce ordinances, and to define and abate nuisances. Hazard mitigation is a form of protecting public health, safety, and welfare, and falls under the general regulatory powers of local government. This also extends to building codes and inspections, land use, acquisition, and floodplain development regulation.

Building Codes & Inspection

Building codes and inspections provide local governments with the means to maintain county structures that are resilient to natural hazards. Poweshiek County and every municipalities have adopted the 2015 International Building and Fire Prevention Codes. These codes prescribe minimum

4.1 – Mitigation Capabilities

standards for building construction, which ensures that new buildings and structures are built to standards that are seismically sound, fire resistant and developed within flood-proofing measures. These codes also require appropriate hazard code updating and compliance when certain thresholds are met for remodel and renovation of existing buildings. These codes also authorize local governments to carry out building inspections to ensure local structures adhere to the minimum state building standards.

Municipal officials have the primary role of enforcement of the International Building Code structural regulations. Fire departments may also take part in the inspection process for fire and general public safety inspections. They enforce the appropriate codes both at the plan approval stage and the site inspection stage. Poweshiek County and this plan's municipal governments are committed to the high standards of building provided through the respective codes, and requires that the same codes and the same enforcement procedures apply during routine permitting procedures as well as following a disaster.

Land Use Planning

Through land use regulatory powers granted by the state, local governments can control the location, density, type and timing of land use and development in the community. Provisions of the land use plans are implemented through regulatory tools that include zoning and subdivision ordinances, and taxation. All of the participating municipalities have established zoning ordinances and codes. Only Malcom has reported having a comprehensive plan.

Taxation

Taxation can be a powerful mitigation tool by providing local governments with a way to guide development. Tax abatements may be used to encourage landowners and developers to integrate mitigation measures into the process of building new developments and retrofitting existing properties in the floodplain. These tools can be especially effective in encouraging the mitigation of existing structures. Additionally, community school districts have the ability to levy revenue through referendums for specific projects whether it is mitigation related or not.

Floodplain Programs

Floodplain management is the operation of a community program of measures for reducing flood damage. These measures take a variety of forms; and generally, include zoning plans, subdivision, or building requirements, and special-purpose floodplain ordinances. Most of the participating municipalities defer to the county in regards to floodplain administration with the exception of Grinnell and Malcom. Both have adopted the same codes as the county, but utilize their Director of Building and Planning and City Superintendent respectively for review and administration of the code.

In order to build or modify a structure in an identified Zone A, the builder must apply for a development permit. The ordinance dictates that the lowest level of the structure (that includes the basement) to be built 1 foot above or at the BFE. Any sanitation that exists below this level must be inspected by a State of Iowa registered engineer.

4.1 – Mitigation Capabilities

Of the 9 participating municipal governments, 5 are active members in the NFIP while none are members of the CRS program. The school districts are not eligible for NFIP or CRS participation. None of the 9 NFIP participating communities have any intention of changing their status to non-participating communities or joining the NFIP if they are not a participant. Their continued compliance is in no way in question as their floodplain enforcement and regulations are well established.

There are no repetitive loss properties in the planning area.

Table 4.1 – NFIP Community Status

Jurisdiction	CID	CRS Rating	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Registration Entry Date
Poweshiek County	190902	N/A	-	05/19/14	05/19/14	06/27/14
Brooklyn	190495	N/A	04/18/75	07/17/86	05/19/14	07/17/86
Deep River	N/A	N/A	N/A	N/A	N/A	N/A
Grinnell	190588	N/A	-	05/19/14	05/19/14	05/19/14
Guernsey	N/A	N/A	N/A	N/A	N/A	N/A
Hartwick	N/A	N/A	N/A	N/A	N/A	N/A
Malcom	190498	N/A	09/19/75	05/19/14	05/19/14	05/19/14
Montezuma	190622	N/A	09/26/75	06/01/88	05/19/14	06/01/88
Searsboro	N/A	N/A	N/A	N/A	N/A	N/A

**The data are from FEMA.*

4.2 – Mitigation Goals

The mitigation goals for Poweshiek County and this plan's participating jurisdictions were established based upon results from the local and state risk assessments, stakeholder meetings, and input from an extensive public survey. These goals represent the plan's participants' long-term vision for the continued reduction of hazard risks and the enhancement of their mitigation capabilities.

Goal 1: Reduce the risk from natural hazard events utilizing community cooperation and an all-hazards approach.

Goal 2: Pursue additional, complete, and accurate data in support of mitigation planning, disaster preparedness, disaster response, and disaster recovery operations.

Goal 3: Integrate the hazard mitigation plan's findings into the planning, and decision-making processes for all current and future emergency management and preparedness related activities.

Goal 4: Minimize the risk to life and property from dam failures.

Goal 5: Minimize the risk to property from droughts.

Goal 6: Minimize the risk to life and property from floods.

Goal 7: Minimize the risk to life and property from severe storms.

Goal 8: Minimize the risk to life and property from tornadoes.

Goal 9: Minimize the risk to life and property from winter storms.

4.3 – Mitigation Projects

This plan identifies a comprehensive range of 21 possible and unique mitigation projects and 4 possible and unique mitigation actions. The selected set carefully takes an all-hazards approach to mitigation while simultaneously addressing each of the individual six profiled hazards.

The projects and actions were selected based upon their potential to reduce the risk to life and property with an emphasis on new and existing infrastructure, ease of implementation, community and departmental support, consistency with other relevant plans and capabilities, available funding, vulnerability, and total risk. For further information on evaluation criteria, please see Section 4.4. The full list of mitigation projects and their descriptions can be found in Appendix D.

Some projects and actions mitigate risk and vulnerability to multiple hazards. Some of these projects and actions list participating jurisdictions that are only at risk from one or a few of the mitigation hazards. For example, the project: “Backup Generators” mitigates against multiple hazards. All participating jurisdictions are interested in this project, but some will not be using it to mitigate against riverine flooding. Instead they will be using it to mitigate against severe storms and winter storms.

Table 4.2 – Mitigation Projects Summary

Project/Action	Jurisdictions
Backup Generators	Poweshiek County, All Municipal Governments, All CSDs
Bury Utility Lines, Pipes, and Tanks	Poweshiek County, All Municipal Governments, All CSDs
Dam Retrofit	Poweshiek County
Elevate Structures	Poweshiek County, All Municipal Governments, All CSDs
FEMA Code 361 Safe Rooms	Poweshiek County, All Municipal Governments, All CSDs
Floodproofing	Poweshiek County, All Municipal Governments, All CSDs
Flood Level Monitoring System	Poweshiek County
Insulation & Energy Efficiency	Poweshiek County, All Municipal Governments, All CSDs
Irrigation Storage Tanks	Poweshiek County, All Municipal Governments
Looped Grid Power Systems	Poweshiek County, All Municipal Governments
Low Flow Utilities	Poweshiek County, All Municipal Governments (except Guernsey)
Rainwater Retention Basins	Poweshiek County, All Municipal Governments (except Guernsey)
Raise Transportation Infrastructure	Poweshiek County, All Municipal Governments
Relocate or Buyout Vulnerable Structures	Poweshiek County, All Municipal Governments
Snow Fences	Poweshiek County, All Municipal Governments, All SDs, Grinnell College
Storm Siren Modernization	Poweshiek County, All Municipal Governments
Storm Water Drainage System Upgrade	Poweshiek County, All Municipal Governments, All CSDs
Storm Water Pump Stations	Poweshiek County, All Municipal Governments, All CSDs
Structural Integrity Monitoring Instruments	Poweshiek County
Water Line Insulation	Poweshiek County, All Municipal Governments, All CSDs
Wind Resistance Structural Retrofit	Poweshiek County, All Municipal Governments, All CSDs

Table 4.3 – Mitigation Actions Summary

Project/Action	Lead Agency
Dam Failure Inundation Study	Poweshiek County EMA
Public Awareness & Education	Poweshiek County EMA
SKYWARN Storm Spotter Training	Poweshiek County EMA
StormReady Accreditation	Poweshiek County EMA

Mitigation Project Updates

Poweshiek County's prior approved mitigation plan (2016) contained suggested projects and actions that are no longer considered qualified mitigation projects or actions, rather, they classify as response, recovery, preparedness, or mere basic emergency management functions. Examples of these items include the development of basic emergency plans, risk assessments that are already part of mitigation planning, and basic municipal functions. If a project or action that was included in Poweshiek County's prior plan is not listed below or carried forward in Appendix D, it has been deleted. The table below lists the mitigation projects that have been completed or initiated since the development of their last hazard mitigation plan.

Table 4.4 – Mitigation Actions & Project Updates

Mitigation Project	Jurisdictions	Status	Notes
Backup Generators	Grinnell	Completed	For Tornado Sirens
Storm Water Drainage System Upgrade	Grinnell	In-Progress	
Storm Water Drainage System Upgrade	Montezuma	In-Progress	South 3 rd Street
Storm Water Drainage System Upgrade	Malcom	In-Progress	Numerous Locations
FEMA Code 361 Tornado Safe Room	Montezuma	Completed	Diamond Lake Park
Water Drainage Study	Malcom	In-Progress	

Poweshiek County's prior approved mitigation plan (2016) contained suggested projects and actions that are no longer considered qualified mitigation projects or actions, rather, they classify as response, recovery, or preparedness phases of emergency management. Additionally, there are a number of actions that were proposed that are simply descriptions of the basic job and operating functions of a municipality or EMA. There is no merit or benefit to including actions and projects that are outside the scope of this plan or that are implicitly part of the job and operating function of a government service. Examples of these items include the development of basic emergency plans, risk assessments that are already part of mitigation planning, and basic municipal functions. The actions and projects that were previously listed, but do not qualify under mitigation are listed in the table on the following page:

Table 4.5 – Removed Non-Qualifying Projects

Mitigation Project	Jurisdictions & Prior Plan ID	Reason for Non-Qualification
Acquire property	Montezuma SD 4.3	Not mitigation
Backup communications equipment	County 2.09	Not mitigation
Create emergency phone tree	Malcom 3.2	Not mitigation
Create emergency shelter procedures	Malcom 3.1	Not mitigation
Create roadway access	Searsboro 4.1	Not mitigation
Create water conservation program	County 3.01	Not mitigation
Earthquake education	County 3.02	No reasonable risk to hazard
Ensure soundness of buildings	Montezuma 4.1	Not mitigation
Expand fire safety education	Montezuma 3.1	Not mitigation
Identify sinkholes	County 1.03,	No reasonable risk to hazard
Public service announcements for extreme heat events	County 3.03	Not mitigation
Purchase radios	Montezuma SD New-1	Not mitigation
Review floodplain ordinance	County New-1, Brooklyn New-1	Not mitigation

4.4 – Project Evaluation, Implementation, & Administration

Situational changes will likely occur throughout the 5-year life cycle of a mitigation plan. This can happen due to any number of factors such as public influence, local and grant funding allotments, changing demographics, other developmental changes, and numerous more. These factors and many others have great influence over how activities and projects will need to be evaluated for feasibility and demand. Therefore, a flexible methodology will serve Poweshiek County and this plan’s participants best when determining what, when, and where to engage an activity or project.

Project Evaluation

Poweshiek County and this plan’s participants will utilize the STAPLE+E method of assessing mitigation actions, projects, and alternatives in conjunction with prioritization tables detailed in Appendix E. Initially, the plan participants should utilize the prioritization tables found in Appendix E to inform their decision-making processes in that they can better view which hazards pose the greatest risk to their community and which mitigation actions and projects are better at decreasing their vulnerability and thus risk.

Upon deciding to move forth with a mitigation project, according to decision-making process of the participating jurisdiction, the decision-making body will use the form on the following page to make a final determination on whether or not the action or project is feasible. Preliminary evaluations, per hazard, per project, per jurisdiction are found in Appendix E and are a composite of the STAPLE+E methodology and the composite risk for from each hazard for each jurisdiction.

The evaluations were conducted according the definitions in the table below:

Table 4.6 – STAPLE+E

Category	Concept of Analysis
Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities’ social and cultural values.
Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community’s environmental goals, have mitigation benefits while being environmentally sound.

- 1.) Fill in the name of the mitigation action or project followed by two other viable alternatives which address the same hazards.
- 2.) For each consideration, indicate a plus (+) for favorable or negative (-) for less favorable. If the consideration does not apply, leave it blank.
- 3.) Compare the total number of pluses and negatives to the alternative actions. Some considerations may carry more weight than others, so a simple tally does not necessarily indicate a more viable or feasible action or project.

Table 4.7 – STAPLE+E Sample Form

Criteria	Considerations	Action/Project	Alternative 1	Alternative 2
Social	Community Acceptance			
	Effect on Segment of the Population			
Technical	Technical Feasibility			
	Long-Term Solution			
	Secondary Impacts			
Administrative	Staffing			
	Funding Allocated			
	Maintenance/Operations			
Political	Political Support			
	Local Champion			
	Public Support			
Legal	State Authority			
	Existing Local Authority			
	Political Legal Challenge			
Economic	Benefit of Action			
	Cost of Action			
	Contributes to Economic Goals			
Environmental	Effect on Land or Water			
	Effect on Endangered Species			
	Effect on HAZMAT Waste Sites			
	Consistent with Environmental Goals			
	Consistent with Federal Laws			
Total =				

Project Implementation

Each municipal government participating in this plan has their own decision-making bodies that are free to implement the mitigation strategies found in this plan as they see fit. Each decision-making body will choose municipal departments to head up implementation efforts appropriate for that municipal department's area of responsibility.

The activity and project evaluation methodology described in this section serves as an aid for them to enhance their decision-making. It is highly suggested that the county coordinates with the other municipal governments as well as the non-municipal plan participants to work towards an organized and concentrated effort when implementing activities and projects. That is, it would better serve their implementation effectiveness to work as a whole community when deciding how to allocate staff and funding resources when implementing mitigation activities and projects.

The participating school districts will be in complete sole control of what, when, and where to implement mitigation activities or projects. Its decision-making bodies that are free to implement as they see fit. The activity and project evaluation methodology provide earlier in this section acts as an aid for them to best apply the prescribed mitigation strategy found in this plan.

Project Administration

Poweshiek County will be self-administering each project through its own government departments. The department chosen to administer a project will vary depending on the characteristics of each activity or project whereas public works would be better suited for some projects while county records and risk management would be better suited for others. For each of the participating municipalities, they have the option and flexibility to administer their own activities and projects if they so choose. However, for the purpose of efficiency and governmental scale, activities and projects will default to be administered by the Poweshiek County Emergency Management Agency.

Each school district will administer activities and projects inhouse with individuals designated administrative responsibility on an ad-hoc, per project basis. Individual will be designated on a case-by-case basis as seen most fitting by the organization according to the specific characteristics of the project or activity as oversight and administration duties can vary wildly among these organizations. Each school district reported near similar processes which includes, contacting construction companies and architects for consultation, school board approval, further evaluation, and community input via public meetings.

4.5 – Planning Integration

Mitigation doesn't end at plan approval. Plan approval is only the beginning. The successful implementation of any number mitigation activities and projects requires the coordination and collaboration of a number of local agencies, departments, and organizations. Each group has varying decision-making processes and authorities governing their actions. This plan, once approved, must be integrated into their decision-making processes as a tool for improving their respective resiliencies.

This plan is not only useful for implementing mitigation activities and projects, but is also critical in making development plans and capital improvement projects. The risk assessment in this plan can prevent unmanaged and dangerous development into identified hazard areas or other portions of the planning area that decrease a community's overall resiliency.

Comprehensive Land Use Planning

As of now, only Grinnell, Malcom, and the county have comprehensive plans while the other participating municipalities do not. All of the municipalities maintain a set of ordinances. These plans typically detail building codes, ordinances, zoning, and other land use measures as they relate to hazard risk reduction. Upon future updates of the Poweshiek County HMP, at a minimum, this mitigation plan will be considered for serving as a base guide to updating and improving hazard risk reduction measures contained within the comprehensive land use plans for each of the participating municipalities.

Democratic Governments & Boards

All the participating jurisdictions use some form of a democratic voting process. These organizations rely on agenda proposals, deliberation and discussion, and voting to solidify their decision-making.

All participating jurisdictions engage in capital improvement, infrastructure, and other various projects on an ad hoc basis. For these stakeholders, this plan should be integrated into agenda proposal's designs and cross-referenced during deliberation and discussion of proposed activities and projects. By using this plan's risk assessment, development and capital improvement projects can be appropriately implemented taking into consideration a community's resiliency.

Emergency Management Planning

Any and all emergency management related planning will at a minimum cross reference this document during its production. In some instances, this plan or portions of it will be fully integrated depending on the circumstances and nature of the planning document.

Emergency Operations Plans

Poweshiek County's next EOP update will reflect the most probable and dangerous hazard event scenarios from the plan's risk assessment. Additionally, the plan will be referenced in its entirety as an appendix to the EOP. This revision is the responsibility of the Poweshiek County EMA for all of the jurisdictions participating in this plan. Upon revision completion, all participating jurisdictions and appropriate emergency services will be notified of the revisions and sent out new copies of the EOP.

State of Iowa Homeland Security and Emergency Management

IA HSEM has a FEMA approved mitigation plan current as of June, 2018 and is updated every 5 years. The state's mitigation plan is required by FEMA regulation to include a discussion and summary of local hazard mitigation plans. The process of integrating this plan is already an established process and is managed by IA HSEM.

Facilities Master Plans

The State of Iowa's Department of Education requires all school districts to keep and maintain a ten-year facilities master plan. This plan is a living document that undergoes rigorous internal and public review. It is responsible for planning out a school district's facility needs, educational needs, and future facility needs. Each school district's master plan requires updating and review every two years.

This hazard mitigation plan will become an integral part in maintaining and developing each participating school district's facilities master plan by acting as a guide for current facilities' hazard risks as well as a provide analysis on future expansion of their campuses. Upon completion of the plan, any revision, review, or consultation use of the facilities master plan will be accompanied by a review of this plan as it pertains to the facility master plan's use.

High priority mitigation projects and actions will be added to the sections of the facilities master plan that covers facility needs and future facility needs as achievable goals and objectives. Upon revision and future development, the facilities master plan will contain a risk assessment summary or building construction analysis to accompany any and all proposed construction or retrofit of a school district's facilities.

Grinnell Herald-Register Newspaper

4/27/2020

Interested citizens can join county hazard mitigation meeting

The Poweshiek County Local Emergency Planning Committee will begin the process of updating its multijurisdictional hazard mitigation plan in May. Anyone who would like to be involved can join the kick-off meeting by Zoom on May 13. A 30-day public comment period will occur later this year, and the updated plan will be approved in February of 2021.

Poweshiek County Emergency Management Coordinator Brian Paul explains that updating the plan every five years is a federal requirement, making the county eligible for disaster funding like that provided by the Federal Emergency Management Agency.

The Local Emergency Planning Committee meets quarterly and is composed of elected officials from all the cities in the county, county supervisors and the county emergency management coordinator, representatives of school districts in the county, public health officials, companies handling a large amount of chemicals and any other key partners interested in the process.

Paul explains that the plan includes steps to mitigate foreseeable hazards, including severe weather hazards such as widespread ice, hail and tornados to possible flooding and wildfire risks to release of hazardous materials. The plan will assess the risks and vulnerability to natural hazards of the county, each municipality within the county and each community school district.

The plan will provide recommendations to increase the resiliency of each entity to the effects of foreseeable hazards. That will include projects each entity can take to mitigate or eliminate the effects of foreseeable hazards. Paul gives as examples the upgrading of tornado sirens and, in counties with flooding potential, the purchase of often-flooded property to be turned into green space.

Paul will host a meeting of the Local Emergency Planning Committee by Zoom software at 7 p.m. on Wednesday, May 13. Anyone interested in joining the meeting can e-mail Paul at ema@poweshiekcsheriff.com.

The meeting will begin a process of gathering information, conducted by consultant Two Rivers Emergency Management LLC of Des Moines, which will survey committee members and the public to gather material for the update. Once the gathering of information is complete, Two Rivers will draft an updated plan to submit to the committee.

Paul expects the draft plan to be completed later in 2020. After the committee has reviewed the plan, it will be submitted to the public for a 30-day comment period. The current plan expires in February of 2021, and Paul expects the updated plan to be approved at the committee's meeting in February of 2021.

Those with questions can e-mail Paul or call him at 641-623-4357.


Poweshiek County Emergency Management Agency


Brian

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Brian Paul-Coordinator
Poweshiek County Emergency Management Agency
4802 Barnes City Rd
Montezuma, IA 50171
(641) 623-4357
ema@poweshiekcsheriff.com

4/29/2020

For Immediate Release

Poweshiek County Multi-Jurisdictional Hazard Mitigation Plan Update

Poweshiek County Emergency Management Agency has contracted with Two Rivers Emergency Management, LLC of Des Moines to develop the latest update to our county-wide Hazard Mitigation Plan. Federal law requires this plan to be updated every five years.

The plan, known as the Poweshiek County Multi-Jurisdictional Hazard Mitigation Plan, will assess natural and human-made hazards' risk and vulnerabilities to the county, each municipality within the county, and each community school district and provide recommendations to increase their resiliency. Participation in this plan makes your municipality, school district, or university eligible for a number of federal grant programs that it would not be eligible for otherwise.

All residents, businesses, community leaders, elected officials, and other interested parties are invited to attend the plan's kick-off meeting. Due to the COVID-19 pandemic and following along with local, state, and federal recommendations this meeting will be held virtually on Wednesday, May 13th at 7:00 PM by Two Rivers Emergency Management, LLC. If you wish to attend the meeting, please email the Poweshiek County Emergency Management Agency at: ema@poweshiekcsheriff.com or calling (641) 623-4357 and the virtual meeting information will be provided to you.

At the kick-off meeting, we will discuss the reasons and benefits of updating the hazard mitigation plan, the project schedule and work plan, and all the hazards that affect Poweshiek County. This project is intended to last the next several months, and in order for it to be successful, we ask for your participation and input.

For more information on this project, or to be added to the kick-off meeting list of attendees please contact the Poweshiek County Emergency Management Agency at ema@poweshiekcsheriff.com or call (641) 623-4357.

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4/29/2020 - For Immediate Release

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Poweshiek County EMA

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Brian Paul-Coordinator
Poweshiek County Emergency Management Agency
4802 Barnes City Rd
Montezuma, IA 50171
(641) 623-4357
ema@poweshiekcsheriff.com

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END STATEMENT

Participants (23)

Find a participant

Two Rivers Emergency Management, LLC (Host, me)

Brian Paul

callawsk

Dan Sicard

DAustin1

Dave Hoeger

Dawn Hamilton

Heather's iPhone

Jamey Robinson Mahaska EMA

Janet Stutz

Jason Burt

KBKim Bushong

Marilyn Kennett

Matt Hansen

Mayor Agnew

Mike Schipper

Russ' iPad Pro

Sarah Smith

Stacie Cameron

15154416181

16412607795

16418880826

Amanda Accola

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Ph: (641) 623-4357
ema@poweshiekcsheriff.com

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Poweshiek County Hazard Mitigation Plan Update Seeks Public Input

Posted on January 13, 2021



Brian Paul-Coordinator
Poweshiek County Emergency Management Agency
4802 Barnes City Rd
Montezuma, IA 50171
(641) 623-4357
ema@poweshiekcsheriff.com

1/4/2021

For Immediate Release

Poweshiek County Hazard Mitigation Plan Update Seeks Public Input

The Poweshiek County Emergency Management Agency is finalizing its Hazard Mitigation Plan draft prior to submission to the Iowa Department of Homeland Security and Emergency Management as well as FEMA for final review and approval. The plan assesses natural and man-made hazards' risks and vulnerabilities to the county, its municipalities, and school districts. It provides recommendations to increase their hazard resiliency and reduce risk. In doing so, these actions aim to protect the people and property within Poweshiek County.

The Agency will be holding a two-week review period from **January 12th to January 26th** for citizens and stakeholders to review the plan, ask questions, and provide any input they may have. The draft plan will be available online in PDF format for viewing and comments along with a review checklist at www.tworiversem.com/poweshiekcsheriff/. Please direct all inquiries to tony@tworiversem.com. A hard copy of the draft plan will be available for viewing by scheduling a time to review the plan by contacting the Emergency Management office at (641) 623-4357.

Once the review period has concluded and we've addressed any issues the public and stakeholders might have, the plan will be submitted to the state and FEMA for review. This plan will serve Poweshiek County for the next 5 years and is a federal requirement for Poweshiek County, its municipalities and school districts to be eligible to receive mitigation funds following a disaster.

For more information on this plan, hazard mitigation, or other inquiries, please contact the Poweshiek County Emergency Management Agency at (641) 623-4357 or ema@poweshiekcsheriff.com

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« Poweshiek County Multi-Jurisdictional Hazard Mitigation Plan Update

Support Services

Poweshiek County
Grinnell Fire Dept.












Poweshiek County Emergency Management Agency

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...



Brian Paul-Coordinator
Poweshiek County Emergency Management Agency
4802 Barnes City Rd
Montezuma, IA 50171
(641) 623-4357
ema@poweshiekcsheriff.com

1/4/2021

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Appendix B – School District Facilities

Table B.1 – Grinnell-Newburg School District

Buildings	Campus	Contents Values	Structural Values
Announcer's Booth	High School	\$0	\$10,145
Athletic Field	High School	\$69,338	\$120,135
Bailey Park Elementary	Bailey Park Elem.	\$783,032	\$4,813,838
Bus Garage	Middle School	\$37,975	\$450,149
Classroom #1	High School	\$0	\$13,867
Classroom #2	High School	\$0	\$13,867
Concession Stand - High School	High School	\$2,771	\$76,116
Concessions - Fowler Field	High School	\$8,324	\$51,815
Davis Elementary	Davis Elem.	\$1,204,583	\$7,382,473
Fairview Elementary	Fairview Elem.	\$616,440	\$5,305,735
High School	High School	\$5,168,846	\$32,221,364
Lights, Bleachers, Scoreboard, & Fences	High School	\$0	\$1,695,120
Math Building	High School	\$13,867	\$371,249
Middle School	Middle School	\$3,092,371	\$17,077,788
Playground Equipment	Fairview Elem.	\$24,867	\$3,097
Press Box East	High School	\$694	\$13,947
Press Box West	High School	\$694	\$10,928
Storage Sheds - High School	High School	\$24,970	\$18,576
Track Shed & Track	High School	\$4,351	\$571,787
Total =		\$11,053,123	\$70,221,996

*The data are from the Grinnell-Newburg Community School District.

Table B.2 – Montezuma School District

Buildings	Campus	Contents Values	Structural Values
All Weather Track	Main	\$0	\$262,920
Backstop - Baseball	Main	\$0	\$26,293
Backstop - Discuss	Main	\$0	\$8,368
Backstop - Little League	Main	\$0	\$5,984
Backstop - North Diamond	Main	\$0	\$19,121
Backstop & Fence - South Diamond	Main	\$0	\$20,317
Batting Cages	Main	\$0	\$2,576
Bleachers - Football	Main	\$0	\$98,002
Bleachers - Football Visitors	Main	\$0	\$22,285
Bleachers - Softball North	Main	\$0	\$1,022
Bleachers - Softball South	Main	\$0	\$15,265
Bus Garage	Bus Garage	\$51,691	\$472,484
Bus Garage Shed	Bus Garage	\$7,029	\$6,812
Concessions - Baseball	Main	\$2,390	\$2,604
Concessions - Football	Main	\$23,901	\$104,452
Concessions - Softball	Main	\$0	\$8,963
Dugouts & Press Box - Baseball	Main	\$0	\$31,532
Dugouts & Pressbox - South Diamond	Main	\$0	\$31,532
Dwelling - 500 N 3rd St.	Main	\$0	\$208,080
Fence - Football	Main	\$0	\$8,118
Fence - Football Perimeter	Main	\$0	\$14,619
Fence - Greenhouse	Main	\$0	\$1,697
Fence - Perimeter	Main	\$0	\$5,520
Fence - South Perimeter	Main	\$0	\$4,781

Appendix B – School District Facilities

Fence - West Perimeter	Main	\$0	\$21,632
Greenhouse	Main	\$2,081	\$37,090
Light Poles	Main	\$0	\$53,835
Lights - Parking Lot	Main	\$0	\$57,430
Lights & Poles - Baseball	Main	\$0	\$53,835
Lights & Poles - Football	Main	\$0	\$53,835
Main Buildings	Main	\$5,552,145	\$22,895,000
Miscellaneous Equipment	Main	\$0	\$55,082
Pitching Mound	Main	\$0	\$2,925
Playground - Little League	Main	\$0	\$39,617
Playground Equipment	Main	\$0	\$194,127
Press Box	Main	\$0	\$55,005
Ramps - Football	Main	\$0	\$16,094
Scoreboard - Baseball	Main	\$0	\$14,526
Scoreboard - Football	Main	\$0	\$11,121
Scoreboard - North Diamond	Main	\$0	\$4,103
Scoreboard - South Diamond	Main	\$0	\$6,375
Sign - Double Sided	Main	\$0	\$1,561
Sign - High School	Main	\$0	\$9,612
Softball Restrooms	Main	\$0	\$38,043
Storage	Main	\$7,391	\$3,825
Storage - Baseball	Main	\$5,952	\$3,107
Storage - Little League	Main	\$753	\$1,792
Storage - Softball	Main	\$5,720	\$3,107
Storage - Track	Main	\$21,184	\$3,107
Swing Gates	Main	\$0	\$4,064
Track - East Side	Main	\$0	\$5,377
Track - South Curve	Main	\$0	\$5,975
Track - West Side	Main	\$0	\$11,950
Weight Training Building	Main	\$221,238	\$61,662
Total =		\$5,901,475	\$25,108,161

*The data are from the Montezuma Community School District.

Appendix C – Hazard Records

Table C.1 – Drought Records

Date	D0	D1	D2	D3	D4	DSCI
1/4/2000	0	100	0	0	0	200
1/11/2000	0	100	0	0	0	200
1/18/2000	0	100	0	0	0	200
1/25/2000	0	100	0	0	0	200
2/1/2000	0	100	0	0	0	200
2/8/2000	0	100	0	0	0	200
2/15/2000	0	100	0	0	0	200
2/22/2000	0	100	0	0	0	200
2/29/2000	0	0	100	0	0	300
3/7/2000	0	0	100	0	0	300
3/14/2000	0	0	100	0	0	300
3/21/2000	0	0	100	0	0	300
3/28/2000	0	0	100	0	0	300
4/4/2000	0	0	100	0	0	300
4/11/2000	0	0	100	0	0	300
4/18/2000	0	0	100	0	0	300
4/25/2000	0	93.76	6.24	0	0	206.24
5/2/2000	0	89.26	10.74	0	0	210.74
5/9/2000	0	55.21	44.79	0	0	244.79
5/16/2000	0	0	100	0	0	300
5/23/2000	0	65.24	34.76	0	0	234.76
5/30/2000	0	76.5	23.5	0	0	223.5
6/6/2000	11.24	88.76	0	0	0	188.76
6/13/2000	12.56	87.44	0	0	0	187.44
6/20/2000	79.19	9.08	0	0	0	97.35
6/27/2000	95.96	4.04	0	0	0	104.04
7/4/2000	22.44	0	0	0	0	22.44
9/5/2000	78.03	0	0	0	0	78.03
9/12/2000	78.03	0	0	0	0	78.03
9/19/2000	68.83	31.17	0	0	0	131.17
9/26/2000	99.59	0	0	0	0	99.59
10/3/2000	99.59	0	0	0	0	99.59
10/10/2000	99.59	0	0	0	0	99.59
10/17/2000	100	0	0	0	0	100
10/24/2000	100	0	0	0	0	100
10/31/2000	100	0	0	0	0	100
11/7/2000	100	0	0	0	0	100
11/14/2000	100	0	0	0	0	100
11/21/2000	100	0	0	0	0	100
11/28/2000	100	0	0	0	0	100
12/5/2000	100	0	0	0	0	100
12/12/2000	100	0	0	0	0	100
12/19/2000	100	0	0	0	0	100
12/26/2000	100	0	0	0	0	100
1/2/2001	100	0	0	0	0	100
1/9/2001	100	0	0	0	0	100
1/16/2001	100	0	0	0	0	100
1/23/2001	100	0	0	0	0	100
1/30/2001	36.4	0	0	0	0	36.4
2/6/2001	36.39	0	0	0	0	36.39
7/17/2001	100	0	0	0	0	100
7/24/2001	100	0	0	0	0	100
7/31/2001	100	0	0	0	0	100
8/7/2001	100	0	0	0	0	100
8/14/2001	100	0	0	0	0	100
9/4/2001	100	0	0	0	0	100
1/29/2002	1.09	0	0	0	0	1.09
4/2/2002	86.22	0	0	0	0	86.22
4/9/2002	90.52	0	0	0	0	90.52
4/16/2002	72.69	0	0	0	0	72.69
4/23/2002	61.98	0	0	0	0	61.98
7/2/2002	88.81	0	0	0	0	88.81
7/23/2002	94.8	0	0	0	0	94.8

Appendix C – Hazard Records

7/30/2002	6.58	0	0	0	0	6.58
11/19/2002	98.31	0	0	0	0	98.31
12/3/2002	26.28	0	0	0	0	26.28
12/10/2002	28.55	0	0	0	0	28.55
12/17/2002	33.72	0	0	0	0	33.72
12/24/2002	34.57	0	0	0	0	34.57
12/31/2002	79.08	20.92	0	0	0	120.92
1/7/2003	0	100	0	0	0	200
1/14/2003	0	100	0	0	0	200
1/21/2003	0	100	0	0	0	200
1/28/2003	0	100	0	0	0	200
2/4/2003	0	100	0	0	0	200
2/11/2003	0	100	0	0	0	200
2/18/2003	0	100	0	0	0	200
2/25/2003	0	100	0	0	0	200
3/4/2003	0	100	0	0	0	200
3/11/2003	0	100	0	0	0	200
3/18/2003	0	100	0	0	0	200
3/25/2003	0	100	0	0	0	200
4/1/2003	0	100	0	0	0	200
4/8/2003	0	100	0	0	0	200
4/15/2003	0	99.14	0.86	0	0	200.86
4/22/2003	0	85.63	14.37	0	0	214.37
4/29/2003	0	0	100	0	0	300
5/6/2003	95.88	4.12	0	0	0	104.12
5/13/2003	0.07	0	0	0	0	0.07
5/27/2003	0.72	0	0	0	0	0.72
6/3/2003	61.13	0	0	0	0	61.13
6/10/2003	19.67	0	0	0	0	19.67
6/17/2003	100	0	0	0	0	100
6/24/2003	0	100	0	0	0	200
8/12/2003	100	0	0	0	0	100
8/19/2003	98.7	1.3	0	0	0	101.3
8/26/2003	0	100	0	0	0	200
9/2/2003	0	41.46	58.54	0	0	258.54
9/9/2003	0	0	100	0	0	300
9/16/2003	0	0	100	0	0	300
9/23/2003	0	0	100	0	0	300
9/30/2003	0	0	100	0	0	300
10/7/2003	0	0	100	0	0	300
10/14/2003	0	0	100	0	0	300
10/21/2003	0	0	100	0	0	300
10/28/2003	0	0	100	0	0	300
11/4/2003	0	100	0	0	0	200
11/11/2003	0.15	99.85	0	0	0	199.85
11/18/2003	0.01	99.99	0	0	0	199.99
11/25/2003	3.77	96.23	0	0	0	196.23
12/2/2003	2.19	97.81	0	0	0	197.81
12/9/2003	21.08	78.92	0	0	0	178.92
12/16/2003	65.47	0	0	0	0	65.47
12/23/2003	55.56	0	0	0	0	55.56
12/30/2003	33.41	0	0	0	0	33.41
1/6/2004	4.75	0	0	0	0	4.75
1/27/2004	24.29	0	0	0	0	24.29
2/3/2004	24.29	0	0	0	0	24.29
2/10/2004	24.29	0	0	0	0	24.29
2/17/2004	24.29	0	0	0	0	24.29
5/4/2004	99.92	0	0	0	0	99.92
12/21/2004	32.98	0	0	0	0	32.98
12/28/2004	32.98	0	0	0	0	32.98
1/4/2005	32.98	0	0	0	0	32.98
2/8/2005	69.91	0	0	0	0	69.91
7/12/2005	2.47	0	0	0	0	2.47
7/19/2005	2.47	0	0	0	0	2.47
7/26/2005	31.85	0	0	0	0	31.85
8/2/2005	38.64	1.05	0	0	0	40.74
8/9/2005	61.51	38.03	0	0	0	137.57
8/16/2005	46.07	0	0	0	0	46.07

Appendix C – Hazard Records

8/23/2005	41.6	5.25	0	0	0	52.1
8/30/2005	41.6	5.25	0	0	0	52.1
9/6/2005	94.75	5.25	0	0	0	105.25
9/13/2005	72.94	26.71	0	0	0	126.36
9/20/2005	76.41	23.54	0	0	0	123.49
9/27/2005	67.21	32.79	0	0	0	132.79
10/4/2005	32.67	67.31	0.02	0	0	167.35
10/11/2005	0	94.1	5.9	0	0	205.9
10/18/2005	0	71.62	28.38	0	0	228.38
10/25/2005	0	71.62	28.38	0	0	228.38
11/1/2005	0	71.62	28.38	0	0	228.38
11/8/2005	0	71.62	28.38	0	0	228.38
11/15/2005	0	71.62	28.38	0	0	228.38
11/22/2005	0	71.62	28.38	0	0	228.38
11/29/2005	0	71.62	28.38	0	0	228.38
12/6/2005	0	71.62	28.38	0	0	228.38
12/13/2005	0	71.62	28.38	0	0	228.38
12/20/2005	0	71.62	28.38	0	0	228.38
12/27/2005	0	71.62	28.38	0	0	228.38
1/3/2006	0	71.62	28.38	0	0	228.38
1/10/2006	0	71.62	28.38	0	0	228.38
1/17/2006	0	71.62	28.38	0	0	228.38
1/24/2006	0	71.62	28.38	0	0	228.38
1/31/2006	0	84.3	15.7	0	0	215.7
2/7/2006	0	84.3	15.7	0	0	215.7
2/14/2006	0	84.3	15.7	0	0	215.7
2/21/2006	0	84.3	15.7	0	0	215.7
2/28/2006	0	84.3	15.7	0	0	215.7
3/7/2006	0	84.3	15.7	0	0	215.7
3/14/2006	0	96.44	3.56	0	0	203.56
3/21/2006	0	96.44	3.56	0	0	203.56
3/28/2006	0	96.44	3.56	0	0	203.56
4/4/2006	100	0	0	0	0	100
4/11/2006	100	0	0	0	0	100
4/18/2006	85.07	0	0	0	0	85.07
4/25/2006	85.07	0	0	0	0	85.07
5/2/2006	98.73	0	0	0	0	98.73
5/9/2006	98.73	0	0	0	0	98.73
5/16/2006	98.73	0	0	0	0	98.73
5/23/2006	98.73	0	0	0	0	98.73
5/30/2006	98.34	0	0	0	0	98.34
6/6/2006	98.34	0	0	0	0	98.34
6/13/2006	100	0	0	0	0	100
6/20/2006	5.61	94.39	0	0	0	194.39
6/27/2006	5.61	94.39	0	0	0	194.39
7/4/2006	5.61	94.39	0	0	0	194.39
7/11/2006	5.61	94.39	0	0	0	194.39
7/18/2006	0	37.92	62.08	0	0	262.08
7/25/2006	0	37.92	62.08	0	0	262.08
8/1/2006	100	0	0	0	0	100
8/8/2006	100	0	0	0	0	100
8/15/2006	67.53	0	0	0	0	67.53
12/19/2006	82.83	0	0	0	0	82.83
12/26/2006	82.83	0	0	0	0	82.83
1/2/2007	79.69	0	0	0	0	79.69
1/9/2007	72	0	0	0	0	72
1/16/2007	72	0	0	0	0	72
1/23/2007	15.38	0	0	0	0	15.38
1/30/2007	15.38	0	0	0	0	15.38
2/6/2007	15.38	0	0	0	0	15.38
2/13/2007	15.38	0	0	0	0	15.38
2/20/2007	15.38	0	0	0	0	15.38
7/24/2007	12.91	0	0	0	0	12.91
8/2/2011	99.79	0	0	0	0	99.79
8/9/2011	99.79	0	0	0	0	99.79
8/16/2011	99.79	0	0	0	0	99.79
8/23/2011	11.67	88.33	0	0	0	188.33
8/30/2011	0	99.91	0.09	0	0	200.09

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9/6/2011	0	99.91	0.09	0	0	200.09
9/13/2011	0	87.19	12.81	0	0	212.81
9/20/2011	0	87.19	12.81	0	0	212.81
9/27/2011	0	87.19	12.81	0	0	212.81
10/4/2011	0	87.19	12.81	0	0	212.81
10/11/2011	0	87.19	12.81	0	0	212.81
10/18/2011	79.68	20.32	0	0	0	120.32
10/25/2011	79.04	20.96	0	0	0	120.96
11/1/2011	78.44	21.56	0	0	0	121.56
11/8/2011	78.44	21.56	0	0	0	121.56
11/15/2011	67.72	0	0	0	0	67.72
11/22/2011	67.72	0	0	0	0	67.72
11/29/2011	62.83	0	0	0	0	62.83
12/6/2011	47.16	0	0	0	0	47.16
12/13/2011	47.16	0	0	0	0	47.16
5/22/2012	100	0	0	0	0	100
5/29/2012	100	0	0	0	0	100
6/5/2012	100	0	0	0	0	100
6/12/2012	100	0	0	0	0	100
6/19/2012	0	100	0	0	0	200
6/26/2012	0	100	0	0	0	200
7/3/2012	0	100	0	0	0	200
7/10/2012	0	100	0	0	0	200
7/17/2012	0	0	100	0	0	300
7/24/2012	0	0	0.04	99.96	0	399.96
7/31/2012	0	0	0.04	99.96	0	399.96
8/7/2012	0	0	0	100	0	400
8/14/2012	0	0	0	100	0	400
8/21/2012	0	0	0	100	0	400
8/28/2012	0	0	38.02	61.98	0	361.98
9/4/2012	0	0	20.23	79.77	0	379.77
9/11/2012	0	0	20.23	79.77	0	379.77
9/18/2012	0	0	19.76	80.24	0	380.24
9/25/2012	0	0	19.76	80.24	0	380.24
10/2/2012	0	0	0	100	0	400
10/9/2012	0	0	0	100	0	400
10/16/2012	0	0	0	100	0	400
10/23/2012	0	0	0	100	0	400
10/30/2012	0	0	0	100	0	400
11/6/2012	0	0	0	100	0	400
11/13/2012	0	11.08	64.42	24.5	0	313.42
11/20/2012	0	11.08	64.42	24.5	0	313.42
11/27/2012	0	11.08	64.42	24.5	0	313.42
12/4/2012	0	11.08	64.42	24.5	0	313.42
12/11/2012	0	11.08	64.42	24.5	0	313.42
12/18/2012	0	11.08	63.44	25.48	0	314.4
12/25/2012	0	33.51	66.49	0	0	266.49
1/1/2013	0	33.51	66.49	0	0	266.49
1/8/2013	0	33.51	66.49	0	0	266.49
1/15/2013	0	31.62	68.38	0	0	268.38
1/22/2013	0	31.62	68.38	0	0	268.38
1/29/2013	0	31.62	68.38	0	0	268.38
2/5/2013	0	31.62	68.38	0	0	268.38
2/12/2013	0	31.62	68.38	0	0	268.38
2/19/2013	0	31.62	68.38	0	0	268.38
2/26/2013	0	31.62	68.38	0	0	268.38
3/5/2013	0	31.62	68.38	0	0	268.38
3/12/2013	0.1	99.9	0	0	0	199.9
3/19/2013	0.1	99.9	0	0	0	199.9
3/26/2013	0.07	99.93	0	0	0	199.93
4/2/2013	0.07	99.93	0	0	0	199.93
4/9/2013	64.9	35.1	0	0	0	135.1
4/16/2013	35.54	0	0	0	0	35.54
7/23/2013	5.44	0	0	0	0	5.44
7/30/2013	100	0	0	0	0	100
8/6/2013	100	0	0	0	0	100
8/13/2013	24.6	75.4	0	0	0	175.4
8/20/2013	24.6	75.4	0	0	0	175.4

Appendix C – Hazard Records

8/27/2013	0	47.02	52.98	0	0	252.98
9/3/2013	0	16	84	0	0	284
9/10/2013	0	0	100	0	0	300
9/17/2013	0	0	100	0	0	300
9/24/2013	0	0	100	0	0	300
10/1/2013	0	0	100	0	0	300
10/8/2013	0	0	100	0	0	300
10/15/2013	0	0	100	0	0	300
10/22/2013	0	0	100	0	0	300
10/29/2013	0	0	100	0	0	300
11/5/2013	0	0	100	0	0	300
11/12/2013	0	0	100	0	0	300
11/19/2013	0	0	100	0	0	300
11/26/2013	0	0	100	0	0	300
12/3/2013	0	0	100	0	0	300
12/10/2013	0	0	100	0	0	300
12/17/2013	0	0	100	0	0	300
12/24/2013	0	0	100	0	0	300
12/31/2013	0	0	100	0	0	300
1/7/2014	0	0	100	0	0	300
1/14/2014	0	0	100	0	0	300
1/21/2014	0	0	100	0	0	300
1/28/2014	0	0	100	0	0	300
2/4/2014	0	0	100	0	0	300
2/11/2014	0	0	100	0	0	300
2/18/2014	0	5.86	94.14	0	0	294.14
2/25/2014	0	25.77	74.23	0	0	274.23
3/4/2014	0	25.77	74.23	0	0	274.23
3/11/2014	0	25.77	74.23	0	0	274.23
3/18/2014	0	25.77	74.23	0	0	274.23
3/25/2014	0	25.77	74.23	0	0	274.23
4/1/2014	0	25.77	74.23	0	0	274.23
4/8/2014	0	25.77	74.23	0	0	274.23
4/15/2014	13.92	86.08	0	0	0	186.08
4/22/2014	13.92	86.08	0	0	0	186.08
4/29/2014	74.43	18.19	0	0	0	110.81
5/6/2014	74.43	18.19	0	0	0	110.81
5/13/2014	74.43	18.19	0	0	0	110.81
5/20/2014	74.43	18.19	0	0	0	110.81
5/27/2014	74.43	18.19	0	0	0	110.81
6/3/2014	75.16	18.19	0	0	0	111.54
6/10/2014	75.18	18.17	0	0	0	111.52
6/17/2014	75.18	18.17	0	0	0	111.52
6/24/2014	61.26	0	0	0	0	61.26
1/27/2015	63.67	0	0	0	0	63.67
3/31/2015	21.45	0	0	0	0	21.45
4/7/2015	21.45	0	0	0	0	21.45
4/14/2015	21.04	0	0	0	0	21.04
5/31/2016	79.71	0	0	0	0	79.71
6/7/2016	100	0	0	0	0	100
6/14/2016	100	0	0	0	0	100
6/21/2016	82.24	17.76	0	0	0	117.76
6/28/2016	0.13	99.87	0	0	0	199.87
7/5/2016	10.34	89.29	0	0	0	188.92
7/12/2016	10.34	89.29	0	0	0	188.92
7/19/2016	99.63	0	0	0	0	99.63
7/26/2016	99.63	0	0	0	0	99.63
8/2/2016	99.63	0	0	0	0	99.63
8/9/2016	12.51	0	0	0	0	12.51
6/13/2017	100	0	0	0	0	100
6/20/2017	85.88	0	0	0	0	85.88
6/27/2017	85.88	0	0	0	0	85.88
7/4/2017	85.88	0	0	0	0	85.88
7/11/2017	50.41	37.5	0	0	0	125.41
7/18/2017	50.41	37.5	0	0	0	125.41
7/25/2017	62.5	37.5	0	0	0	137.5
8/1/2017	0	100	0	0	0	200
8/8/2017	0	100	0	0	0	200

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8/15/2017	33.73	66.27	0	0	0	166.27
8/22/2017	33.73	66.27	0	0	0	166.27
8/29/2017	33.73	66.27	0	0	0	166.27
9/5/2017	33.73	66.27	0	0	0	166.27
9/12/2017	33.73	66.27	0	0	0	166.27
9/19/2017	0	100	0	0	0	200
9/26/2017	0	100	0	0	0	200
10/3/2017	0	100	0	0	0	200
10/10/2017	0	100	0	0	0	200
10/17/2017	80.95	19.05	0	0	0	119.05
10/24/2017	93.92	6.08	0	0	0	106.08
10/31/2017	93.92	6.08	0	0	0	106.08
11/7/2017	93.92	6.08	0	0	0	106.08
11/14/2017	93.92	6.08	0	0	0	106.08
11/21/2017	93.92	6.08	0	0	0	106.08
11/28/2017	93.92	6.08	0	0	0	106.08
12/5/2017	93.92	6.08	0	0	0	106.08
12/12/2017	93.92	6.08	0	0	0	106.08
12/19/2017	93.92	6.08	0	0	0	106.08
12/26/2017	93.92	6.08	0	0	0	106.08
1/2/2018	93.92	6.08	0	0	0	106.08
1/9/2018	93.92	6.08	0	0	0	106.08
1/16/2018	93.92	6.08	0	0	0	106.08
1/23/2018	93.92	6.08	0	0	0	106.08
1/30/2018	93.92	6.08	0	0	0	106.08
2/6/2018	94.06	5.94	0	0	0	105.94
2/13/2018	93.83	6.17	0	0	0	106.17
2/20/2018	93.83	6.17	0	0	0	106.17
2/27/2018	93.83	6.17	0	0	0	106.17
3/6/2018	93.83	6.17	0	0	0	106.17
3/13/2018	93.83	6.17	0	0	0	106.17
3/20/2018	26.67	6.17	0	0	0	39.01
3/27/2018	26.67	6.17	0	0	0	39.01
4/3/2018	26.67	6.17	0	0	0	39.01
4/10/2018	26.67	6.17	0	0	0	39.01
4/17/2018	26.67	6.17	0	0	0	39.01
4/24/2018	26.67	6.17	0	0	0	39.01
5/1/2018	93.83	6.17	0	0	0	106.17
5/8/2018	93.83	6.17	0	0	0	106.17
5/15/2018	46.93	0	0	0	0	46.93
7/24/2018	33.59	0	0	0	0	33.59
7/31/2018	31.15	0	0	0	0	31.15
8/7/2018	31.15	0	0	0	0	31.15
8/14/2018	31.15	0	0	0	0	31.15
8/21/2018	69.02	0	0	0	0	69.02
8/28/2018	68.75	0	0	0	0	68.75
8/6/2019	87.25	0	0	0	0	87.25
8/13/2019	52.76	47.24	0	0	0	147.24
8/20/2019	51.83	0	0	0	0	51.83
8/27/2019	100	0	0	0	0	100
9/3/2019	100	0	0	0	0	100
9/10/2019	100	0	0	0	0	100
9/17/2019	100	0	0	0	0	100

*The data are from the National Drought Mitigation Center.

Table C.2 – Flash Floods Records

Location	Event Date	Injuries	Deaths	Property Damage
Hartwick	6/22/2007	0	0	\$50,000
Brooklyn	7/7/2010	0	0	\$50,000
Grinnell	5/26/2013	0	0	\$100,000
Malcolm	5/26/2013	0	0	\$150,000
Grinnell Arpt	5/26/2013	0	0	\$150,000
Sheridan	5/26/2013	0	0	\$25,000
Malcolm	5/26/2013	0	0	\$25,000
Sheridan	9/1/2018	0	0	\$50,000
Sheridan	9/1/2018	0	0	\$10,000

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Tilton	9/5/2018	0	0	\$100,000
Forest Home	9/5/2018	0	0	\$0
Totals =		0	0	\$710,000

*The data are from the NOAA NCDC Storm Events Database.

Table C.3 – Hail Records

Location	Event Date	Size (Inches)	Injuries	Deaths	Property Damage	Crop Damage
Countywide	5/16/1960	1.75	0	0	\$0	\$0
Countywide	5/7/1962	2.75	0	0	\$0	\$0
Countywide	6/14/1975	1.75	0	0	\$0	\$0
Countywide	5/28/1976	0.75	0	0	\$0	\$0
Countywide	7/10/1980	2.5	0	0	\$0	\$0
Countywide	9/20/1986	1.75	0	0	\$0	\$0
Countywide	3/24/1988	0.75	0	0	\$0	\$0
Countywide	8/8/1988	1.75	0	0	\$0	\$0
Countywide	8/5/1989	0.88	0	0	\$0	\$0
Countywide	10/17/1990	1.75	0	0	\$0	\$0
Countywide	5/17/1991	1	0	0	\$0	\$0
Malcom	6/13/1994	0.75	0	0	\$5,000	\$50,000
Grinnell	6/21/1997	1	0	0	\$5,000	\$10,000
Hartwick	4/15/1998	0.75	0	0	\$200	\$0
Grinnell	7/26/2000	0.88	0	0	\$2,000	\$5,000
Grinnell	7/26/2000	0.88	0	0	\$2,000	\$5,000
Brooklyn	7/26/2000	1	0	0	\$3,000	\$10,000
Brooklyn	7/26/2000	0.75	0	0	\$0	\$10,000
Montezuma	9/11/2000	0.75	0	0	\$0	\$5,000
Brooklyn	9/11/2000	0.75	0	0	\$1,000	\$5,000
Hartwick	5/10/2001	0.75	0	0	\$0	\$0
Searsboro	5/10/2001	1	0	0	\$5,000	\$0
Montezuma	5/10/2001	0.75	0	0	\$0	\$0
Searsboro	6/12/2001	1.5	0	0	\$10,000	\$5,000
Grinnell	6/12/2001	1.75	0	0	\$10,000	\$50,000
Brooklyn	7/17/2001	1.25	0	0	\$3,000	\$10,000
Brooklyn	4/18/2002	2	0	0	\$40,000	\$0
Searsboro	5/8/2002	1	0	0	\$5,000	\$1,000
Searsboro	5/8/2002	1.75	0	0	\$20,000	\$1,000
Montezuma	5/8/2002	0.88	0	0	\$3,000	\$1,000
Hartwick	4/30/2003	0.75	0	0	\$0	\$0
Malcolm	4/30/2003	0.75	0	0	\$0	\$0
Brooklyn	4/30/2003	1.75	0	0	\$10,000	\$0
Brooklyn	4/30/2003	0.75	0	0	\$0	\$0
Grinnell	5/10/2003	1.75	0	0	\$15,000	\$0
Grinnell	5/10/2003	2	0	0	\$50,000	\$0
Grinnell	5/10/2003	1.75	0	0	\$15,000	\$0
Grinnell	5/10/2003	2.75	0	0	\$50,000	\$0
Grinnell	5/10/2003	1.75	0	0	\$15,000	\$0
Grinnell Arpt	5/10/2003	2.5	0	0	\$50,000	\$0
Grinnell	5/10/2003	3	0	0	\$50,000	\$0
Grinnell	6/6/2003	0.88	0	0	\$1,000	\$5,000
Grinnell	8/27/2004	0.75	0	0	\$0	\$0
Grinnell	10/29/2004	0.88	0	0	\$2,000	\$1,000
Brooklyn	3/30/2005	1	0	0	\$5,000	\$0
Grinnell	6/4/2005	1	0	0	\$5,000	\$1,000
Grinnell	6/4/2005	0.88	0	0	\$1,000	\$1,000
Deep River	3/8/2006	0.75	0	0	\$0	\$0
Grinnell	3/8/2006	0.75	0	0	\$0	\$0
Montezuma	5/16/2006	0.88	0	0	\$3,000	\$3,000
Grinnell Arpt	11/10/2006	0.75	0	0	\$0	\$0
Montezuma	4/22/2008	0.88	0	0	\$1,000	\$0
Malcolm	6/10/2008	1	0	0	\$3,000	\$5,000
Grinnell Arpt	6/12/2008	0.88	0	0	\$1,000	\$5,000
Grinnell Arpt	7/2/2008	0.88	0	0	\$1,000	\$10,000
Montezuma	7/2/2008	0.88	0	0	\$1,000	\$10,000
Deep River	4/5/2010	1.25	0	0	\$5,000	\$0
Deep River	4/5/2010	1	0	0	\$1,000	\$0
Brooklyn	4/6/2010	0.88	0	0	\$0	\$0

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Grinnell	4/6/2010	1	0	0	\$3,000	\$0
Grinnell	4/6/2010	1.5	0	6	\$500,000	\$0
Searsboro	4/30/2010	1	0	0	\$5,000	\$0
Montezuma	4/3/2011	1	0	0	\$1,000	\$0
Brooklyn	5/22/2011	1.5	0	0	\$5,000	\$3,000
Malcolm	5/22/2011	1	0	0	\$2,000	\$6,000
Brooklyn	5/22/2011	0.75	0	0	\$0	\$3,000
Brooklyn	5/22/2011	1.5	0	0	\$5,000	\$3,000
Carnforth	5/22/2011	1.75	0	0	\$10,000	\$5,000
Montezuma	5/29/2011	1	0	0	\$2,000	\$10,000
Hartwick	6/5/2011	1	0	0	\$1,000	\$5,000
Brooklyn Arpt	6/5/2011	1	0	0	\$3,000	\$10,000
Grinnell Arpt	6/29/2012	1.25	0	0	\$2,000	\$10,000
Guernsey	10/4/2013	1	0	0	\$5,000	\$0
Grinnell Arpt	4/12/2014	1	0	0	\$1,000	\$0
Grinnell	7/6/2014	1	0	0	\$3,000	\$10,000
Tilton	8/2/2015	2	0	0	\$10,000	\$0
Grinnell Arpt	4/15/2017	1	0	0	\$0	\$0
Malcolm	4/15/2017	1	0	0	\$0	\$0
Malcolm	9/1/2018	1	0	0	\$0	\$0
Montezuma	9/18/2019	1	0	0	\$0	\$0
Totals =			0	6	\$957,200	\$274,000

*The data are from the NOAA NCDC Storm Events Database.

Table C.4 – High Winds Records

Location	Event Date	Wind Speed (MPH)	Injuries	Deaths	Property Damage
Countywide	1/17/1996	55	0	0	\$0
Countywide	2/10/1996	56	0	0	\$0
Countywide	3/24/1996	54	0	0	\$0
Countywide	4/25/1996	52	0	0	\$0
Countywide	10/29/1996	57	0	0	\$0
Countywide	4/6/1997	55	0	0	\$0
Countywide	4/30/1997	52	0	0	\$0
Countywide	5/5/1997	52	0	0	\$0
Countywide	4/12/1998	-	0	0	\$500,00
Countywide	11/10/1998	61	0	0	\$300,000
Countywide	3/8/2000	50	0	0	\$10,000
Countywide	4/7/2001	67	0	0	\$100,000
Countywide	3/9/2002	-	0	0	\$50,000
Countywide	5/30/2003	35	0	0	\$25,000
Countywide	11/12/2003	52	0	0	\$50,000
Countywide	4/27/2004	35	0	0	\$75,110
Countywide	12/12/2004	56	0	0	\$50,000
Countywide	1/22/2005	53	0	0	\$10,000
Countywide	6/8/2005	50	0	0	\$20,000
Countywide	11/12/2005	35	0	0	\$50,000
Countywide	1/24/2006	51	0	0	\$10,000
Countywide	5/27/2006	35	0	0	\$5,000
Countywide	10/26/2008	52	0	0	\$25,000
Countywide	1/1/2012	37	0	0	\$10,000
Countywide	1/26/2014	51	0	0	\$25,000
Countywide	2/19/2016	35	0	0	\$0
Totals =			0	0	\$865,110

*The data are from the NOAA NCDC Storm Events Database.

Table C.5 – Lightning Records

Location	Event Date	Injuries	Deaths	Property Damage
Grinnell	6/18/1998	0	0	\$5,000
Montezuma	7/21/2008	0	0	\$10,000
Grinnell	6/23/2010	0	0	\$25,000
Grinnell	6/26/2010	0	0	\$550,000
Totals =		0	0	\$590,000

*The data are from the NOAA NCDC Storm Events Database.

Table C.6 – Riverine Flood Records

Location	Event Date	Injuries	Deaths	Property Damage
Countywide	2/9/1996	0	0	\$0
Countywide	5/9/1996	0	0	\$0
Montezuma	5/9/1996	0	0	\$50,000
Countywide	5/23/1996	0	0	\$0
Countywide	5/26/1996	0	0	\$0
Countywide	6/17/1996	0	0	\$0
Countywide	2/18/1997	0	0	\$0
Grinnell	6/14/1998	0	0	\$50,000
Countywide	7/6/1998	0	0	\$50,000
Countywide	6/9/1999	0	0	\$50,000
Countywide	3/15/2001	0	0	\$5,000
Countywide	3/23/2001	0	0	\$7,500
Countywide	6/13/2002	0	0	\$10,000
Countywide	5/4/2003	0	0	\$5,000
Countywide	5/9/2003	0	0	\$5,000
Countywide	5/22/2004	0	0	\$100,000
Countywide	6/26/2005	0	0	\$74,070
Chester Center	6/12/2010	0	0	\$0
Searsboro	8/3/2010	0	0	\$25,000
Forest Home	5/26/2013	0	0	\$250,000
Grinnell	9/2/2018	0	0	\$50,000
Hartwick	9/5/2018	0	0	\$150,000
Grinnell	10/9/2018	0	0	\$100,000
Totals =		0	0	\$981,570

*The data are from the NOAA NCDC Storm Events Database

Table C.7 – Severe Winter Storm Records

Location	Event Date	Storm Type	Injuries	Deaths	Property Damage
Countywide	11/14/1996	Ice Storm	0	0	\$0
Countywide	12/21/1997	Ice Storm	0	0	\$2,050
Countywide	1/4/1998	Ice Storm	0	0	\$20,400
Countywide	3/17/1998	Ice Storm	0	0	\$5,880
Countywide	1/1/1999	Winter Storm	0	0	\$10,000
Countywide	2/11/1999	Ice Storm	0	0	\$5,000
Countywide	3/8/1999	Winter Storm	0	0	\$10,000
Countywide	1/19/2000	Winter Storm	0	0	\$1,000
Countywide	2/17/2000	Winter Storm	0	0	\$10,000
Countywide	12/10/2000	Winter Storm	0	0	\$24,900
Countywide	2/8/2001	Ice Storm	0	0	\$75,000
Countywide	2/8/2001	Winter Storm	0	0	\$50,000
Countywide	1/28/2003	Winter Weather	0	0	\$0
Countywide	2/14/2003	Winter Storm	0	0	\$5,000
Countywide	2/12/2007	Winter Storm	0	0	\$0
Countywide	2/24/2007	Winter Storm	0	0	\$1,000,000
Countywide	12/1/2007	Ice Storm	0	0	\$10,000
Countywide	12/11/2007	Ice Storm	0	0	\$100,000
Countywide	2/5/2008	Winter Storm	0	0	\$10,000
Countywide	2/17/2008	Winter Storm	0	0	\$50,000
Countywide	12/18/2008	Winter Storm	0	0	\$5,000
Countywide	12/27/2008	Ice Storm	0	0	\$5,000
Countywide	1/6/2010	Winter Storm	0	0	\$25,000
Countywide	1/20/2010	Ice Storm	0	0	\$100,000
Countywide	12/19/2012	Winter Storm	0	0	\$25,000
Countywide	1/30/2013	Winter Storm	0	0	\$25,000
Countywide	2/4/2014	Winter Storm	0	0	\$0
Countywide	2/1/2015	Winter Storm	0	0	\$50,000
Countywide	11/20/2015	Winter Storm	0	0	\$0
Countywide	12/28/2015	Winter Storm	0	0	\$0
Countywide	1/15/2017	Ice Storm	0	0	\$0
Countywide	2/5/2018	Winter Storm	0	0	\$0
Countywide	3/24/2018	Winter Storm	0	0	\$0

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Countywide	1/22/2019	Winter Storm	0	0	\$0
Countywide	2/11/2019	Winter Storm	0	0	\$0
Totals =			0	0	\$1,624,230

*The data are from the NOAA NCDC Storm Events Database.

Table C.8 – Thunderstorm Records

Location	Event Date	Wind Speed (MPH)	Injuries	Deaths	Property Damage
Countywide	5/16/1960	0	0	0	\$0
Countywide	6/27/1965	0	0	0	\$0
Countywide	7/4/1965	0	0	0	\$0
Countywide	6/29/1969	0	0	0	\$0
Countywide	5/13/1970	0	0	0	\$0
Countywide	7/3/1970	0	0	0	\$0
Countywide	9/9/1970	0	0	0	\$0
Countywide	6/6/1971	0	0	0	\$0
Countywide	5/13/1974	0	0	0	\$0
Countywide	6/14/1975	52	0	0	\$0
Countywide	6/18/1975	0	0	0	\$0
Countywide	7/30/1979	0	0	0	\$0
Countywide	4/3/1981	0	0	0	\$0
Countywide	4/3/1981	0	0	0	\$0
Countywide	10/16/1984	0	0	0	\$0
Countywide	6/1/1985	0	0	0	\$0
Countywide	6/1/1985	0	0	0	\$0
Countywide	7/8/1986	52	0	0	\$0
Countywide	7/28/1986	69	0	0	\$0
Countywide	7/28/1986	52	0	0	\$0
Countywide	7/28/1986	52	0	0	\$0
Countywide	7/28/1986	61	0	0	\$0
Countywide	8/14/1986	50	0	0	\$0
Countywide	11/8/1986	0	0	0	\$0
Countywide	8/5/1989	50	0	0	\$0
Countywide	8/5/1989	70	0	0	\$0
Countywide	6/2/1990	52	0	0	\$0
Countywide	4/26/1991	0	0	0	\$0
Countywide	4/26/1991	0	0	0	\$0
Countywide	7/6/1991	50	0	0	\$0
Malcom	4/14/1994	50	0	0	\$50,000
Grinnell	6/18/1994	50	0	0	\$5,000
Montezuma	6/23/1995	50	0	0	\$10,000
Grinnell	7/4/1995	52	0	0	\$3,000
Brooklyn	7/4/1995	61	0	0	\$25,000
Montezuma	6/18/1998	74	0	0	\$200,000
Grinnell	6/18/1998	63	0	0	\$25,000
Montezuma	6/18/1998	69	0	0	\$40,000
Grinnell	6/18/1998	64	0	0	\$25,000
Brooklyn	6/18/1998	65	0	0	\$75,000
Montezuma	6/28/1998	56	0	0	\$25,000
Grinnell Arpt	6/29/1998	52	0	0	\$5,000
Brooklyn	6/29/1998	74	0	0	\$150,000
Hartwick	6/29/1998	69	0	0	\$75,000
Montezuma	6/29/1998	65	0	0	\$50,000
Grinnell	5/8/2000	65	0	1	\$150,000
Brooklyn	5/22/2000	50	0	0	\$5,000
Montezuma	11/1/2000	52	0	0	\$30,000
Brooklyn	11/1/2000	52	0	0	\$5,000
Montezuma	6/14/2001	56	0	0	\$27,000
Malcolm	6/14/2001	52	0	0	\$3,000
Montezuma	6/14/2001	52	0	0	\$10,000
Brooklyn	9/7/2001	61	0	0	\$15,000
Searsboro	5/8/2002	65	0	0	\$10,000
Montezuma	7/5/2002	50	0	0	\$5,000
Montezuma	8/20/2003	52	0	0	\$15,000
Montezuma	8/20/2003	50	0	0	\$5,000
Deep River	8/20/2003	52	0	0	\$5,000
Grinnell	3/27/2004	61	0	0	\$25,000

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Malcolm	4/16/2004	50	0	0	\$0
Brooklyn	4/16/2004	50	0	0	\$0
Brooklyn	4/16/2004	52	0	0	\$0
Brooklyn	5/17/2004	50	0	0	\$1,000
Grinnell	10/29/2004	52	0	0	\$2,000
Grinnell	5/11/2005	54	0	0	\$10,000
Montezuma	6/4/2005	50	0	0	\$5,000
Searsboro	6/8/2005	61	0	0	\$10,000
Montezuma	6/13/2005	50	0	0	\$2,000
Montezuma	6/13/2005	50	0	0	\$1,000
Grinnell	9/8/2005	52	0	0	\$5,000
Brooklyn	9/8/2005	52	0	0	\$5,000
Brooklyn	9/8/2005	52	0	0	\$5,000
Montezuma	7/25/2006	57	0	0	\$10,000
Brooklyn	6/21/2007	70	0	0	\$50,000
Grinnell Arpt	7/18/2007	52	0	0	\$5,000
Montezuma	7/18/2007	56	0	0	\$10,000
Montezuma	9/18/2007	60	0	0	\$10,000
Montezuma	5/25/2008	51	0	0	\$2,000
Brooklyn	5/25/2008	51	0	0	\$3,000
Montezuma	5/25/2008	50	0	0	\$0
Grinnell Arpt	6/3/2008	56	0	0	\$5,000
Grinnell Arpt	6/3/2008	56	0	0	\$2,000
Grinnell Arpt	6/3/2008	58	0	0	\$5,000
Grinnell	6/5/2008	56	0	0	\$3,000
Montezuma	6/8/2008	56	0	0	\$3,000
Guernsey	6/8/2008	52	0	0	\$3,000
Grinnell	7/21/2008	65	0	0	\$50,000
Montezuma	7/21/2008	57	0	0	\$5,000
Montezuma	7/21/2008	52	0	0	\$3,000
Grinnell	7/21/2008	61	0	0	\$15,000
Deep River	7/21/2008	57	0	0	\$5,000
Grinnell	7/27/2008	65	0	0	\$40,000
Montezuma	7/27/2008	61	0	0	\$35,000
Montezuma	7/27/2008	54	0	0	\$5,000
Montezuma	7/27/2008	57	0	0	\$10,000
Montezuma	7/27/2008	57	0	0	\$10,000
Sheridan	5/8/2009	52	0	0	\$0
Brooklyn	8/9/2009	55	0	0	\$5,000
Grinnell	4/6/2010	78	0	0	\$75,000
Grinnell	4/6/2010	91	0	0	\$3,000,000
Grinnell	4/6/2010	70	0	0	\$100,000
Grinnell	4/6/2010	78	0	0	\$2,000
Grinnell	4/6/2010	65	0	0	\$10,000
Brooklyn	4/6/2010	65	0	0	\$10,000
Brooklyn	6/21/2011	57	0	0	\$20,000
Grinnell	7/11/2011	61	0	0	\$50,000
Grinnell	7/11/2011	57	0	0	\$15,000
Grinnell	7/22/2011	50	0	0	\$1,000
Searsboro	4/14/2012	52	0	0	\$5,000
Searsboro	6/29/2012	61	0	0	\$50,000
Grinnell Arpt	6/29/2012	57	0	0	\$25,000
Grinnell Arpt	6/29/2012	63	0	0	\$35,000
Grinnell	6/29/2012	52	0	0	\$2,000
Montezuma	6/29/2012	57	0	0	\$5,000
Brooklyn	6/29/2012	61	0	0	\$75,000
Brooklyn	6/29/2012	50	0	0	\$1,000
Grinnell	6/29/2012	52	0	0	\$10,000
Brooklyn	6/29/2012	61	0	0	\$10,000
Brooklyn	7/25/2012	57	0	0	\$3,000
Grinnell	4/27/2014	50	0	0	\$2,000
Grinnell	4/27/2014	50	0	0	\$50,000
Brooklyn	6/17/2014	52	0	0	\$5,000
Brooklyn	6/22/2014	52	0	0	\$1,000
Grinnell	8/4/2016	61	0	0	\$50,000
Grinnell Arpt	5/17/2017	59	0	0	\$0
Grinnell Arpt	6/15/2017	62	0	0	\$0
Brooklyn	8/21/2017	52	0	0	\$0

Appendix C – Hazard Records

Grinnell	6/6/2018	61	0	0	\$50,000
Grinnell	6/6/2018	55	0	0	\$0
Grinnell Arpt	8/20/2019	61	0	0	\$50,000
Montezuma	9/18/2019	54	0	0	\$5,000
Totals =			0	1	\$5,130,000

*The data are from the NOAA NCDC Storm Events Database.

Appendix D – Mitigation Actions & Projects

Backup Generators

Backup generators provide critical facilities with electricity in the event a community's electrical transmission grid is either damaged by a disaster or overloaded by excessive use during an event.

- Poweshiek County Courthouse
- All municipal facilities in:
 - Brooklyn
 - Deep River
 - Grinnell
 - Guernsey
 - Hartwick
 - Malcom
 - Montezuma

Hazard/s Addressed	Floods, Severe Storms, Winter Storms, Tornadoes, Winter Storms
Effectiveness	Medium
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County (Relevant Building Department), CSD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Bury Utility Lines, Pipes, and Tanks

Transferring existing utilities lines, pipes, and chemical storage tanks from above ground to below ground will significantly reduce the amount of property damage incurred from wind, ice, and snow related events.

Hazard/s Addressed	Severe Storms, Tornadoes, Winter Storms
Effectiveness	Medium
Timeframe	1 – 5 Years
Lead Organization	Poweshiek County (Relevant Building Department), CSD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Dam Failure Inundation Study

Poweshiek County will partner with the USACE to develop comprehensive dam failure inundation maps and effects studies for the Albion Reservoir Dam and the Smith Lake 1 Dam. Without a comprehensive hydrological study and scientifically derived impacts of a dam failure, selecting appropriate mitigation actions and projects is difficult at best.

Hazard/s Addressed	Dam Failures
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County EMA
Funding Sources	Local Budgets

Dam Retrofit

Retrofitting a dam or levee with structural upgrades can make them more resistant to failure, integrity degradation, and increase the water supply of the area. Examples of these upgrades are expanding the depth of the reservoirs, drill wells, and rock facing dam walls to prevent erosion.

Hazard/s Addressed	Dam Failures, Droughts
Effectiveness	Medium
Timeframe	1 – 4 Years
Lead Organization	Poweshiek County EMA
Funding Sources	FMA, HMGP, Local Budgets, PDM

Elevate Structures

Structures located within identified flood zones can be elevated above base flood elevation or predicted other predicted flood inundation levels.

Hazard/s Addressed	Dam Failures, Floods
Effectiveness	High
Timeframe	1 – 3 Years
Lead Organization	Poweshiek County (Relevant Building Department), CSD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

FEMA Code 361 Safe Rooms

FEMA Code 361 regulations ensure a structure is capable of withstanding wind speeds greater than 200 miles per hour. Additionally, these anti-tornado regulations also ensure the structure is protected against hail, lightning, high and strong winds. This project can be implemented as a retrofit of a current structure or the construction of a new facility. Any critical facility is a potential target for this, but realistically location will be determined by which participating jurisdictions have the want and resources to accomplish this project.

- Grinnell – Veteran’s Building
- Trailer Parks – Brooklyn, Grinnell (2x), Montezuma

Hazard/s Addressed	Severe Storms, Tornadoes
Effectiveness	High
Timeframe	1 – 3 Years
Lead Organization	Poweshiek County (Relevant Building Department), CSD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Floodproofing

This technique is often used when relocation or buying out is not an option as is the case with a historic building or it would require astronomical funding that is not available. Floodproofing projects constitute any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage. Wet floodproofing reduces property damage counteracting hydrostatic pressure on walls or other support structures by equalizing the pressure between the interior and exterior of a structure.

Hazard/s Addressed	Dam Failures, Floods
Effectiveness	Medium
Timeframe	1 – 3 Years
Lead Organization	Poweshiek County (Relevant Building Department), CSD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

Flood Level Monitoring System

Strategically installing water monitoring stations will assist in measuring the severity of an existing or impending drought, the real-time and historical levels of flooding, as well as dam failures. Accurately measuring water levels will allow the community to take the necessary conservation and regulatory measures to mitigate the droughts, flood, and dam failure effects. This project should be implemented in all major basins and water retention, rivers and streams prone to flooding, natural and man-made, areas throughout the planning area. Additionally, having precise historical data from past floods will enhance the planning area's ability to develop future mitigation planning actions and projects.

Hazard/s Addressed	Dam Failures, Droughts, Floods
Effectiveness	Low
Timeframe	1 – 3 Years
Lead Organization	Poweshiek County EMA (With USACE)
Funding Sources	BRIC, FMA, HMGP, Local Budgets

Insulation & Energy Efficiency

Upgrading a facility's windows, windows frames, roofing, and insulation will allow it to better maintain a desired warm or cool temperature during prolonged extreme heat or winter storms. Additionally, it decreases the energy load necessary to do so, decreasing the burden on the local energy grid.

Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 – 3 Years
Lead Organization	Poweshiek County (Relevant Building Department), SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Irrigation Storage Tanks

Storage tanks can significantly increase the water supply available to rural communities. They are instrumental in providing relief to agricultural sectors in places without sizable water delivery infrastructure during drought events. Further, they help enhance and maintain the ability of local responders to fight wildfires during drought periods.

Hazard/s Addressed	Droughts
Effectiveness	High
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County (Relevant Building Department), Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Looped Grid Power Systems

Linear power grids have single points of failure that are vulnerable to a number of hazards. Looped power grids operate in parallel and are thus significantly more resistant to damage allowing the utilities to maintain power after an event.

Hazard/s Addressed	Dam Failures, Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Medium
Timeframe	1 – 5 Years
Lead Organization	Poweshiek County Roads Department, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Low Flow Utilities

To decrease water usage before, during, and after a drought, communities can install low water flow utilities throughout its critical facilities and infrastructure. This will not only decrease water usage, but also decrease water demands. The planning area should implement this project in conjunction with their school districts and critical facilities standard maintenance cycles.

Hazard/s Addressed	Droughts
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County (Relevant Building Department), Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Public Awareness & Education

A campaign will inform and educate the public on hazard risks, allowing them to better protect their property through preparation and their lives through appropriate evacuation and survival procedures.

Hazard/s Addressed	Dam Failures, Droughts, Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Low
Timeframe	1 Year
Lead Organization	Poweshiek County EMA
Funding Sources	Local Budgets

Rainwater Retention Basins

Rainwater retention basins are artificial basins built in strategic locations to protect against floods and droughts by collecting and holding rainwater for an extended period of time. The participating jurisdictions should implement these installations in areas where the water can be used during a drought, for agricultural or urban use, or in areas where poor functioning, outdated, or old stormwater drainage systems are in place. Construction of these basins will occur in conjunction with local and regional irrigation districts to multiply their effectiveness and benefit.

Hazard/s Addressed	Droughts, Floods
Effectiveness	Low
Timeframe	1 – 4 Years
Lead Organization	Poweshiek County (Relevant Building Department), Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

Raise Transportation Infrastructure

To combat uncontrollable waters emanating from a dam or levee failure, flash flood, or riverine flood, transportation infrastructure may be raised to allow its continued use in a disaster as well as a partial earthen berm to protect a neighboring lower elevation area. Additionally, the increased elevation of road or railway bridges can prevent the buildup of debris during incidents of high floodwaters and preventing further water buildup.

Hazard/s Addressed	Dam Failures, Floods
Effectiveness	High
Timeframe	1 – 5 Years
Lead Organization	Poweshiek County Roads Department, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

Relocate or Buyout Vulnerable Structures

Some structures may be able to be relocated from identified floodplains or dam inundation zones. Removing them from identified hazard area will eliminate their risk.

Hazard/s Addressed	Dam Failures, Floods
Effectiveness	High
Timeframe	1 – 5 Years
Lead Organization	Poweshiek County EMA, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

SKYWARN Storm Spotter Training

The NWS' SKYWARN Storm Spotter training program educates and delivers basic weather identification, spotting, and reporting information to any concerned citizens. Educating citizens in this program helps increase specific awareness and creates a skillset that helps the NWS create more accurate and timely warnings for tornadoes, severe storms, flash flooding, and other severe weather.

Hazard/s Addressed	Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County EMA
Funding Sources	Local Budgets

Snow Fences

Snow fences force drifting snow to accumulate in a desired place minimizing the amount of snowdrift on roads and railways. Controlling snow accumulation decreases the danger to a jurisdiction's citizens traveling during and after a winter storm. This project should be implemented along major transportation routes throughout the planning area.

Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County Roads Department, SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Storm Siren Modernization

Storm siren modernization exists in two distinct fashions. First, replacing existing sirens with sirens that are capable of running off of backup battery power allows for the mitigation and protection of multiple, subsequent hazard events. Second, replacing existing sirens with those that can be networked for automatic activation by the NWS allows for the proper mitigation and protection in the event of human error or events where human activation prevents alarm.

Hazard/s Addressed	Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County EMA, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Storm Water Drainage System Upgrade

Significant flood damage in developed communities can be prevented by upgrading their storm water drainage system by way of increasing culvert sizes, installing debris blocking grates, and weir dams. This mitigation measure will allow flood waters to drain quicker and prevent excess accumulation. This project should be implemented in older drainage systems and any expanding areas throughout the planning area.

- Grinnell – Sewer Lining
- Grinnell – Culvert Installation

Hazard/s Addressed	Floods
Effectiveness	Medium
Timeframe	1 – 4 Years
Lead Organization	Poweshiek County Roads Department, SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

Storm Water Pump Stations

Storm water pump stations help protect areas by pumping away large volumes of water therefore preventing or decreasing the level of a flood. Pump stations can vary in size and design, allowing them to be tailored to the needs of a specific floodplain, region, or site-specific facility.

Hazard/s Addressed	Dam Failures, Floods
Effectiveness	Medium
Timeframe	1 – 4 Years
Lead Organization	Poweshiek County EMA, SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, FMA, HMGP, Local Budgets

StormReady Accreditation

The NWS' StormReady helps arm communities with the communication and safety skills needed to save lives and property before, during, and after an event. Communities who have achieved this accreditation are better prepared to save lives from severe weather through advanced planning, education, and awareness.

Hazard/s Addressed	Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Lead Organization	Poweshiek County EMA
Funding Sources	Local Budgets

Structural Integrity Monitoring Instruments

Dam failure is often preventable, but due to the structural nature of their construction and limited inspection resources, inspections happen too infrequently. Installing a series of seismic monitoring instruments at strategic locations along a dam can detect small, often unnoticed or detected, shifts in the dam's substructure that are the primary cause in premature collapse or failure. These instruments serve not only as early warning devices, but as the means to ensuring a dam's maintenance and repair schedule is kept.

Hazard/s Addressed	Dam Failures
Effectiveness	Medium
Timeframe	1 Year
Lead Organization	Poweshiek County EMA (With USACE)
Funding Sources	BRIC, HMGP, Local Budgets

Water Line Insulation

Insulating a facility's water pipes helps prevent them from freezing and bursting due to sudden and prolonged low temperatures during winter storms. The planning area should implement this project in conjunction with their school districts and critical facilities standard maintenance cycles.

Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 Year
Lead Organization	Poweshiek County Roads Department, SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Wind Resistance Structural Retrofit

Enhancing a structure's wind resistance according to FEH bronze, silver, or gold specifications will significantly reduce probability of a structure incurring damage and potentially hurting its occupants during a wind related event. Efforts to do so are, but not limited to, strengthening gable anchorages, soffits, roof sheathing, anchoring attached structures such as porches or carports, replacing thing windows, enhancing the integrity of building openings, and developing continuous load paths throughout a structure.

Hazard/s Addressed	Severe Storms, Tornadoes
Effectiveness	Medium
Timeframe	1 – 5 Years
Lead Organization	Poweshiek County Roads Department, SD Facilities Departments, Municipal Public Works
Funding Sources	BRIC, HMGP, Local Budgets

Appendix E – Action & Project Prioritization

Table E.1 – Action & Project Prioritization, Poweshiek County (Unincorporated)

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study	Low					
Dam Retrofit	Low					
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System		Low	Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks		Low				
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities		Low				
Public Awareness & Education	Low	Low	Low	Low	Low	Low
Rainwater Retention Basins		Low	Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments	Low					
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

■ = Hazard or Project Not Applicable to this Plan Participant

■ = Action or Project not Applicable to this Hazard

Table E.2 – Action & Project Prioritization, Brooklyn

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System		Low	Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks		Low				
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities		Low				
Public Awareness & Education		Low	Low	Low	Low	Low
Rainwater Retention Basins		Low	Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

■ = Hazard or Project Not Applicable to this Plan Participant

■ = Action or Project not Applicable to this Hazard

Table E.3 – Action & Project Prioritization, Deep River

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Low	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Low			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Low			
Flood Level Monitoring System		Low	Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks		Low				
Looped Grid Power Systems			Low	Medium	Medium	Medium
Low Flow Utilities		Low				
Public Awareness & Education		Low	Low	Low	Low	Low
Rainwater Retention Basins		Low	Low			
Raise Transportation Infrastructure			Low			
Relocate or Buyout Vulnerable Structures			Low			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Low			
Storm Water Pump Stations			Low			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

= Hazard or Project Not Applicable to this Plan Participant

= Action or Project not Applicable to this Hazard

Table E.4 – Action & Project Prioritization, Grinnell

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Low	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Low			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Low			
Flood Level Monitoring System		Low	Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks		Low				
Looped Grid Power Systems			Low	Medium	Medium	Medium
Low Flow Utilities		Low				
Public Awareness & Education		Low	Low	Low	Low	Low
Rainwater Retention Basins		Low	Low			
Raise Transportation Infrastructure			Low			
Relocate or Buyout Vulnerable Structures			Low			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Low			
Storm Water Pump Stations			Low			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

= Hazard or Project Not Applicable to this Plan Participant

= Action or Project not Applicable to this Hazard

Table E.5 – Action & Project Prioritization, Guernsey

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

 = Hazard or Project Not Applicable to this Plan Participant

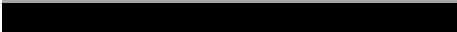
 = Action or Project not Applicable to this Hazard

Table E.6 – Action & Project Prioritization, Hartwick

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Low	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Low			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Low			
Flood Level Monitoring System		Low	Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks		Low				
Looped Grid Power Systems			Low	Medium	Medium	Medium
Low Flow Utilities		Low				
Public Awareness & Education		Low	Low	Low	Low	Low
Rainwater Retention Basins		Low	Low			
Raise Transportation Infrastructure			Low			
Relocate or Buyout Vulnerable Structures			Low			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Low			
Storm Water Pump Stations			Low			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

 = Hazard or Project Not Applicable to this Plan Participant

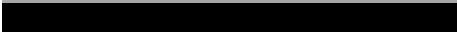
 = Action or Project not Applicable to this Hazard

Table E.7 – Action & Project Prioritization, Malcom

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

= Hazard or Project Not Applicable to this Plan Participant

= Action or Project not Applicable to this Hazard

Table E.8 – Action & Project Prioritization, Montezuma

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

■ = Hazard or Project Not Applicable to this Plan Participant

■ = Action or Project not Applicable to this Hazard

Table E.9 – Action & Project Prioritization, Searsboro

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Medium	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Medium			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Medium			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Medium	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Medium			
Relocate or Buyout Vulnerable Structures			Medium			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Medium			
Storm Water Pump Stations			Medium			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

= Hazard or Project Not Applicable to this Plan Participant

= Action or Project not Applicable to this Hazard

Table E.10 – Action & Project Prioritization, Grinnell-Newburg School District

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Low	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Low			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Low			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Low	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Low			
Relocate or Buyout Vulnerable Structures			Low			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Low			
Storm Water Pump Stations			Low			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

■ = Hazard or Project Not Applicable to this Plan Participant

■ = Action or Project not Applicable to this Hazard

Table E.11 – Action & Project Prioritization, Montezuma School District

Project/Action	Dam Failures	Droughts	Floods	Severe Storms	Tornadoes	Winter Storms
Backup Generators			Low	Medium	Medium	Medium
Bury & Secure Utility Lines, Pipes, and Tanks				Medium	Medium	Medium
Dam Failure Inundation Study						
Dam Retrofit						
Elevate Structures			Low			
FEMA Code 361 Safe Rooms				High	High	
Floodproofing			Low			
Flood Level Monitoring System			Low			
Insulation & Energy Efficiency						Low
Irrigation Storage Tanks						
Looped Grid Power Systems			Low	Medium	Medium	Medium
Low Flow Utilities						
Public Awareness & Education			Low	Low	Low	Low
Rainwater Retention Basins			Low			
Raise Transportation Infrastructure			Low			
Relocate or Buyout Vulnerable Structures			Low			
SKYWARN Storm Spotter Training			Low	Low	Low	Low
Snow Fences						Low
Storm Water Drainage System Upgrade			Low			
Storm Water Pump Stations			Low			
Storm Siren Modernization			Low	High	High	Low
StormReady Accreditation			Low	Low	Low	Low
Structural Integrity Monitoring Instruments						
Water Line Insulation						Low
Wind Resistance Structural Retrofit				Medium	Medium	

■ = Hazard or Project Not Applicable to this Plan Participant

■ = Action or Project not Applicable to this Hazard

Appendix F – Plan Adoption Resolutions

<POWESHIEK COUNTY RESOLUTION>

<BROOKLYN RESOLUTION>

<DEEP RIVER RESOLUTION>

<GRINNELL RESOLUTION>

<GUERNSEY RESOLUTION>

<HARTWICK RESOLUTION>

<MALCOM RESOLUTION>

<MONTEZUMA RESOLUTION>

<SEARSBORO RESOLUTION>

<GRINNELL-NEWBURG SCHOOL DISTRICT RESOLUTION>

<MONTEZUME SCHOOL DISTRICT RESOLUTION>

Appendix G – FEMA Approval Letter
