# Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025

This plan maintains Hazard Mitigation Assistance (HMA) funding eligibility for participating jurisdictions until September 22, 2025.

Prepared by the East Central Iowa Council of Governments (ECICOG) in partnership with the Iowa County Emergency Management Agency.

SEAL OF THE COUNTY OF IOWA IOWA

ECICOG
EAST CENTRAL IOWA COUNCIL OF GOVERNMENTS
YOUR REGIONAL PLANNING AGENCY

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# Introduction

## Local Hazard Mitigation Planning Overview

The primary purpose of hazard mitigation planning is to identify how a community can minimize the negative impacts of natural, technological, and human-caused hazards.

Communities also engage in hazard mitigation planning to maintain a local government's eligibility to apply for FEMA's Hazard Mitigation Assistance funding, which includes the following grant programs:

**Hazard Mitigation Grant Program**
*The HMGP provides funding for long-term hazard mitigation measures following major disaster declarations. Funding is available to implement projects in accordance with State, territorial, federally-recognized tribal, and local priorities.*

**Pre-Disaster Mitigation**
*The PDM program provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects. FEMA provides funding measures to reduce or eliminate overall risk from natural hazards.*

**Flood Mitigation Assistance**
*The FMA program provides funds on an annual basis so that measures can be taken to reduce or eliminate the risk of flood damage to buildings insured under the National Flood Insurance Program.*

The primary purpose of hazard mitigation planning is to identify how a community can minimize the negative impacts—such as death, injury, property damage, and community disruption—of natural, technological, and human-caused hazards. For the State of Iowa and Iowa County, recurring natural disasters such as windstorms, flooding, and severe winter storms have made local hazard mitigation planning an essential activity.

The secondary purpose of hazard mitigation planning is to maintain a local government's eligibility to apply for the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) funding, which includes the Pre-Disaster Mitigation (PDM) program, Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance (FMA) program. HMGP grant funding is made available following a Presidential Disaster Declaration while PDM and FMA funding is nationally competitive and awarded on an annual cycle. Upon approval of this plan, the county, cities, and school districts included in this plan are eligible to apply for HMA funding to complete their mitigation strategy.

The importance of hazard mitigation planning was recognized at the federal level in the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which was amended most recently by the Disaster Mitigation Act of 2000 (DMA 2000). The current federal requirements for local hazard mitigation planning that are required for eligibility for HMA are contained in Title 44 of the Code of Federal Regulations §201.6. DMA 2000 repealed previously established mitigation planning provisions and replaced them with requirements that emphasize the need to coordinate mitigation planning and implementation.

Local hazard mitigation plans are required to 1) document the planning process, 2) identify hazards and assess risks, 3) document jurisdictions' mitigation strategies and priorities, and 4) if applicable provide an update to the previously approved local plan(s). The participating jurisdictions are required to formally adopt the plan for the plan to be approved by FEMA.

*Title 44 of the Code of Federal Regulations §201.6 codifies the requirements all hazard mitigation plans must include to maintain eligibility for HMA grants for participating jurisdictions. Where specific requirements are met in the plan, they will be cited throughout following this example:*

Requirement §201.6 (c)(2)(i): (c) *Plan content.* The plan shall include the following:…(2) The risk assessment shall include: (i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

# Iowa County Multi-Jurisdictional Hazard Mitigation Plan

## Plan Background

This plan is a multi-jurisdictional hazard mitigation plan for Iowa County, Iowa, and participating local jurisdictions within or overlapping it. It is an update to the *Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2015–2020*. The development of the plan was funded by the Iowa County Emergency Management Agency (Iowa County EMA). To complete the planning process and create the updated plan, Iowa County EMA contracted with the East Central Iowa Council of Governments (ECICOG), which is a regional planning agency. Iowa County regularly contracts with ECICOG because of its extensive experience in planning and grant administration.

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

Plan development began May 2019 and occurred over an eight-month period that involved collaboration among local officials, staff, Iowa County EMA, and ECICOG. The planning consultant facilitated research, public meetings, and a public comment period. The plan was submitted to the Iowa Homeland Security and Emergency Management Department (HSEMD) and FEMA for initial review on February 24, 2020. Upon approval and adoption by participating jurisdictions, this plan is effective for five years and maintains eligibility for HMA funding.

### Plan Participants

The planning area for a multi-jurisdictional hazard mitigation plan includes multiple jurisdictions with common climate and geography. Jurisdictions are either contiguous or located in close proximity. In Iowa, the planning area for a multi-jurisdictional plan typically includes an entire county. In Iowa County, the planning area includes the unincorporated areas, cities, and school districts. Not all school districts participated in this plan. See Table 1 for a full list of jurisdictions included in this plan.

Table 1: Iowa County Multi-Jurisdictional Hazard Mitigation Plan Participants

| Participant | 2015–2020 Plan | 2020–2025 Plan |
|---|---|---|
| County | | |
| Iowa County | ✓ | ✓ |
| City | | |
| Ladora | ✓ | ✓ |
| Marengo | ✓ | ✓ |
| Millersburg | ✓ | ✓ |
| North English | ✓ | ✓ |
| Parnell | ✓ | ✓ |
| Victor | ✓ | ✓ |
| Williamsburg | ✓ | ✓ |
| School District | | |
| English Valleys | ✓ | ✓ |
| HLV | ✓ | |
| Iowa Valley | ✓ | ✓ |
| Williamsburg | ✓ | ✓ |

## Plan Development

Requirement §201.6 (c)(1): (c) The plan shall include the following: (1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

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

### Planning Consultant

In May 2019, the Iowa County EMA contracted with ECICOG, a regional planning agency. Iowa County has worked with the agency since its establishment in 1972 as an intergovernmental

council. Planning staff at ECICOG possess specific knowledge and experience in hazard mitigation planning, having prepared the previously approved Iowa County multi-jurisdictional hazard mitigation plan, as well as the multi-jurisdictional hazard mitigation plans in Linn, Johnson, and Washington counties. For more information about ECICOG, visit the agency website at www.ecicog.org.

Alicia Presto, a planner at ECICOG, coordinated the service agreement and overall planning process with Iowa County EMA. Tom Gruis, also a planner at ECICOG, was the primary consultant to complete the plan development process, which ended June 2020.

## Review and Research

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

> Requirement §201.6 (b)(3): (b) In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:… (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

In addition to existing documents, extensive research was completed to include current information for each jurisdiction in the plan. The bulk of this research consists of database searches for hazard event information relevant to Iowa County. The databases used are cited throughout the plan. Discussions with planning committee members provide local perspectives to include with current information.

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

## Planning Meetings

A planning kickoff meeting was held on September 4, 2019 to provide participating Iowa County jurisdictions with an overview of hazard mitigation planning, HMA grant programs, and the planning process. A separate planning meeting was held for school districts on October 30, 2019 that covered the topics above and allowed for districts to complete the update to their portions of the plan. Because school districts have less infrastructure to maintain than cities, their

planning meetings are typically shorter and their mitigation strategies tend to include fewer projects, so holding a joint planning meeting was feasible. Three school districts sent small committees to complete the planning process. All districts were provided with a public meeting notice to post prior to the meeting.

> Requirement §201.6 (b)(2): (b) An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:… (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

Following the kickoff meeting, the planning consultant worked directly with a primary contact in each jurisdiction. With guidance from the consultant, the primary contact identified and invited members of the community to serve on the local planning committee, scheduled a local planning meeting, and posted the public meeting notice. To maintain an open plan development process, one public meeting was held in each jurisdiction. Every person in attendance of each of planning meetings was considered a member of the respective planning committee. A schedule of local planning meetings is shown in Table 2.

Table 2: Schedule of Local Planning Meetings

| Jurisdiction | Local Planning Meeting Dates |
|---|---|
| County | |
| Iowa County | November 13, 2019 |
| City | |
| Ladora | November 13, 2019 |
| Marengo | November 12, 2019 |
| Millersburg | October 14, 2019 |
| North English | November 6, 2019 |
| Parnell | December 17, 2019 |
| Victor | September 30, 2019 |
| Williamsburg | September 23, 2019 |
| School District | |
| English Valleys | October 30, 2019 |
| Iowa Valley | October 30, 2019 |
| Williamsburg | October 30, 2019 |

For the local planning meetings, a consistent set of agenda items, shown below, was followed regardless of jurisdiction type and size. The planning consultant prepared documentation for each meeting to provide information about the agenda items for the planning committee member's review. For review and future updates of this plan, the members of a planning committee can provide valuable context. Documentation for all planning meetings include the following items: 1) public notice, 2) agenda, 3) sign-in sheet, and 4) community summary. The documentation for each jurisdiction is included in the appendix.

**Planning Meeting Agenda**

1. Introductions
2. Hazard mitigation planning overview
3. Critical facilities update
4. Vulnerable populations update
5. Operations & resources update
6. Hazard prioritization
7. Mitigation strategy update
8. Action plan update
9. Select representative and time period for annual plan review

## Public Comment

The 30-day public comment period for this plan began May 13, 2020 and ended June 17, 2020. A draft of the plan was available on ECICOG's website, and a news release with information about the public comment period was sent to each participating jurisdiction, local media, and emergency management coordinators in surrounding counties—Tama, Benton, Linn, Poweshiek, Johnson, Keokuk, and Washington. Specifically inviting surrounding counties to participate in the public comment period allows for potential regional cooperation beyond the planning area because the mitigation strategies and action plans are not yet finalized.

Before the full draft of the plan was released for public comment, the planning consultant gave local planning committees the option to review and verify that the plan information reflects the discussion at planning meetings. The majority of initial planning committee comments were to clarify the jurisdiction's mitigation strategy. Since this plan affects eligibility for mitigation project funding, jurisdictions wanted to ensure the overall mitigation strategy reflected local risk and priorities.

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

During the formal public comment period, comments could be submitted through an online electronic form on the ECICOG's website, the planning consultant's email, or by mail. During the public comment period, there were no comments submitted to the planning consultant.

## Plan Writing

This plan was written by the planning consultant at ECICOG based on the ongoing review of existing documents, research, and discussion at planning meetings with each jurisdiction's planning committee. Plan writing was an ongoing activity throughout the plan development process. The planning committee in each jurisdiction had the opportunity to provide feedback.

## Plan Review and Revision

During the public comment period, the draft version of this plan was concurrently reviewed by HSEMD's hazard mitigation planner and FEMA Region 7 plan reviewers. Required plan edits included the following: none.

### Plan Review Schedule

State Review Submission: February 24, 2020

Public Comment Period: May 13, 2020

FEMA Final Review Submission: June 17, 2020

## Plan Approval and Adoption

This multi-jurisdictional hazard mitigation plan was submitted for final public comment, review, and approval on May 13, 2020. An initial review of the plan was completed by Iowa's hazard mitigation planner. After the state review process, the plan was submitted to the FEMA Region 7 plan reviewers for final review and approval on June 16, 2020. Iowa County adopted the initial draft of the plan through a resolution on June 19, 2020, and the plan was approved on September 22, 2020.

### Plan Approval and Initial Adoption Date

Plan Approval: September 22, 2020

Plan Adoption: June 19, 2020

# Plan Goals

Requirement §201.6 (c)(3)(i): (c) The plan shall include the following:… (3) A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include: (i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Throughout the development process of this plan, goals were used as a guide for planning committee discussion and final decision making. Jurisdiction representatives reviewed the goals in the 2015–2020 hazard mitigation plan. In the 2015–2020 hazard mitigation plan, most jurisdictions adopted the planning goals shown below, but Williamsburg adopted slightly different goals. For the plan update, all of the jurisdictions adopted the goals shown below.

## Plan Goals

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

# Community Profile

## Planning Area and Population

Requirement §201.6 (d)(3): (d) Plan review… (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it within 5 years in order to continue to be eligible for mitigation project grant funding.

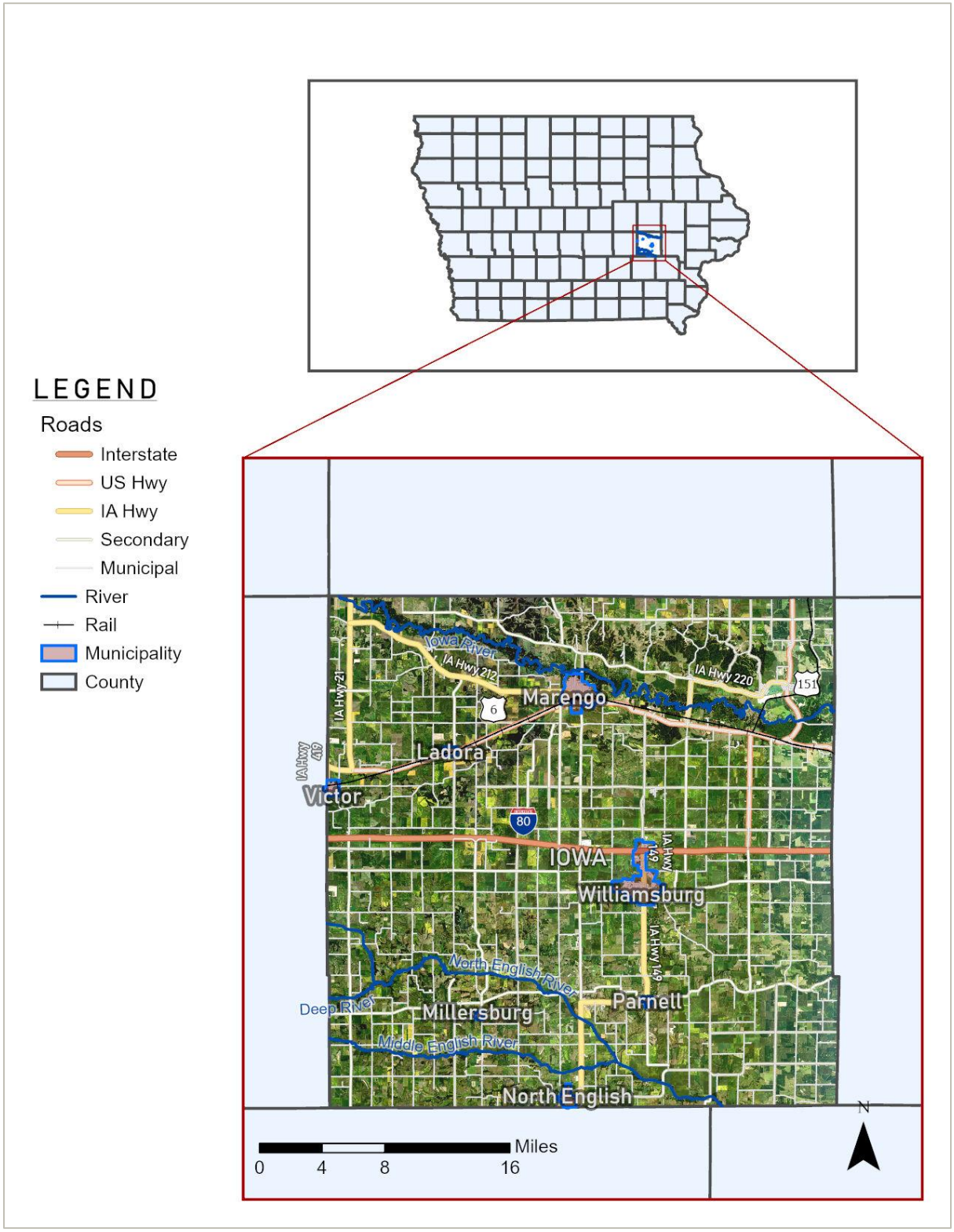
Iowa County is located in east central Iowa, and Marengo is the county seat. A map of the county and its location within Iowa is shown in Map 1. The county experienced slight population decline, -1.31 %, between 2010 and 2018.[i] Refer to Table 3. This follows a decade of population growth of 4.36 % between the 2000 and 2010 censuses. If the annual rate of population decline from 2010–2018 remains constant, the county would have a population of 16,088 in 2020, representing a decline of 1.6 %.

Table 3: Iowa County 2010 Census and 2018 Population Estimates

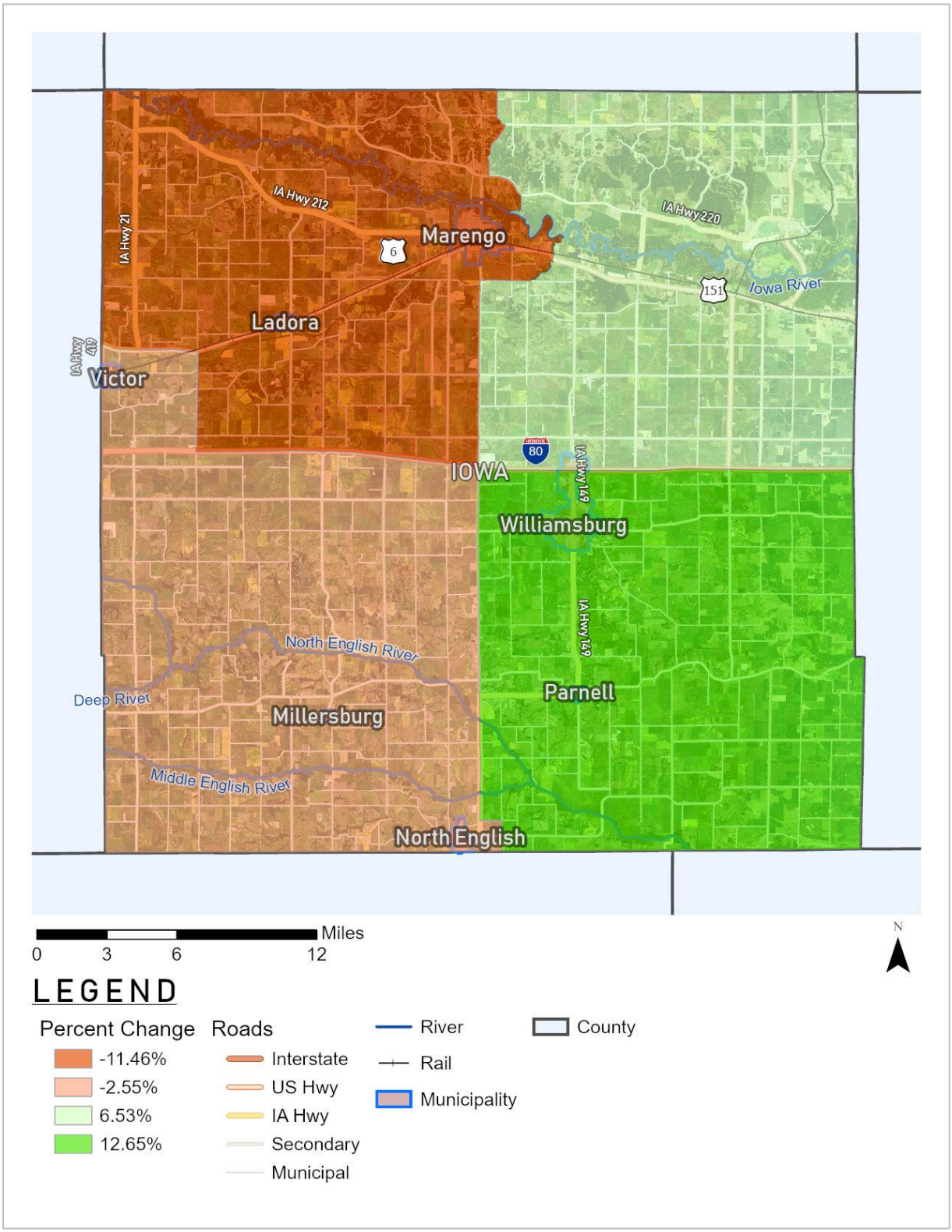
| Jurisdiction | 2010 Census | 2018 Population Estimate | Percent Change |
|---|---|---|---|
| Iowa County | 16,355 | 16,141 | -1.31% |
| Iowa County, unincorporated | 8,314 | 8,103 | -2.54% |
| Williamsburg | 3,068 | 3,149 | 2.64% |
| Victor, part | 778 | 757 | -2.70% |
| Parnell | 193 | 265 | 37.31% |
| North English, part | 1,032 | 997 | -3.39% |
| Millersburg | 159 | 141 | -11.32% |
| Marengo | 2,528 | 2,455 | -2.89% |

The population of the county is nearly evenly split between residents of incorporated and unincorporated areas. The largest city in the county is Williamsburg, with 3,149 residents. The smallest city is Millersburg, with 141 residents. The 2018 population estimate is not broken down by census tract. Using census tract data from 2000 to 2010, the regional patterns of population growth or decline within the county is evident. Refer to Map 2. The population growth or decline in that decade reflect the trends exhibited from 2010–2018, with growth in the tracts on the eastern part of the county, where Williamsburg and Parnell are located. Development pressure to the eastern side of the county likely comes from the Cedar Rapids and Iowa City metropolitan areas, to the northeast and east, respectively. It is important to note where the highest rates of growth are occurring in the county because these areas may not yet have the appropriate capacity to protect a developed or more densely populated area from hazards.

Map 1: Iowa County Planning Area



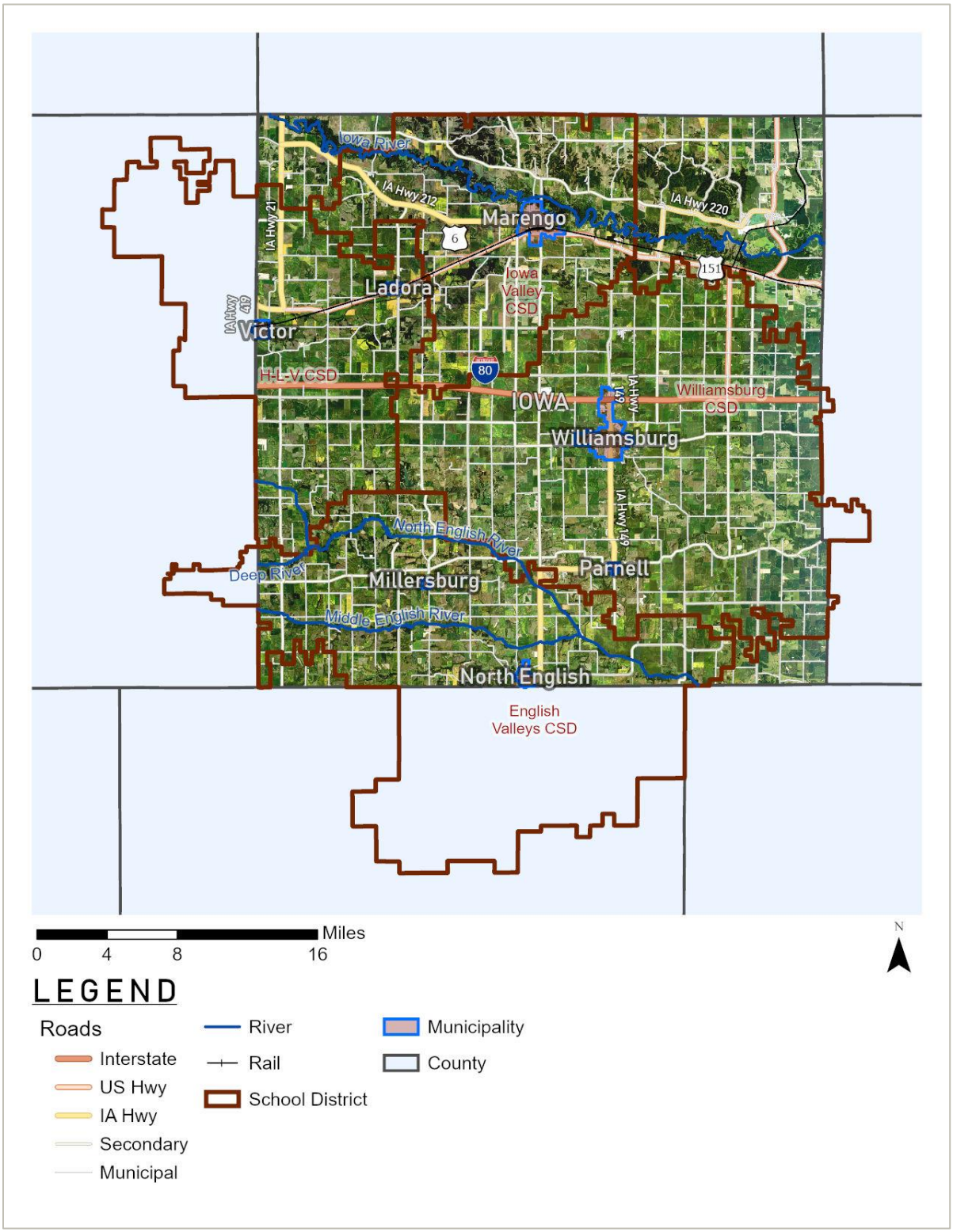
Map 2: Iowa County Population Change 2000–2010 by Census Tract



## School Districts

Four community school districts provide education services to kindergarten- through twelfth-grade students in Iowa County. In many areas, school districts also provide amenities to the public, such as libraries and recreation opportunities. In addition to county and city governments, school districts were included in the plan to maintain Hazard Mitigation Assistance (HMA) funding eligibility to mitigate or reduce the potential impacts of hazards on their students, staff, and visitors. Refer to Table 4 for school districts in Iowa County.

Map 3: Iowa County Planning Area School Districts



The largest school district in Iowa County in terms of enrollment is the Williamsburg CSD, which had over 1,100 enrolled students in the 2018–2019 school year.[ii] The smallest school district in Iowa County is HLV CSD, with 336 enrolled students in the 2018–2019 school year. Enrollments were relatively unchanged, plus or minus 1.5 %, with the exception of HLV, which saw in increase of 7.2 % from 2014–2015 to 2018–2019; however, that increase represents only 23 additional students. Refer to Table 4.

Table 4: Iowa County School District Certified Enrollment
2014–2015 and 2018–2019 School Years

| District | 2014–2015 Enrollment | 2018-2019 Enrollment |
|---|---|---|
| English Valleys CSD | 436.0 | 428.0 |
| HLV CSD | 313.7 | 336.3 |
| Iowa Valley CSD | 516.0 | 524.0 |
| Williamsburg CSD | 1,160.1 | 1,142.8 |

[i] US 2010 Decennial Census and US Census Bureau 2018 Population Estimate. Accessed through Iowa State Data Center: https://www.iowadatacenter.org/data/estimates/2018, accessed September 19, 2019.
[ii] Iowa Department of Education. https://educateiowa.gov/data-and-reporting/data-reporting/certified-enrollment/school-district-certified-enrollment, accessed October 16, 2019.

# Risk Assessment

## Introduction

A risk assessment was completed in a basic three-step process for Iowa County. First, hazards that can affect the planning area were identified. Second, possible impacts of each hazard were identified. And third, based on historical occurrences, potential severity, and local knowledge, a priority level was assigned to each hazard.

## Hazard Identification

In the *Iowa Comprehensive Emergency Plan—Part B: Iowa Hazard Mitigation Plan 2018*, a statewide risk assessment identifies a broad spectrum of hazards that can occur in the state, including natural, technological, and human-caused hazards. For Iowa County, all the hazards in the statewide plan are included in the risk assessment in order to prepare as complete a mitigation strategy as possible. As is the case statewide, variations in where hazards can occur within Iowa County exist, so detailed profiles for each hazard are prepared to reflect those variations. All hazards included in Iowa County's risk assessment are listed below.

Several of the hazards in the statewide plan present so remote a possibility of affecting Iowa County that they are by default excluded in each jurisdiction's hazard prioritization. The jurisdictions had the option to rank an excluded hazard. In Iowa County, excluded hazards include earthquake, expansive soils, grass and wildland fire, landslide, and sinkholes.

## Natural Hazards

*A natural hazard is an event occurring due to climate, geology, or hydrology that will negatively impact people or the environment.*

- Animal, Plant, and Crop Disease
- Drought
- Earthquake
- Expansive Soils
- Extreme Heat
- Flood
- Grass or Wildland Fire
- Human Disease
- Landslide
- Severe Winter Storm
- Sinkholes
- Thunderstorm, Lightning, and Hail
- Tornado and Windstorm

## Technological Hazards

*A technological hazard is an event involving a man-made structure, equipment, or substance that will negatively impact people or the environment.*

- Hazardous Materials Incident
- Infrastructure Failure
- Levee and Dam Failure
- Radiological Incident
- Transportation Incident

## Human Caused Hazards

*A human-caused hazard is an event occurring due to intentional human actions that will negatively impact people or the environment.*

- Terrorism

### Hazard Impact Assessment

To understand the potential impact of hazards that can occur in Iowa County, profiles were prepared using historical data, existing hazard mitigation plans, local knowledge, and the risk assessment criteria in the *Iowa Hazard Mitigation Plan 2018*. Hazard profiles include a description of the hazard and possible areas of impact. Although Iowa County is a geographically small portion of Iowa, there are variations, sometimes to a large degree, in where hazards are likely to occur. For this risk assessment, hazards are categorized as countywide hazards or local hazards. The hazard profiles also summarize the probability of future occurrences, potential magnitude and severity, amount of warning time available, and typical duration of each hazard.

Requirement §201.6 (c)(2): (c) The plan shall include the following:…(2) A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards… The risk assessment shall include: (i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events. (ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community…

## Hazard Prioritization Criteria

The information provided in the hazard impact assessment—probability, magnitude and severity, warning time, and duration—reflects the criteria used to assess risk. To determine the extent a mitigation strategy should focus on one or more hazards, the full set of hazards that can potentially affect Iowa County were prioritized using these criteria. Each criterion of the prioritization process is detailed in Table 5–Table 8. In the hazard profiles, each element of the assessment is discussed in the context of Iowa County. In the next chapter, each hazard's risk is plotted on a risk grid, with axes of probability and impact (magnitude and severity). The scores for duration and warning time are weighted less and incorporated into the scores for probability and impact.

Probability reflects the likelihood of the hazard occurring again in the future, considering both the hazard's historical occurrence and the projected likelihood of the hazard occurring in any given year. See scoring criteria in Table 5.

Table 5: Probability Scoring Criteria

| Score | | Description |
|---|---|---|
| 1 | Unlikely | Less than 10% probability in any given year, history of events is less than 10%, or event is unlikely but there is a possibility of occurrence |
| 2 | Occasional | Greater than 10% up to 19% probability in any given year, history of events is greater than 10% up to 19%, or the event could possibly occur |
| 3 | Likely | Greater than 19% up to 33% probability in any given year, history of events is greater than 20% up to 33%, or the event is likely to occur |
| 4 | Highly Likely | More than 33% probability in any given year, history of events is greater than 33% likely, or the event is highly likely to occur |

The magnitude and severity of the impacts of a hazard event is related directly to the extent that a hazard affects the community. It is rated using technical measures specific to the hazard, which are ideally determined with standard scientific scales. This is also a function of when the event occurs, year-round or seasonal, the location affected, the resilience of the community, and the

effectiveness of emergency response and disaster recovery efforts. See scoring criteria in Table 6.

Table 6: Magnitude/Severity Scoring Criteria

| Score | | Description |
|---|---|---|
| 1 | Negligible | Less than 10% of property severely damaged, shutdown of facilities and services for less than 24 hours, and/or injuries/illnesses treatable with first aid |
| 2 | Limited | Greater than 10% up to 25% of property severely damaged, shutdown of facilities and services for more than a week, and/or injuries/illnesses that do not result in permanent disability |
| 3 | Critical | Greater than 25% up to 50% of property severely damaged, shutdown of facilities and services for at least 2 weeks, and/or injuries/illnesses that result in permanent disability |
| 4 | Catastrophic | More than 50% of property severely damaged, shutdown of facilities and services for more than 30 days, and/or multiple deaths |

Warning time or the speed of onset is the amount of warning time available before a hazard occurs. The average rather than shortest or longest warning time is considered in the hazard assessment. For many natural hazards, there is a considerable amount of warning time as opposed to the human caused hazards that occur instantaneously or without any significant warning time. See scoring criteria in Table 7.

Table 7: Warning Time Scoring Criteria

| Score | Description |
|---|---|
| 1 | More than 24 hours warning time |
| 2 | More than 12 up to 24 hours warning time |
| 3 | 6 to 12 hours warning time |
| 4 | Minimal or no warning (less than 6 hours warning) |

Duration is the typical amount of time that the community is impacted by a hazard. As an example, a snowstorm will likely last several hours, whereas a lightning strike would last less than a second. See scoring criteria in Table 8.

Table 8: Duration Scoring Criteria

| Score | Description |
|---|---|
| 1 | Less than 6 hours |
| 2 | Less than 1 day |
| 3 | Less than 1 week |
| 4 | More than 1 week |

## Data Limitations

Data collected for many of the natural hazards is from the National Centers for Environmental Information (NCEI). This database is the most comprehensive and detailed available for natural hazards; however, there are some limitations. Information from this source can be queried by county, but the data returned is for an event. For example, if a tornado started in Poweshiek County, moved through part of Iowa County, and then continued into Benton County, it would be counted as one event. Data for injuries, fatalities, and storm damage would be presented for the whole event in a set of query results for Iowa County, even if some of those effects occurred outside of Iowa County.

Conversely, NCEI data is for reported effects, so damage that occurred may not be represented in the data. For example, a blizzard event on 2/1/2011 has an episode narrative that begins, "A tremendous blizzard, one of the worst in memory…," and goes on to outline the closing of the University of Iowa in neighboring Johnson County and the death of man in nearby Henry County. The episode record in the queried table reports property damage and fatalities as $0.00 and 0, respectively. Despite these limitations, the NCEI data provides a comprehensive overview of the frequency of hazard events, and often detailed information about hazard effects is included.

# Natural Hazards

## Animal, Plant, and Crop Disease

### Definition of Hazard

This natural hazard is an outbreak of disease or infestation that can be transmitted from animal to animal or plant to plant. The outbreak may have an adverse effect on human health, significant economic implications, cause significant crop production losses, and/or significant environmental damage.

#### Potential Hazard Area

The potential hazard area for the animal, plant, and crop disease hazard in Iowa County is primarily rural or recreation areas throughout the county, although this hazard can affect urban areas.

#### Historical Occurrences

In Iowa, there are several major reportable animal diseases, which include the Avian Flu, Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease), Chronic Wasting Disease, Exotic Newcastle Disease, Foot and Mouth Disease, Johne's Disease, Pseudorabies, Scrapie, and West Nile Virus. Reports from the Iowa Department of Agriculture and Land Stewardship (IDALS) and the Center for Food Security and Public Health at Iowa State University indicate minimal or no recent cases of most reportable animal diseases in Iowa. The IDALS website reports only three Animal Health Alter Network alerts since August 2012[iii].

In 2014–2015, the U.S. saw the largest ever outbreak of highly pathogenic avian influenza, with Iowa one of the hardest-hit states in the nation. The H5N2 strain struck 70 premises of commercial or backyard flocks in Iowa, and nationwide, over 50 million commercial birds were lost to the virus or depopulation efforts meant to stop the spread of the disease.[iv] The outbreak led to an estimated $1.6 billion in direct losses and a $3.3 billion impact in the US economy (1-10).[v] In Iowa, the affected area was in the northwestern part of the state. There were no reported incidents in Iowa County;[vi] however, the outbreak demonstrates the magnitude and volatility of communicable disease that occurs periodically in the United States.

In the past decade, cases of Scrapie, which affects sheep, have significantly decreased.[vii] Four areas in Iowa have confirmed cases of Chronic Wasting Disease (CWD) in captive White Tail Deer. Those herds have been depopulated. CWD has also been observed in wild deer populations in four Iowa counties. All diagnosed cases, both domestic and wild, are outside of

Iowa County.[viii] Across Iowa, there were 18 cases of West Nile Virus in horses 2018. There were no cases of West Nile Virus reported in Iowa County, but there was one confirmed case in a neighboring county.[ix] The total number of cases is similar to 2017 and 2016, when 2 and 15 cases were observed, respectively. In addition, there were 10 confirmed cases of rabies in Iowa in 2017, which was 48% lower than the previous year, and 8 of those cases were observed in wild animals. There were no confirmed cases in Iowa County, and there was only one confirmed case in eastern Iowa counties.[x]

Plant disease and infestations occur throughout Iowa, but most cases are relatively isolated and have not reached an outbreak level. For Iowa's major crops, chemical and non-chemical methods are used to prevent and manage disease and infestations. Reports from Iowa State University Extension and Outreach have confirmed cases of historically uncommon crop diseases like Physoderma, which is a fungus that can cause corn stalks to break, and Goss's Wilt, a bacterium that can destroy a corn plant. Disease affecting seedlings in corn and soybean crops were reported in 2013, primarily in southeast Iowa. In addition, pest populations that are resistant to genetic modification and chemical management methods have been confirmed across Iowa.

As for Iowa's landscape, a major concern is the Emerald Ash Borer, which is a beetle that infests and kills ash trees in large numbers. Efforts to eradicate beetle populations have proven to be too great to effectively protect a large area. In early 2014, the presence of the borer was confirmed in eastern Iowa. The presence of the beetle was confirmed in Iowa County prior to 2018.[xi] A statewide quarantine is in place to prevent the spread of the insect to other states. Iowans are discouraged from transporting firewood to other counties in the state to prevent a statewide infestation.

#### Probability

Minimal historical occurrences indicate that an animal, plant, or crop disease will not likely become a major outbreak in Iowa County. The *Iowa Hazard Mitigation Plan 2018* only noted the avian influenza outbreak. Additionally, an Emerald Ash Borer outbreak is likely with the beetle having been confirmed in the county.

#### Magnitude and Severity

If a major outbreak of an animal, plant, or crop disease were to occur in Iowa County, areas beyond the county could potentially be impacted. If animals are affected, a major disease could significantly limit or eliminate the ability to move, slaughter, and export animals and animal products, which could result in a shutdown of facilities. A major disease outbreak could have widespread public health and economic impacts in Iowa, the nation, and potentially the world. If crops and plants are affected there could be similar impacts to public health and industries associated with crops. For some disease and infestations, there could also be major environmental damage.

### Warning Time

Animals and plants that are infected with a disease or pests can transmit the disease or pest before the issue is realized. Iowa would only have warning time if an event occurred in another state or region.

### Duration

Response and recovery from a major disease or infestation is lengthy, with some producers potentially unable to sustain operation. In addition, diseases and infestations can reoccur, causing repeated losses.

## Drought

**Definition of Hazard**

Drought is a prolonged lack of precipitation that produces severe dry conditions. Four types of drought conditions are relevant in Iowa: meteorological drought, hydrological drought, agricultural drought, and socioeconomic drought. A meteorological drought is a lack of precipitation. A hydrological drought is a decline in surface and groundwater. An agricultural drought is a lack of moisture in soil, and a socioeconomic drought is a shortage of water that affects people's daily usage.

### Potential Hazard Area

The potential hazard area for drought in Iowa County is countywide due to the widespread nature of this hazard. Typically, rural areas in Iowa County are more severely impacted by this hazard.

### Historical Occurrences

A detailed weekly record of drought across the entire country is provided by the U.S. Drought Monitor. The monitor shows the percent of a selected area that is in drought conditions across five categories of drought. The drought categories are shown in Figure 1. From abnormally dry through exceptional, the categories reflect more severe conditions and impacts. In addition to the percentage of the area covered by different categories of drought, each record also contains a figure for the Drought Severity and Coverage Index (DSCI). This number approximates the severity of the drought in a region with a weighted sum of the categories of drought for the selected areas, i.e. 1 point per percentage point of area categorized as abnormally dry, 2 points per percentage point of area categorized as moderate drought, etc. Weeks with a higher DSCI score tend to exhibit more severe conditions that weeks with lower scores.

Figure 1: US Drought Monitor Drought Categories

| | | | Ranges | | | | |
|---|---|---|---|---|---|---|---|
| Category | Description | Possible Impacts | Palmer Drought Severity Index (PDSI) | CPC Soil Moisture Model (Percentiles) | USGS Weekly Streamflow (Percentiles) | Standardized Precipitation Index (SPI) | Objective Drought Indicator Blends (Percentiles) |
| D0 | Abnormally Dry | Going into drought:<br>▪ short-term dryness slowing planting, growth of crops or pastures<br>Coming out of drought:<br>▪ some lingering water deficits<br>▪ pastures or crops not fully recovered | -1.0 to -1.9 | 21 to 30 | 21 to 30 | -0.5 to -0.7 | 21 to 30 |
| D1 | Moderate Drought | ▪ Some damage to crops, pastures<br>▪ Streams, reservoirs, or wells low, some water shortages developing or imminent<br>▪ Voluntary water-use restrictions requested | -2.0 to -2.9 | 11 to 20 | 11 to 20 | -0.8 to -1.2 | 11 to 20 |
| D2 | Severe Drought | ▪ Crop or pasture losses likely<br>▪ Water shortages common<br>▪ Water restrictions imposed | -3.0 to -3.9 | 6 to 10 | 6 to 10 | -1.3 to -1.5 | 6 to 10 |
| D3 | Extreme Drought | ▪ Major crop/pasture losses<br>▪ Widespread water shortages or restrictions | -4.0 to -4.9 | 3 to 5 | 3 to 5 | -1.6 to -1.9 | 3 to 5 |
| D4 | Exceptional Drought | ▪ Exceptional and widespread crop/pasture losses<br>▪ Shortages of water in reservoirs, streams, and wells creating water emergencies | -5.0 or less | 0 to 2 | 0 to 2 | -2.0 or less | 0 to 2 |

Data from 2000 through June 2019 was queried for any drought conditions where at least 20 percent of the county was in a moderate or more severe drought. That threshold was set somewhat arbitrarily: it is meant to signify a level of drought that causes some damage and covers a large portion of the county. During that period, there were 17 drought events, averaging 6.9 weeks, with the longest drought lasting 36 weeks. Refer to Table 9. The table also shows the amount of the county not classified in drought conditions. There is only one example, in 2016, where essentially the whole county was not classified in drought conditions; i.e. when droughts occur, they tend to be countywide. Over half of the droughts lasted four weeks or less. No droughts have been classified higher than a severe drought.

Table 9: Summary of Moderate or Greater Droughts Affecting at Least 20 % of County January 2000–June 2019

| ID | Event Period | Duration | Average Area Not in Drought | Max Severity Drought (level and % covered) | Max DSCI |
|---|---|---|---|---|---|
| 1 | 9/12/2017–10/10/2017 | 4 weeks | 0 % | Moderate 100 % | 200 |
| 2 | 6/21/2016–6/28/2016 | 1 week | 30.79 % | Moderate 35.26 % | 104 |

Table 9: Summary of Moderate or Greater Droughts Affecting at Least 20 % of County January 2000–June 2019, continued

| ID | Event Period | Duration | Average Area Not in Drought | Max Severity Drought (level and % covered) | Max DSCI |
|---|---|---|---|---|---|
| 3 | 4/8/2014–6/24/2014 | 11 weeks | <1 % | Severe 31.18 % | 229 |
| 4 | 8/20/2013–9/3/2013 | 2 weeks | 0 % | Severe 72.04 % | 272 |
| 5 | 11/6/2012–4/2/2013 | 21 weeks | 0 % | Severe 4.57 % | 205 |
| 6 | 6/12/2012–7/10/2012 | 4 weeks | 0 % | Severe 45.26 % | 245 |
| 7 | 8/23/2011–10/11/2011 | 7 weeks | 0 % | Severe 20.79 % | 221 |
| 8 | 7/11/2006–7/25/2006 | 2 weeks | 0 % | Severe 7.95 % | 180 |
| 9 | 7/19/2005–3/28/2006 | 36 weeks | <1 % | Severe 74.75% | 275 |
| 10 | 11/26/2003–12/2/2003 | 1 week | 0 % | Moderate 26.85 % | 127 |
| 11 | 10/29/2003–11/18/2003 | 3 weeks | 0 % | Moderate 100 % | 200 |
| 12 | 8/19/2003–9/2/2003 | 2 weeks | 0 % | Severe 0.34 % | 200 |
| 13 | 6/17/2003–6/24/2003 | 1 week | 0 % | Moderate 100 % | 200 |
| 14 | 4/30/2003–5/6/2003 | 1 week | 0 % | Moderate 67.49 % | 167 |
| 15 | 12/26/2002–4/22/2003 | 17 weeks | 0 % | Severe 60.43 % | 260 |
| 16 | 5/16/2000–5/30/2000 | 2 weeks | 0 % | Severe 0.37 % | 200 |
| 17 | 4/18/2000–5/9/2000 | 3 weeks | 0 % | Severe 0.68 % | 201 |
| Source: U.S. Drought Monitor, https://droughtmonitor.unl.edu/Data/DataTables.aspx, accessed July 2019 | | | | | |

### Probability

Based on the major periods of drought, the probability estimate for drought conditions occurring in Iowa County is likely or greater than 19 % up to 33 % in any given year. Multiple short-term drought conditions or long-term drought conditions could occur in Iowa County, Iowa, and the Midwest region of the United States. Overall, the probability estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

### Magnitude and Severity

Droughts are typically widespread, affecting a large area. If a drought occurs in Iowa County, it is likely most of eastern Iowa or even the entire Midwest United States is experiencing drought conditions. Local conditions, typically intensity, vary during a widespread drought.

People are vulnerable during a drought if water supplies are significantly reduced, but typically there are secondary sources of water that can prevent negative health impacts due to lack of water. Most often, people are affected by higher food prices during and after major periods of drought. Wildlife and livestock are more likely to be vulnerable during a drought when there is a limited supply of water.

The agricultural sector of the economy, especially in Iowa, would be impacted if widespread and long-term drought conditions were to occur. Due to reliance on precipitation and water supply for irrigation, crops are extremely vulnerable. Most often, rural areas experience the majority of negative impacts.

A long-term, severe drought can decrease stream flow and water table levels, which can limit the amount of water available to residents. In certain circumstances, it may be necessary to place restrictions on industries that use large amounts of water.

Fire suppression may be challenging during drought conditions due to dry vegetation and limited water supply. The majority of property losses would likely be livestock and crops. On the other hand, infrastructure can be affected due to drying soils and low water levels around dams.

In Iowa County, widespread drought conditions could severely damage up to 25% of property, primarily crops. Although the potential magnitude and severity of drought conditions would be considered limited countywide, the direct impacts on rural areas may be critical. If drought conditions were severe enough to significantly reduce water supply, urban areas in Iowa County could be directly impacted.

### Warning Time

Drought warning is directly related to the ability to predict conditions that produce drought, primarily precipitation and temperature. There are many variables, and it is difficult to predict a drought in advance. An area may already be in a drought before it is recognized. While drought warning may not come until the drought is already occurring, the secondary effects may be predicted weeks in advance.

### Duration

Drought conditions are part of normal climate fluctuations in the United States. According to Iowa and Iowa County's drought history, most drought events affect the state for a period of a few months or a few weeks; however, climate variability can cause drought conditions for a period of a year and more.

## Earthquake

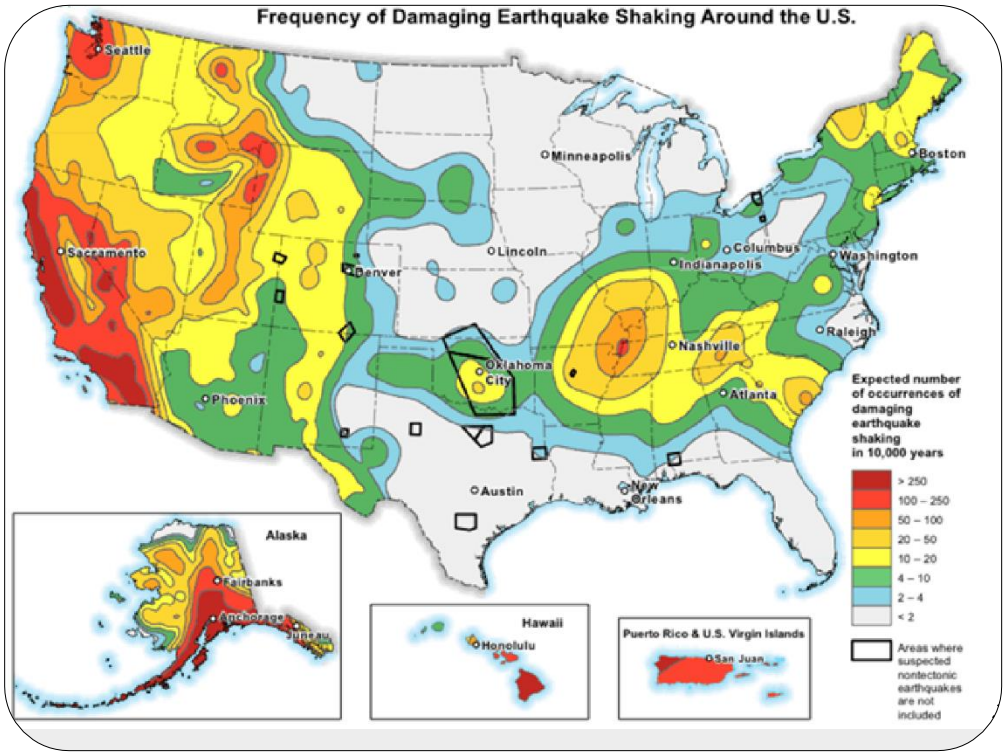
### Definition of Hazard

An earthquake is sudden shaking or vibration of the earth that may impose a direct threat to life and property. The shaking or vibration is caused by the breaking and shifting or rock beneath the earth's surface. The three general classes of earthquakes are tectonic, volcanic, and artificially produced.

### Excluded Hazard

The number of expected *damaging* earthquakes in Iowa is less than 2 in 10,000 years. Refer to the earthquake probabilistic map, shown in Map 4.

Map 4: Earthquake Probabilistic Map




Source: USGS, see https://earthquake.usgs.gov/hazards/learn/ for explanation and details.

The possibility remains for Iowans to occasionally feel shaking from an earthquake; however, with the probability of damage occurring from the hazard being extremely low, earthquake is excluded from this hazard assessment.

## Expansive Soils

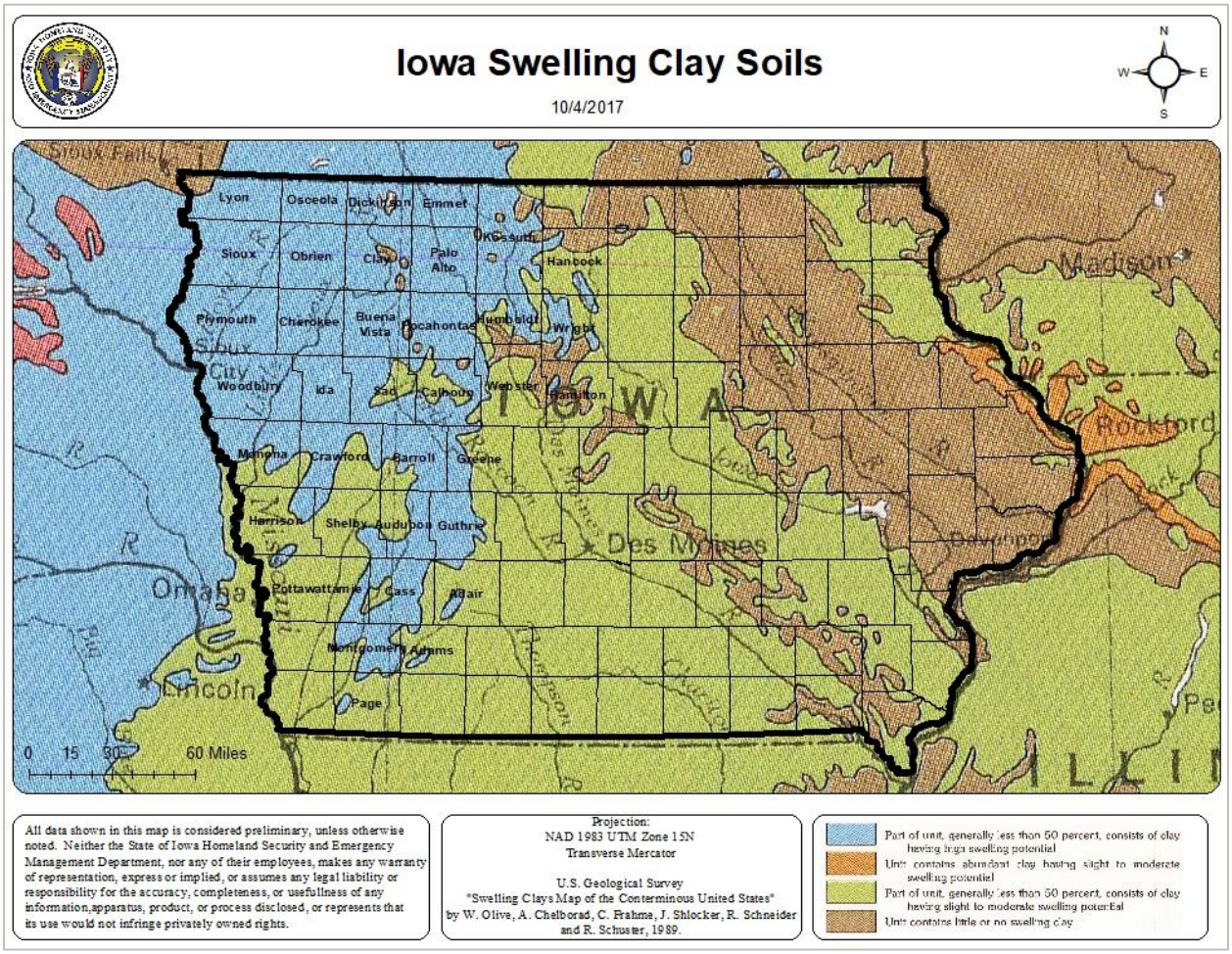
### Definition of Hazard

Soils and soft rock that tend to swell or shrink excessively due to changes in moisture content are commonly known as expansive soils. The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall.

#### Excluded Hazard

The content of swelling clay soils is low in Iowa County, and there is a lack of historical data for losses related to expansive soils statewide. The *Iowa Hazard Mitigation Plan 2018* states, "At least, impact from this hazard has not attracted enough attention for anyone to keep track of losses due to the hazard. So, no comprehensive data is available to compare past losses across the state." (3-32). Furthermore, Map 5 shows that Iowa County was assessed by the U.S. Geological Survey (USGS) as having soil that consists of less than 50% clay having slight to moderate swelling potential or little or of little to no swelling clay. Because of these factors, expansive soils is excluded from this risk assessment.

Map 5: Map of Swelling Clay Soils in Iowa



## Extreme Heat

### Definition of Hazard

Extreme heat is a temperature hotter or more humid than average for a location at that time of year. This includes three successive days of 90+ degrees Fahrenheit or one day with a temperature or heat index in excess of 100 degrees Fahrenheit.

### Potential Hazard Area

The potential hazard area for an extreme heat event in Iowa County is countywide.

#### Historical Occurrences

From 1999–2018, Iowa County has experienced three heat events and one excessive heat event. Refer to Table 10. As defined by the NCEI, a heat event is whenever heat index values meet or exceed locally established advisory thresholds. A heat event, as defined by NCEI, does not fully meet the description of an extreme heat even in Iowa, but data from NCEI is included because it is for other natural hazards in this risk assessment and contains records of losses—although, none were reported.

Table 10: Iowa County Heat and Excessive Heat Events 1999–2018

| Location | Date | Type | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| IOWA (ZONE) | 07/19/1999 | Heat | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 08/31/2000 | Heat | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 07/04/2012 | Excessive Heat | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 08/26/2013 | Heat | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 4 | | 0 | 0 | 0.00K | 0.00K |

Source: National Centers for Environmental Information, August 2019

Data from the National Oceanic and Atmospheric Administration's (NOAA) Surface Data Hourly Global (SDHG) dataset contains hourly weather data that includes temperature and relative humidity. With this data, the circumstances for an extreme heat event described in the hazard definition were identified. No data from within Iowa County is available, so data from the Eastern Iowa Airport, approximately six miles from Iowa County, was queried.

From 1999–2018, There were 122 days with a temperature or heat index above 100 degrees Fahrenheit during 17 different years. Refer to Table 11. While these extreme heat events occurred nearly every year and often multiple times per year, there were only eight times with

90 degree heat for three or more days. Four of those events occurred in one year, 2012. See Table 12.

Table 11: Days with Temperature or Heat Index Above 100 Degrees Fahrenheit

| |
|---|
| 1999 |
| 7/3, 7/4, 7/5, 7/20, 7/21, 7/22, 7/23, 7/24, 7/25, 7/26, 7/28, 7/29, 7/30, 7/31 |
| 2000 |
| 7/8, 8/14, 8/31, 9/2 |
| 2001 |
| 6/11, 7/7, 7/8, 7/21, 7/22, 7/23, 7/30, 7/31, 8/1, 8/2, 8/6, 8/9 |
| 2002 |
| 7/8, 7/20, 7/21, 7/27, 7/28, 8/1 |
| 2003 |
| 6/24, 6/25, 7/3, 7/7, 7/26, 8/20, 8/25 |
| 2005 |
| 7/20, 7/21, 7/23, 7/24, 7/25 |
| 2006 |
| 7/16, 7/17, 7/29, 7/30, 7/31, 8/1 |
| 2008 |
| 8/4 |
| 2010 |
| 7/14, 7/15, 8/8, 8/10 |
| 2011 |
| 6/30, 7/1, 7/17, 7/18, 7/19, 7/20, 7/27, 8/1, 8/2, 9/1 |
| 2012 |
| 6/27, 6/28, 7/3, 7/4, 7/5, 7/6, 7/7, 7/18, 7/19, 7/23, 7/25 |
| 2013 |
| 7/19, 8/26, 8/27, 8/28, 8/30 |
| 2014 |
| 7/22, 8/24, 8/25, 9/4 |
| 2015 |
| 7/12, 7/13, 7/17, 7/18, 7/25, 8/2, 9/6 |
| 2016 |
| 6/25, 7/11, 7/21, 7/22, 7/23, 7/24, 8/4, 8/10, 8/11, 8/18, 9/6 |
| 2017 |
| 7/11, 7/12, 7/18, 7/19, 7/20, 7/21, 7/22 |
| 2018 |
| 5/28, 6/16, 6/17, 6/18, 6/29, 6/30, 7/4, 7/13 |
| Source: NOAA, SDHG dataset, accessed December 2019 |

Table 12: Events With Three or More Days at or Above 90 Degrees Fahrenheit

| |
|---|
| Event 1: 1999-07-22,1999-07-23,1999-07-24 |
| Event 2: 2003-08-24,2003-08-25,2003-08-26,2003-08-27 |
| Event 3: 2011-07-17,2011-07-18,2011-07-19 |
| Event 4: 2012-07-02,2012-07-03,2012-07-04,2012-07-05,2012-07-06 |
| Event 5: 2012-07-15,2012-07-16,2012-07-17,2012-07-18 |
| Event 6: 2012-07-22,2012-07-23,2012-07-24,2012-07-25 |
| Event 7: 2012-07-30,2012-07-31,2012-08-01,2012-08-02 |
| Event 8: 2013-08-26,2013-08-27,2013-08-28,2013-08-29 |
| Source: NOAA, SDHG dataset, accessed December 2019 |

### Probability

Historical occurrences indicate that extreme heat events are occasional in Iowa County. Higher than normal temperatures due to climate change may increase the likelihood of an extreme heat event occurring in the state and Iowa County. The probability is likely, greater than 19% and up to 33% in any given year, for an extreme heat event to occur in Iowa County.

### Magnitude and Severity

An extreme heat event typically affects a large geographic area, sometimes as large as an entire region in the United States. If an extreme heat even were to occur in Iowa County, the entire county and beyond would likely be impacted.

Humans, outdoor pets, and livestock are vulnerable during extreme heat events. Heatstroke, sunstroke, cramps, exhaustion, and fatigue can be caused by prolonged heat exposure and/or physical activity. Certain groups of people like the young, elderly, and outdoor workers are especially vulnerable to extreme heat events.

In more urban areas, the heat island effect and air stagnation can exacerbate the already dangerous conditions for humans and animals during an extreme heat event. In Iowa County, the majority of cities do not have large, densely developed areas, but some areas of cities could experience relatively higher temperatures than rural areas of the county. In rural areas, which is the majority of Iowa County, livestock loss and reduced crop yields can occur in extreme heat events. Throughout the county, extreme heat events can damage buildings and infrastructure, which can result in shutdown of facilities for an extended period of time. Based on historical occurrences, the magnitude and severity of an extreme heat event in Iowa County would likely be limited although the impacts could be more severe.

### Warning Time

Extreme heat events are predictable within a few degrees approximately three days before the event may occur. Variations in local conditions can affect the actual temperature within a matter of hours or even minutes so warning time may be less. With as much warning time as possible,

the National Weather Service will initiate alert procedures when the heat index is expected to exceed 105 degrees for at least two consecutive days.

### Duration

By definition an extreme heat event is three consecutive days with a 90+ degree Fahrenheit temperature or one day with a 100+ degree Fahrenheit temperature or heat index. Based on past extreme heat events in the state and Iowa County, an event can last a week or longer.

## Flood

### Definition of Hazard

In a flash flood event, water levels rise at an extremely fast rate with minimal to no warning. Common causes include heavy precipitation over a short period of time, rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces like pavement.

In a river flood event, water levels of a tributary or body of water exceed capacity and cover adjacent land that is not typically covered by water. In this plan, flooding of creeks and other water bodies is included in this hazard.

#### Potential Hazard Area

The potential hazard areas for a flood are generally the areas designated as a floodplain by the Federal Emergency Management Agency. Refer to the risk assessment maps. The flood hazard layer is also shown in the critical facilities maps for each jurisdiction. It should be noted that flooding is not limited to designated floodplains because uncommon climate conditions and changes in development patterns can affect what areas ultimately experience water inundation.

Flash flooding can occur in any area of Iowa County. Certain areas have a greater potential to be affected due to factors such as low elevation, nearby waterways, insufficient storm water management, intense urban or agricultural development, etc. All jurisdictions in the planning area have identified at least minor flash flood issues, but most have persistent issues due to insufficient storm water management.

#### Historical Occurrences

From 1999–2018, there have been 31 documented flash flood events through Iowa County. Refer to Table 13. It should be noted, NCEI data identifies the area where a flash flood even began and not necessarily the only area impact by the event.

Table 13: Iowa County Flash Flood Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| MARENGO | 06/11/1999 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/11/1999 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/11/1999 | 0 | 0 | 0.00K | 0.00K |

Table 13: Iowa County Flash Flood Events 1999–2018, continued

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| COUNTYWIDE | 06/13/2000 | 0 | 0 | 0.00K | 0.00K |
| AMANA | 07/26/2000 | 0 | 0 | 0.00K | 0.00K |
| MIDDLE AMANA | 08/26/2004 | 0 | 0 | 40.00K | 5.00K |
| MARENGO | 06/22/2007 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/22/2007 | 0 | 0 | 750.00K | 0.00K |
| LADORA | 06/22/2007 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/22/2007 | 0 | 0 | 10.00K | 0.00K |
| MARENGO | 06/22/2007 | 0 | 0 | 10.00K | 0.00K |
| MARENGO | 04/25/2008 | 0 | 0 | 0.00K | 0.00K |
| LADORA | 06/03/2008 | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/12/2008 | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 06/19/2009 | 0 | 0 | 0.00K | 0.00K |
| AMANA | 06/19/2009 | 0 | 0 | 50.00K | 0.00K |
| MARENGO | 06/19/2009 | 0 | 0 | 50.00K | 0.00K |
| LADORA AIR STRIP | 06/19/2009 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/21/2009 | 0 | 0 | 250.00K | 0.00K |
| MARENGO | 06/23/2010 | 0 | 0 | 100.00K | 0.00K |
| KOSZTA | 08/03/2010 | 0 | 0 | 100.00K | 0.00K |
| KOSZTA | 05/26/2013 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 05/26/2013 | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/26/2013 | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 06/30/2014 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/11/2015 | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 08/09/2015 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 08/11/2016 | 0 | 0 | 0.00K | 0.00K |
| EAST AMANA | 09/23/2016 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 09/01/2018 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 09/01/2018 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 31 | 0 | 0 | 1.360M | 5.00K |

Source: National Centers for Environmental Information, August 2019

For the reported flash flood events, there were no deaths or injuries, but there was $1.36 million in property damage reported across the entire area affected by the hazard events. Of all property damage, $750 thousand occurred during one flash flood event that involved Marengo and Ladora in June 2007. Additional flash flood events involved Marengo in June 2009 and 2010, which resulted in $350 thousand in property damage across the entire area affected. Other flash flood events involved Amana and Marengo with $50 thousand and $45 thousand in reported damage, respectively. Other flash flood events with reported property had totals of $10 thousand. Refer to Table 13.

In Iowa County, 30 river flood events occurred between 1999 and 2018. There were no deaths or injuries associated with the flood events, but there was over $4 million in property and crop damage. Refer to Table 14.The most recent river flood events occurred in 2018, but no damage estimates are recorded. Significant property damage was recorded for the river flood events from 2008–2010.

In June 2008, the Iowa River reached over 21 feet, and flood stage is 14 feet. In 2009 and 2010, several major flood events occurred due to heavy rains. In each event, the Iowa River exceeded flood stage in Marengo and significant property damage was reported. Flooding of the Iowa River in 2013, 2014, and 2018 did not result in major damage reported.

Aside from severe winter storms and thunderstorm, lightning, and hail, flooding is the most persistent hazard that causes substantial damage in Iowa County. Unlike other weather-related hazards, the areas impacted and the type of damage sustained is consistent. In the flood events reported from 1999 through 2018, there have been seven events with at least $500,000 in reported damage and two events with $250,000 in reported damage. Refer to Table 14.

Table 14: Iowa County River Flood Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 05/17/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 06/01/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 07/01/2000 | 0 | 0 | 0.00K | 0.00K |
| COUNTYWIDE | 02/24/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 05/09/2003 | 0 | 0 | 500.00K | 0.00K |
| IOWA (ZONE) | 02/21/2004 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 05/23/2004 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 06/01/2004 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 06/11/2004 | 0 | 0 | 0.00K | 0.00K |

Table 14: Iowa County River Flood Events 1999–2018, continued

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 08/27/2004 | 0 | 0 | 0.00K | 10.00K |
| IOWA (ZONE) | 05/13/2005 | 0 | 0 | 0.00K | 5.00K |
| AMANA | 04/01/2008 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 06/01/2008 | 0 | 0 | 747.00K | 0.00K |
| KOSZTA | 04/29/2009 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 05/01/2009 | 0 | 0 | 500.00K | 0.00K |
| KOSZTA | 06/19/2009 | 0 | 0 | 500.00K | 0.00K |
| KOSZTA | 08/27/2009 | 0 | 0 | 500.00K | 0.00K |
| KOSZTA | 04/09/2010 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 04/25/2010 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 05/13/2010 | 0 | 0 | 500.00K | 0.00K |
| KOSZTA | 06/14/2010 | 0 | 0 | 500.00K | 0.00K |
| KOSZTA | 07/01/2010 | 0 | 0 | 250.00K | 0.00K |
| KOSZTA | 07/31/2010 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 08/11/2010 | 0 | 0 | 250.00K | 0.00K |
| MARENGO | 05/27/2013 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/01/2013 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 06/30/2014 | 0 | 0 | 0.00K | 0.00K |
| KOSZTA | 09/05/2018 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 09/05/2018 | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 10/10/2018 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 30 | 0 | 0 | 4.247M | 15.00K |

Source: National Centers for Environmental Information, August 2019

### Repetitive Loss Properties

In certain areas of the county, several properties have been damaged by multiple flood events. These properties are considered repetitive flood loss properties. The technical definition for a repetitive flood loss property, as defined by the National Flood Insurance Program (NFIP), is a property that has received two or more claim payments through NFIP of more than $1,000 within a ten-year period. As of January 2020, there are two repetitive loss properties in the county. Both are residential properties located in Marengo.

> Requirement §201.6 (c)(2)(ii): [ The plan shall include the following:] (ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.

### Probability

Historical occurrences indicate that flash flood events can occur at least every other year, if not more, in Iowa County. Minor flood events, which are not always reflected in the data available, occur frequently. The probability estimate is highly likely that a major flash flood event will occur in Iowa County. This is 33% or greater probability in any given year.

For river flood events, the estimated probability is also highly likely, which is more than 33% in any given year. The probability estimate for flood hazards in Iowa County is based on historical occurrences and local knowledge.

### Magnitude and Severity

With flood hazard mapping, vulnerability of life and property to river flooding is well identified in Iowa County. The Federal Emergency Management Agency (FEMA) has delineated the probable extent of the 100-year flood hazard areas in Iowa County. These maps are Flood Insurance Rate Maps (FIRMs), which show properties that have 1% chance in any given year to be affected by floods. For the designated floodplain in Iowa County, refer to the risk assessment maps.

In addition to current FIRMs, the Iowa Flood Center, Iowa Department of Natural Resources (IDNR), and FEMA partnered to develop the Iowa Flood Information System (IFIS). The IFIS is a web interface with interactive flood mapping and forecasting features that can be used to understand potential flood risk. To explore the information available for Linn County on this system, visit the following website: http://ifis.iowafloodcenter.org/ifis/en/. Figure 2, in the risk assessment maps, shows the stream gauge reporting tool provided by IFIS. Flood inundation maps are another tool that has been implemented for other Iowa communities and may be available for Iowa County jurisdictions someday. In the future, more detailed flood risk information will be provided through the RiskMap program, which is a partnership between FEMA and IDNR to provide watershed-based information and solutions.

A flash flood event can impact areas far from a tributary or body of water. Streets can become swift moving rivers, and basements can become deathtraps because flash floods can fill them with water in minutes. Nearly half of all flash flood fatalities are auto-related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current.

Buildings, infrastructure, and land can be eroded, extensively damaged, or completely destroyed in a flood event. Disruption or complete shutdown of essential facilities and services like major travel routes, water distribution, and wastewater treatment facilities often occurs during severe flood events. Depending on severity, overall disruption may occur just a few hours causing minor inconveniences or up to months causing major environmental and economic impacts in the county and state.

Potential impacts of flooding include injury and loss of life. River flooding does not have as high of risk to human as does flash flooding mostly because of the slow onset of river flooding. People in a flood zone, downstream from a dam or levee, or in low-lying areas are especially vulnerable in any type of flood event. In addition, people located in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be impacted in the event of a significant rainfall.

#### Warning Time

Flash floods are somewhat unpredictable, but there are factors that can indicate the likelihood of a flash flood event occurring in an area. Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. Knowledge of the watershed characteristics, modeling, monitoring, and warning systems increases the predictability of flash floods. Depending on the location in the watershed, warning times can be increased. The National Weather Service (NWS) forecasts the height of flood crests, the data, and time the flow is expected to occur at a particular location.

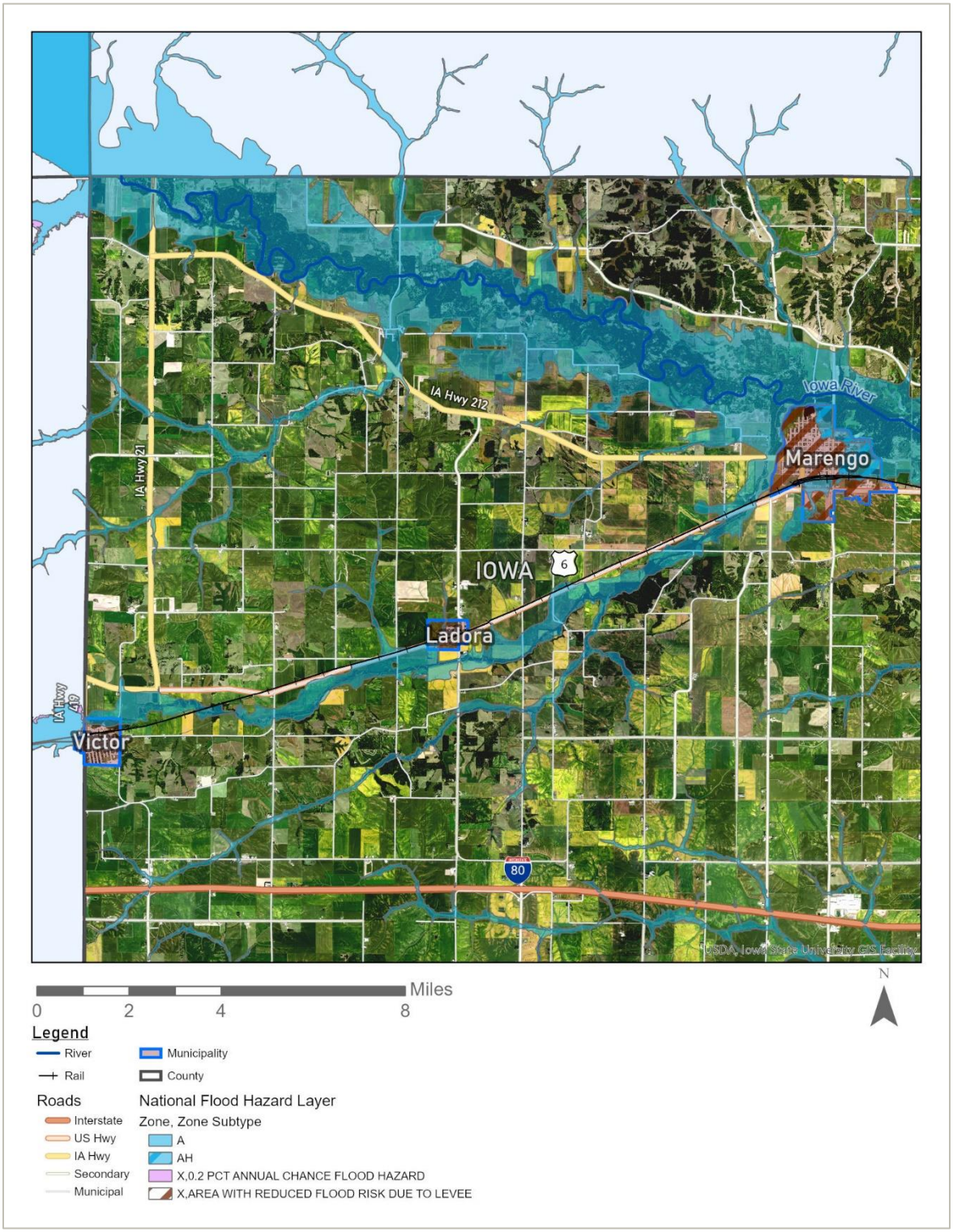
Gages along streams and rain gages provide information for flood warnings. Advance warning is possible for river flood events because a flood usually develops over the course of several days. The NWS provides flood forecasts for Iowa, and now, IFIS provides information and forecasts. Flood warnings are issued over mass notification systems and television stations. People in the path of river floods usually have time to take appropriate actions to limit harm to themselves and property.

#### Duration

Response to a flash flood event is usually shorter term relative to a river flood event, requiring just days or weeks depending on the severity of the event. Response to a river flood event is usually extensive and requires days and even up to years to adequately recover.

## Risk Assessment Maps

Map 6: Iowa County NW Quadrant Flood Hazard Zones

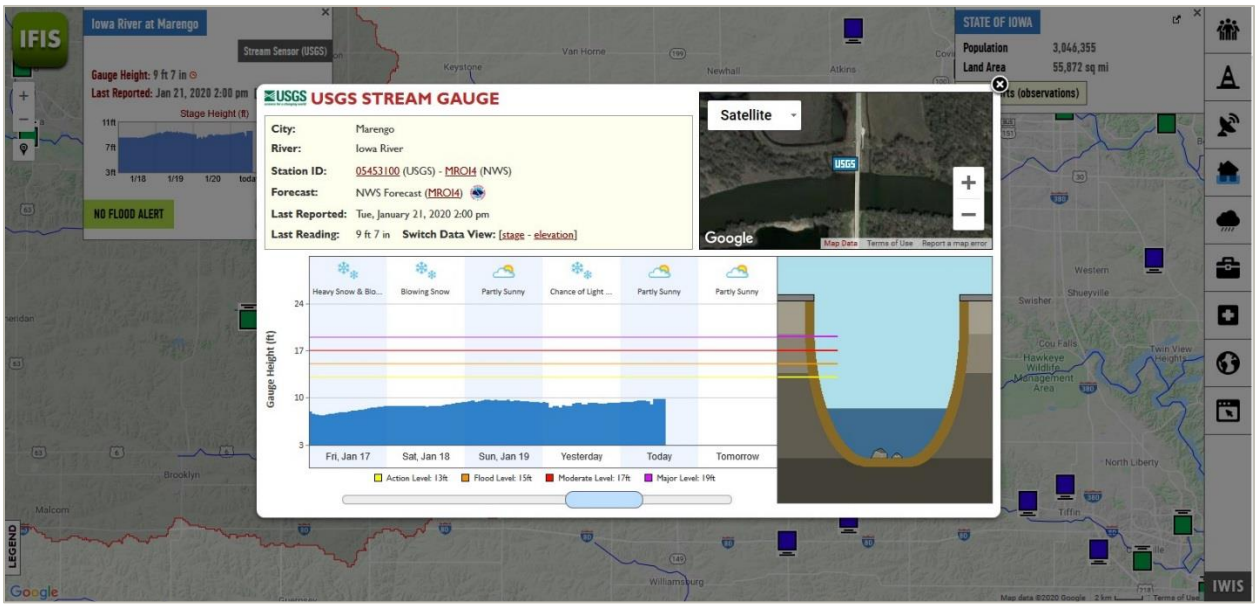


Map 7: Iowa County NE Quadrant Flood Hazard Zones

Map 8: Iowa County SW Quadrant Flood Hazard Zones

Map 9: Iowa County SE Quadrant Flood Hazard Zones

Figure 2: IFIS Stream Gauge Data Tool



## Grass and Wildland Fire

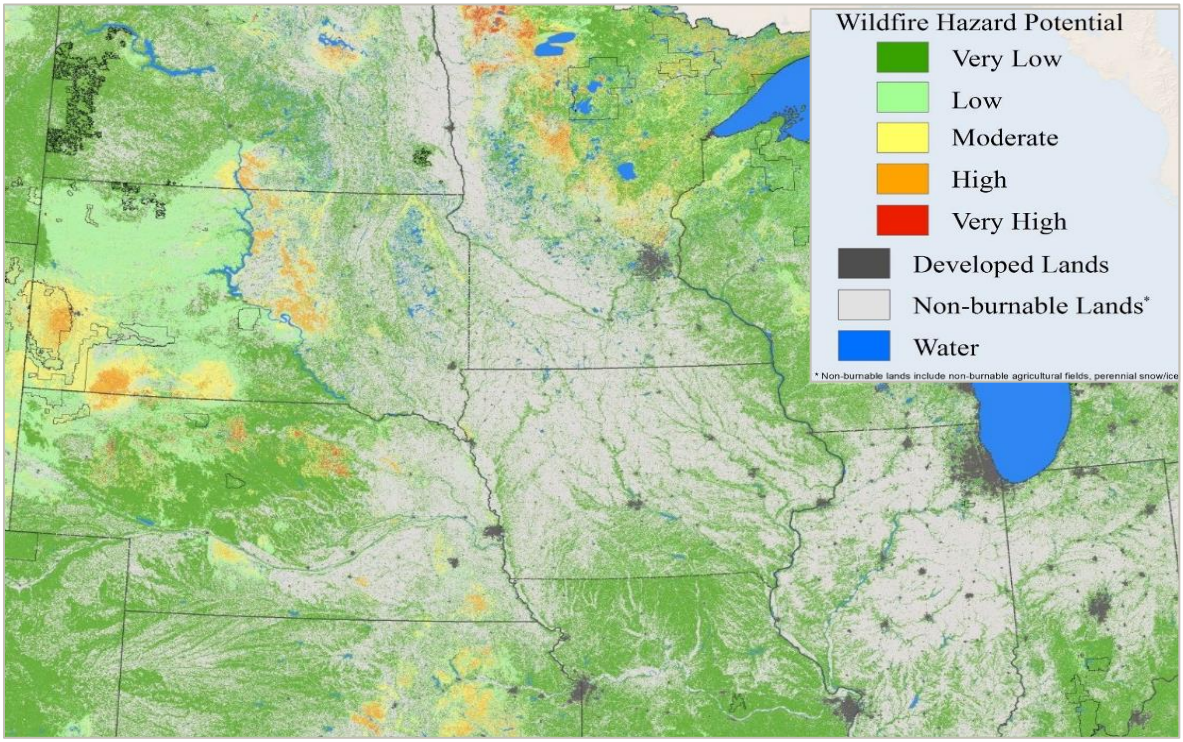
### Definition of Hazard

A grass or wildland fire is an uncontrolled fire that threatens life and property in a rural or wooded area. Grass and wildland fires can occur when conditions are favorable, such as periods of drought when natural vegetation would be drier and subject to combustibility.

### Excluded Hazard

According to the *Iowa Hazard Mitigation Plan 2018*, "A grass fire or wildland fire is not a cropland fire… Wildland or grass fires occur in natural, wild areas." (3-52). The plan also references the wildfire hazard potential (WHP) map (refer to Map 10), developed by the US Department of Agriculture (USDA) Forest Service's Fire Modeling Institute. The map was designed to "depict the relative potential for wildfire that would be difficult for suppression resources to contain."[xii] Iowa County is a mixture of lands categorized as non-burnable or very low wildfire hazard potential. Due to the lack of even low-hazard areas for grass or wildland fires, Grass and Wildland fire is excluded from this hazard assessment.

Map 10: Wildfire Hazard Potential Map, 2014



## Human Disease

**Definition of Hazard**

A human disease event is a medical, health, or sanitation threat to the general public such as contamination, epidemics, plagues, and insect infestation. A human disease event requires regular, frequent, and time information regarding individual cases to prevent and control spread of the disease.

### Potential Hazard Area

The potential hazard area for human disease events in Iowa County is countywide.

### Historical Occurrences

In Iowa, there are 49 reportable communicable diseases and infectious conditions that hospitals and other health care providers must report to their county public health department.[xiii] Iowa County Public Health investigates these diseases and maintains reports, which are shared with the Iowa Department of Public Health (IDPH) and the Centers for Disease Control and Prevention (CDC). IDPH releases an annual report of notifiable and other diseases. Table 15 displays the cases for common reportable diseases for Iowa County for the odd years from 2007–2017.[xiv] Blank records indicate the communicable disease/infectious condition was not included in that year's report. For all reported diseases, there were low numbers of cases reported each year. This fact is reinforced by the reporting in 2015 and 2017 of outbreak investigations in Iowa by County. In 2015, no outbreak investigation were reported in Iowa County. In 2017, only three outbreaks were investigated—two suspected norovirus GI events in schools and one influenza outbreak in a long-term care facility.[xv]

Table 15: Common Reportable Diseases for Iowa County 2007–2017

| Communicable Disease/ Infectious Disease | 2007 | 2009 | 2011 | 2013 | 2015 | 2017 |
|---|---|---|---|---|---|---|
| Campylobacteriosis | 4 | 5 | 1 | 3 | 5 | 8 |
| Chlamydia | 17 | 30 | 42 | 45 | - | - |
| Cryptosporidiosis | 4 | 0 | 2 | 0 | 3 | 2 |
| E. coli | 7 | 2 | 0 | 3 | 3 | 3 |
| Giardiasis | 1 | 1 | 0 | 1 | 1 | 5 |
| Gonorrhea | 1 | 2 | 0 | 1 | | |
| Hepatitis B (chronic) | 0 | 0 | 1 | 0 | 0 | 0 |

Table 15: Common Reportable Diseases for Iowa County 2007–2017, continued

| Communicable Disease/ Infectious Disease | 2007 | 2009 | 2011 | 2013 | 2015 | 2017 |
|---|---|---|---|---|---|---|
| Lyme disease | 8 | 3 | 0 | 5 | 1 | 0 |
| Mumps | 0 | 0 | 0 | 0 | 1 | 0 |
| Pertussis | 0 | 0 | 2 | 0 | 3 | 0 |
| Q Fever | - | - | - | - | 0 | 1 |
| Salmonellosis | 3 | 3 | 2 | 3 | 4 | 2 |
| Shigellosis | 0 | 0 | 0 | 0 | 1 | 0 |
| Syphilis | 0 | 0 | 1 | 2 | - | - |

Source: Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report, 2007–2017

In recent annual reports of notifiable diseases, the surveillance of influenza has its own dedicated chapter. According to the 2016 annual report, the 2016–2017 flu season was worse in nearly every measure compared to the 2015–2016 season.[xvi] The 2017 annual report stated that that were 270 influenza-related deaths in Iowa in the 2017–2018 flu season, more than the previous two flu seasons combined.[xvii] It was also noted that 79 % of those deaths were among person with a reported underlying health condition. IDPH reported "widespread" statewide influenza activity to the CDC for 10 consecutive weeks during that season. While the rate of infections from influenza increases and decreases seasonally in a fairly predictable manner, many people will have some immunity from previous exposure and vaccinations, and receiving an annual inoculation can help prevent the spread of and hospitalizations due to influenza. In contrast, pandemic flu occurs when a new strain of influenza causes a global outbreak. People have little to no immunity to these viruses because there is no past exposure to them or similar viruses. They can also occur any time of year, i.e. they are not seasonal.[xviii] According to the *2013 Iowa Hazard Mitigation Plan*, there have been four influenza pandemics in Iowa since 1900, occurring approximately 30 years apart. The most recent, the H1N1 outbreak in 2009–2010, killed fewer people in Iowa than the 2017–2018 seasonal flu, 41 compared to 270. No mention of pandemic flu was made in the 2017 annual report.[xix]

### Probability

Historically, pandemics occur approximately every 30 years in Iowa. Influenza occurs every year in nearly every country in the world. The virus spreads through a population for a few months and will disappear or move to another country due to travel. Influenza usually occurs in the fall and winter months in the United States, but this type of human disease event is typically manageable at the local level. Overall, the probability of a major human disease event occurring in Iowa County is unlikely but there is a possibility of occurrence.

### Magnitude and Severity

If a human disease event were to occur, the area of effect, severity of symptoms, or loss of human life would be determined by the communicability and virulence of the disease. A neighborhood, entire city or county, and beyond could be impacted. As such, public health agencies work to reduce the spread of diseases in Iowa. Agencies use community-based prevention, monitor current infectious disease trends, and provide early detection and treatment for infected persons.

Because society is extremely mobile, diseases can move rapidly across the state and nation within months, weeks, and even days. Many diseases on the national notification list result in serious illness and even death. Some diseases are treatable, but for others, only the symptoms are treatable.

Typically the people who are especially vulnerable during a human disease event are the elderly, young, people with chronic medical conditions, and people who engage in high risk behaviors. People who travel internationally and have high exposure to potential vectors of disease are the most susceptible. The population under 5 in Iowa County was a similar percentage to the US population, 6.11 % versus 6.54 %, respectively, in the 2010 Census[xx]; however, the population over 70 in Iowa County was 13.21 % versus 9.01 % for the U.S. With such a high percentage of the population at risk, the magnitude and severity of a human disease event can reach a critical level.

### Warning Time

Being the first to diagnose diseases, a healthcare provider is the first line of defense in a human disease event. Iowa County Public Health, IDPH, and the U.S. CDC monitor reports submitted by healthcare providers, hospitals, and labs to identify patterns. Monitoring agencies are proactive in providing information to the health care community on medical concerns.

The public is reminded to prepare for typical human disease events like influenza before the common time of year this virus spreads throughout Iowa and the United States. For other human disease events, the public is informed of initial outbreaks, which are confirmed cases of a disease, so for most human disease events there is minimal to no warning.

When there is a potential for a human disease event such as contamination of water supplies from infrastructure failure, flooding, or other hazards, there is also minimal to no warning for the public. The Iowa Department of Natural Resources and local governments issue warning as soon as possible, but the contamination is already present in water supplies.

### Duration

Response to highly infectious diseases occurs continuously, but the direct effects of a human disease event such as pandemic influenza can occur for months at a time. A major example is the H1N1 influenza in August of 2009.

## Landslide

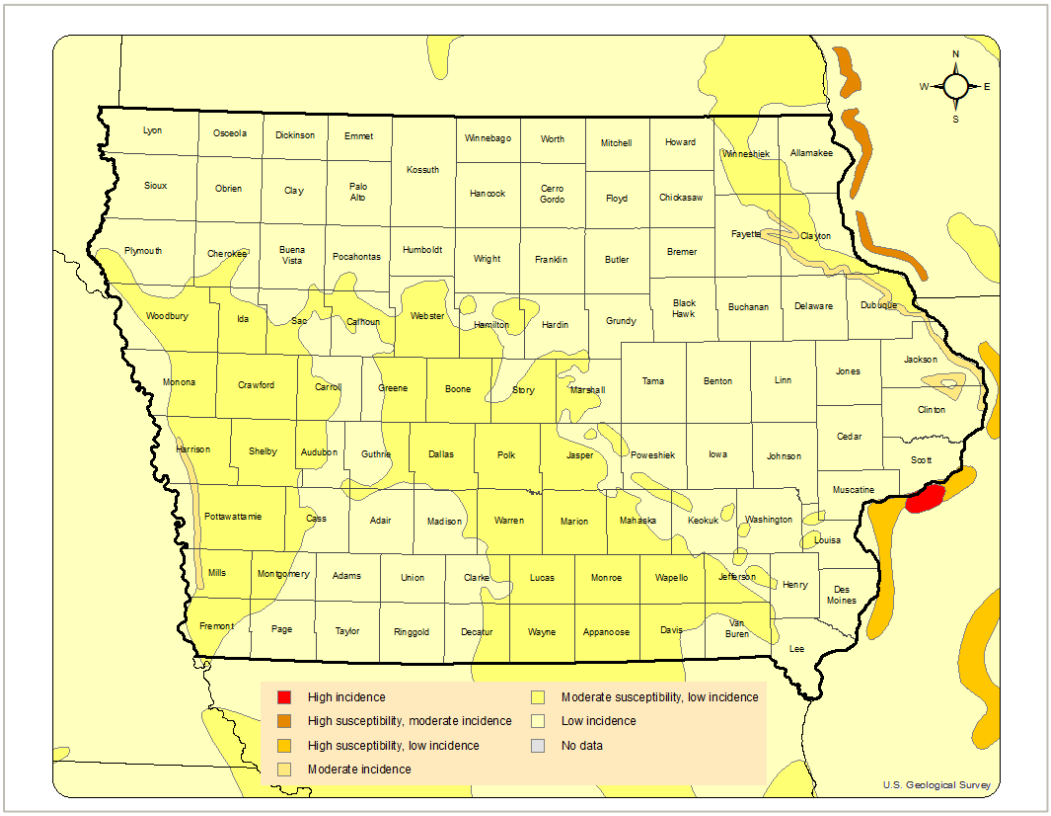
### Definition of Hazard

A landslide occurs when rock, earth, or debris moves down a slope under the force of gravity and water. Landslides may be small or large and can move at slow or very high speed. In addition to geological conditions, landslides can occur because of rainstorms, fires, earthquakes, and development that modifies slope and drainage.

### Excluded Hazard

There have been no reported landslides in Iowa resulting in injury or death, according to the *Iowa Hazard Mitigation Plan*. Furthermore, no State agency documents occurrences of landslide in Iowa. (3-54). The United States Geological Survey landslide susceptibility map provided in the plan (3-55), refer to Map 11, shows that the entirety of Iowa County is a low incidence area. Due to the lack of historical data or empirical evidence of moderate or higher susceptibility, Landslide is excluded from this risk assessment.

Map 11: USGS Landslide Susceptibility Map, 2010



## Severe Winter Storm

### Definition of Hazard

Severe winter storm conditions that affect daily activities can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold.

Blizzard conditions are defined as winter storms lasting at least three hours with sustained winds of 35 mph or more, reduced visibility of ¼ mile or less, and whiteout conditions.

#### Potential Hazard Area

The potential hazard area for a severe winter storm in Iowa County is countywide.

#### Historical Occurrences

From 1999–2018, there have been 36 recorded winter storm events in Iowa County. In most years, there was one or more winter storm or other winter-related events. The only years without a major winter storm event were 2004–2006, 2011–2012, 2014, 2016, and 2018; although, other winter-related storms have been recorded in those years. For all the winter storm events, there were no deaths, injuries, or damage reported. Refer to Table 16.

Table 16: Iowa County Winter Storm Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 01/01/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/05/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/08/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/16/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/19/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/23/1999 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/03/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/17/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/19/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/29/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/17/2000 | 0 | 0 | 0.00K | 0.00K |

Table 16: Iowa County Winter Storm Events 1999–2018, continued

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 12/10/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/08/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/15/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/30/2002 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/01/2002 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/28/2003 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/14/2003 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/04/2003 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/22/2007 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/03/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/05/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/16/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/18/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/08/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/06/2010 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/23/2010 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/29/2013 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/21/2013 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/26/2013 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/21/2013 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/05/2015 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/01/2015 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 11/20/2015 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/28/2015 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/29/2017 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 36 | 0 | 0 | 0.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

In addition to winter storms, there have been six blizzard events recorded in Iowa County from 1999 to 2018. There were no deaths, injuries, or damage reported for Iowa County. Refer to Table 17. However, the episode narrative described the blizzard of February 2011 as, "A tremendous blizzard, one of the worst in memory, impacted the region on February 1–2, 2011, as deep low pressure tracked from Texas to southern Indiana. Snowfall totals ranged from 10 to

20 inches with drifts as high as 7 feet. Blizzard conditions were widespread with visibilities near zero in heavy snow and wind gusting to over 50 to 60 mph." The closure of the University of Iowa and the death of a man in Henry County were also reported. This event shows the magnitude of impact severe winter weather is capable of producing.

Table 17: Iowa County Blizzard Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 12/20/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/12/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/09/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/11/2010 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/01/2011 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/19/2012 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 6 | 0 | 0 | 0.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

Another type of severe winter weather is heavy snow events. There have been fourteen events recorded in Iowa County. There were no directly attributable deaths or injuries reported. Three events had property damage reported, totaling $10 thousand or less each, which is a relatively low figure. Refer to Table 18.

Table 18: Iowa County Heavy Snow Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 12/01/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/01/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/18/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/20/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/28/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/01/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/26/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/04/2004 | 0 | 0 | 5.00K | 0.00K |
| IOWA (ZONE) | 03/15/2004 | 0 | 0 | 5.00K | 0.00K |
| IOWA (ZONE) | 01/05/2005 | 0 | 0 | 10.00K | 0.00K |

Table 18: Iowa County Heavy Snow Events 1999–2018, continued

| | | | | | |
|---|---|---|---|---|---|
| IOWA (ZONE) | 01/09/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/13/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 03/23/2018 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 11/25/2018 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 14 | 0 | 0 | 20.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

In Iowa, ice storm events typically cause the human loss and property damage associated with severe winter weather, if any. From 1999–2018, there were nine ice storm events in Iowa County. Refer to Table 19. There were no deaths or injuries reported. Only one event, from February 2007, has reported property damage, but the figure is relatively high, at nearly $900 thousand.

In some areas, there was up to seven inches of accumulated ice. This storm occurred over widespread area in combination with blizzard conditions. Thousands of people lost power in east central Iowa and travel was dangerous for several days.

Table 19: Iowa County Ice Storm Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 12/15/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/28/2001 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/03/2005 | 0 | 0 | 5.00K | 0.00K |
| IOWA (ZONE) | 02/24/2007 | 0 | 0 | 890.00K | 0.00K |
| IOWA (ZONE) | 12/01/2007 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/11/2007 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/08/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/27/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/20/2010 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 9 | 0 | 0 | 895.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

Extreme cold and wind chill is also included in the severe winter storm definition because it is a dangerous component of Iowa's winter season. There have been eight extreme cold or wind chill events reported in Iowa County from 1999 through 2018. No deaths, injuries, property damage, or crop damage has been reported; however, extreme cold and wind chill events are potentially life-threatening. Refer to Table 20.

Table 20: Iowa County Extreme Cold/Wind Chill Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| IOWA (ZONE) | 12/16/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/21/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 12/23/2000 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/02/2007 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/24/2008 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/14/2009 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/05/2014 | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 01/22/2014 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 8 | 0 | 0 | 0.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

### Probability

Historical occurrences indicate that several winter storm events can occur annually in Iowa County so the probability is high likely, which is greater than 33% chance in any given year. The frequency of severe winter storm events depends on the overall severity of a particular winter season. As historical data indicates, Iowa County can be affected by several severe winter storm events in one year, but there can also be a year with few or no severe winter storm events.

### Magnitude and Severity

Winter storms usually impact several counties during a single event. Due to size and environmental changes as a storm travels across a region, there will be local variation in storm intensity and quantity of precipitation. The presence of snow or ice, high winds, and low temperatures can make a significant difference in how a severe winter storm event will impact a community.

During a winter storm event, people, pets, and livestock are susceptible to frostbite and hypothermia. The people primarily at risk are engaged in outdoor activity such as shoveling snow, digging out vehicles, or assisting stranded motorists. The elderly or very young are also vulnerable during a winter storm event. Businesses and schools often close during extreme cold or heavy snow conditions to protect the safety of patrons, workers, students, and bus drivers.

Heavy snows, blizzards, and ice storms can immobilize transportation systems, damage trees and power lines, and collapse buildings and communications towers. The potential for drifting snow is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind. Severe ice storms have caused total electric power outages

over large areas of Iowa and rendered assistance unavailable to those in need due to impassable roads.

Regarding the transportation system, the Iowa Department of Transportation (IDOT), county road departments, and local governments are responsible for snow removal of snow and treatment of snow streets and highways. Severe winter storm conditions can slow or stop the flow of vital supplies and disrupt emergency services. In addition, the emergency needs of remote or isolated residents for food or fuel, as well as for feed, water and shelter for livestock may be difficult to fulfill.

In Iowa County, a severe winter storm can reach a critical level primarily due to the potential risk of human injury and death. It is possible a shutdown of services and facilities could last more than one week if the storm causes major power outages. This severity estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

#### Warning Time

The NWS has developed effective weather notifications that are promptly and widely distributed to the public. Notifications made by the NWS include winter storm watch, winter storm warning, blizzard warning, winter weather advisory, and freeze advisory.

Radio, television, weather alert radios, and even smart phone applications provide current weather information. For winter storm events accurate information is available up to a few days in advance.

#### Duration

Although a severe winter storm typically occurs over several hours, the event can have lasting impacts on a community beyond a week. Dangerous road conditions and/or electrical power outage can affect a community, especially rural areas, for an extended period of time. It is also possible that a severe winter storm event can last several days due to multiple storms events occurring in short period of time.

## Sinkholes

### Definition of Hazard

A sinkhole is the loss of surface elevation due to the removal of subsurface support. Sinkholes range from broad, regional lowering of the land surface to localized collapse. The primary cause of most subsidence are human activities such as underground mining, groundwater or petroleum withdraw, and drainage of organic soils. Sinkholes are also caused by erosion of limestone in subsurface areas.

### Excluded Hazard

There is no record of sinkholes or mines in Iowa County. The *Iowa Hazard Mitigation Plan* states that no State agency is designated as a central collection point for sinkhole information (3-61). The IDNR has compiled sinkhole locations based on field reports, creating the most comprehensive collection of data. IDNR data was used to create Map 12, which shows no recorded sinkholes, a very small area of potential karst geography, and no mines. Because there is no history of sinkholes in the county and almost complete absence of geography more susceptible to sinkholes, Sinkholes is excluded from this risk assessment.

Map 12: Sinkholes, Potential Karst Soil, and Mines in Iowa Coutny

## Thunderstorm, Lightning, and Hail

### Definition of Hazard

A thunderstorm can occur singly, in clusters, or in lines resulting in heavy rains, winds reaching or exceeding 58 mph, producing a tornado, or hail. Most thunderstorms produce only thunder, lightning, and rain.

Severe storms, however, can produce tornadoes, straight-line winds, microbursts above 58 mph, lightning, hailstorms, and flooding. The National Weather Service considers a thunderstorm severe if it produces hail at least 1 inch in diameter, winds 58 mph or higher, or tornadoes.

Straight-line winds can often exceed 60 mph, are common occurrences, and are often mistaken for tornadoes. A number of thunderstorms have caused other hazards such as flash flooding, river flooding, and tornadoes.

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. The temperature of lightning can reach 50,000 degrees Fahrenheit in a split second. The rapid heating, expansion, and then cooling of air near lightning creates thunder.

A hailstorm is an outgrowth of a severe thunderstorm in which pellets or irregularly shaped lumps of ice, otherwise known as hail, fall with rain. Hail can be smaller than a pea or as large as a softball.

#### Potential Hazard Area

The potential hazard area for thunderstorm, lightning, and hail in Iowa County is countywide.

#### Historical Occurrences

From 1999–2018, there have been 84 thunderstorm events recorded in Iowa County. Thunderstorms are the most frequently occurring natural hazard in Iowa County. There are several thunderstorms every year, and multiple storms often develop in an area within just a few days. From the recorded thunderstorm events, there have been no deaths, three reported injuries, over $5 million in property damage, and $28 thousand in crop damage reported over the entire area impacted by the events. Refer to

Table 21. Some of the property damage reported during wind events includes a roof blown off of a car wash about one mile north of Williamsburg, power poles snapped in half, and widespread damage to trees and crops.

Table 21: Iowa County Thunderstorm Wind Events 1999–2018

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| WILLIAMSBURG | 07/27/1999 | | 0 | 0 | 1.00K | 0.00K |
| NORTH ENGLISH | 07/27/1999 | | 0 | 0 | 10.00K | 0.00K |
| NORTH ENGLISH | 09/11/2000 | | 0 | 0 | 20.00K | 0.00K |
| COUNTYWIDE | 06/14/2001 | 61 kts. E | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/14/2001 | 52 kts. E | 0 | 1 | 0.00K | 0.00K |
| VICTOR | 06/14/2001 | 52 kts. E | 0 | 0 | 0.00K | 0.00K |
| COUNTYWIDE | 06/14/2001 | 61 kts. E | 0 | 0 | 0.00K | 0.00K |
| SOUTH AMANA | 07/08/2001 | 52 kts. E | 0 | 0 | 0.00K | 0.00K |
| LADORA | 09/07/2001 | 52 kts. E | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 09/07/2001 | 52 kts. E | 0 | 1 | 0.00K | 0.00K |
| VICTOR | 03/09/2002 | 52 kts. E | 0 | 0 | 0.00K | 0.00K |
| LADORA | 06/26/2002 | 57 kts. E | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/26/2002 | 57 kts. M | 0 | 0 | 0.00K | 0.00K |
| LADORA | 07/05/2003 | 52 kts. EG | 0 | 0 | 50.00K | 5.00K |
| VICTOR | 08/20/2003 | 52 kts. EG | 0 | 0 | 3.00K | 0.00K |
| LADORA | 08/20/2003 | 52 kts. EG | 0 | 0 | 3.00K | 0.00K |
| VICTOR | 05/23/2004 | 52 kts. EG | 0 | 0 | 7.00K | 0.00K |
| MILLERSBURG | 05/23/2004 | 52 kts. EG | 0 | 0 | 5.00K | 0.00K |
| MARENGO | 05/23/2004 | 57 kts. EG | 0 | 0 | 8.00K | 0.00K |
| LADORA | 08/03/2004 | 52 kts. EG | 0 | 0 | 3.00K | 3.00K |
| WILLIAMSBURG | 08/03/2004 | 52 kts. EG | 0 | 0 | 3.00K | 3.00K |
| LADORA | 08/26/2004 | 61 kts. EG | 0 | 0 | 5.00K | 2.00K |
| AMANA | 05/11/2005 | 52 kts. EG | 0 | 0 | 0.50K | 0.00K |
| MARENGO | 07/17/2006 | 70 kts. EG | 0 | 0 | 15.00K | 0.00K |
| AMANA | 08/10/2006 | 57 kts. EG | 0 | 0 | 0.00K | 15.00K |
| AMANA | 08/10/2006 | 57 kts. EG | 0 | 0 | 5.00K | 0.00K |
| VICTOR | 03/31/2007 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 03/31/2007 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| AMANA APT | 06/07/2007 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 05/25/2008 | 56 kts. EG | 0 | 1 | 10.00K | 0.00K |

Table 21: Iowa County Thunderstorm Wind Events 1999–2018, continued

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| CONROY | 06/08/2008 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/10/2008 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 07/21/2008 | 56 kts. EG | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 07/21/2008 | 70 kts. MG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 07/21/2008 | 61 kts. EG | 0 | 0 | 25.00K | 0.00K |
| WILLIAMSBURG | 07/21/2008 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| HIGH AMANA | 06/23/2009 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| EAST AMANA | 06/23/2009 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 08/09/2009 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 08/09/2009 | 61 kts. EG | 0 | 0 | 5.00K | 0.00K |
| VICTOR | 05/24/2011 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 05/02/2012 | 70 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 05/02/2012 | 60 kts. EG | 0 | 0 | 0.00K | 0.00K |
| LADORA AIR STRIP | 06/29/2012 | 70 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 06/29/2012 | 70 kts. EG | 0 | 0 | 1.00K | 0.00K |
| GENOA BLUFF | 06/29/2012 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 06/29/2012 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/29/2012 | 78 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 08/09/2012 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| CONROY | 08/09/2012 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 08/09/2012 | 50 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 08/16/2012 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 08/16/2012 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 08/16/2012 | 50 kts. EG | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 05/19/2013 | 65 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/19/2013 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 04/27/2014 | 50 kts. EG | 0 | 0 | 0.00K | 0.00K |
| LADORA | 04/27/2014 | 50 kts. EG | 0 | 0 | 0.00K | 0.00K |
| LADORA | 04/27/2014 | 61 kts. MG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 04/27/2014 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |

Table 21: Iowa County Thunderstorm Wind Events 1999–2018, continued

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| VICTOR | 04/27/2014 | 60 kts. EG | 0 | 0 | 0.00K | 0.00K |
| LADORA | 05/12/2014 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/12/2014 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 06/29/2014 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/30/2014 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/30/2014 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| HOMESTEAD | 06/30/2014 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 11/11/2015 | 61 kts. EG | 0 | 0 | 5.000M | 0.00K |
| MARENGO | 03/06/2017 | 70 kts. MG | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 03/06/2017 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 05/17/2017 | 70 kts. EG | 0 | 0 | 10.00K | 0.00K |
| MARENGO | 05/17/2017 | 52 kts. MG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 05/17/2017 | 50 kts. EG | 0 | 0 | 0.00K | 0.00K |
| LADORA AIR STRIP | 05/17/2017 | 61 kts. MG | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/14/2017 | 56 kts. EG | 0 | 0 | 0.00K | 0.00K |
| HOLBROOK | 07/21/2017 | 56 kts. EG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 05/26/2018 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 06/20/2018 | 52 kts. EG | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 08/28/2018 | 65 kts. EG | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 08/28/2018 | 60 kts. EG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 08/28/2018 | 74 kts. EG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 08/28/2018 | 52 kts. MG | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 08/28/2018 | 60 kts. EG | 0 | 0 | 0.00K | 0.00K |
| HOLBROOK | 08/28/2018 | 61 kts. EG | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 84 | | 0 | 3 | 5.189M | 28.00K |

Source: National Centers for Environmental Information, August 2019

The NCEI contains records of lightning events when lightning results in fatality, injury, and/or property or crop damage. From 1999 through 2018, only one lightning event is recorded. It occurred in Marengo in June 2011. $15 thousand in property damage was recorded.[xxi]

Hail events, which often accompany thunderstorms, are also frequent in Iowa County. From 1999 through 2018, there have been 87 recorded hail events in the county. There were no

deaths or injuries reported, but there was over $2.5 million in reported property and crop damage. The majority of the damage, $2.5 million, occurred in three events that took place on two days in 2003 and 2011. One event in April 2003 caused $50 thousand in reported property damage, but all other events with recorded damage resulted in damages of $5 thousand or less. Overall, the majority of hail events resulted in no reported damage. Refer to Table 22.

Table 22: Iowa County Hail Events 1999–2018

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| NORTH ENGLISH | 04/03/1999 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 04/03/1999 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 09/03/1999 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 07/26/2000 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 08/09/2000 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 09/11/2000 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 09/11/2000 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 09/11/2000 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 05/10/2001 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 05/10/2001 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 05/10/2001 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 05/10/2001 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| HOMESTEAD | 05/08/2002 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 08/11/2002 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 04/30/2003 | 1.00 in. | 0 | 0 | 50.00K | 0.00K |
| NORTH ENGLISH | 05/10/2003 | 1.00 in. | 0 | 0 | 500.00K | 0.00K |
| WILLIAMSBURG | 05/10/2003 | 2.75 in. | 0 | 0 | 1.000M | 0.00K |
| LADORA | 05/10/2003 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 10/22/2004 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 10/22/2004 | 1.00 in. | 0 | 0 | 3.00K | 3.00K |
| MARENGO | 10/22/2004 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 06/04/2005 | 0.88 in. | 0 | 0 | 0.00K | 3.00K |
| CONROY | 03/08/2006 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |

Table 22: Iowa County Hail Events 1999–2018, continued

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| VICTOR | 04/13/2006 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 04/13/2006 | 1.00 in. | 0 | 0 | 5.00K | 0.00K |
| SOUTH AMANA | 04/13/2006 | 1.25 in. | 0 | 0 | 2.00K | 0.00K |
| AMANA | 04/13/2006 | 1.75 in. | 0 | 0 | 5.00K | 0.00K |
| MARENGO | 06/30/2006 | 0.75 in. | 0 | 0 | 0.00K | 5.00K |
| MILLERSBURG | 03/31/2007 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 03/31/2007 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 03/31/2007 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 06/21/2007 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/21/2007 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| HOLBROOK | 06/21/2007 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 02/04/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 03/31/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 06/09/2008 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 06/12/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CONROY | 06/12/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 06/12/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| HIGH AMANA | 06/12/2008 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| AMANA APT | 06/14/2008 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| MIDDLE AMANA | 06/14/2008 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 06/25/2008 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 07/02/2008 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 07/02/2008 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/21/2009 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 07/24/2009 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 04/05/2010 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 04/05/2010 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| CONROY | 04/05/2010 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |

Table 22: Iowa County Hail Events 1999–2018, continued

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| WILLIAMSBURG | 04/05/2010 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 05/25/2010 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 03/22/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 04/03/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 04/03/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 04/03/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| HOMESTEAD | 04/03/2011 | 1.75 in. | 0 | 0 | 1.000M | 0.00K |
| GENOA BLUFF | 04/03/2011 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| MIDDLE AMANA | 04/03/2011 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA | 04/03/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| AMANA APT | 04/03/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/22/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| HOLBROOK | 05/22/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| HOMESTEAD | 05/22/2011 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/22/2011 | 2.00 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 06/08/2011 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 06/08/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| HOLBROOK | 06/08/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 06/14/2011 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 05/02/2012 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 05/02/2012 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| LADORA AIR STRIP | 05/03/2012 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 05/03/2012 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 09/07/2012 | 1.50 in. | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 09/07/2012 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |

Table 22: Iowa County Hail Events 1999–2018, continued

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| WEST AMANA | 05/29/2013 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/22/2013 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MIDDLE AMANA | 10/04/2013 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| VICTOR | 06/22/2014 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 06/22/2014 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 05/26/2016 | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 05/26/2016 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 02/28/2017 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 05/17/2017 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 05/26/2018 | 1.00 in. | 0 | 0 | 0.00K | 0.00K |
| MARENGO | 06/09/2018 | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 08/28/2018 | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 87 | | 0 | 0 | 2.565M | 11.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | | |

In combination, the thunderstorm, lightning, and hail hazard is the most frequently occurring natural hazard in Iowa County. Every community has been affected, although not every community has reported injuries, deaths, or damage.

### Probability

Iowa experiences on average between 30 and 50 thunderstorm days per year. Several of these thunderstorms days include Iowa County each year. Because of the humid continental climate in Iowa, the conditions that create severe thunderstorms are typically present. To become severe, a storm needs moisture to form clouds and rain, relatively warm and unstable air that can rise rapidly, and weather fronts and convective systems that lift air masses.

In Iowa County, it is highly likely a thunderstorm and lighting event will occur at least once each year, if not several times during a severe summer season. Thunderstorm and lightning events are the mostly frequently occurring hazard in Iowa County. This probability estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

Considering hail events, based on historical occurrences in Iowa County a hail event is highly likely with a probability of occurring at least once each year. In a year with severe weather, Iowa County will likely experience several hail events in the spring and summer months.

### Magnitude and Severity

Severe thunderstorms can be quite expansive with areas of localized severe conditions. Most severe thunderstorm cells are 5 to 25 miles wide with a larger area of heavy rain and strong winds around the main cell. Depending on the size, a thunderstorm can affect several or just one community in Iowa County.

Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. Those in unprotected areas, mobile homes, or automobiles during a storm are at risk. Sudden strong winds often accompany a severe thunderstorm and may blow down trees across, power lines, homes, especially mobile homes, and businesses. High winds can also push vehicles off of the road. Straight-line winds are typically responsible for most damage during a thunderstorm event.

Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year according to the *2010 Iowa Hazard Mitigation Plan*. Floods and flash floods are the number one cause of weather related deaths in the United States. Livestock and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures.

Thunderstorms can produce hail that can cause injury, damage homes and businesses, break glass, and destroy vehicles. Flash floods and tornadoes can develop during thunderstorms as well. People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile homes are vulnerable to the impacts of severe thunderstorms. One or more severe thunderstorms occurring over a short period, especially on saturated ground, can lead to flooding and cause extensive power and communication outages as well as agricultural damage.

In Iowa County, when a future thunderstorm event occurs, the magnitude and severity will likely be limited. Injuries will likely not result in permanent disability, although one thunderstorm has resulted in one death. Severe damage could affect 10% to 25% of Iowa County, and any facility shutdown could last a week or more.

The land area affected by a hail event is often the same size or smaller than the area affected by the storm that produces the hail. Typically, a hail event occurs within a 15 mile diameter around

the center of the storm. Historical hail events in Iowa County have been widespread overall due to the storms moving through an entire community.

Hails events are rarely a direct cause of death but can cause injuries to humans, pets, and livestock that are outdoors during a storm. Hail can cause widespread damage to buildings, infrastructure, and vehicles. Damage to buildings is usually limited to damaged windows, roofs, and exteriors.

Agricultural crops are extremely vulnerable because a hailstorm can strip leaves or completely destroy plants. The peak time for hail events to occur in Iowa coincides with the agricultural season making damage a common risk. Factoring crop damage, hail events can cause millions in damage annually in Iowa. It is important to note, most of the financial impacts of hail damage are covered by insurance.

In a future hail event in Iowa County, the magnitude and severity of the event is likely to be limited based on historical occurrences. For property damage, 10% to 25% could be severely damaged, and injuries would not likely result in permanent disability. There is a possibility that some facilities and services may shutdown, but the period of time would likely be short, lasting less than a week.

#### Warning Time

The National Weather Service issues severe thunderstorm watches and warnings as well as statements about severe weather and localized storms. These messages are broadcast over NOAA Weather Alert Radios and area television and radio stations. Weather forecasting and severe weather warnings issued by the National Weather Service usually provide residents and visitors adequate warning time, which is 12 to 24 hours. Problems arise when warnings are ignored or not understood by residents and visitors.

Hail events can usually be predicted in conjunction with a severe storm that has conditions suitable for creating hail. The National Weather Service issues severe thunderstorm watches and warnings as well as statements about what type of severe weather might be produced during a storm. These messages are broadcast over NOAA Weather Alert Radios, television, and regular radio stations. Most often, warnings provide residents and visitors adequate time to prepare for a storm, which is approximately 12 to 24 hours in advance. Some hail events, though, may occur without warning during periods of volatile severe weather, typically when conditions are ideal for a tornado.

#### Duration

Depending on the size and severity of a thunderstorm and lightning event, the negative impacts can affect a community for a relatively short period of time. Typically, thunderstorm and lightning events that occur in conjunction with other hazards like flash flood, flood, hail, tornado, etc. affect a community for an extended period of time due to damage and shutdown

of facilities and services. Independently, a thunderstorm and lightning event will likely impact Iowa County for less than a day. A hail event is typically short-term lasting not more than six hours. In most occurrences, hailstorm events are just a few minutes within a larger storm that can occur over several hours.

## Tornado and Windstorm

### Definition of Hazard

A tornado is a violent whirling wind with a rotating funnel shaped cloud extending down. Rotating wind speeds can exceed 300 mph and travel across the ground at average speeds of 25–30 mph. A tornado path can be a few yards to a mile wide, but an average tornado is a few hundred yards wide. A tornado can move over land for distances ranging from short hops to miles.

Before 2007, the Fujita Scale was used to rate the magnitude of a tornado. The scale is a range of values for wind speed, frequency, average damage path width, and potential damage. The current rating scale is the Enhanced Fujita Scale, which uses more accurate ranges for wind speed and more detailed analysis of damage.

| Fujita Scale | | Enhanced Fujita Scale | |
|---|---|---|---|
| Scale | Wind Speed | Scale | Wind Speed |
| F0 | 40–72 mph | EF0 | 68–85 mph |
| F1 | 73–112 mph | EF1 | 86–110 mph |
| F2 | 113–157 mph | EF2 | 111–135 mph |
| F3 | 158–206 mph | EF3 | 136–165 mph |
| F4 | 207–260 mph | EF4 | 166–200 mph |
| F5 | 261–318 mph | EF5 | 200+ mph |

A windstorm is the extreme wind associated with severe storms. Windstorms may have a destructive path up to tens of miles wide. These events can produce straight line winds in excess of 64 knots. The Beaufort Scale, which ranges 0–12, is typically used to determine the magnitude of a windstorm.

| Beaufort Scale | Description | Wind Speed |
|---|---|---|
| 0 | Calm | <1 knot |
| 1 | Light air | 1–3 knots |
| 2 | Light breeze | 4–6 knots |
| 3 | Gentle breeze | 7–10 knots |
| 4 | Moderate breeze | 11–16 knots |
| 5 | Fresh breeze | 17–21 knots |
| 6 | Strong breeze | 22–27 knots |
| 7 | Near gale | 28–33 knots |
| 8 | Gale | 34–40 knots |
| 9 | Strong gale | 41–47 knots |
| 10 | Storm | 48–55 knots |
| 11 | Violent storm | 56–63 knots |
| 12 | Hurricane | >64 knots |

### Potential Hazard Area

The potential hazard area for a tornado and windstorm in Iowa County is countywide.

### Historical Occurrences

From 1999–2018, the have been 10 tornadoes reported in Iowa County. In total, there were no injuries or deaths reported, but there was almost $100 thousand in property and crop damage across the entire area impacted by the event. Refer to Table 23.

Table 23: Iowa County Tornadoes 1999–2018

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| MILLERSBURG | 05/18/2000 | F0 | 0 | 0 | 0.00K | 0.00K |
| NORTH ENGLISH | 05/18/2000 | F0 | 0 | 0 | 0.00K | 0.00K |
| PARNELL | 04/11/2001 | F0 | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 05/30/2004 | F1 | 0 | 0 | 10.00K | 3.00K |
| VICTOR | 05/25/2008 | EF1 | 0 | 0 | 100.00K | 0.00K |
| KOSZTA | 05/22/2011 | EF2 | 0 | 0 | 250.00K | 0.00K |
| MILLERSBURG | 05/22/2011 | EF0 | 0 | 0 | 10.00K | 0.00K |
| HOLBROOK | 04/27/2014 | EF1 | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 11/11/2015 | EF1 | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 07/11/2017 | EF1 | 0 | 0 | 1.00K | 0.00K |
| **Totals:** | 10 | | 0 | 0 | 371.00K | 3.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | | |

The highest magnitude tornado occurred in May 2011 in a rural area between Ladora and Marengo. There was $250 thousand in property damage that included snapped power poles and damaged roofs. $100 thousand in property damage was recorded for an EF1 event in May 2008. Three EF1 tornadoes have been recorded since, but only $1,000 of property damage was reported in one event.

A funnel cloud is a visible predictor for a tornado event. In Iowa County, there have been four funnel cloud events from 1999 through 2018. Refer to Table 24.

Table 24: Iowa County Funnel Cloud Events 1999–2018

| Location | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| LADORA | 05/10/2001 | 0 | 0 | 0.00K | 0.00K |
| MILLERSBURG | 04/18/2002 | 0 | 0 | 0.00K | 0.00K |
| WILLIAMSBURG | 06/06/2006 | 0 | 0 | 0.00K | 0.00K |
| GENOA BLUFF | 04/10/2008 | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 4 | 0 | 0 | 0.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | |

Windstorms can potentially cause widespread damage, as well. While their wind speeds are lower than tornadoes, they affect a wider area and can persist for several hours. There have been two strong wind events and four high wind events in Iowa County from 1999 through 2018. A high wind event is a windstorm with measurable wind speed that is gale force and stronger. Among all windstorm events, there were no deaths or injuries reported. $20,500 in property damage was recorded. Refer to Table 25 and Table 26.

Table 25: Iowa County Strong Wind Events 1999–2018

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| IOWA (ZONE) | 04/23/2001 | | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 04/02/2016 | 43 kts. EG | 0 | 0 | 0.50K | 0.00K |
| **Totals:** | 2 | | 0 | 0 | 0.50K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | | |

Table 26: Iowa County High Wind Events 1999–2018

| Location | Date | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|
| IOWA (ZONE) | 02/25/2001 | 40 kts. M | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 02/11/2003 | 43 kts. ES | 0 | 0 | 0.00K | 0.00K |
| IOWA (ZONE) | 11/12/2003 | 35 kts. MS | 0 | 0 | 20.00K | 0.00K |
| IOWA (ZONE) | 02/19/2016 | 52 kts. MG | 0 | 0 | 0.00K | 0.00K |
| **Totals:** | 4 | | 0 | 0 | 20.00K | 0.00K |
| Source: National Centers for Environmental Information, August 2019 | | | | | | |

### Probability

According to the *Iowa Hazard Mitigation Plan 2018*, Iowa averages 35 tornadoes per year[xxii], so they are common statewide. 10 tornadoes have been documented in the County from 1999–2018. Funnel clouds, which are a strong indicator of tornadoes, have been documented less often but have occurred several times, as well. The average period of time between tornado and funnel cloud events is two years.

The entire United States is subject to various types of windstorm events. According to the *Iowa Hazard Mitigation Plan 2018*, Iowa experienced more than 1,500 windstorm events, including wind associated with thunderstorms, straight-line winds, and funnel clouds.[xxiii] Including the high wind events shown in Table 26, Iowa County has high winds events every year.

Looking toward the future, it is highly likely a tornado or windstorm event will occur in Iowa County within the next five years. The estimated probability of a tornado event is approximately once every three years. This probability estimate is based on historical occurrences, parameters defined in the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

### Magnitude and Severity

The most severe tornado events that have occurred in Iowa County are F2 rated, but the majority of tornadoes are F0 and F1. Based on historical occurrences, Iowa County will most likely be affected by an EF0 or EF1 tornado in the next five years although a higher magnitude tornado is possible. Regarding windstorms, Iowa County has experienced gale force wind events. Based on historical occurrences, Iowa County will most likely be affected by windstorm events rated 8 or higher on the Beaufort scale, although hurricane winds are possible.

During a tornado and windstorm event, everyone located in or near the path of the tornado is vulnerable. There are several groups of people who are especially vulnerable during tornado events. These people include mobile or manufacturing home residents, outdoor recreation and campground visitors, outdoor workers, motorists, elderly, young, disabled individuals with limited mobility, and residents or workers in buildings without basements.

Generally the destructive path of a tornado is a few hundred feet in width, but stronger tornadoes can leave a path of devastation up to a mile wide. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area. In rare tornado events, entire neighborhoods and even communities have been destroyed.

Windstorms can have a destructive path that is several miles wide. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with windstorms and may cause significant damage to a wider area. It is often difficult to separate windstorm and tornado damage when wind speed exceeds 64 knots.

Damage from a tornado or windstorm can range from broken tree branches, shingle damage to roofs, and broken windows all the way to complete destruction of well-constructed buildings, infrastructure, and large trees. Tornadoes can also impact critical services, especially electrical power. Buried services such as water and gas are less vulnerable but can be negatively affected by their system components located above ground.

For Iowa and Iowa County, it is important to note varying degrees of crop damage can occur during a tornado or windstorm event. Wind can flatten fields, break plant stalks, or twist plants. Windstorm events can completely destroy a crop or cause limited damage than can reduce crop yields. Both circumstances can cause economic hardship for the agricultural sectors of Iowa and Iowa County's economy.

If a tornado or windstorm were to occur in Iowa County, the magnitude and severity would likely be limited. A future tornado event may result in injuries that do not result in permanent disability, 10% to 25% of a jurisdiction's property severely damaged, and shutdown of facilities and services for approximately a week. This magnitude and severity estimate is based on historical occurrences, parameters defined in the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

#### Warning Time

Advancement in weather forecasting has allowed tornado watches to be issued hours in advance of a tornado event. The best lead time is approximately 30 minutes. A tornado can change paths very rapidly limiting the amount of warning time for the people located in its path. Outside of weather forecasting, there may not be visible indicators of a tornado on the ground due to blowing dust or driving rain and hail, which limits the ability to spot and report a tornado.

A future tornado event in Iowa County will likely have minimal, less than six hours, or no warning time. The National Weather Service has developed a windstorm warning system that issues windstorm watches 12 to 24 hours in advance. Advisories are issued when existing or imminent windstorms could impact an area. Similar to tornado warnings, the typical warning time for a windstorm is 30 minutes. It is important to note that Iowa County activates the outdoor warning system for storm events that are predicted to have a wind speed of 70 mph or greater, which are rated 11 and greater on the Beaufort scale. This warning time estimate is based on historical occurrences and local knowledge.

#### Duration

Normally a tornado will stay on the ground for no more than 20 minutes. However, a tornado can touch ground several times in different areas. Typically, local response during a tornado event is for the immediate threat to life and property. After a tornado event, local response is for the individuals, services, and structures that were negatively impacted by the tornado.

Based on historical occurrences in Iowa County, a series of tornadoes can develop in a few hours prolonging the amount of time jurisdictions can be impacted by a tornado event but the event lasts less than six hours. In Iowa County, a windstorm event can last several hours but usually not more than an entire day. This duration estimate is based on historical occurrences, the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

# Technological Hazards

## Hazardous Materials Incident

### Definition of Hazard

Generally, a hazardous materials incident includes the accidental release of flammable, explosive, toxic, noxious, corrosive, oxidizing, or radioactive substances, irritants, or mixtures that can pose a risk to life, health, or property possibly requiring evacuation. A hazardous materials event includes fixed hazardous materials, transportation of hazardous materials, and pipeline transportation.

A fixed hazardous materials incident is the accidental release of hazardous materials during handling, storage, or production at a facility. Fixed incidents generally affect a localized area.

A transportation hazardous materials incident involves the accidental release of hazardous materials during the transport of materials. Transportation incidents generally affect the area where the incident occurs.

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small slow leak to a large rupture where an explosion is possible.

#### Potential Hazard Area

The potential hazard area for a hazardous materials event is conditionally identified as the entire county. Areas surrounding facilities using hazardous materials, which are required to report materials through a Tier II form, or along transportation infrastructure are immediate potential hazard areas. Refer to Map 13 through Map 16 in the Risk Assessment Maps for the locations of these facilities. Iowa County contains 105 miles of gas transmission pipelines and 97 miles of hazardous liquid pipelines.  17 and Map 18: NPMS Incident 2 show the approximate location of pipelines and the locations of pipeline spills since 2002. If materials are released in the air or water, the potential hazard area may be expanded downwind or downstream of the incident.

#### Historical Occurrences

Since 2000, there have been 17 hazardous materials incidents in Iowa County that involve 500 or more pounds or gallons of hazardous materials. Most incidents in Iowa County involve a relatively small amount of materials and are well contained. Data for all hazardous materials incidents are available through the Hazardous Substance Incident Tracking Database maintained

by the Iowa Department of Natural Resources. Refer to Table 27 for hazardous materials incidents involving 500 or more pounds or gallons—none of which exceeded local capabilities.

Table 27: Iowa County Hazardous Materials Events 500+ Gallons/Pounds 2000–2018

| Reported Date | Mode | Type | Material Name | Amount | Unit |
|---|---|---|---|---|---|
| 5/1/2001 11:16 | Handling And Storage | Acids/Bases | Acid | 10000 | gal |
| 1/17/2002 12:33 | Handling And Storage | Organic Chemical | R-134A Refrigerant | 13000 | lbs |
| 5/7/2002 21:32 | Theft | Fertilizer/Pesticide | Ammonia (anhydrous) - Agricultural | 2000 | lbs |
| 11/1/2002 16:25 | Manure | Manure | Manure | 3000 | gal |
| 5/17/2008 09:51 | Handling And Storage | Ammonia (anhydrous) | Anhydrous ammonia | 1000 | gal |
| 3/17/2009 11:26 | Handling And Storage | Other Chemical | Reverse Osmosis Water | 1250 | gal |
| 4/1/2009 17:19 | Manure | Manure | Cattle manure | 500 | gal |
| 4/1/2010 12:14 | Handling And Storage | Fertilizer/Pesticide | Ammonia (anhydrous) - Agricultural | 2000 | lbs |
| 8/4/2010 12:30 | Handling And Storage | Petroleum | Oil | 1000 | gal |
| 11/30/2010 10:19 | Pipeline | Fertilizer/Pesticide | Ammonia (anhydrous) - Agricultural | 500 | lbs |
| 8/16/2013 09:00 | Theft | Fertilizer/Pesticide | Anhydrous Ammonia - Ag related | 800 | gal |
| 11/11/2013 15:44 | Manure | Manure | Manure Hog | 2000 | gal |
| 12/11/2013 15:06 | Transportation | Acids/Bases | Citric Acid | 500 | gal |
| 4/23/2016 15:12 | Manure | Manure | Manure | 1000 | gal |

Table 27: Iowa County Hazardous Materials Events 500+ Gallons/Pounds 2000–2018, continued

| Reported Date | Mode | Type | Material Name | Amount | Unit |
|---|---|---|---|---|---|
| 4/12/2017 19:29 | Manure | Manure | Manure | 500 | gal |
| 7/9/2018 16:05 | Handling And Storage | | | 515 | lbs |
| | | Fertilizer/Pesticide | Anhydrous Ammonia - Ag related | 515 | lbs |
| Source: IDNR, Hazardous Substance Incident Tracking Database, September 2019 | | | | | |

Since 2000, the largest hazardous materials incident involved 13,000 lbs. of a refrigerant in January 2002. Only one other incident, an acid spill in 2001, was at least 10,000 gallons or pounds. Most of the spills, 11, in the county are agricultural materials: anhydrous ammonia and manure. Regardless of the amount of materials involved in a hazardous materials event, spillage in handling and storage is the most common.

Since 2002, there have been two pipeline incidents in Iowa County according to the National Pipeline Mapping System (NPMS). See  17 and Map 18: NPMS Incident 2. The incidents involved highly volatile liquids (HVL), e.g. propane or butane. The spills were fairly small, at 2.30 and 0.98 BBLS (barrels), which equals around 97 and 41 gallons, respectively. No fatalities or injuries were reports. The Hazardous Substance Incident Tracking Database also recorded one pipeline incident involving 500 pounds of anhydrous ammonia. The NPMS does not include distribution or gas gathering pipelines.

#### Probability

Minor hazardous materials incidents occur fairly frequently in Iowa County. Most incidents are not a major threat due to small quantities or immediate containment. Any of the frequent incidents could become a major event if materials are released in a densely populated or environmentally sensitive area and/or involves a large amount of material. The probability estimate of a major hazardous materials incident occurring in Iowa County is likely, which is a probability greater than 19% and up to 33% in any given year. This probability estimate is based primarily on local knowledge.

#### Magnitude and Severity

People, pets, livestock, and vegetation in close proximity to facilities producing, storing, or transporting hazardous substances are at risk. Some hazardous materials may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful and damaging burns to skin if they come in direct contact with your body.

Populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.

Most hazardous materials incidents are localized and are quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristic of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the material contaminates a source of water.

Facilities are required to have an off-site consequence plan that addresses the population of the surrounding area. Responding personnel are required to be trained to HAZMAT Operations Level to respond to the scene, and those personnel that come into direct contact with the substances released are required to have HAZMAT Technician level training.

Throughout Iowa County, there are fixed facilities with hazardous materials—farm cooperatives, manufacturers, water and wastewater treatment facilities, etc. In addition, Iowa County has major travel routes including Interstate 80, Highway 6 and 151, railroad lines, and pipelines. Refer to the risk assessment maps for transportation incident.

Hazardous materials incidents can be widespread and severe, but historical occurrences in Iowa County had negligible impact. It is most likely potential hazardous materials incidents will continue to have negligible impacts, although it is possible an incident can be severe.

#### Warning Time

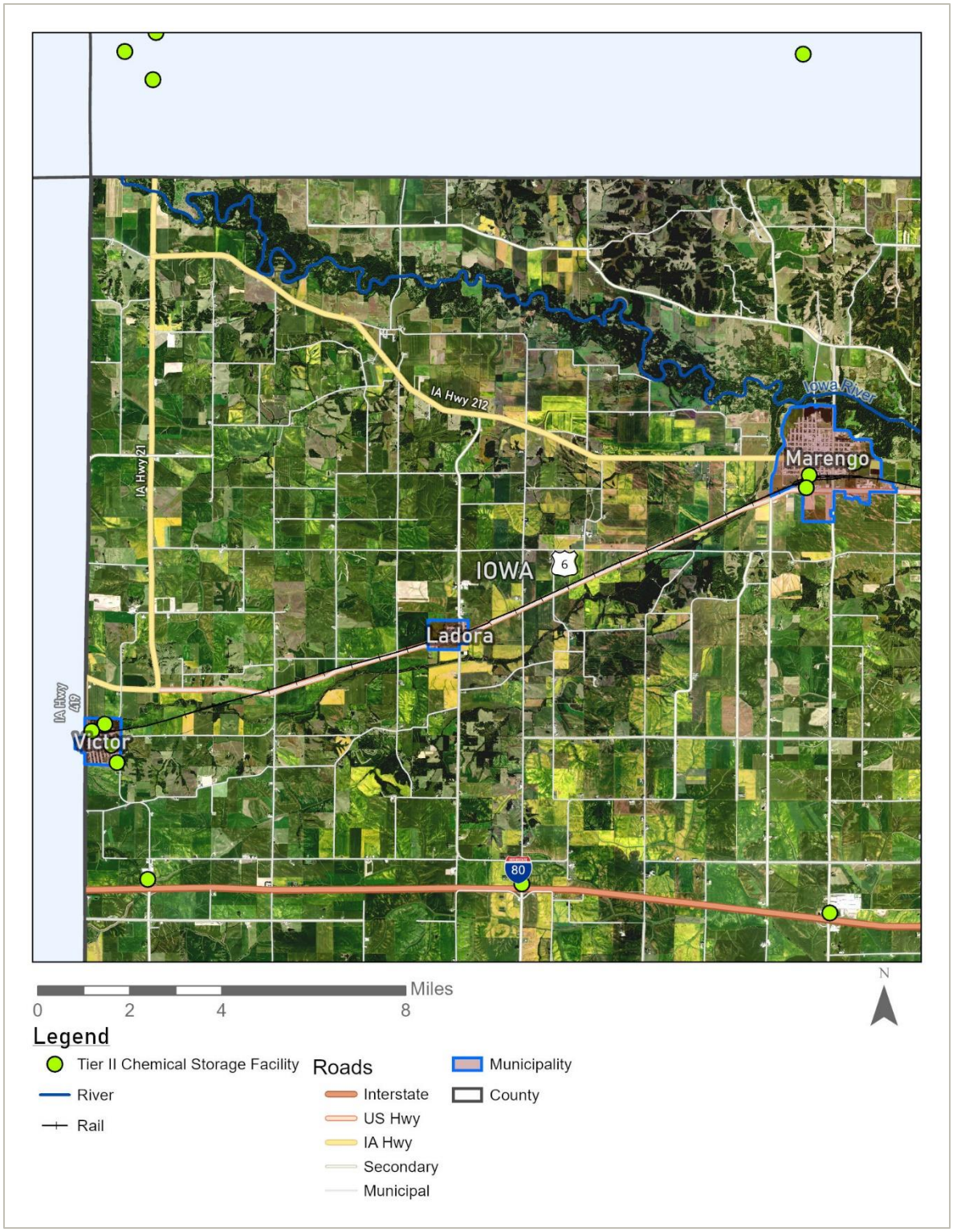
Hazardous materials incidents usually occur rapidly with minimal or no warning. Even if reported immediately, people in the area have very little time to react and/or evacuate. During some events, sheltering in-place is the best alternative to evacuation because there is no time to evacuate safely. Mass notification systems, television, radio, and weather radios disseminate emergency messages about incidents.

#### Duration

A hazardous materials incident can affect a community for a short period of time if the amount of material is relatively small and well-contained. On the other hand, a hazardous materials incident can be widespread, extremely dangerous and require long-term remediation and recovery. Response to a hazardous materials release is generally limited to the immediate effects, but response is expanded for environmental emergencies.

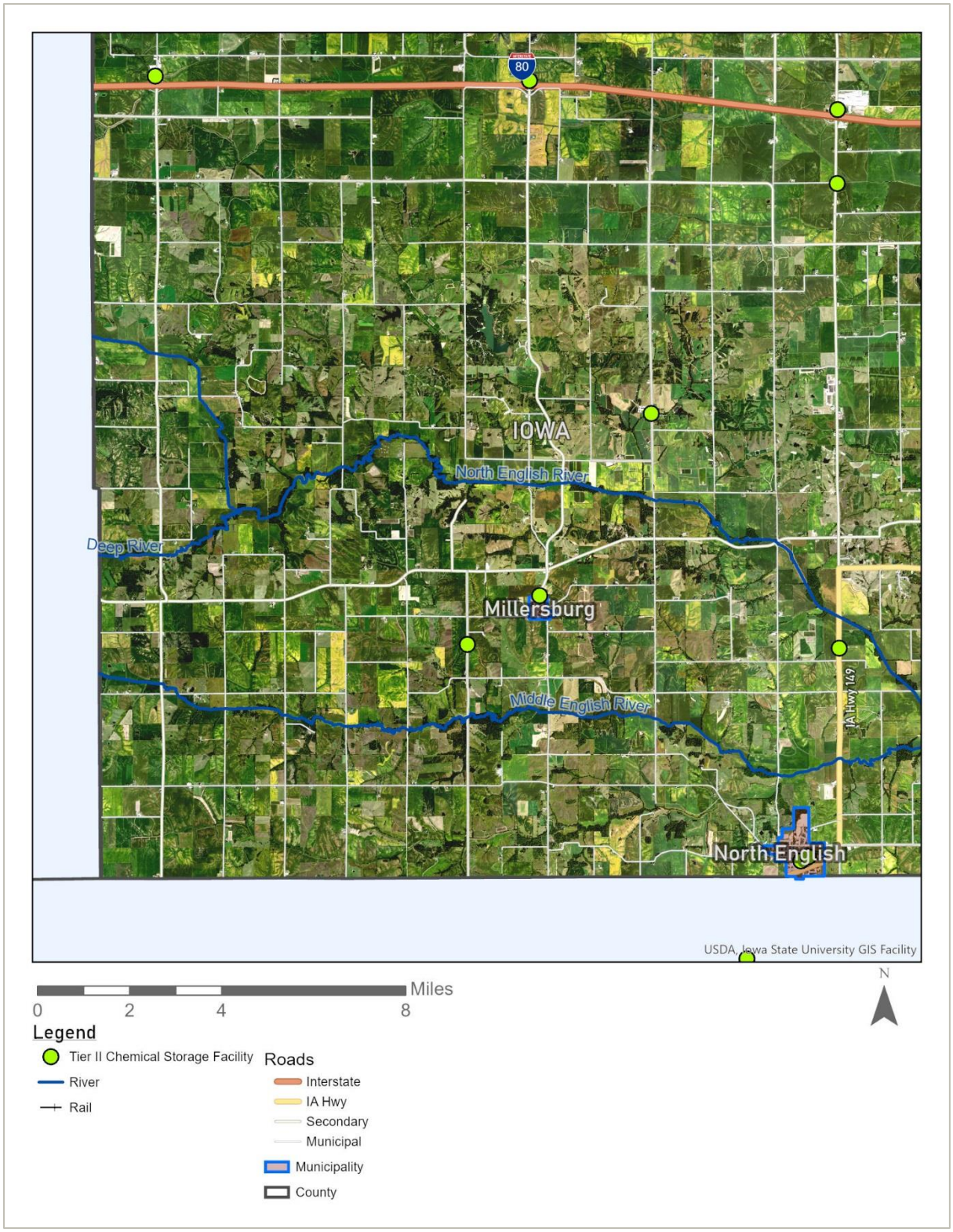
## Risk Assessment Maps

Map 13: Iowa County NW Quadrant Tier II Facilities



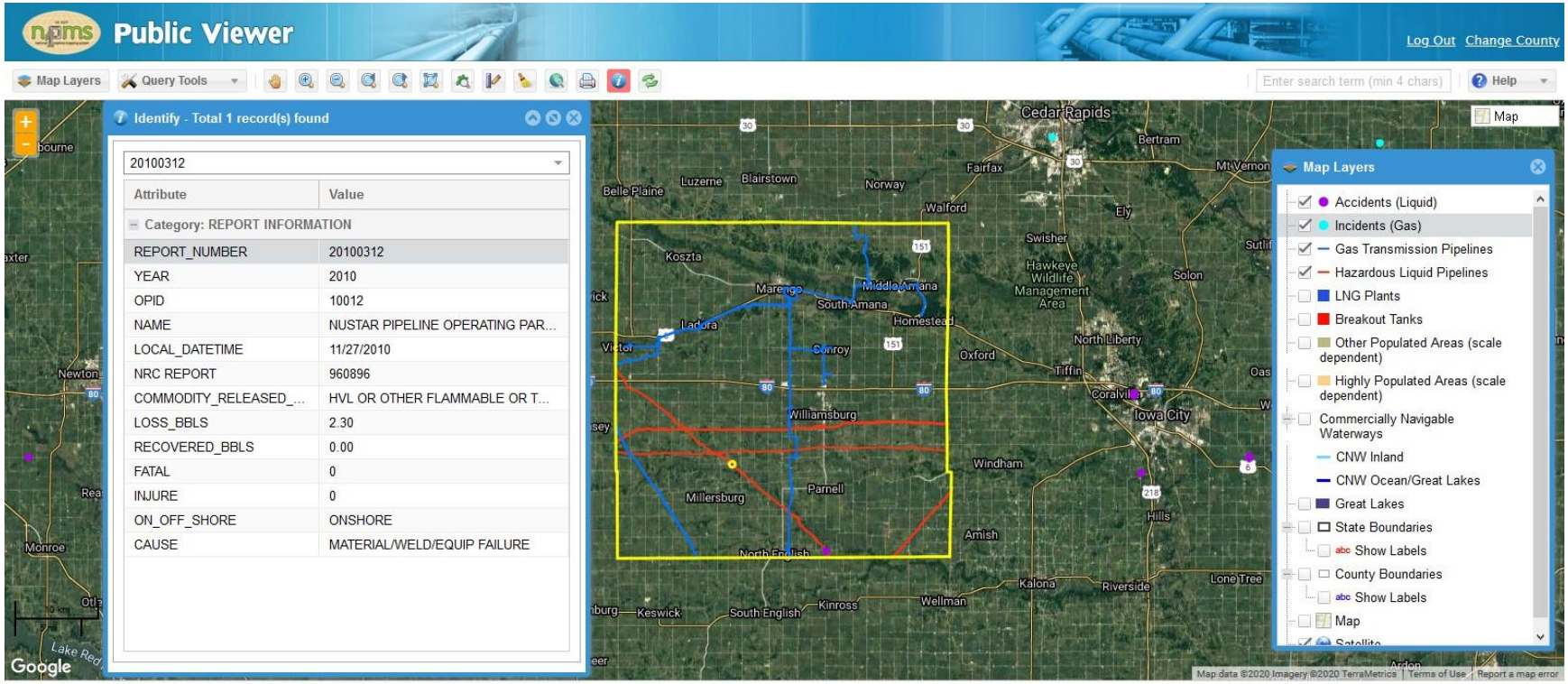
Map 14: Iowa County NE Quadrant Tier II Facilities

Map 15: Iowa County SW Quadrant Tier II Facilities

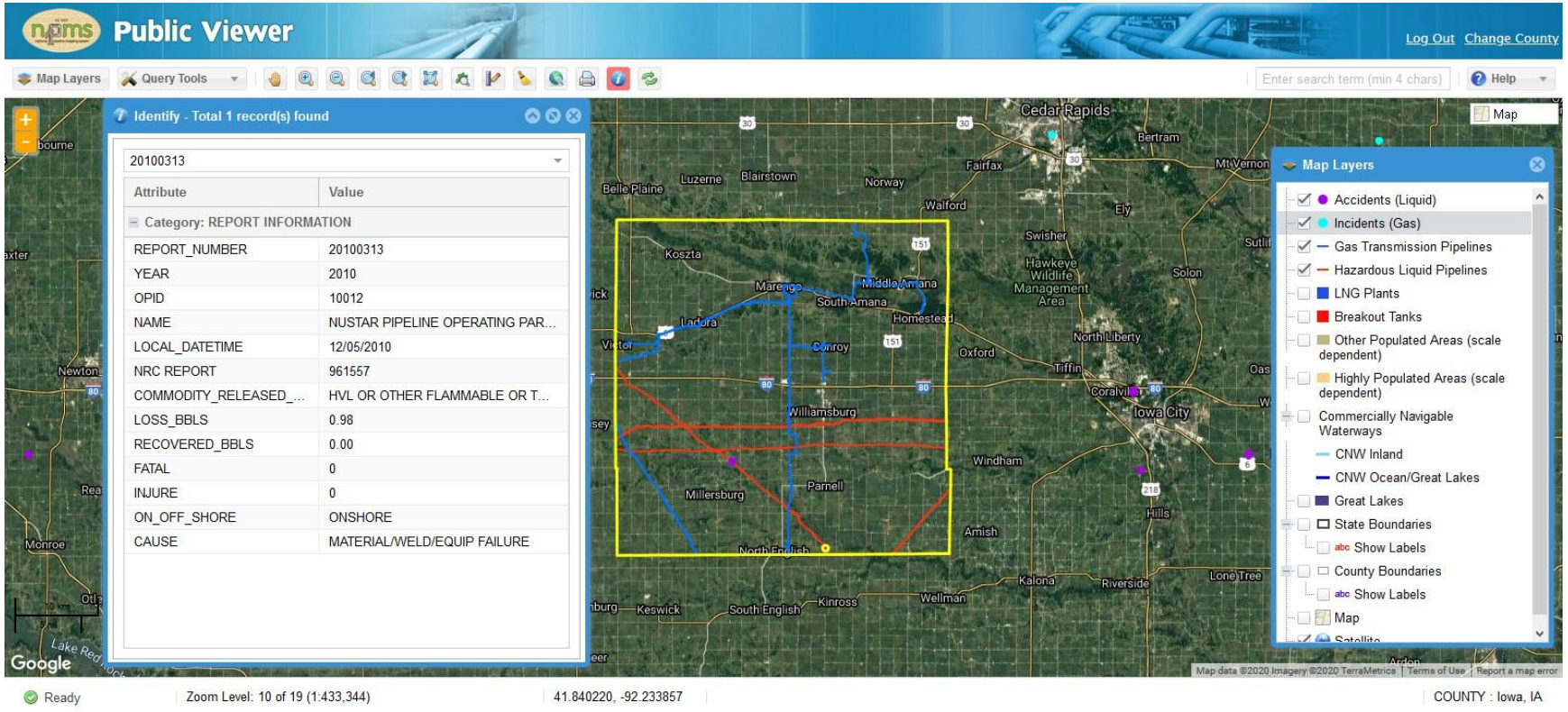


Map 16: Iowa County SE Quadrant Tier II Facilities

Map 17: NPMS Incident 1



Map 18: NPMS Incident 2



## Infrastructure Failure

### Definition of Hazard

This hazard encompasses communication failure, energy failure, structural failure, and structural fire. This includes an extended interruption, widespread breakdown, or collapse (part or all) of any public or private infrastructure that threatens life and property.

#### Potential Hazard Area

The potential hazard area for infrastructure failure in Iowa County is countywide but concentrated in and around cities.

#### Historical Occurrences

There have been no widespread communication failures in Iowa County. There are typically multiple power outages throughout Iowa County each year. The most recent and widespread power outage occurred during a major flash flooding event, which limited the use of pumps in structures.

The majority of major and minor infrastructure failure, such as roads, bridges, or water infrastructure, is due to natural hazards that occur in Iowa County. The persistent infrastructure failure that occurs in Iowa County is stormwater and wastewater backup due to insufficient capacity during heavy rains or infiltration due to cracks in sewer lines.

Degrading transportation infrastructure is a consistent issue in Iowa County similar to all counties throughout Iowa. Bridges are especially challenging due to the high cost of repair and replacement to meet modern safety standards.

Structural fires occur often throughout Iowa County, but typically, local capabilities are sufficient to respond and control the fire.

#### Probability

No widespread communications failures have occurred in Iowa or Iowa County. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner. Widespread and long-term communications losses are unlikely due to backup systems and redundant system designs.

An extended interruption of electric, petroleum, or natural gas service, which by an actual or impending acute shortage of usable energy, could create a potential health problem for the population and possibly even mass panic. International events could potentially affect supplies

of energy producing products while local conditions could affect distribution of electricity, petroleum, or natural gas. The magnitude and frequency of energy shortages are associated with international markets.

Local and state events such as severe winter storms can disrupt power distribution systems. If disruptions are long lasting, public shelters may need to be opened to provide shelter from extreme cold or extreme heat. Stockpiles of energy products like power generators and fuel can eliminate short disruptions.

In Iowa County, there have been structural failures, primarily structural damage from severe weather events. Throughout Iowa County, local jurisdictions inspect and maintain structures or enforce local regulations to prevent failures that can cause injury, death, or property damage. Most often, structures are closed or decommissioned before a major failure event can occur, but there is still a likely probability of a failure occurring in Iowa County.

Structural fires are a frequent occurrence in some communities, but nearly all are quickly extinguished by on-site personnel or local fire departments. In Iowa County, there have been structural fires requiring emergency response and recovery efforts but local capabilities have been sufficient. Despite comprehensive fire prevention and education in public, commercial, and residential structures, there is a likely probability for a major structural fire to occur in Iowa County.

#### Magnitude and Severity

Most critical communication systems have backup and redundant designs to provide continuity of service. It should be noted that Iowa County's E911 communications are based in Marengo with communication sites located throughout the county. If a communications failure were to affect the main communication center, the entire county would be affected and at risk, especially if the failure event occurred during a hazard event.

Energy failure, or power outages, can be widespread and last for several hours or a few days. Depending on the time of year, an extended period of time without power can be dangerous in extreme cold or heat conditions. In addition, power outages can limit the use of pumps or other necessary equipment to protect structures during other hazards, like flash food, that may affect an area during the outage.

Any structure in Iowa County could become hazardous in the event of flooding, earthquake, fire, high winds, or other natural events. All structures are vulnerable due to normal deterioration and natural elements. Expected increases in traffic volume and weight will likely increase the vulnerability of transportation facilities in Iowa and Iowa County.

The impacts of a failed structure would likely be contained to the immediate area and adjacent properties. The area could be as small as the house and yard of a fallen chimney, or the area could be relatively extensive if a failed structure is a multi-story building or a tall communication

tower. Dam and levee failures would affect a much larger area and are discussed as separate hazards.

Occupants of older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Structures with combustible materials are more vulnerable than steel or concrete structures. In addition, structures without early detection devices are more likely to be completely destroyed before containment by response agencies.

Structures in areas served by older, smaller, or otherwise inadequate water distribution infrastructure are also at significant risk. The fire death risk for the elderly and children under 5 years of age is more than two times that of the average population.

With modern training, equipment, fire detection devices, and building regulations and inspections, most fires can be quickly contained and limited to the immediate structure involved. Certain circumstances, such as the involvement of highly combustible materials or high winds, can threaten a larger area. The density of a neighborhood can also make occupants and structures more vulnerable due to the potential of fire spreading.

#### Warning Time

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

A typical, more frequent type of energy failure, which is an electrical outage, does not have a warning. If an outage occurs because of severe weather, then warnings for severe weather events can be considered a warning, but it is difficult to predict whether or not utilities will be impacted. Overall, this type of energy failure cannot usually be predicted.

The failure of a structure would likely occur suddenly with little or no warning. Inspection and maintenance of public structures and enforcement of local regulation usually prevents failure or removes people who are vulnerable. Causal hazards can include fire, explosion, overloading of ice and snow, earthquakes, flooding, high wind, erosion, chemical corrosion, subsidence, and lack of general upkeep.

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

#### Duration

With the exception of structural failure and fires, which are handled by local response personnel, communication failure and energy failure are usually widespread in nature and may require outside resources to assist the county in emergency response.

## Levee and Dam Failure

### Definition of Hazard

Levee failure can be attributed to the loss of structural integrity of a flood wall or berm by erosion, piping, saturation, or under seepage causing water to inundate normally dry areas.

Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, which can affect life and property. Dams are constructed for a variety of uses, including flood control, erosion control, water supply impoundment, hydroelectric power generation, and recreation.

Dams are classified as high, moderate, or low hazard to indicate the potential impacts of failure. The classifications, which do not signify the likelihood of failure, are:

- High Hazard—Failure may result in loss of life and extensive damage
- Moderate Hazard—Failure may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads, interrupt major utility services; and there is no substantial risk of loss of life. Or the dam and its impoundment are of public importance, such as water supply, public recreation, or a feature in a private development complex.
- Low Hazard—Failure would be limited to loss of the dam, livestock, farm outbuildings, agricultural lands and lesser used roads, and loss of life is unlikely.

### Potential Hazard Area

The majority of Marengo is protected by a levee so if a failure were to occur, major or even minor, the entire city and the surrounding rural areas could be severely impacted. In total, there are about 11 miles of levees in the county, but east of Marengo, the levees protect mostly agricultural lands. Refer to the risk assessment maps in the Flood section, which include the levee protected area in Marengo.

There are 21 dams located throughout Iowa County. The potential hazard area for dam failure is generally the areas surrounding and downstream of the dam. Overall, dam classification determines the potential risk if failure were to occur. Of the eighteen dams in Iowa County, all are low hazard except one dam that is classified as a high hazard dam. The high hazard dam is the Middle Pond Dam located at the Amana Colonies Golf Club in northeast Iowa County. The

potential hazard area would be immediately surrounding the pond: the normal storage area is 78 acre-feet, which is fairly low relative to other dammed water bodies in the county. Refer to the risk assessment maps. Outside of Iowa County, the nearest dams are all classified as low hazard except one significant hazard dam 7.6 miles west of the county.

#### Historical Occurrences

There have been no major failures of levee or dam structures in Iowa County.

#### Probability

The IDNR inspects major dams and levee structures. Major dams are all high hazard dams plus moderate hazard dams that have a permanent storage volume exceeding 100 acre-feet or a total water storage volume to the top of the dam exceeding 250 acre-fee. Low hazard dams with a product of the storage, in acre-feet, and height, in feet, that exceeds 30,000 are also considered major. One of the low hazard dams is classified as major. Major levee and dam structures in Iowa County are regularly inspected and maintained so it is unlikely a major dam failure would occur. In addition to historical occurrences, this probability estimate is based on the *Iowa Hazard Mitigation Plan 2018* and local knowledge.

#### Magnitude and Severity

The majority of Marengo is protected by a levee so if a major failure were to occur, the entire city and the surrounding rural areas could be severely impacted. Minor failures are more likely to occur as the levee structure and pumps degrade so levee protected areas near the failure would be impacted. Regardless, any level of failure could result in the shutdown of critical facilities, including emergency services buildings, hospital, and major transportation routes through the county. Refer to the risk assessment maps.

Most of the dams in Iowa County are low risk so failure would likely result in flooding of the surrounding area and downstream flood prone areas. For the high hazard dam, the Middle Pond Dam, there is a risk of loss of life and severe property damage due to the large amount of water regulated north of development in Amana. Refer to the risk assessment maps.

Overall, the estimated magnitude and severity of this particular hazard is catastrophic due to the potential damage to a large area of property and shutdown of countywide critical facilities that could result from a major levee failure in Marengo. It is likely a dam failure would result in negligible or limited damage, but the primary local priority is the levee structure in Marengo.

#### Warning Time

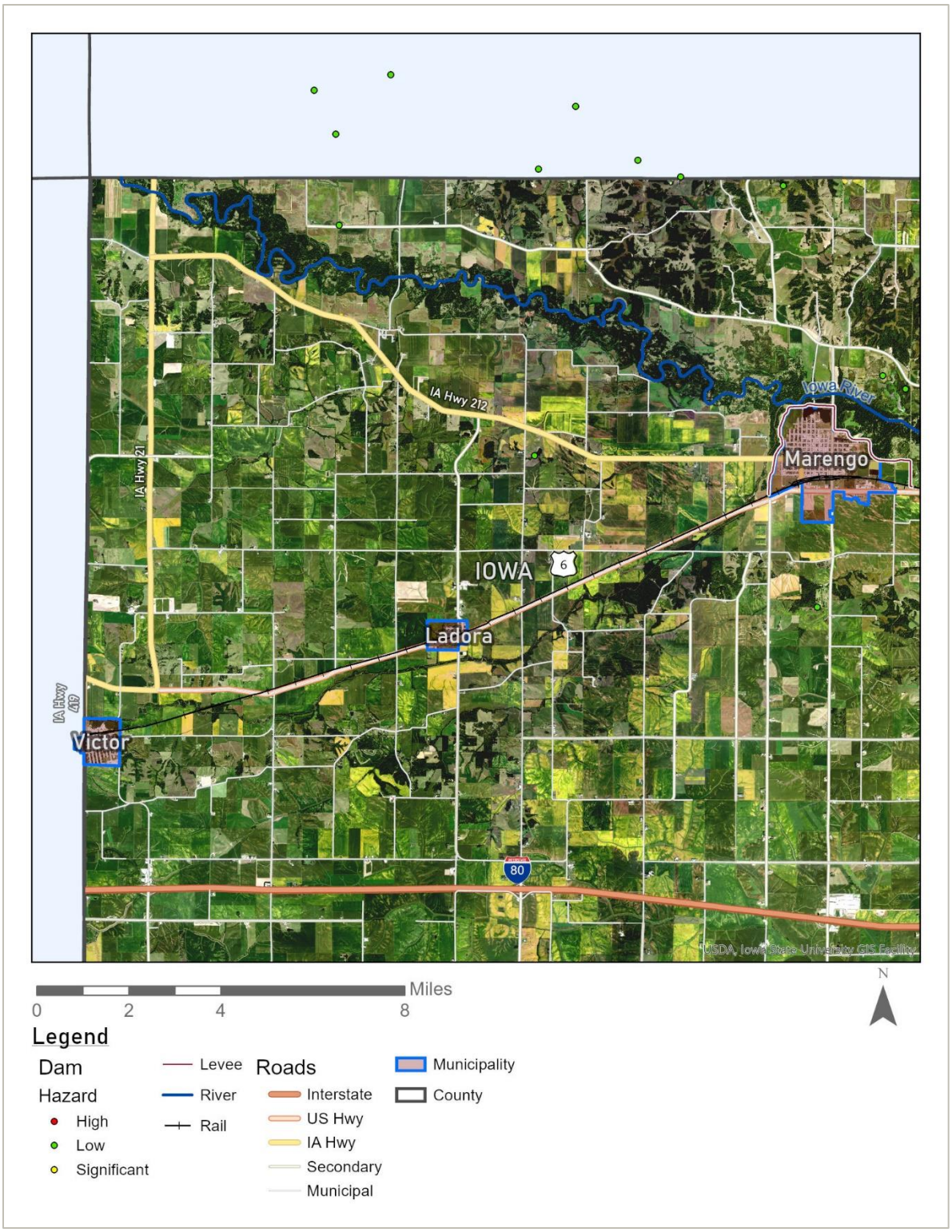
There is little to no warning if structures are not monitored, which is more likely for small, private dams. Because major structures are monitored, if the levee or major dam were to fail, there would likely be several hours for the surrounding and vulnerable downstream areas to evacuate. Due to the potential impacts, a minimal warning time is the preferred estimate.

### Duration

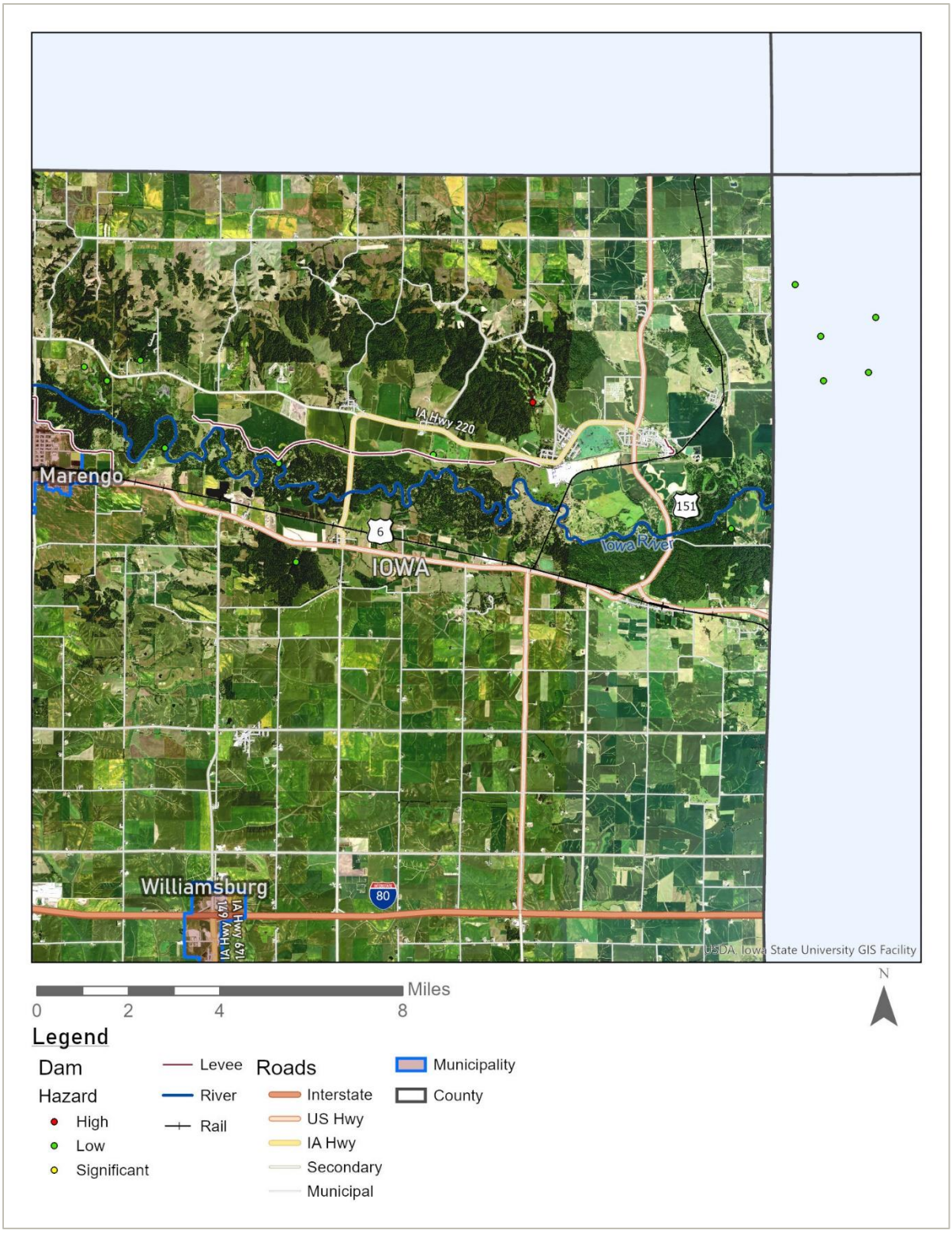
Response to a dam or levee failure would be extensive and require wide ranging recovery efforts for reconstruction of the original flood control structures and any damaged property.

## Risk Assessment Maps

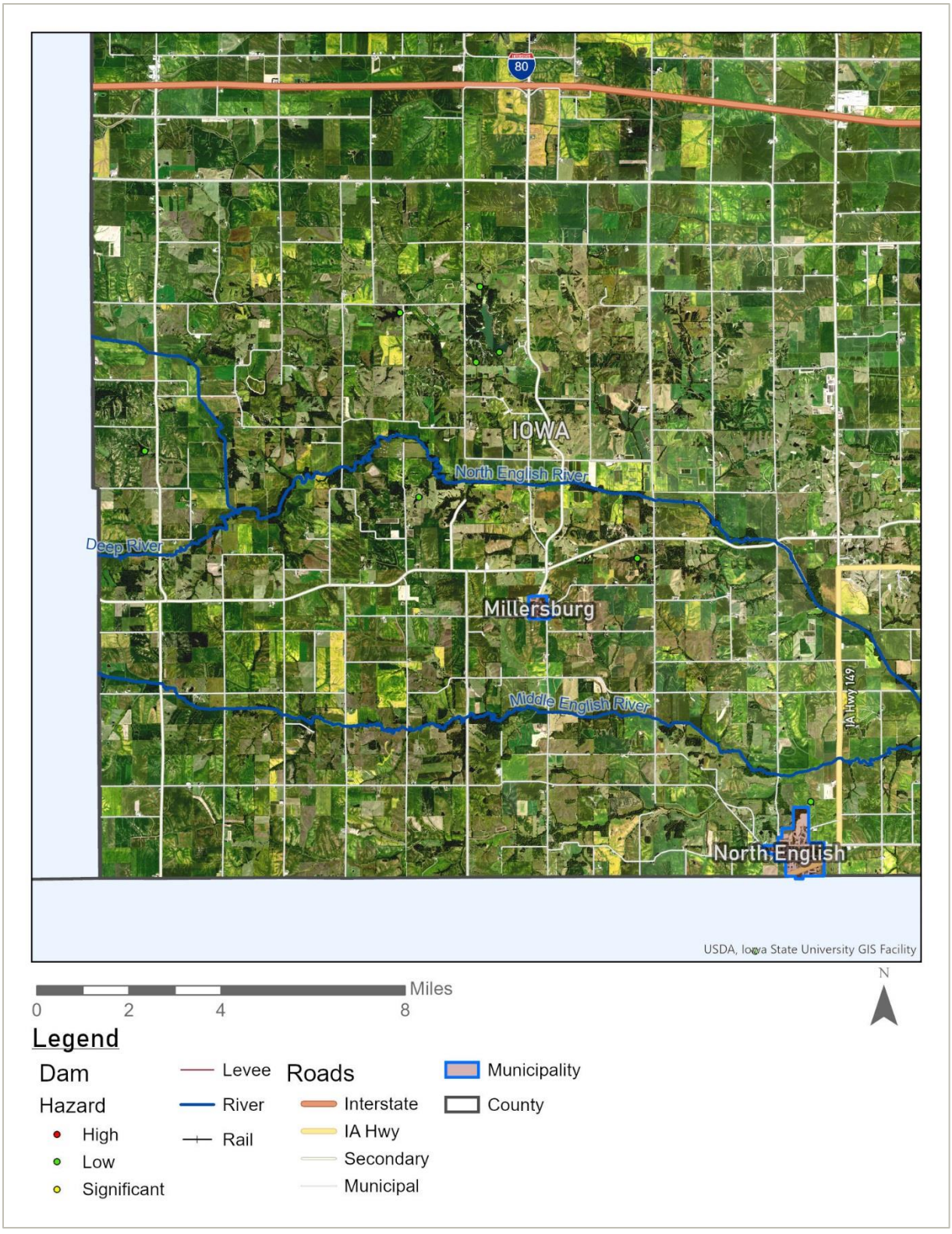
Map 19: Iowa County NW Quadrant Levees and Dams



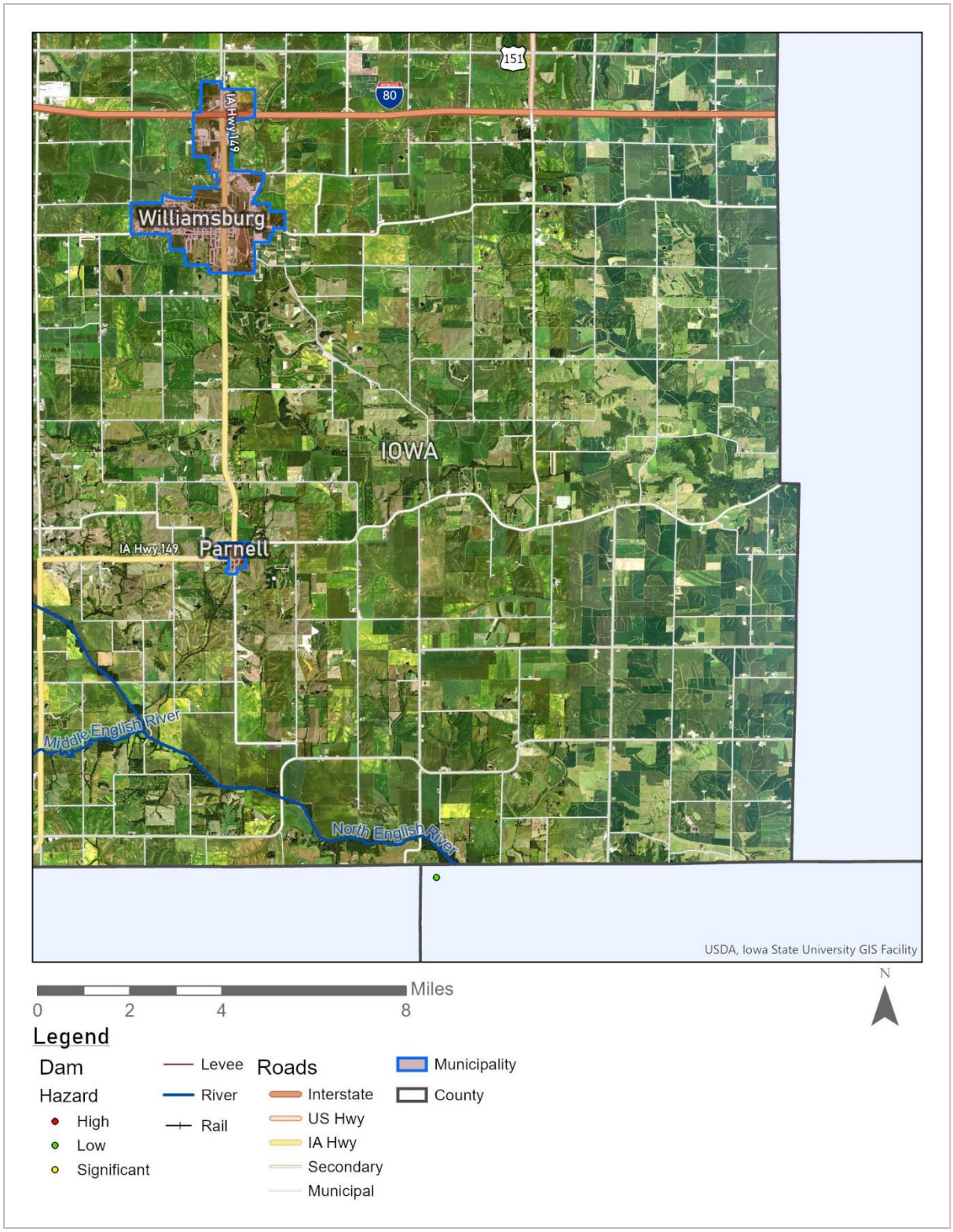
Map 20: Iowa County NE Quadrant Levees and Dams



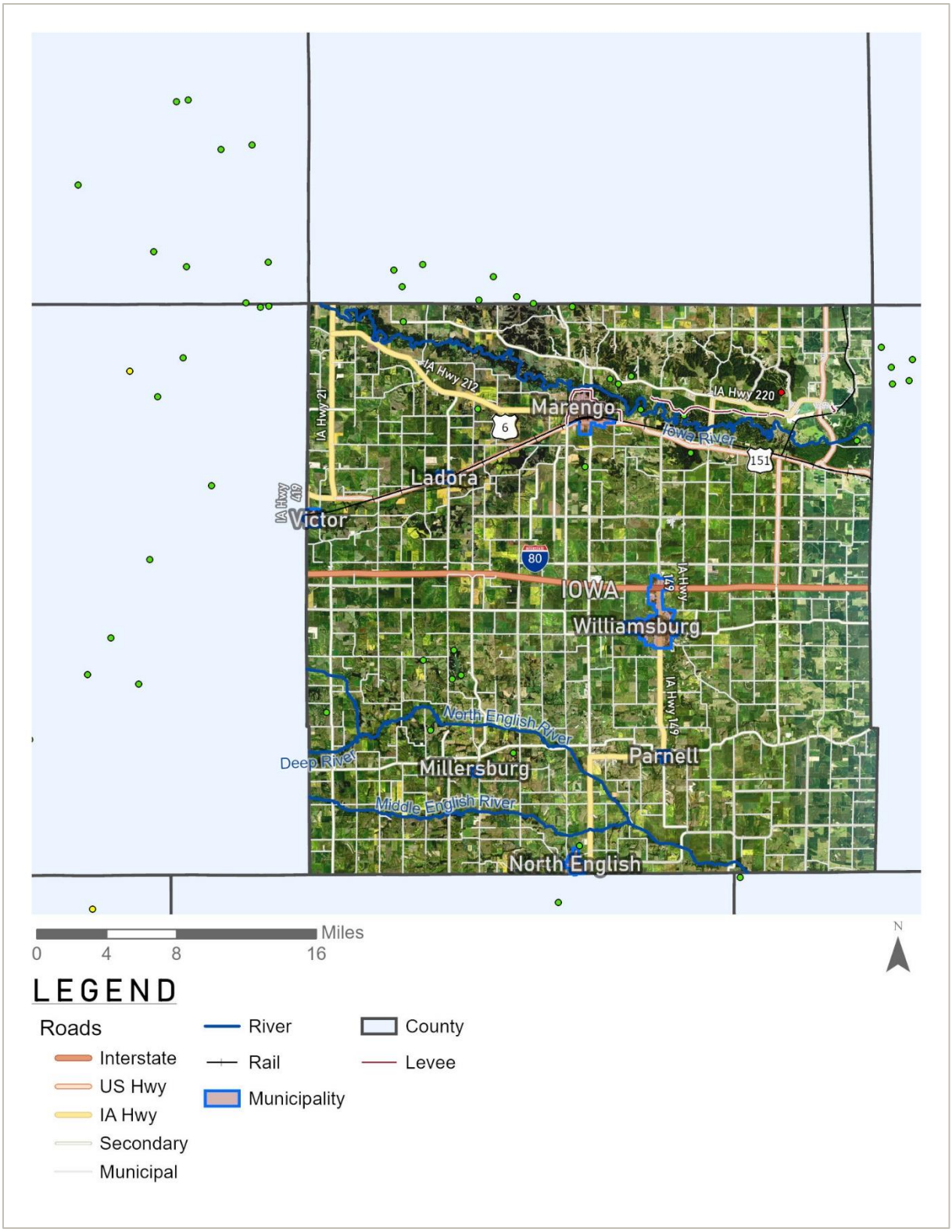
Map 21: Iowa County SW Quadrant Levees and Dams



Map 22: Iowa County SE Quadrant Levees and Dams



Map 23: Iowa County Upstream Dams



## Radiological Incident

### Definition of Hazard

This hazard encompasses fixed radiological incident and transportation radiological incident, which involve and incident resulting in a release of radiological material in transport or at a fixed facility to include power plants, hospitals, laboratories, and other facilities with radioactive material.

#### Potential Hazard Area

The potential hazard area for a radiological incident in Iowa County is countywide but limited primarily to transportation routes.

#### Historical Occurrences

There is no history of radiological incidents in Iowa.

#### Probability

Historically there have been no significant releases of radiation from fixed facilities in Iowa or even the United States. Iowa has one nuclear power plant located within its borders. Duane Arnold Energy Center is located near Palo in Linn County, which is approximately 30 miles from Iowa County. This puts Iowa County within the 50-mile ingestion pathway, which would be an area monitored for radioactive contamination of food and water resources. It is well outside of the 10-mile emergency planning area. Refer to Map 24. Three other nuclear facilities border Iowa.

There have also been no occurrences of radiological incidents in Iowa. Transportation accidents are the most common type of incident involving radioactive materials because of the high frequency of radioactive shipments. Radioactive materials are transported through the United States and Iowa regularly.

Operators of facilities with radioactive materials and transporters of radioactive waste are trained in the packaging, handling. In addition, the shipment of radioactive waste is closely regulated. The likelihood of an incident is unlikely but still possible.

#### Magnitude and Severity

Sources of radioactive materials include medical products, industrial products, nuclear power plant fuel, nuclear weapons, and radioactive waste from hospitals, laboratories, nuclear reactors, and military facilities.

Both the Duane Arnold and the Fort Calhoun Nuclear Power Plants have completed construction of on-site storage facilities for spent nuclear fuel.

In over 50 years of nuclear power production in the U.S., no deaths or injuries from radiation have been recorded among the general public. Each of the nuclear facilities in the country identifies a 10 mile radius Emergency Planning Zone and a 50-mile radius Ingestion Pathway Zone.

Depending on the level of exposure, radiation can cause loss of life and long and short term health effects. Time, distance, and shielding minimize radiation exposure to the body. Nuclear radiation above normal levels could be a health and safety consideration because of its ability to damage human cells.

Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the toxic materials. Proper training and equipment greatly reduce the risk to response personnel.

If the land and facilities cannot be used for weeks, months, or even years, the loss of production would be devastating. Economic impacts would be multi-sector and long-lasting, especially in and around the affected region.

#### Warning Time

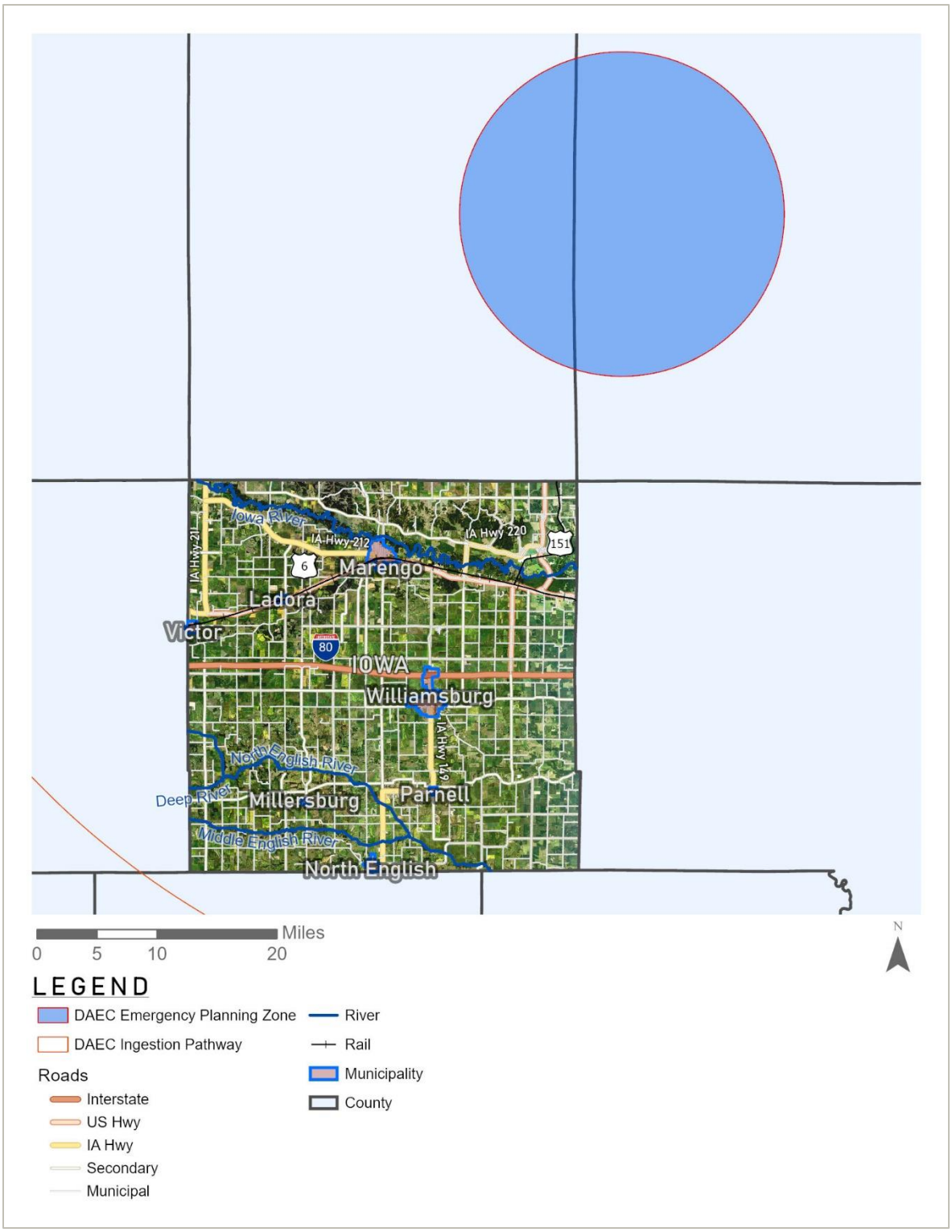
A radiological incident in Iowa could result from an incident in handling or transporting radioactive materials. This accident could occur with little or no warning. Ionizing radiation cannot be detected with human senses. Detection instruments are needed to indicate the existence of radiation. Distance from the incident would dictate the amount of time needed to avoid exposure from damaging radiation.

#### Duration

Responding to the effects of a radiological release in Iowa is extensive and will require resources and assistance from several Federal agencies to determine and evaluate the threat to life and the environment in the affected areas.

## Risk Assessment Map

Map 24: Duane Arnold Energy Center Planning Zone and Ingestion Pathway



## Transportation Incident

### Definition of Hazard

A transportation incident is generally an accident involving any mode of transportation that directly threatens life and results in a combination of death, injury, property damage, or adverse impacts to a community's capabilities to provide emergency services.

An air transportation incident may involve a military, commercial, or private aircraft. Air transportation incidents can occur in the air or on the ground. In addition, incidents can occur at or near an airport, in remote unpopulated areas, residential areas, or dense urban areas.

A highway transportation incident can be a single or multi-vehicle incident requiring response exceeding normal daily capabilities.

A railway transportation incident may include derailment, collision, and at-grade highway crossing accidents. Train incidents can result from a variety of causes including human error, mechanical failure, faulty signal, or problems with the track. Results of an incident can range from minor "track hops" to catastrophic hazardous material incidents and even human or animal casualties.

A waterway incident involved any incident with a water vessel. In addition, waterway incidents may include events in which a person or object fall through the ice on partially frozen bodies of water.

#### Potential Hazard Area

The potential hazard area for a transportation incident in Iowa County is countywide, but transportation infrastructure and surrounding areas are the primary potential hazard areas. For an air transportation incident, any area below a flight path in Iowa County could be affected. For a waterway incident, any body of water and the surrounding areas could be affected.

#### Historical Occurrences

From 1999–2018, there have been two airway incidents recorded in Iowa County. Refer to Table 28 In the National Transportation Safety Board Database, two records have North English identified as the location; however, the corresponding coordinates for the accidents are outside of the county. Several incidents have been recorded near the county. Refer to Map 25.

Table 28: Iowa County Airway Incidents 1999–2018

| Date | Location | Severity |
|---|---|---|
| 3/22/2003 | North English | Fatal |
| 6/21/2011 | North English | Non-fatal |
| **Total** | 2 incidents | |
| Source: National Transportation Safety Board Database, August 2019 | | |

Overall, highway transportation incidents in Iowa County are regularly handled by local emergency responders. Highway transportation incidents will rarely exceed local capabilities because the local emergency responders complete ongoing and interagency training for incidents that could occur along major and minor travel routes. Incidents that could exceed local capabilities would be crashes involving a large number of vehicles or may involve large amounts of dangerous materials.

It should be noted, detailed analysis of auto crash data is not available for each city in Iowa County. Across the entire county, there is a high frequency of crashes but a small amount results in a fatality each year. The majority of crashes involve property damage only. The crash frequency has remained relatively consistent throughout the decade. Refer to Table 29.

Table 29: Iowa County Auto Crashes 2009–2018

| Year | Crashes | Fatal | Major | Minor | Possible Injury | Property Damage Only |
|---|---|---|---|---|---|---|
| 2009 | 431 | 1 | 6 | 16 | 29 | 379 |
| 2010 | 338 | 1 | 7 | 19 | 39 | 272 |
| 2011 | 307 | 3 | 7 | 20 | 24 | 253 |
| 2012 | 341 | 2 | 6 | 22 | 35 | 276 |
| 2013 | 369 | 2 | 7 | 37 | 33 | 290 |
| 2014 | 418 | 1 | 9 | 27 | 38 | 343 |
| 2015 | 404 | 5 | 10 | 34 | 43 | 312 |
| 2016 | 372 | 5 | 7 | 31 | 48 | 281 |
| 2017 | 358 | 7 | 8 | 27 | 30 | 286 |
| 2018 | 444 | 2 | 4 | 35 | 44 | 359 |
| **Total** | 3,782 | 29 | 71 | 268 | 363 | 3,051 |
| Source: Iowa Department of Transportation, Iowa Crash Analysis Tool, September 2019 | | | | | | |

A major transportation incident concern in participating jurisdictions is train incidents involving vehicles at highway and railroad crossings. In Iowa County, there have been two railway incidents recorded from 1999–2018 in the Federal Railroad Administration Office of Safety Analysis's database. One is a highway-rail incident in 2010, which caused injuries for one person and $11,242 in property damage. The other incident was a train derailment in 2011, which caused no deaths or injuries and $30,773 in property damage.

The remaining type of transportation incident is a waterway incident. See Table 30 for information about the type of recreational boating accidents in Iowa. Comprehensive accident

data is not available at the local or county level. Iowa County does not have large waterways or waterbodies that would support extensive commerce or leisure. Major water recreation areas in Iowa County include Lake Iowa near Ladora and areas near several creeks, the English River, and the Iowa River. There are small lakes, ponds, and creeks located throughout Iowa County that are used for recreation.

Table 30: Iowa Recreational Boating Accidents 2005–2018 by Accident Type

| Accident Event | Accidents | Vessels | Injuries | Deaths |
|---|---|---|---|---|
| Capsizing | 47 | 47 | 31 | 23 |
| Collision with commercial vessel | 2 | 4 | 1 | 1 |
| Collision with Fixed Object | 52 | 56 | 38 | 1 |
| Collision with Floating Object | 10 | 10 | 4 | 1 |
| Collision with government vessel | 1 | 2 | 0 | 0 |
| Collision with Recreational Vessel | 69 | 138 | 43 | 7 |
| Collision with submerged object | 14 | 14 | 7 | 2 |
| Collision with Vessel | 41 | 83 | 31 | 2 |
| Fall in Vessel | 17 | 18 | 21 | 0 |
| Fall Overboard | 45 | 48 | 25 | 19 |
| Fire/explosion (fuel) | 14 | 14 | 11 | 0 |
| Fire/explosion (non-fuel) | 2 | 2 | 2 | 0 |
| Flooding/swamping | 40 | 42 | 14 | 6 |
| Grounding | 35 | 35 | 7 | 0 |
| Other | 9 | 9 | 10 | 1 |
| Person departed vessel | 19 | 20 | 9 | 8 |
| Person Ejected from Vessel | 28 | 29 | 26 | 6 |
| Person struck by propeller | 10 | 11 | 9 | 1 |
| Person Struck by Vessel | 9 | 12 | 11 | 0 |
| Sinking | 1 | 1 | 0 | 0 |
| Skier Mishap | 76 | 79 | 81 | 1 |
| Source: United States Coast Guard Boating Safety Resource Center, January 2020 | | | | |

### Probability

Since 2000, there have been two air transportation incidents resulting in one fatality in Iowa County. Flight paths over the county and several municipal airports present a risk for an air transportation incident to occur within the county. A fairly limited history of air transportation incidents does indicate a low probability of an air transportation incident occurring in the future, but the risk does exist. As part of the larger transportation incident hazard, an air transportation incident has an unlikely probability, especially relative to a highway transportation incident.

At least a few major or minor traffic accidents occur every day in Iowa County. These accidents result in injury, death, and property damage in approximately 20 % of incidents. Although traffic engineering, inspection and maintenance of infrastructure, land use management, and the readiness of local response agencies have increased, highway incidents continue to occur. As the volume of traffic in Iowa County increases, especially along major highways, the number of traffic accidents may increase. The combination of large numbers of people on the road, wildlife, weather conditions, potential mechanical problems, and human error increases the probability of a transportation incident occurring in Iowa County. Overall, a highway transportation incident is likely.

In Iowa County, there have been two train incidents—one highway-rail incident and one derailment. Although recent incidents have not been fatal or exceeded local capabilities, rail traffic will continue in Iowa County so there is an occasional probability of a rail incident occurring.

There have been few waterway incidents across Iowa and none in Iowa County that have exceeded local capabilities. There have been search and rescue events involving a single person or small boats with only a couple people on board. Small scale incidents have resulted in loss of life from pleasure craft collisions and falls from vessels, but the probability of a waterway incident is unlikely.

#### Magnitude and Severity

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

As mentioned, most accidents occur during takeoffs and landings. Accordingly, the spatial extent of the majority of incidents would occur on airport grounds or adjacent areas. In Iowa County, there are three small airports including the Amana Airport, Weiss Airport, and Rinehart Airport. Compared to many other hazards, an air transportation accident would occupy a relatively small area. For airport locations in Iowa County, refer to the risk assessment maps.

The extent to which the impacts would be felt would depend on the materials involved. For example, if a cargo plane transporting volatile or hazardous substances were involved in an accident, the area of concern would be significantly larger than the area for an accident involving a small personal aircraft carrying stable materials. The largest share of accidents would likely affect only a few city blocks.

The people who use the surface transportation system are most vulnerable in a highway transportation incident. Travelers, truckers, delivery personnel, and commuters are at risk at all times that they are on the road. During rush hours, holidays, and major events, the number of people on the road is significantly higher. Pedestrians and citizens of the community are less vulnerable but are still vulnerable in a highway transportation incident.

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

Two major railways cross north Iowa County and several cities. For railway locations, refer to the risk assessment maps. People and property in close proximity to railroad tracks, crossings, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

Rail and highway incidents are usually limited to areas in and near at-grade crossing. Rarely, the incident will result in widespread effects. The direct area of impact is usually quite small, but depending on the vehicle(s) and materials involved, the area could become extensive. If hazardous materials are involved, the effects could reach miles beyond the incident. Harmful products may contaminate streams, rivers, water distribution systems, and storm water systems. The ability of response agencies to contain the product on-scene usually limits the area affected.

Passengers of pleasure craft are most vulnerable in a waterway incident. The maximum extent of a waterway incident would be limited. Impacts would not extend beyond the immediate incident scene. The only exception would include a search and rescue event that could expand downstream.

For transportation incidents in Iowa County, the potential magnitude and severity is estimated to be limited. A transportation incident could result in injuries, up to 10% to 25% of property damaged, and shutdown of facilities for a week. The property damage estimate is estimated relatively high, because if a transportation incident were to occur in a small jurisdiction, a high percentage of the community can be impacted. Overall, the magnitude and severity estimate is based on historical occurrences, existing hazard mitigation plans, the *Iowa Hazard Mitigation Plan 2018*, and local knowledge.

### Warning Time

The amount of warning time prior to an aircraft accident could vary from several minutes to a matter of seconds. Crew aboard a troubled aircraft can radio to ground crew to prepare for the incident, but little can be done to lessen the direct effects of the impact. Rarely, there is adequate time to do more than position on-site emergency response personnel.

There is usually no warning of highway incidents. During snow storms and other severe weather events that may impede travel, travelers, response agencies, and hospitals alike can be notified of hazardous travel conditions. Flash flooding is a common travel hazard in Iowa County, and warnings are often issued several hours before the flooding may occur.

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

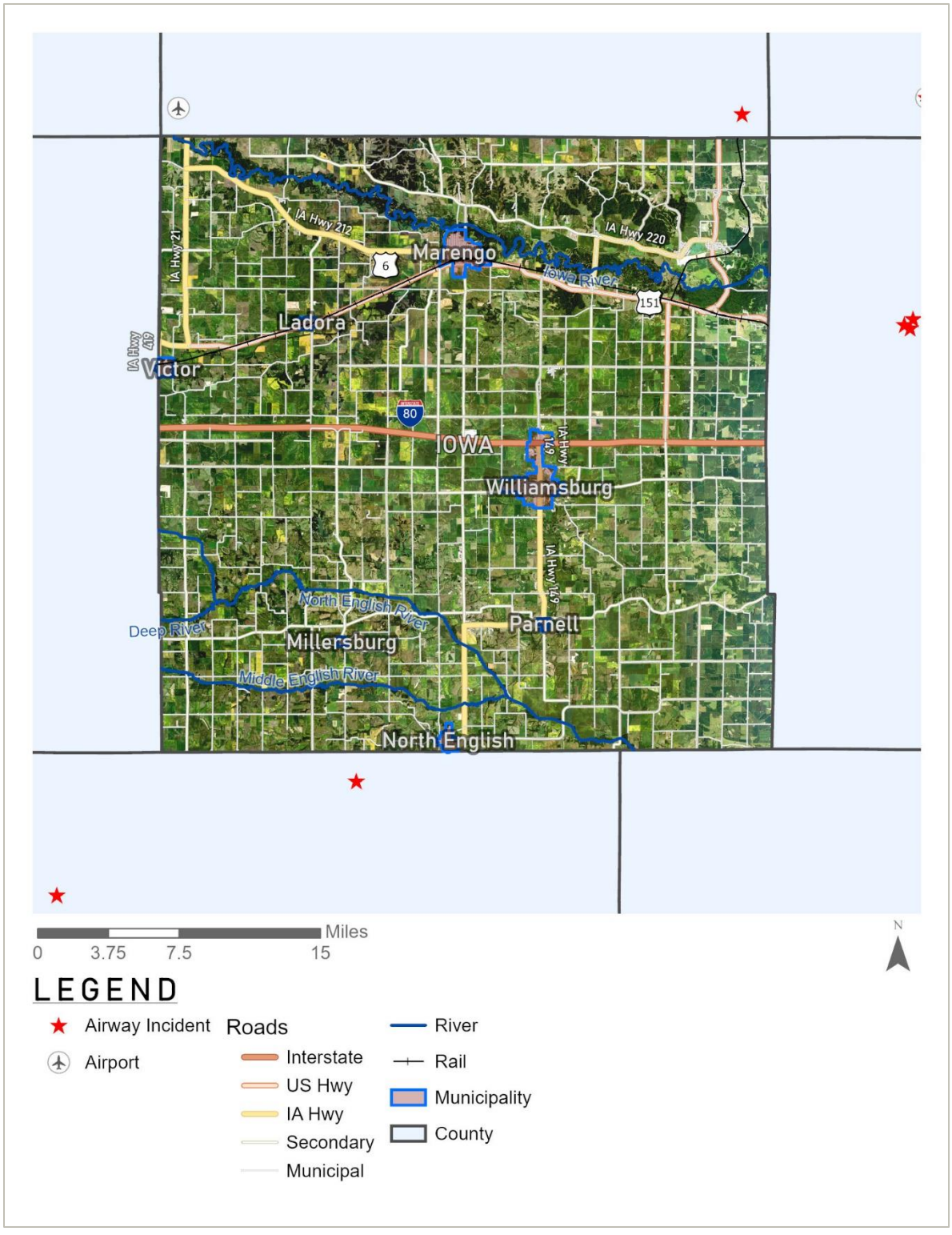
Leading causes of waterway incidents are inclement weather and operator error and incidents would occur with little or no warning. Weather forecasts are usually available days in advance and would give ample time to take shelter away from water.

### Duration

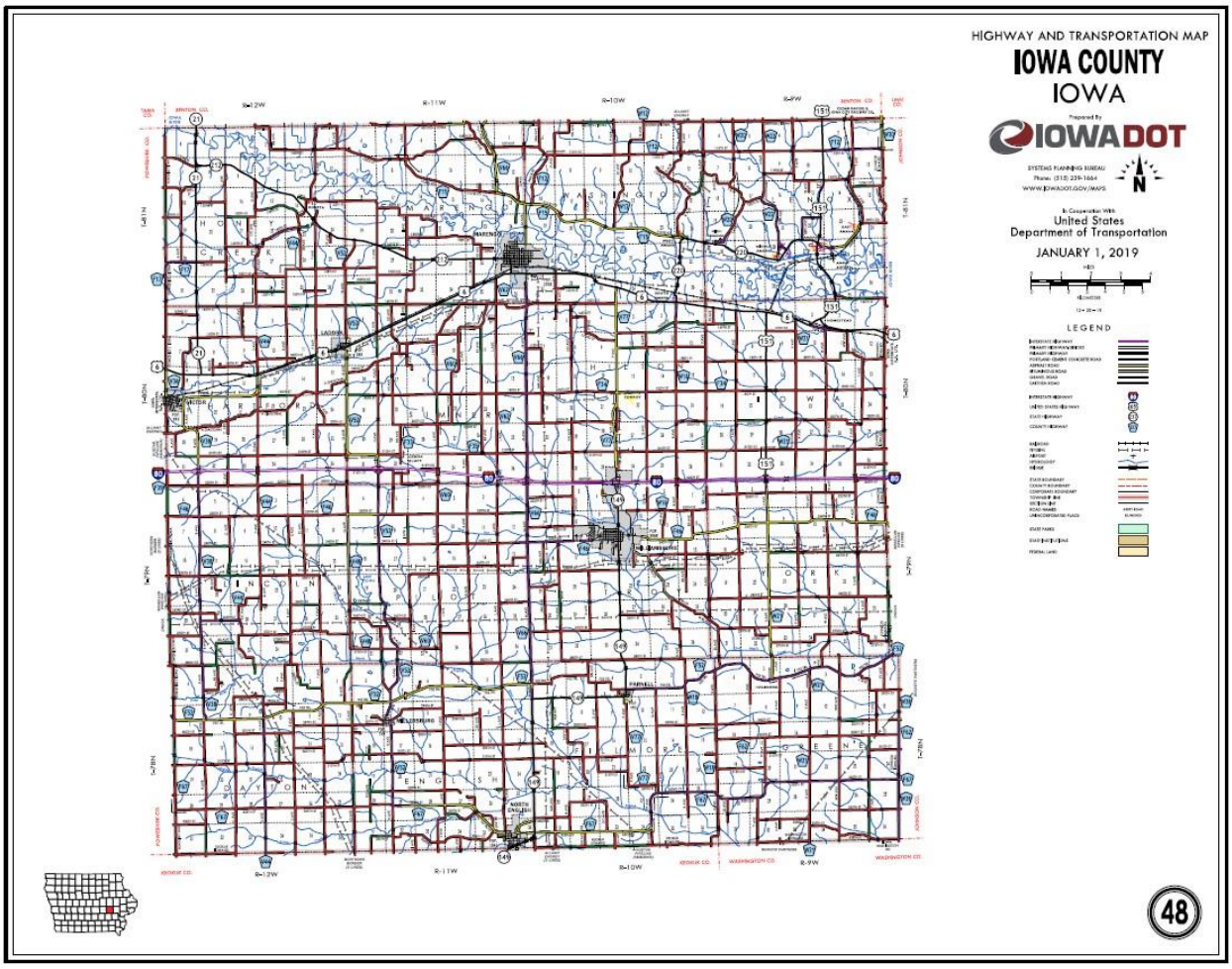
Transportation incidents, particularly rail, air, and waterway related hazards are likely to create more intensive response and resources to protect life and safety of those affected.

## Risk Assessment Map

Map 25: Airway Incidents Near Iowa County



Map 26: Iowa County Highway and Transportation Map



# Human-Caused Hazards

## Terrorism

### Definition of Hazard

This hazard encompasses the following specific hazards: enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, cyber terrorism, radiological terrorism, and public disorder. This includes the use of multiple outlets to demonstrate unlawful force, violence, and/or threat against persons or property causing intentional harm for purposes of intimidation, coercion or ransom in violations of the criminal laws of the United States. These actions may cause massive destruction and/or extensive casualties.

#### Potential Hazard Area

The potential area for a terrorism even in Iowa County is countywide.

#### Historical Occurrences

Iowa County has not been the direct target of a major terrorism event. There have been threats and potential acts of terrorism, but none have resulted in injury, death, or destruction.

#### Probability

The federal government monitors the international political and military activities of other nations and would notify the State of Iowa of escalating military threats. There are many small military installations in Iowa; most are Iowa National Guard assets spread throughout the state comprised of various military units and functions.

There have been no enemy attacks on or in Iowa in modern times. The only history of enemy attack dates back to early settlement and the Civil War in the 1800s. The breakup of the Soviet Union and other Soviet-Bloc nations has ended the Cold War. An enemy attack is a remote possibility due to international conflicts and the large number of weapons still in existence throughout the world. Although a few areas are relatively dense with development and population in Iowa County, in an all-out military attack on the United States, it is unlikely that Iowa and Iowa County would be a primary target during a conventional attack.

Despite not experiencing a full terrorism event, Iowa has experienced many terrorist threats. Most incidents have been limited to reported "suspect" powders, actual threats, and hoaxes. Beginning in October 2001, following the original "Amerithrax" scares, Iowa experienced a large number of responses for suspicious powder.

Incidents of agro-terrorism have occurred in Iowa. In the past ten years, Iowa has experienced incidents in which animal rights activists have vandalized or released animals in agricultural facilities. There have been cases of vandalism of agricultural facilities or incidents of disgruntled employees causing damage to animals and animal products.

Chemical terrorism has been limited in Iowa. Throughout the country, public officials have received suspicious letters, and this certainly can happen in Iowa. In 2005, a subject mailed "rat poison" to several state and local officials. One of the letters was torn open in a mail-sorting machine in Des Moines, which led to the closure of the Main Post Office and the Emergency Room of Mercy Medical Center.

There has been at least one event where subjects broke into a city's water supply and it was suspected that chemicals may have been deposited in the water supply. There have been many releases of anhydrous ammonia by persons engaged in drug manufacturing, but terrorism is likely not the intent.

Iowa has experienced many bomb threats. During the spring of 2002, 18 pipe bombs were found in mailboxes in five states stretching from Illinois to Texas, including Iowa. Six people were injured in the bombings in Iowa and Illinois. In 2005 and 2006, pipe bombs were used in attempted murder cases in two Iowa cities.

For cyber terrorism, it is difficult to track incidents and threats, but there are definite incidents where account information has been jeopardized. Many of these notifications are concerning private companies where there could be financial concerns with data breach. In Iowa County, there are institutions and businesses that may be potential targets of cyber terrorism.

There is no history of radiological terrorism in Iowa. A nuclear power plant is located near Palo. This facility could be a potential target. Otherwise, there is international concern regarding unstable countries potential developing nuclear weapons. It is unlikely that radiological terrorism could affect the Midwest United States, but potential targets are located in Iowa and nearby in Linn County.

As for public disorder, there have been no recent mass demonstrations, or direct conflicts among large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes in Iowa. Although large-scale destructive civil disturbances are rare, the potential exists for an incident to occur. Alcohol is often involved in public disorder, especially related to college campuses, sporting events, and concerts.

Labor strikes and work stoppages are not considered in this hazard unless they become a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target group or institution. Overall, most events of this type are within the capacity of local law enforcement.

Recent national events have increased awareness of school safety. Although there has not been a major incident, schools in Iowa County complete training to teach staff to response during a potential intruder event. Many schools have also installed limited access entrance systems.

### Magnitude and Severity

For all types of terrorism, people who are targets, people located within targets, or people located within or near a targeted area are extremely vulnerable. The potential injuries and deaths caused by a terrorism event depends on the type of terrorism, the scale of the event, and whether or not the terrorism attempt is successful. In general, it is difficult to assume who and what structures are potential targets.

The type, scale, and success of a terrorism attempt will also determine how much of Iowa County can potentially be affected by a terrorism event. Some terrorism attempts are limited in scale with specific targets while others are widespread. If a terrorism event is large scale, it is likely more than just Iowa County will be affected by the event. Aside from public disorder type events, a terrorism event in Iowa County has the potential to affect the entire county.

### Warning Time

The United States federal government monitors worldwide political and military activity. The citizens and states of the U.S. would be put on heightened alert during periods of intense political or military conflict. With Iowa's position in the interior of the U.S., there would likely be significant warning of an impending enemy attack.

Acts of terrorism can be immediate and often come after little or no warning. There are occasions when terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat. Terrorists threaten people and facilities through "bomb threats" and other scare tactics. Even if it is a shallow threat, precautions must be taken to ensure the safety of the people and property involved.

In most incidents we would have no warning time. The only exception would be if someone called in a threat. Acts of terrorism can be immediate and often come after no warning. There are occasions where terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat.

Even if it is an unlikely threat, precautions must be taken to ensure the safety of the people and property involved. Explosions are usually instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear.

### Duration

The response to all sources of terrorism are extensive and will result in the need for outside resources and response from federal agencies in both the investigation of a crime scene and in the response to the direct threats to life and property.

## Presidential Disaster Declarations

The Robert T. Stafford Disaster Relief and Emergency Assistance Act authorized the President of the United States to issue a disaster declaration when the President has determined that a disaster has caused damage of such severity that it is beyond the capabilities of state and local governments to respond. The Presidential Disaster Declaration allows the federal government to provide assistance to affected areas, such as Individual Assistance, Public Assistance, and Hazard Mitigation Assistance.

In the past 20 years, 1999-2018, Iowa County has been in a Presidentially Declared Disaster seven times, which is approximately once every three years. Refer to Table 31 for the hazard events that led to those declarations and the Public Assistance and Individual Assistance approved in response. In all declarations, Iowa County is one of several counties covered by the declaration. Two declarations were in response to winter weather, which would be classified as a severe winter storm hazard event within this plan. The remaining five declarations were in response to hazards associated with spring and summer weather. Within this plan they would be classified as the flood (flash flood and river flood); thunderstorm, lightning, and hail; and tornado and windstorm hazard events.

Table 31: Iowa County Presidential Disaster Declarations 1999–2018

| Date | Declaration | Hazard | Public Assistance |
|---|---|---|---|
| June 26, 2014–July 7, 2014 | DR-4187 | Severe Storms, Tornadoes, Straight-Line Winds, and Flooding | $14,338,940.70 |
| May 19, 2013–June 14, 2013 | DR-4126 | Severe Storms, Tornadoes, and Flooding | $20,524,115.81 |
| April 17, 2013–April 30, 2013 | DR-4119 | Severe Storms, Straight-Line Winds, and Flooding | $7,594,458.33 |
| June 1, 2010–August 31, 2010 | DR-1930 | Severe Storms, Flooding, and Tornadoes | $52,178,015.97 Individual Assistance $26,438,629.85 |

Table 31: Iowa County Presidential Disaster Declarations 1999–2018, continued

| Date | Declaration | Hazard | Public Assistance |
|---|---|---|---|
| May 25, 2008–August 13, 2008 | DR-1763 | Severe Storms, Tornadoes, and Flooding | $1,155,438,930.30<br>Individual Assistance<br>$138,679,472.90 |
| December 10, 2007–December 11, 2007 | DR-1737 | Severe Winter Storm | $28,052,065.58 |
| February 23, 2007–March 2, 2007 | DR-1688 | Severe Winter Storm | $65,377,279.14 |
| **Seven declarations** | | | **Total PA**<br>$1,343,503,806 |

In the following chapter, the hazards considered under this plan are prioritized based on the data collected for the risk assessment. The hazard events that were deemed to exceed local response capabilities, i.e. received a Presidential Declaration, reinforce the priority levels that result from the weighted average of four criteria: probability, magnitude and severity, warning time, and duration. The winter weather and summer weather hazards that cause these events are all rated with the highest priority level and have wrought extensive loss across the planning area.

[iii] https://www.iowaagriculture.gov/animalIndustry/AHAN.asp, accessed 8/15/2019
[iv] U.S. Dept. of Agriculture. Highly Pathogenic Avian Influenza Response Plan: The Red Book. 2017. P. 1-7.
[v] Ibid. P. 1-10.
[vi] U.S. Dept. of Agriculture. Highly Pathogenic Avian Influenza Infected Premises. Updated 6/8/2016. P. 2.
[vii] U.S. Dept. of Agriculture. National Scrapie Eradication Program Fiscal Year 2018 Report. 2019.
[viii] https://www.usgs.gov/centers/nwhc/science/expanding-distribution-chronic-wasting-disease?qt-science_center_objects=0#qt-science_center_objects, accessed 8/15/2019.
[ix] U.S. Dept. of Agriculture. 2018 Summary of West Nile Virus Equine Cases in the United States. July 2019. P. 4.
U.S. Dept. of Agriculture. 2017 Summary of West Nile Virus Equine Cases in the United States. March 2018. P. 4.
U.S. Dept. of Agriculture. 2016 Summary of West Nile Virus Equine Cases in the United States. February 2017. P. 3.
[x] Xiaoyue Ma MPH; Ben P. Monroe MPH; Julie M. Cleaton MPH; Lillian A. Orciari MS; Yu Li PhD; Jordona D. Kirby MS; Richard B. Chipman MS; Brett W. Petersen MD; Ryan M. Wallace DVM; Jesse D. Blanton DrPH. (2018). Rabies surveillance in the United Stated during 2017. *Journal of the American Veterinary Medical Association*, Vol. 253, No. 12. 1555–1568.
[xi] http://www.iowatreepests.com/eab_locations.html, accessed 8/15/2019.
[xii] Iowa Department of Homeland Security. *Iowa Hazard Mitigation Plan 2018,* 3-53
[xiii] http://idph.iowa.gov/CADE/reportable-diseases, accessed 8/16/2019.
[xiv] Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2017. P 12.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2015. P. 11.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2013. P. 52.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2011. P. 46.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2009. P. 41.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2007. P. 35.
[xv] Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2015. P. 19–29.
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2017. P. 21–27.
[xvi] Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2016. P. 52
[xvii] Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2017. P. 56
[xviii] https://www.cdc.gov/flu/pandemic-resources/, https://www.cdc.gov/flu/pandemic-resources/basics/about.html, accessed 6/27/2018
[xix] Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2009. P. 12
Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2017. P. 56
[xx] US Census Bureau (2010). *Table P12: Sex by Age, 2010 Decennial Census.* Retrieved from https://data.census.gov/cedsci/table?t=Age%20and%20Sex%3APopulations%20and%20People&tid=DECENNIALSF12010.P12&y=2010&d=DEC%20Summary%20File%201&vintage=2010&hidePreview=false, accessed February 11, 2020.
[xxi] https://www.ncdc.noaa.gov/stormevents/faq.jsp, accessed 6/9/2019
[xxii] P. 3-69.
[xxiii] P. 3-69.

# Hazard Prioritization

Requirement §201.6 (d)(3): (d) Plan review… (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it within 5 years in order to continue to be eligible for mitigation project grant funding.

The full set of hazards that can potentially affect Iowa County were prioritized using the criteria outlined in the previous chapter—probability, magnitude and severity, warning time, and duration—to determine the extent a mitigation strategy should focus on one or more hazards. Descriptions of the criteria are shown in Table 5–Table 8, starting on page 29. For ease of assessment of the results of this evaluation, each hazard in the plan is represented on a risk grid, with the axes of probability and magnitude. Refer to Chart 1. The scores for warning time and duration are integrated into the probability and magnitude scores, respectively, with each providing up to one additional point for the axes. Refer to Table 32 for an explanation of the weight of each criterion. A hazard that is further from the origin would be a higher priority hazard to address through mitigation than one that is closer to the origin based on the countywide evaluation alone. The distance from the origin for each hazard is included in each data label.

Table 32: Weight of Hazard Prioritization Criteria in Risk Grid

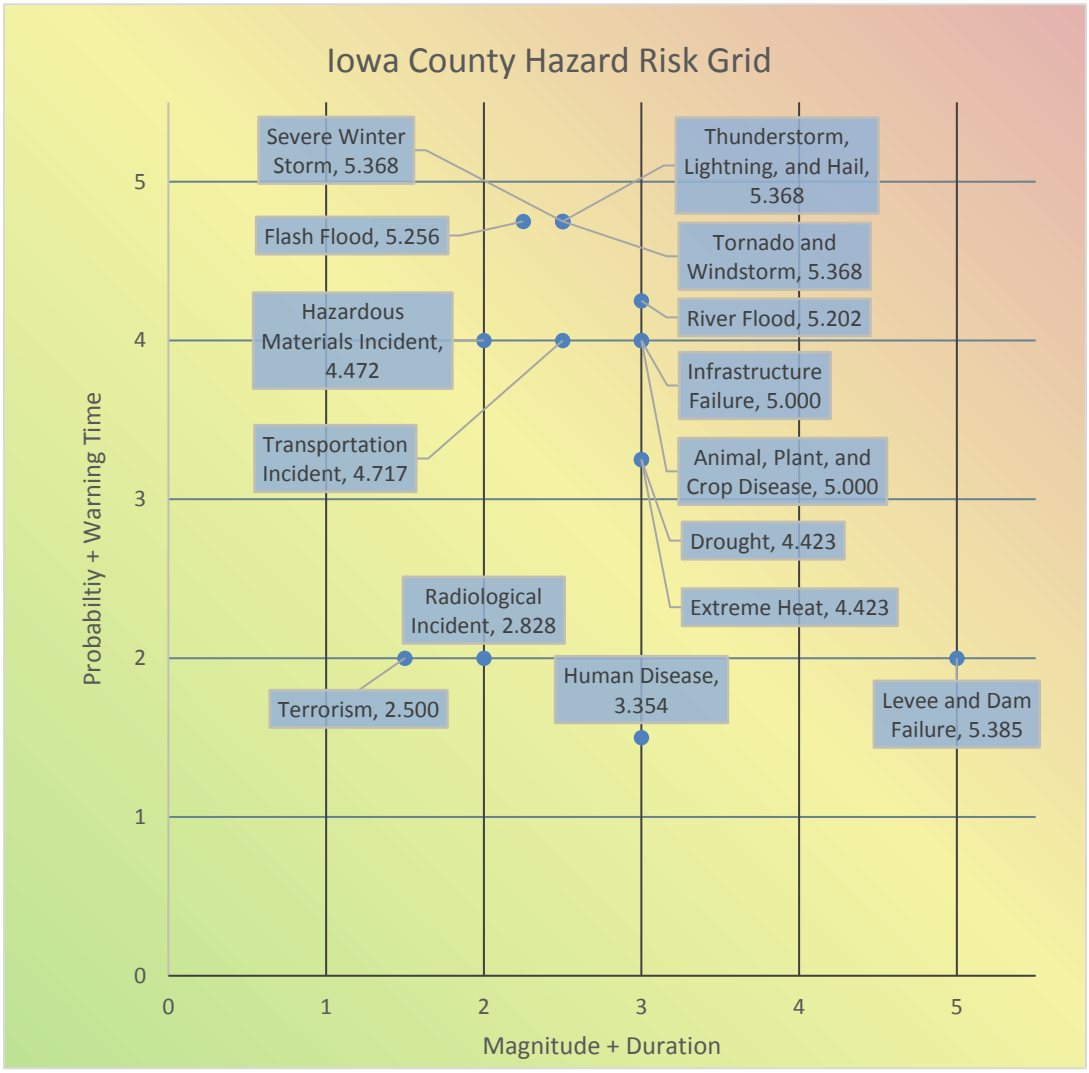
| Criterion | Score | Risk Grid Score |
|---|---|---|
| Probability | 1–4 | 1–4 |
| Magnitude and Severity | 1–4 | 1–4 |
| Warning Time | 1–4 | 0.25–1 |
| Duration | 1–4 | 0.25–1 |

The Risk Grid score is used to determine the priority level of each hazard by ranking the hazards from 1 to 3, with 1 being assigned to the top third of hazards with the highest score and so on. Refer to Table 33 for the description of each priority level. The full summary of scoring for each criterion and the corresponding Risk Grid score and priority levels are shown in Table 34. Because of the local variability of risks, each participating jurisdiction determines the priority level that is appropriate for their community. The multi-jurisdictional assessment was used by each participating jurisdiction as a base for their specific hazard risk assessment. Each local planning committee was given an opportunity to modify the priority level of hazards to reflect local conditions and priorities. Priorities for the existing and updated plan are included in each jurisdictions prioritization list to document changes.

Table 33: Hazard Priority Level

| Hazard Priority | | Description |
|---|---|---|
| 1 | High | Risk assessment score is high relative to other hazards; hazards may have occurred recently with severe impacts and long-term recovery; the hazard is generally a high priority in the community; the planning committee will identify potential mitigation projects |
| 2 | Medium | Risk assessment score is mid-range relative to other hazards; mitigation actions for hazards may already be complete or in progress; the hazard is generally a medium priority in the community; the planning committee will identify potential mitigation projects that may also address other hazards |
| 3 | Low | Risk assessment score is low relative to other hazards; mitigation actions for hazards may already be complete; the hazard is generally a low priority in the community; the planning committee may discuss potential mitigation projects |

Chart 1: Iowa County Hazard Risk Grid



The multi-jurisdictional hazard risk assessment results for Iowa County are included in Table 34. The assessment was used by each participating jurisdiction as a base for their specific hazard risk assessment. The planning committee was given an opportunity to modify the priority level of hazards to reflect local conditions and priorities.

Table 34: Iowa County Multi-Jurisdictional Hazard Analysis and Risk Assessment

| Hazard | Probability | Magnitude | Warning Time | Duration | Probability + Warning Time | Magnitude + Duration | Risk Grid Score | Rank |
|---|---|---|---|---|---|---|---|---|
| Animal, Plant, and Crop Disease | 3 | 2 | 1.00 | 1.00 | 4.00 | 3.00 | 5.000 | 2 |
| Drought | 3 | 2 | 0.25 | 1.00 | 3.25 | 3.00 | 4.423 | 3 |
| Extreme Heat | 3 | 2 | 0.25 | 1.00 | 3.25 | 3.00 | 4.423 | 3 |
| Flash Flood | 4 | 2 | 0.75 | 0.25 | 4.75 | 2.25 | 5.256 | 1 |
| River Flood | 4 | 2 | 0.25 | 1.00 | 4.25 | 3.00 | 5.202 | 2 |
| Human Disease | 1 | 2 | 0.50 | 1.00 | 1.50 | 3.00 | 3.354 | 3 |
| Severe Winter Storm | 4 | 2 | 0.75 | 0.50 | 4.75 | 2.5 | 5.368 | 1 |
| Thunderstorm, Lightning, and Hail | 4 | 2 | 0.75 | 0.50 | 4.75 | 2.5 | 5.368 | 1 |
| Tornado and Windstorm | 4 | 2 | 0.75 | 0.50 | 4.75 | 2.5 | 5.368 | 1 |
| Hazardous Materials Incident | 3 | 1 | 1.00 | 1.00 | 4.00 | 2.00 | 4.472 | 2 |
| Infrastructure Failure | 3 | 2 | 1.00 | 1.00 | 4.00 | 3.00 | 5.000 | 2 |
| Levee and Dam Failure | 1 | 4 | 1.00 | 1.00 | 2.00 | 5.00 | 5.385 | 1 |
| Radiological Incident | 1 | 1 | 1.00 | 1.00 | 2.00 | 2.00 | 2.828 | 3 |
| Transportation Incident | 3 | 2 | 1.00 | 0.50 | 4.00 | 2.50 | 4.717 | 2 |
| Terrorism | 1 | 1 | 1.00 | 0.50 | 2.00 | 1.50 | 2.500 | 3 |

## Iowa County Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 35.

Table 35: Iowa County Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | 1 | 2 |
| Drought | Natural | 2 | 2 |
| Earthquake | Natural | 3 | Excluded |
| Expansive Soils | Natural | 3 | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | 1 | 1 |
| Grass or Wildland Fire | Natural | 2 | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | 1 | 1 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | 3 | Excluded |
| Levee and Dam Failure | Technological | 1 | 1 |
| Radiological Incident | Technological | 3 | 3 |
| River Flood | Natural | 1 | 1 |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | 3 | Excluded |
| Terrorism | Human Caused | 3 | 3 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Ladora Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 36.

Table 36: City of Ladora Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | 3 | 3 |
| Drought | Natural | 2 | 2 |
| Earthquake | Natural | 3 | Excluded |
| Expansive Soils | Natural | 3 | Excluded |
| Extreme Heat | Natural | 3 | 3 |
| Flash Flood | Natural | 1 | 1 |
| Grass or Wildland Fire | Natural | 2 | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | 2 | 2 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | 3 | Excluded |
| Levee and Dam Failure | Technological | 1 | 1 |
| Radiological Incident | Technological | 3 | Excluded |
| River Flood | Natural | 1 | 1 |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | 3 | Excluded |
| Terrorism | Human Caused | 3 | 3 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Marengo Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 37.

Table 37: City of Marengo Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | Excluded | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | 1 | 1 |
| Grass or Wildland Fire | Natural | Excluded | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | Excluded | Excluded |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | 1 | 1 |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | 2 | 1 |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | 3 | 3 |
| Thunderstorm, Lightning and Hail | Natural | 2 | 2 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Millersburg Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 38.

Table 38: City of Millersburg Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | Excluded | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 2 | 1 |
| Flash Flood | Natural | Excluded | Excluded |
| Grass or Wildland Fire | Natural | Excluded | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | 1 | Excluded |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | Excluded |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | Excluded | Excluded |
| Thunderstorm, Lightning and Hail | Natural | 2 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 1 |

## North English Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 39.

Table 39: City of North English Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | Excluded | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | 2 | 2 |
| Grass or Wildland Fire | Natural | Excluded | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | Excluded | Excluded |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | Excluded |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | 3 | 3 |
| Thunderstorm, Lightning and Hail | Natural | 2 | 2 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | Excluded | Excluded |

## Parnell Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 40.

Table 40: City of Parnell Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | Excluded | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | Excluded | 1 |
| Grass or Wildland Fire | Natural | Excluded | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | 2 | 2 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | 1 |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | Excluded | Excluded |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Victor Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 41.

Table 41: Victor Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | Excluded | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | 3 | 3 |
| Grass or Wildland Fire | Natural | Excluded | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | Excluded | Excluded |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | Excluded |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | Excluded | Excluded |
| Thunderstorm, Lightning and Hail | Natural | 3 | 3 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 1 | 1 |

## Williamsburg Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 42.

Table 42: Williamsburg Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | Excluded |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | 2 | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 1 | 1 |
| Flash Flood | Natural | Excluded | 1 |
| Grass or Wildland Fire | Natural | 3 | 2 |
| Hazardous Materials Incident | Technological | 3 | 2 |
| Human Disease | Natural | 1 | 1 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | Excluded |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | 1 | 2 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 1 | 1 |

## English Valleys Community School District Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 43.

Table 43: English Valleys CSD Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | 3 | 3 |
| Drought | Natural | 3 | 3 |
| Earthquake | Natural | 3 | Excluded |
| Expansive Soils | Natural | 3 | Excluded |
| Extreme Heat | Natural | 1 | 1 |
| Flash Flood | Natural | 3 | 3 |
| Grass or Wildland Fire | Natural | 3 | Excluded |
| Hazardous Materials Incident | Technological | 3 | 3 |
| Human Disease | Natural | 1 | 1 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | 3 | Excluded |
| Levee and Dam Failure | Technological | 3 | 3 |
| Radiological Incident | Technological | 3 | 3 |
| River Flood | Natural | 3 | 3 |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | 3 | Excluded |
| Terrorism | Human Caused | 2 | 2 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Iowa Valley Community School District Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 44.

Table 44: Iowa Valley CSD Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | 3 | 3 |
| Drought | Natural | 3 | 3 |
| Earthquake | Natural | 3 | Excluded |
| Expansive Soils | Natural | 2 | Excluded |
| Extreme Heat | Natural | 2 | 2 |
| Flash Flood | Natural | 1 | 1 |
| Grass or Wildland Fire | Natural | 2 | Excluded |
| Hazardous Materials Incident | Technological | 2 | 2 |
| Human Disease | Natural | 1 | 1 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | 1 | 1 |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | 1 | 1 |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | 2 | 2 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 2 | 2 |

## Williamsburg Community School District Hazard Prioritization

The jurisdiction's planning committee used the multi-jurisdictional risk assessment prepared for the planning area as a base for discussing the hazards that may affect the area and an appropriate priority level. Ultimately, the planning committee based the priority levels on local conditions and priorities. Refer to Table 45.

Table 45: Williamsburg CSD Hazard Prioritization

| Hazard | Type | Current Priority Level | Priority Level Update |
|---|---|---|---|
| Animal, Plant, Crop Disease | Natural | Excluded | 3 |
| Drought | Natural | Excluded | Excluded |
| Earthquake | Natural | 2 | Excluded |
| Expansive Soils | Natural | Excluded | Excluded |
| Extreme Heat | Natural | 1 | 1 |
| Flash Flood | Natural | Excluded | 2 |
| Grass or Wildland Fire | Natural | 3 | Excluded |
| Hazardous Materials Incident | Technological | 3 | 3 |
| Human Disease | Natural | 1 | 1 |
| Infrastructure Failure | Technological | 1 | 1 |
| Landslide | Natural | Excluded | Excluded |
| Levee and Dam Failure | Technological | Excluded | Excluded |
| Radiological Incident | Technological | Excluded | Excluded |
| River Flood | Natural | Excluded | Excluded |
| Severe Winter Storm | Natural | 1 | 1 |
| Sinkholes | Natural | Excluded | Excluded |
| Terrorism | Human Caused | 1 | 1 |
| Thunderstorm, Lightning and Hail | Natural | 1 | 1 |
| Tornado and Windstorm | Natural | 1 | 1 |
| Transportation Incident | Technological | 1 | 1 |

# Community Attributes

In a multi-jurisdictional plan, it is important to identify local conditions and priorities that differ among participating jurisdictions. These differences are important to consider before identifying a jurisdiction's final mitigation strategy. Despite a relatively small planning area based on county boundaries, variation in topography, hydrology, population, etc. result in different risks for each jurisdiction. These variations and other attributes such as critical facilities, vulnerable populations, community resources, and overall hazard mitigation progress factor into how a jurisdiction should approach each hazard. This chapter will document these attributes.

## Critical Facilities

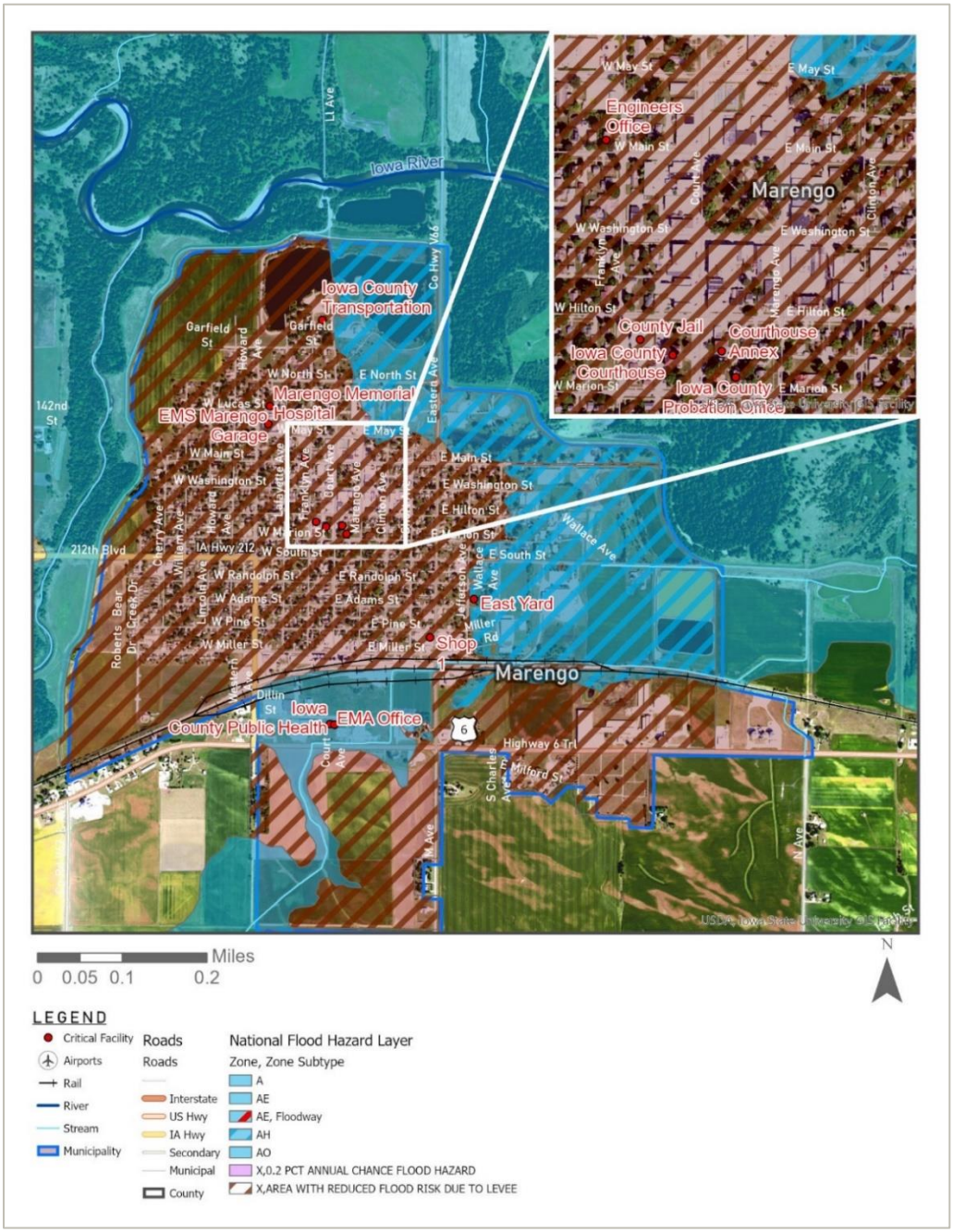
Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in a community. In each jurisdiction, the planning committee identified the primary critical facilities in their community. Generally, all jurisdiction property and infrastructure are considered critical facilities, but additional facilities may be included. This section displays the critical facilities identified by each jurisdiction. The critical facilities maps include the flood zone layer because it is the only mapped hazard that scored a priority level 1 in the countywide risk assessment.

Schools were considered critical facilities in many cities; however, three of four school districts in the county participated in the plan, so their facilities are considered in the school district sections.

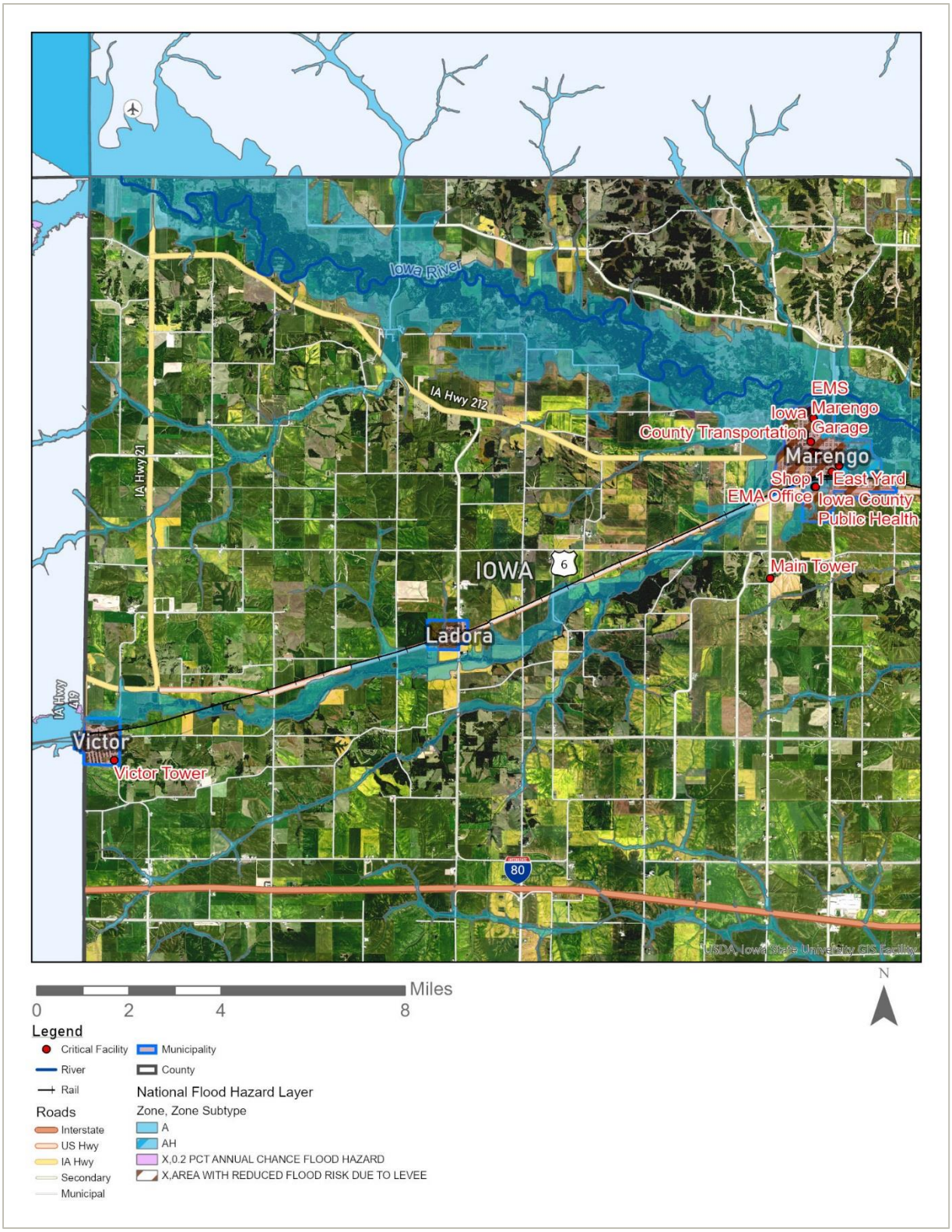
## Iowa County Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Iowa County, all county property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 27 to Map 31.

Map 27: Iowa County Critical Facilities in Marengo



Map 28: Iowa County Critical Facilities NW Quadrant



Map 29: Iowa County Critical Facilities NE Quadrant

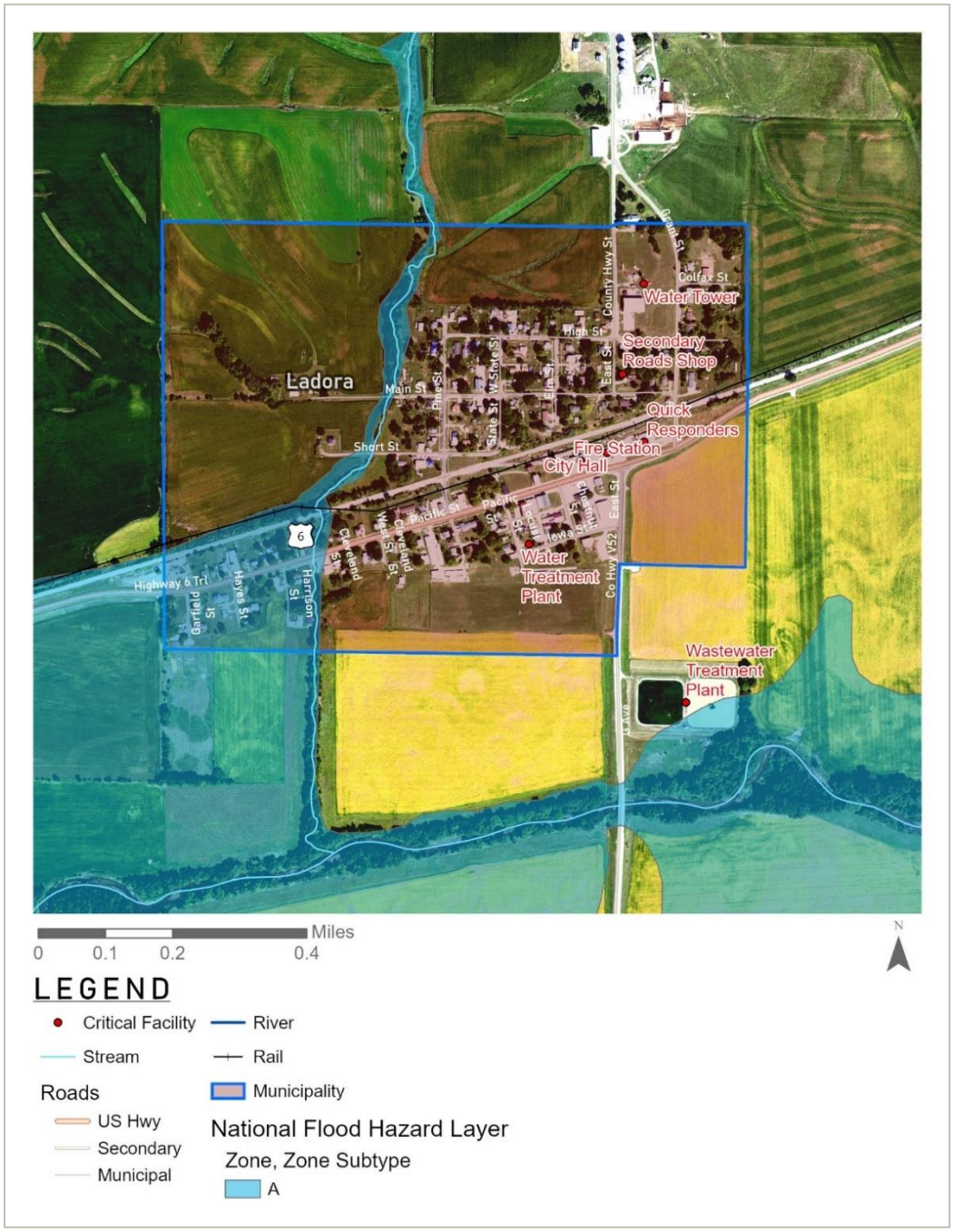
Map 30: Iowa County Critical Facilities SW Quadrant

Map 31: Iowa County Critical Facilities SE Quadrant

## Ladora Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Ladora, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 32.

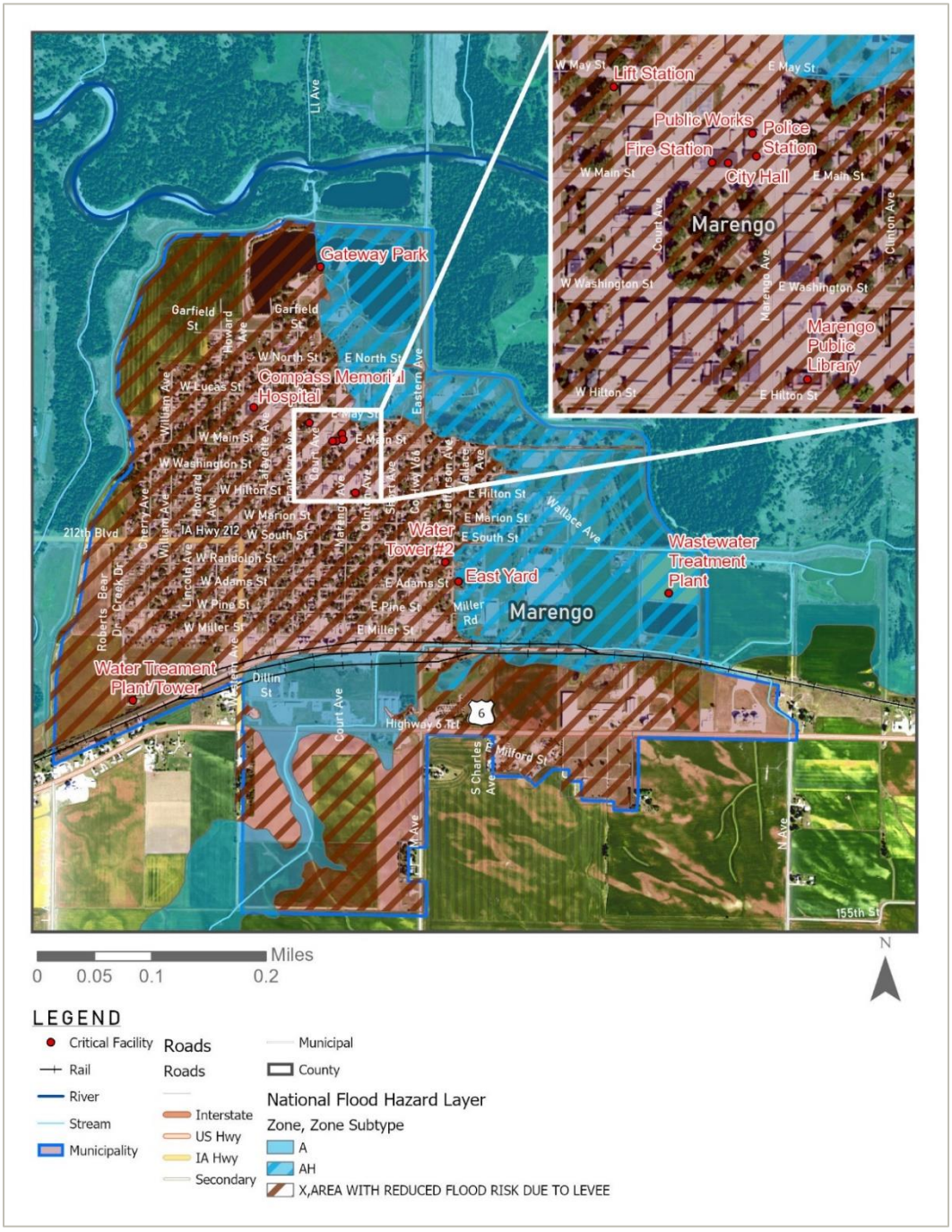
Map 32: Ladora Critical Facilities



## Marengo Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Marengo, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 33.

Map 33: Marengo Critical Facilities



## Millersburg Critical Facilities

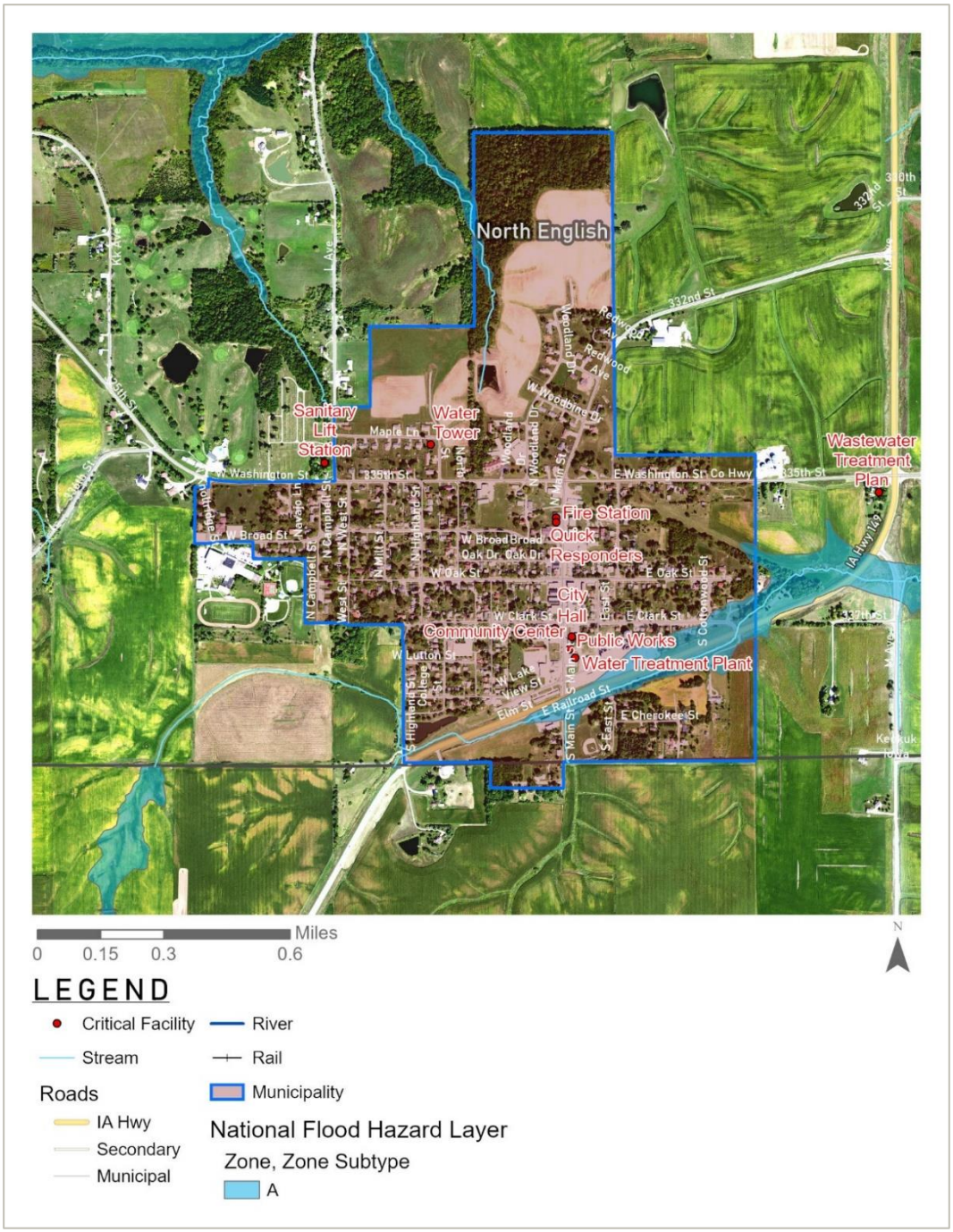
Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Millersburg, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 34.

Map 34: Millersburg Critical Facilities

## North English Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In North English, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 35.

Map 35: North English Critical Facilities



## Parnell Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Parnell, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 36.

Map 36: Parnell Critical Facilities

## Victor Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Victor, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 37.

Map 37: Victor Critical Facilities

## Williamsburg Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Williamsburg, all City property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 38.

Map 38: Williamsburg Critical Facilities

## English Valleys Community School District Critical Facilities

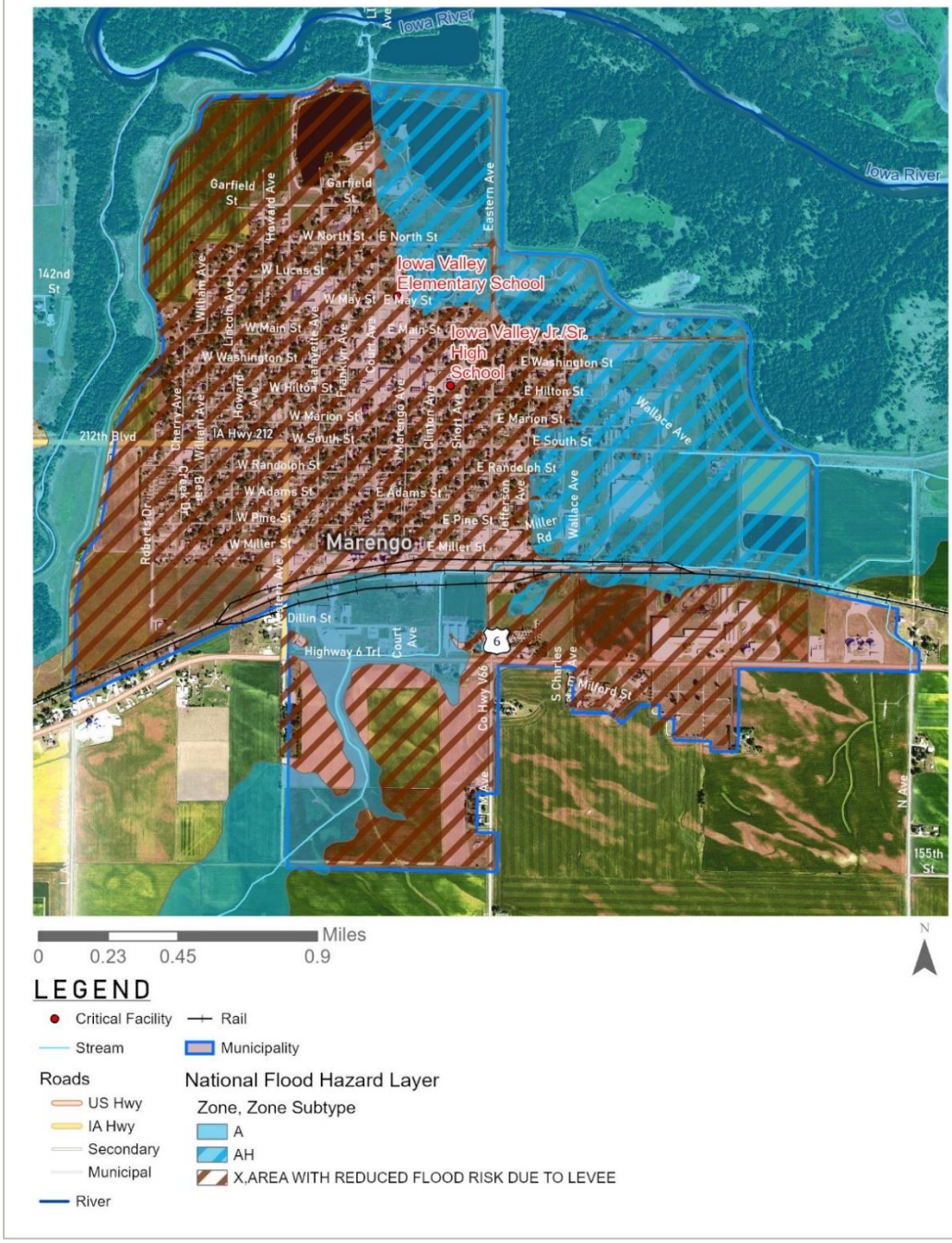
Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In English Valleys CSD, all School District property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 39.

Map 39: English Valleys CSD Critical Facilities

## Iowa Valley Community School District Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Iowa Valley CSD, all District property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 40.

Map 40: Iowa Valley CSD Critical Facilities



## Williamsburg Community School District Critical Facilities

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Williamsburg CSD, all District property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 41.

Map 41: Williamsburg CSD Critical Facilities

## Vulnerable Populations

Vulnerable populations are groups of people who may be vulnerable during a hazard event due to lack of mobility or extended exposure. In all communities, elderly, ill, or disabled living in their home, retirement facilities, or long-term care facilities may be vulnerable due to mobility issues or dependence on medical devices. Daycare and school facilities may also be vulnerable due to a high ratio of children to adults.

Regarding exposure, people who work outdoors or use outdoor recreation facilities are vulnerable during severe weather events. There are recreation areas, large and small, throughout Iowa County and trails that stretch for miles. Shelters are provided in most areas, but the existing shelters may not be sufficient for severe weather events.

In school districts, the students, staff, and visitors who are in school facilities during school or extracurricular activities are generally considered a vulnerable population. Aside from providing an education, each district's mission is to actively prevent illness, injury, or death. Due to the generalization, the location of specific vulnerable populations was not identified in maps for the participating school districts. The facilities of the community school districts involved in this plan are considered to host vulnerable populations. Refer to Map 39 through Map 41.

Aside from school districts, the planning committee in five jurisdictions identified specific vulnerable populations located in their community. Refer to Table 46. The majority of specific vulnerable populations include people living in retirement housing, long-term care facilities, or apartments.

Table 46: Jurisdictions with Specific Vulnerable Populations

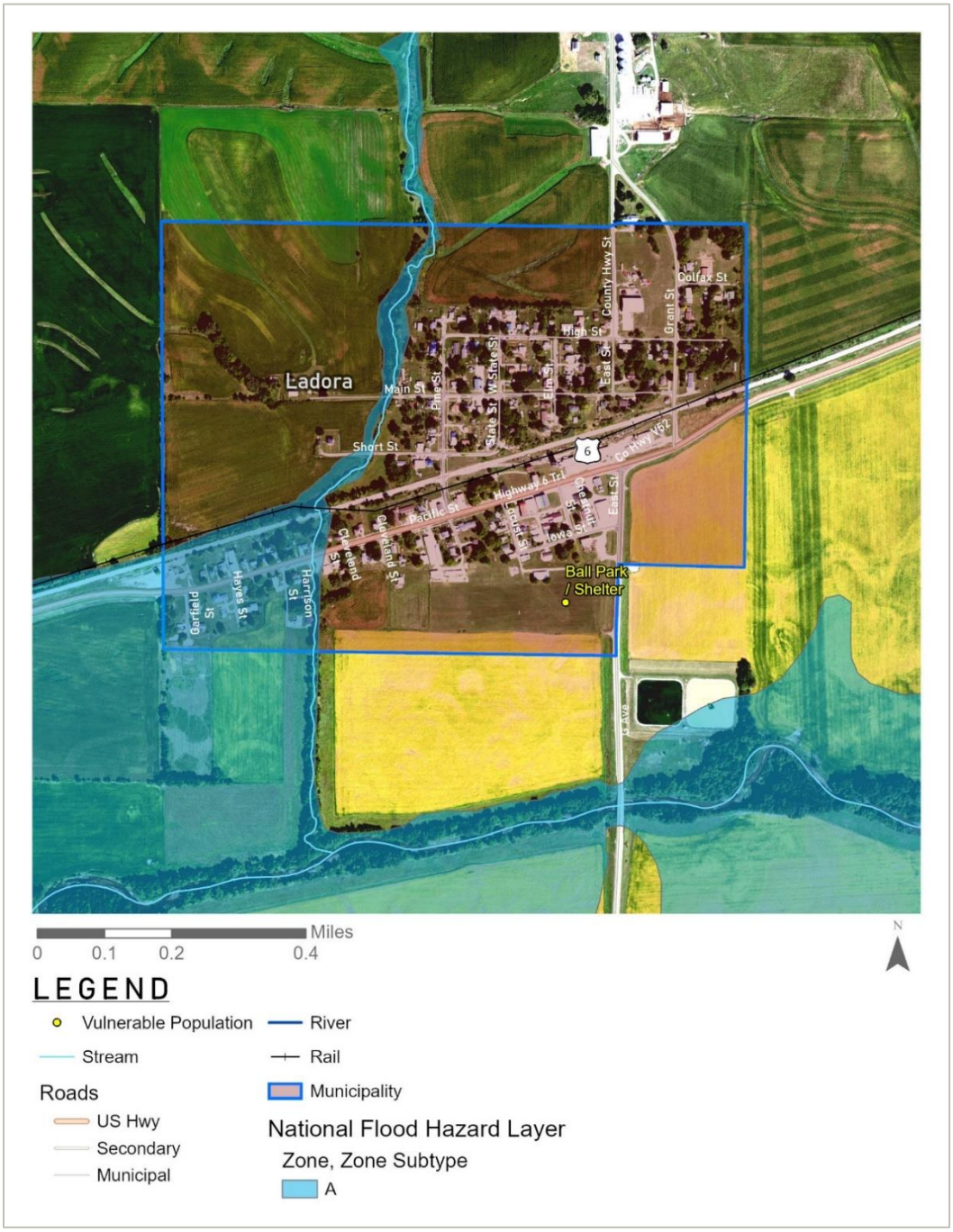
| Jurisdiction | Number of Vulnerable Populations Identified |
|---|---|
| Ladora | 1 |
| Marengo | 9 |
| Millersburg | 2 |
| North English | 1 |
| Williamsburg | 8 |

It should be noted, not all participating jurisdictions identified specific vulnerable populations because the planning committee did not ultimately address a specific population in the final mitigation strategy. In the following sections, the specific vulnerable populations are identified in Map 42 through Map 46.

## Ladora Vulnerable Populations

The Ladora planning committee identified the facilities that regularly host vulnerable populations, i.e. locations where there may be several individuals who may require assistance during or following a hazard event. For specific vulnerable populations, refer to Map 42.

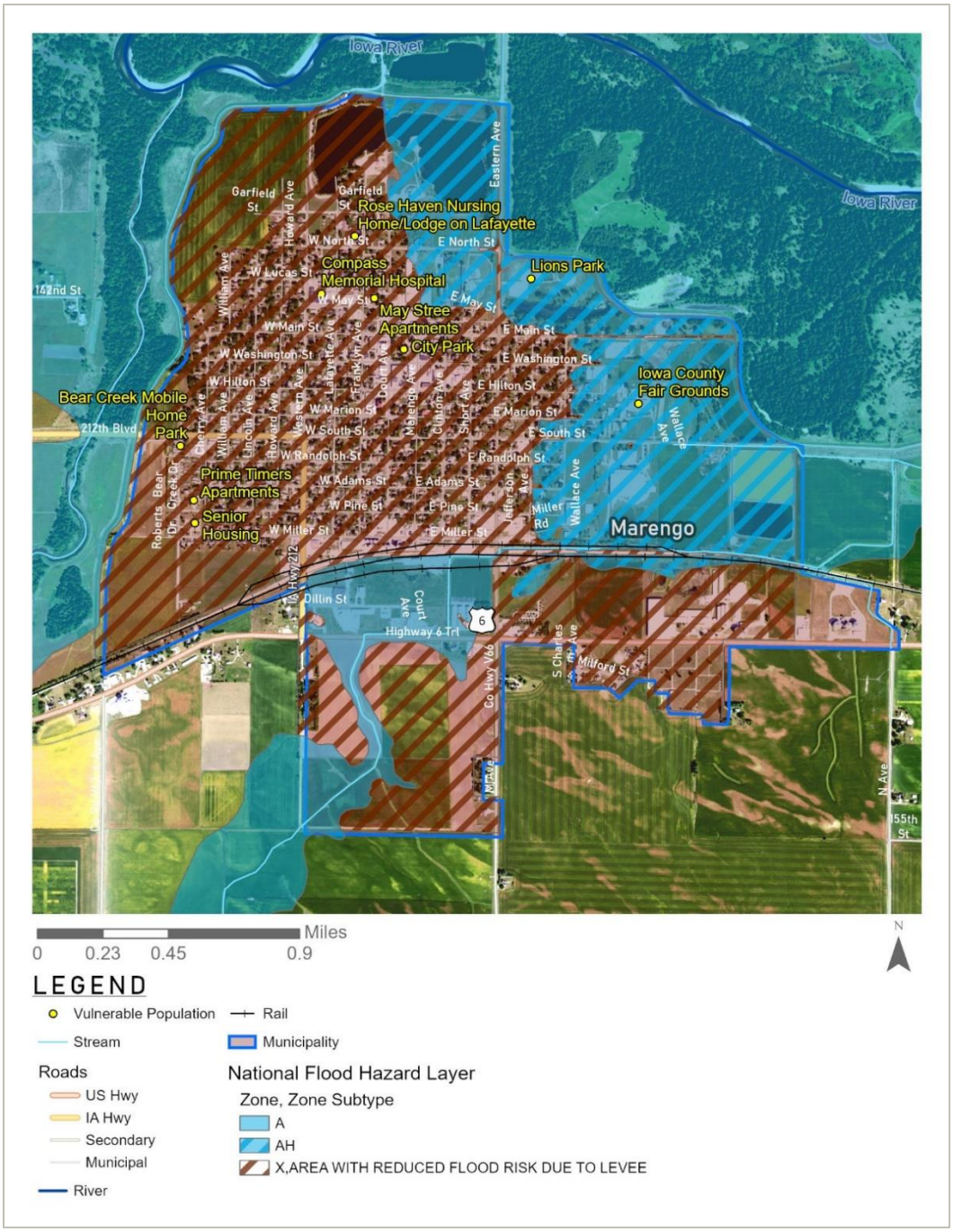
Map 42: Ladora Vulnerable Populations



## Marengo Vulnerable Populations

The Marengo planning committee identified the facilities that regularly host vulnerable populations, i.e. locations where there may be several individuals who may require assistance during or following a hazard event. For specific vulnerable populations, refer to Map 43.

Map 43: Marengo Vulnerable Populations



## Millersburg Vulnerable Populations

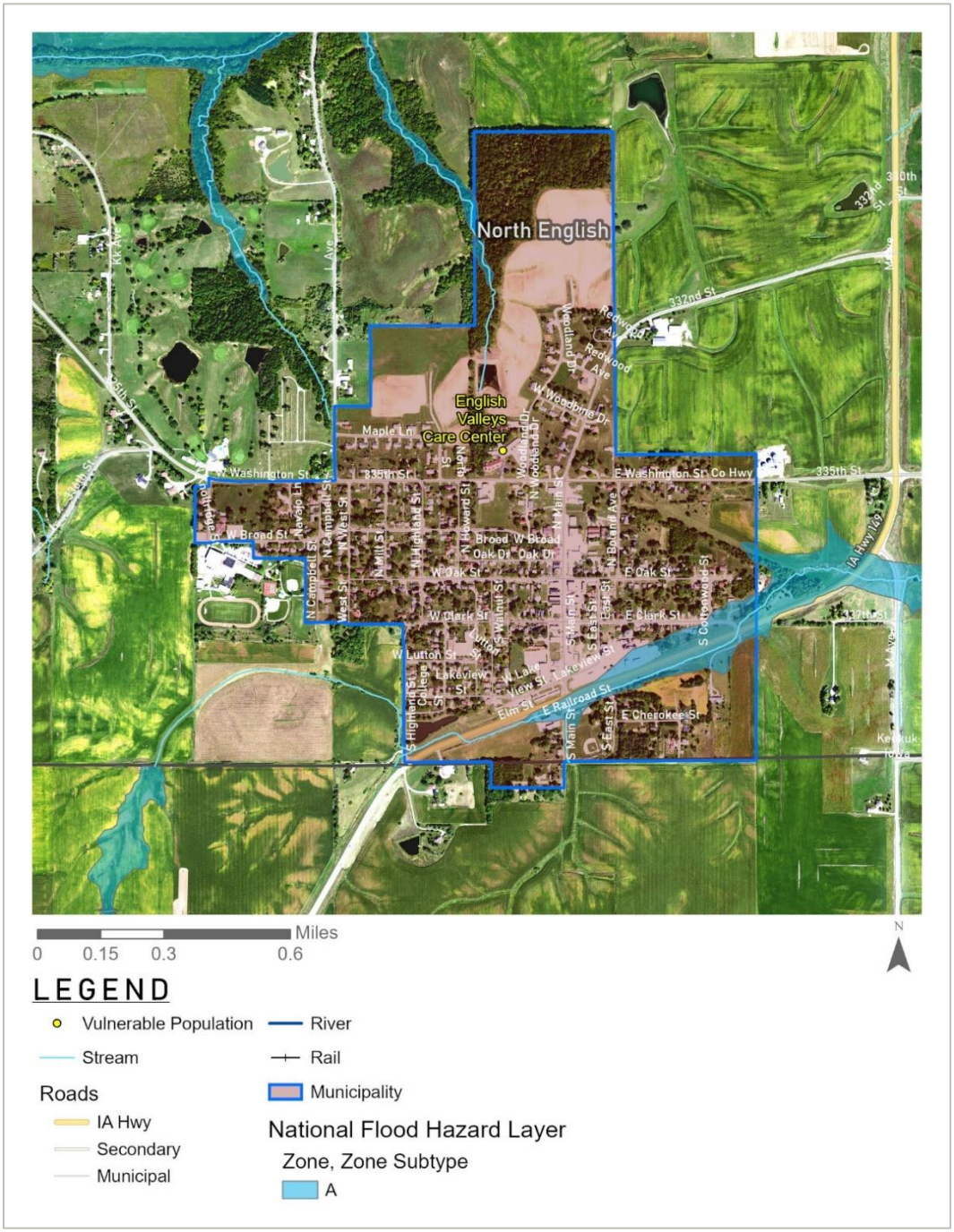
The Millersburg planning committee identified the facilities that regularly host vulnerable populations, i.e. locations where there may be several individuals who may require assistance during or following a hazard event. For specific vulnerable populations, refer to Map 44.

Map 44: Millersburg Vulnerable Populations

## North English Vulnerable Populations

The North English planning committee identified the facilities that regularly host vulnerable populations, i.e. locations where there may be several individuals who may require assistance during or following a hazard event. For specific vulnerable populations, refer to Map 45.

Map 45: North English Vulnerable Populations



## Williamsburg Vulnerable Populations

The Williamsburg planning committee identified the facilities that regularly host vulnerable populations, i.e. locations where there may be several individuals who may require assistance during or following a hazard event. For specific vulnerable populations, refer to Map 46.

Map 46: Williamsburg Vulnerable Populations

## Operations and Resources

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

Local governments in Iowa are subject to Iowa Code, which gives the authority to protect the health, safety, and welfare of its residents and levy taxes to provide services. Participating jurisdictions have similar authority, but each jurisdiction varies in terms of size and governmental priorities. When developing a mitigation strategy in a multi-jurisdictional planning area, it is important to distinguish the variation in operations and resources among jurisdictions to ensure the mitigation strategy is feasible. In other words, it is important to consider whether or not each community has the expertise or access to the resources needed to complete a project. In the following pages, the operations and resources for each participating jurisdiction are included.

### Types of Operations and Resources

- Officials, commissions, and committees
- Staff and departments
- Services provided by jurisdiction
- Contracted or agreement services
- Policies, programs, and plans
- Financial and other resources

## Iowa County Operations and Resources

Iowa County has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All County operations and resources were considered throughout the plan development process to ensure the County's final mitigation strategy is feasible. See Table 47.

Table 47: Iowa County Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Board of Supervisors*<br>• Emergency Management Commission*<br>• Iowa County Conservation Board<br>• Regional Environmental Improvement Commission<br>• Iowa County Economic Development Commission<br>• Iowa Soil and Water Conservation District Commission |
| Staff and Departments | • Assessor's Office<br>• Attorney's Office<br>• Auditor's Office*<br>• Community Services<br>• Conservation Office*<br>• Department of Human Services<br>• Emergency Medical Services*<br>• Engineer's Office and Secondary Roads Department*<br>• Environmental Services<br>• General Assistance Office<br>• Iowa County Transportation*<br>• Medical Examiner's Office<br>• Mental Health Office<br>• Public Health Office<br>• Recorder's Office<br>• Sheriff's Office*<br>• Treasurer's Office<br>• Veterans Commissions Office<br>• Weed Commissioner<br>• Iowa County Emergency Management Agency* |

Table 47: Iowa County Operations and Resources, continued

| | |
|---|---|
| County Services | • Road and bridge maintenance<br>• Stormwater system maintenance<br>• Snow removal<br>• Vegetation management in public areas<br>• Law enforcement and response<br>• Emergency medical response<br>• Well and septic system permits<br>• Treasurer and Recorder services<br>• Transportation services<br>• Generators for Sheriff's Office, All Radio tower sites, and Marengo Ambulance Garage<br>• Flood protection supplies including pumps, HESCO barriers, and sandbags<br>• County website |
| Contracted or Agreement Services | • Police and fire protection mutual aid agreements<br>• Iowa County Soil and Water Conservation District |
| Policies, Programs, and Plans | • Capital Improvement Program*<br>• Iowa County Code of Ordinances*<br>• Floodplain ordinance and management program*<br>  ○ National Flood Insurance Program participation<br>  ○ Current effective map: 8/2/2011<br>• Iowa County Emergency Management Plan*<br>• Coordinate with Iowa Department of Natural Resources<br>• Coordinate with Iowa Department of Public Health<br>• Multi-Jurisdictional Hazard Mitigation Plan 2020-2025<br>• Debris Management Plan FEMA approved March 2019<br>• NWS Storm Ready County<br>• English River Watershed Improvement & Resilience Plan*<br>• Clear Creek Watershed Management Plan* |
| Financial and Other Resources | • County budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Ladora Operations and Resources

Ladora has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 48.

Table 48: Ladora Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission<br>• Regional Environmental Improvement Commission<br>• E911 Service Board<br>• LDC (Ladora Development Committee) |
| Staff and Departments | • City Clerk*<br>• Public Works*<br>• Treasurer*<br>• Street Maintenance<br>• Grounds Maintenance |
| City Services | • Clean and secure water supply<br>• Wastewater management and treatment<br>• Stormwater management<br>• Ladora Fire Department<br>• Ladora Quick Responders<br>• Vegetation and tree management in public areas<br>• Snow removal<br>• Outdoor warning siren<br>• Generator at water and wastewater treatment plant<br>• Maintain sandbagging supplies |
| Contracted or Agreement Services | • Iowa County Sheriff's Office<br>• Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service<br>• Fire protection mutual aid agreements<br>• Street maintenance and improvements<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Solid waste and recycling<br>• Linn County HAZMAT Response Team<br>• Contracted Engineering Services |
| Policies, Programs, and Plans | • Ladora Code of Ordinances*<br>• National Flood Insurance Program participation*<br>  ○ Floodplain ordinance and management program<br>  ○ Current Effective Map: 8/2/2011<br>  ○ Ladora will continue participate and enforce the floodplain ordinance<br>• Iowa County Emergency Management Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |

Table 48: Ladora Operations and Resources, continued

| | |
|---|---|
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Marengo Operations and Resources

Marengo has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 49.

Table 49: Marengo Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission*<br>• Regional Environmental Improvement Commission*<br>• E911 Service Board |
| Staff and Departments | • City Administrator*<br>• City Clerk*<br>• Public Works*<br>• Fire (Volunteer)*<br>• Police* |
| City Services | • Clean and secure water supply*<br>• Wastewater management and treatment*<br>• Marengo Fire Department*<br>• Marengo Police Department*<br>• Street maintenance and improvements*<br>• Vegetation and tree management in public areas*<br>• Snow removal*<br>• Public Library<br>• Memorial Hospital<br>• Maintain generators at the wastewater plant, water plant, and wells*<br>• Outdoor warning siren system*<br>• Yard waste management<br>• Website* |
| Contracted or Agreement Services | • Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service*<br>• Fire protection mutual aid agreements*<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Solid waste and recycling<br>• Storm debris removal*<br>• Linn County HAZMAT Response Team* |

Table 49: Marengo Operations and Resources, continued

| | |
|---|---|
| Policies, Programs, and Plans | • Marengo Code of Ordinances*<br>• Debris Management Plan*<br>• National Flood Insurance Program participation*<br>  ○ Floodplain ordinance and management program<br>  ○ Current Effective Map: 8/2/2011<br>  ○ Marengo will continue to participate in the NFIP and enforce the floodplain ordinance<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025*<br>• Emergency Management Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Millersburg Operations and Resources

Millersburg has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 50.

Table 50: Millersburg Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission*<br>• Regional Environmental Improvement Commission<br>• E911 Service Board<br>• Iowa County Supervisors |
| Staff and Departments | • City Clerk*<br>• Public Works*<br>• Millersburg Library |
| City Services | • Maintain water infrastructure and storage*<br>• Wastewater management and treatment<br>• Stormwater management*<br>• Millersburg Fire Department*<br>• Millersburg Quick Responders*<br>• Street maintenance and improvements<br>• Vegetation and tree management in public areas*<br>• Snow removal* |
| Contracted or Agreement Services | • Poweshiek Water Association<br>• Iowa County Sheriff's Office<br>• Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service<br>• Fire protection mutual aid agreements<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Solid waste and recycling<br>• Linn County HAZMAT Response Team*<br>• Alliant Energy |
| Policies, Programs, and Plans | • Millersburg Code of Ordinances*<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025*<br>• Iowa County Emergency Management Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |

Table 50: Millersburg Operations and Resources, continued

| | |
|---|---|
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## North English Operations and Resources

North English has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 47.

Table 51: North English Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission<br>• Regional Environmental Improvement Commission<br>• E911 Service Board |
| Staff and Departments | • City Clerk*<br>• Municipal Works* |
| City Services | • Clean and secure water supply<br>• Wastewater management and treatment<br>• Stormwater management<br>• Street maintenance and improvements<br>• Vegetation and tree management in public areas<br>• Snow removal<br>• Outdoor warning siren<br>• Generator at the Water Plant |
| Contracted or Agreement Services | • Iowa County Sheriff's Office<br>• North English Benefited Fire District*<br>• Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service<br>• Fire protection mutual aid agreements<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Solid waste and recycling<br>• Linn County HAZMAT Response Team |
| Policies, Programs, and Plans | • North English Code of Ordinances*<br>• North English Hazard Mitigation Plan 2010*<br>• Iowa County Emergency Management Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Parnell Operations and Resources

Parnell has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 52.

Table 52: Parnell Operations and Resource

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission*<br>• Regional Environmental Improvement Commission<br>• E911 Service Board |
| Staff and Departments | • City Clerk* |
| City Services | • Clean and secure water supply*<br>• Wastewater management and treatment*<br>• Stormwater management* |
| Contracted or Agreement Services | • Iowa County Sheriff's Office<br>• Iowa County Emergency Management Agency*<br>• Iowa County Emergency Warning Siren*<br>• Iowa County Emergency Medical Service<br>• Williamsburg Fire Department*<br>• Fire protection mutual aid agreements*<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Street maintenance and improvements<br>• Public works management<br>• Vegetation and tree management in public areas*<br>• Snow removal*<br>• Solid waste and recycling services<br>• Linn County HAZMAT Response Team* |
| Policies, Programs, and Plans | • Parnell Code of Ordinances*<br>• Iowa County Emergency Management Plan*<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Victor Operations and Resources

Victor has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 53.

Table 53: Victor Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Iowa County Emergency Management Commission<br>• South Central Iowa Solid Waste Commission (Poweshiek County)<br>• E911 Service Board |
| Staff and Departments | • City Clerk*<br>• Public Works* |
| City Services | • Clean and secure water supply*<br>• Wastewater management and treatment*<br>• Stormwater management*<br>• Victor Fire Department*<br>• Victor Quick Responders*<br>• Street maintenance and improvements<br>• Vegetation and tree management in public areas*<br>• Snow removal*<br>• Public Library<br>• Yard waste management<br>• Outdoor warning siren*<br>• Generator at the wastewater plant*<br>• Website* |
| Contracted or Agreement Services | • Iowa County Sheriff's Office<br>• Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service<br>• Fire protection mutual aid agreements<br>• East Central Iowa Council of Governments*<br>• South Central Iowa Solid Waste Agency (Poweshiek County)<br>• Solid waste and recycling<br>• Storm debris removal<br>• Linn County HAZMAT Response Team* |

Table 53: Victor Operations and Resources, continued

| | |
|---|---|
| Policies, Programs, and Plans | • Victor Code of Ordinances*<br>• National Flood Insurance Program participation*<br>  ○ Floodplain ordinance and management program<br>  ○ Current Effective Map: 5/19/2014<br>  ○ Victor will continue to participate in the NFIP and enforce the floodplain ordinance<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025*<br>• Iowa County Emergency Management Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |
| Financial and Other Resources | • City budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Williamsburg Operations and Resources

Williamsburg has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All City operations and resources were considered throughout the plan development process to ensure the City's final mitigation strategy is feasible. See Table 54.

Table 54: Williamsburg Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Mayor*<br>• City Council*<br>• Planning and Zoning Commission*<br>• Board of Adjustment<br>• Iowa County Emergency Management Commission<br>• Regional Environmental Improvement Commission<br>• E911 Service Board |
| Staff and Departments | • City Clerk's Office*<br>• Public Works Department*<br>• Police Department*<br>• Fire Department*<br>• Recreation Department*<br>• Library* |
| City Services | • Clean and secure water supply<br>• Wastewater management and treatment<br>• Stormwater management<br>• Williamsburg Fire Department<br>• Williamsburg Police Department<br>• Williamsburg Quick Responders<br>• Iowa County EMS<br>• Street maintenance and improvements<br>• Vegetation and tree management in public areas<br>• Snow removal<br>• Public Library<br>• Yard waste compost<br>• Warning Siren<br>• Website |
| Contracted or Agreement Services | • Iowa County Emergency Management Agency*<br>• Iowa County Emergency Medical Service<br>• Fire protection mutual aid agreements<br>• East Central Iowa Council of Governments*<br>• Iowa County Landfill<br>• Solid waste and recycling<br>• Linn County HAZMAT Response Team |

Table 54: Williamsburg Operations and Resources, continued

| | |
|---|---|
| Policies, Programs, and Plans | • Williamsburg Code of Ordinances*<br>• National Flood Insurance Program participation*<br>  ○ Floodplain ordinance and management plan<br>  ○ Current Effective Map: 8/2/2011<br>  ○ The City will continue to participate in the NFIP and enforce the floodplain ordinance. NFIP participation is supported in the comprehensive plan. Watershed projects have been considered, such as bank stabilization as part of the wastewater improvement project.<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025* |
| Financial and Other Resources | • Iowa County Emergency Management Plan*<br>• Emerald Ash Borer Plan*<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Iowa Department of Natural Resources |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## English Valleys Community School District Operations and Resources

English Valleys CSD has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All District operations and resources were considered throughout the plan development process to ensure the District's final mitigation strategy is feasible. See Table 55.

Table 55: English Valleys CSD Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Board of Education |
| Staff and Departments | • Administration*<br>• Teaching Staff<br>• Office Staff<br>• Support Staff |
| District Services | • Building maintenance and improvements*<br>• Grounds maintenance<br>• Transportation*<br>• Food Service<br>• Website<br>• Mass notification system* |
| Contracted or Agreement Services | • Iowa County Sheriff's Office*<br>• North English Benefited Fire District*<br>• North English Quick Responders*<br>• Iowa County Emergency Management Agency*<br>• Solid waste and recycling<br>• Nurse services<br>• Snow removal |
| Policies, Programs, and Plans | • Emergency plans and drills*<br>• CPR and blood borne pathogen training<br>• Coordinate with Iowa County Public Health*<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025 |
| Financial and Other Resources | • District budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Iowa Valley Community School District Operations and Resources

Iowa Valley CSD has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All District operations and resources were considered throughout the plan development process to ensure the District's final mitigation strategy is feasible. See Table 56.

Table 56: Iowa Valley CSD Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Board of Education<br>• Health Committee |
| Staff and Departments | • Administration*<br>• Teaching Staff<br>• Office Staff<br>• Support Staff |
| District Services | • Building maintenance and improvements*<br>• Grounds maintenance<br>• Transportation*<br>• Health Services*<br>• Food Service<br>• Website<br>• Mass notification system* |
| Contracted or Agreement Services | • Marengo Police Department*<br>• Iowa County Sheriff's Office*<br>• Marengo Fire Department*<br>• Iowa County EMS*<br>• Iowa County Emergency Management Agency*<br>• Solid waste and recycling<br>• Snow removal*<br>• Cedar Rapids/Linn County Solid Waste Agency Hazardous Materials Management* |
| Policies, Programs, and Plans | • Emergency plans and drills*<br>• CPR and blood borne pathogen training<br>• Coordinate with Iowa County Public Health<br>• Coordinate with Environmental Protection Agency<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025* |
| Financial and Other Resources | • District budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Williamsburg Community School District Operations and Resources

Williamsburg CSD has a wide range of operations and resources to implement a well-rounded hazard mitigation strategy. All District operations and resources were considered throughout the plan development process to ensure the District's final mitigation strategy is feasible. See Table 57.

Table 57: Williamsburg CSD Operations and Resources

| | |
|---|---|
| Officials, Commissions, and Committees | • Board of Education<br>• Wellness Committee<br>• School Improvement Advisory/Technology Committee<br>• Building and Grounds Committee |
| Staff and Departments | • Administration*<br>• Teaching Staff<br>• Office Staff<br>• Support Staff*<br>• Information Technology Department<br>• Custodial/Maintenance Staff*<br>• Food Service Staff<br>• Athletic Staff |
| District Services | • Building maintenance and improvements*<br>• Grounds maintenance<br>• Snow removal*<br>• Transportation*<br>• Food Service<br>• Health Services*<br>• Website<br>• Mass notification system*<br>• Tornado safe room in Junior/Senior High School and Mary Welsh Elementary School* |
| Contracted or Agreement Services | • Williamsburg Police Department*<br>• Iowa County Sheriff's Office*<br>• Williamsburg Fire Department*<br>• Iowa County Ambulance<br>• Williamsburg Quick Responders*<br>• Iowa County Emergency Management Agency*<br>• Solid waste and recycling |
| Policies, Programs, and Plans | • Emergency plans and drills*<br>• Safe room operation plans*<br>• Coordinate with Iowa County Public Health*<br>• Iowa County Multi-Jurisdictional Hazard Mitigation Plan 2020–2025* |

Table 57: Williamsburg CSD Operations and Resources, continued

| | |
|---|---|
| Financial and Other Resources | • District budget*<br>• Bonds*<br>• Grants*<br>• Donations* |

*The asterisk indicates officials or staff that participated in the plan development process or policies, programs, and plans that were discussed or reviewed for relevancy in the City's mitigation strategy.

## Progress Update

For jurisdictions with existing hazard mitigation plans, it is important to document the mitigation actions that have been completed since the plan was adopted. The jurisdictions that participated in the previously approved plan completed mitigation actions that significantly reduce the risk of high priority hazards in the community.

> Requirement §201.6 (d)(3): (d) Plan review… (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it within 5 years in order to continue to be eligible for mitigation project grant funding.

The following section provides an update on the completed mitigation actions. A table is included that displays information about the action, hazard(s) addressed, goal(s) addressed, whether the action was included in the previous plan, and notes on the work completed. Actions that were included in the previous plan are indicated with an "X" in the corresponding column. The absence of "X" indicates a mitigation action that was undertaken but not specifically referenced in the previous hazard mitigation plan. Generally, in a jurisdiction's progress update, the mitigation actions that were included in the previous hazard mitigation plan show a commitment to and documented progress toward completing mitigation actions.

It should be noted that although a mitigation action may be included in a jurisdiction's progress update as a completed mitigation action, the mitigation action may not necessarily be excluded from the jurisdiction's updated mitigation strategy in this plan. The majority of hazard mitigation actions are ongoing in nature, as risk and vulnerability change throughout a jurisdiction. In addition, the majority of mitigation actions require multiple projects over a span of time that extends beyond the five-year life of a hazard mitigation plan, which is often due to the cost of completing large or multi-stage mitigation actions.

## Iowa County Progress Update

Iowa County has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Iowa County's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 58.

Table 58: Iowa County Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Elevate access roads over the Iowa River to prevent roadway and bridge shutdown | Flood, Infrastructure Failure | 1, 2, 3, 5 | X | Several County roads have been raised |
| Install culverts to mitigate flooding | Flood | 1, 3, 5 | | Several larger culverts have been installed |

## Ladora Progress Update

Ladora has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Ladora's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 59.

Table 59: Ladora Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Build and maintain levee to protect water and wastewater infrastructure | Infrastructure Failure, Flood | 1, 2, 3, 5 | | Built Berm around water treatment plant |
| Replace insufficient pumps at the Water Treatment Plant | Infrastructure Failure, Flood | 1, 2, 3, 5 | | Replaced 1 pump |

## Marengo Progress Update

Marengo has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Marengo's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 60.

Table 60: Marengo Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Update the local emergency operations plan and establish a review and update schedule | All hazards | 1, 2, 3, 4, 5 | X | Multi-Jurisdictional Debris Management Plan updated May 2019 |
| Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | All hazards | 1, 2, 4, 5 | X | Booklets and mass notification completed by Iowa County EMA |
| Purchase and install backup power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Installed backup generator at May Street lift station |
| Enhance Fire Department training, especially storm spotter training and initial hazardous materials incident response | Hazardous Materials, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 4, 5 | X | Completed/on-going |

## North English Progress Update

North English has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate North English's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 61.

Table 61: North English Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Designate a shelter, develop an operations plan, and determine a review and update schedule | All hazards | 1, 4, 5 | X | Community Center, Fire Station |
| Purchase and install power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Generator will be included in new wastewater treatment plant and new lift station |
| Complete water, wastewater, and stormwater infrastructure improvements | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Replacing water main (ongoing), repair storm intakes/pipes is in process of new wastewater treatment plant and collection system upgrade |

## Parnell Progress Update

Parnell has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Parnell's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 62.

Table 62: Parnell Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Purchase and install backup power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | The City has a portable generator and is adding the connection to the water treatment facility |
| Install warning siren with remote activation, and backup source of power | Tornado and Windstorm, Thunderstorm, Lightning, and Hail | 1, 4, 5 | X | The City, with Iowa County EMA, installed a siren and backup battery in 2019. |

## Victor Progress Update

Victor has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Victor's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 63.

Table 63: Victor Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Purchase and install a power generator in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Victor installed a backup generator at the water treatment plant with HMA funding. |

## Williamsburg Progress Update

Williamsburg has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Williamsburg's general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to

Table 64: Williamsburg Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Complete water and wastewater infrastructure improvements | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | A new water plant is estimated to begin construction in 2020. Design work is underway for wastewater plant improvements. |
| Other Actions Not in Mitigation Strategy | | | | |
| Complete infrastructure and utility improvements | Infrastructure Failure | 1, 3, 5 | | Work will begin on Oak Street in 2020. The State Street bridge is scheduled to be replaced in 2021. Circle Terrace was repaved and the utilities updated in 2017–2018. |
| Complete streambank stabilization | Flood | 1, 4, 5 | | Williamsburg is exploring an Iowa Department of Natural Resources Water Resource Restoration Sponsored Project to complete streambank stabilization, watershed improvements, and cleaning up old city dump sites along Old Man's Creek. |

## English Valleys Community School District Progress Update

English Valleys CSD has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate English Valleys CSD's general commitment and progress toward mitigating or reducing the risk of hazards in the district. Refer to Table 65.

Table 65: English Valleys CSD Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Create hand sanitation stations in major traffic areas | Human Disease | 1, 4, 5 | X | Completed |

## Iowa Valley Community School District Progress Update

Iowa Valley CSD has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Iowa Valley CSD's general commitment and progress toward mitigating or reducing the risk of hazards in the district. Refer to Table 68.

Table 66: Iowa Valley CSD Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Install a security system to limit access to school buildings | Terrorism | 1, 2, 5 | X | Completed |

## Williamsburg Community School District Progress Update

Williamsburg CSD has an existing hazard mitigation strategy, so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Williamsburg CSD's general commitment and progress toward mitigating or reducing the risk of hazards in the district. Refer to Table 67.

Table 67: Williamsburg CSD Completed Mitigation Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Purchase and install generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, Hail, Tornado and Windstorm | 1, 2, 3, 5 | | Priority facilities are the main school facilities primarily for technology and food storage to maintain communication capabilities and avoid food loss. The jr./sr. high school has a generator that powers the tornado safe room. Mary Welsh does not have a generator. |

# Mitigation Strategy

> Requirement §201.6 (c)(3)(ii): (c) The plan shall include the following:… (3) A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:... (ii) A section that identifies and analyzed a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

A mitigation strategy is a set of mitigation actions meant to prevent or reduce the potential impacts of hazards. There are several types of mitigation actions with a different method of reducing vulnerability. Types of mitigation actions include prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

The planning committee in each participating jurisdiction identified proposed mitigation actions, which are actions beyond current operations resources, for each hazard that may affect the jurisdiction. The planning committee in each jurisdiction considered each type of mitigation action before identifying final mitigation actions. To be included in the final mitigation strategy, a mitigation action must be within the jurisdiction's authority, technically feasible, and fulfill at least one goal.

In jurisdictions that have developed mitigation strategies for past hazard mitigation plans, the existing mitigation strategy was used as a base for this plan. Mitigation actions that were included in the existing plan and continue to be a priority are noted with an "X." The absence of an "X" indicates the mitigation action was not specifically referenced in the existing hazard plan. In the adjacent "Notes" column, the jurisdiction's progress is referenced.

As determined by the planning committee in each jurisdiction, there are mitigation actions in the existing plan not included in the updated mitigation strategy because the proposed mitigation actions are technically ongoing operations, the jurisdiction is not financially or legally responsible for the action, or the project does not reflect current conditions and priorities in the community. In addition to these reasons, notes may be included for many of the mitigation strategies that were removed for the plan update.

## Iowa County Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Iowa County's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 68 for the County's mitigation strategy.

Table 68: Iowa County Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Develop policy for road closure due to flooding | River flood | 1, 2, 4, 5 | X | Completed |
| Distribute emergency preparedness booklets and promote the mass notification system | All hazards | 1, 2, 4, 5 | X | Booklets are shared with jurisdictions/the public |
| Purchase and install generators or replace obsolete generators in critical facilities | Thunderstorm, Lightning, and Hail, Tornado and Windstorm, Infrastructure Failure | 1, 3, 5 | X | Generators will be replaced as needed |
| Upgrade levee pumps and flood gate control system | Levee and Dam Failure, Flood | 1, 2, 3, 5 | X | The existing pumps (5) are not sufficient |
| Acquire, relocate, elevate, and/or demolish properties in flood hazard areas | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 3, 4, 5 | X | Primary areas include Amana Colonies, Iowa Lake Park, Conroy, and Parnell, which currently have no outdoor warning sirens |
| Expand the outdoor warning siren system | Infrastructure Failure | 1, 2, 3, 5 | X | No current projects. Sirens are installed as needed. |
| Construct tornado safe rooms in critical facilities or in vulnerable areas | | 1, 3, 4, 5 | | |

Table 68: Iowa County Mitigation Strategy, continued

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Construct paved shoulders where water overtops road and causes road undermining and roadside washouts | Flash flood, river flood | 1, 2, 3, 5 | | |
| Construct road/dam structures to help reduce downstream flash flooding | Flash flood, river flood | 1, 2, 3, 5 | | |
| Install or replace culverts to mitigate flood loss | Flash flood | 1, 2, 3, 5 | | |

Updated Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Elevate roads to prevent roadway and bridge shutdown<br>*Previously: Elevate access roads over the Iowa River to prevent roadway and bridge shutdown* | Flood, Infrastructure Failure | 1, 2, 3, 5 | X | Several County roads have been raised |

## Ladora Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Ladora's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 69 for the City's mitigation strategy.

Table 69: Ladora Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Distribute disaster preparedness booklets and promote the mass notification system | All hazards | 1, 2, 3, 4, 5 | X | Efforts under way |
| Build and maintain levee to protect water and wastewater infrastructure | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Built Berm around water treatment plant |
| Complete a sewer lining project to reduce water inflow and infiltration | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | No funding |
| Purchase and install backup power generators for critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 3, 5 | X | No funding |
| Replace outdoor warning siren, when coverage is insufficient | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 3, 4, 5 | X | No funding |
| Construct a new community center with a tornado safe room | Tornado and Windstorm | 1, 2, 3, 5 | X | No funding |
| Replace insufficient pumps at the Water Treatment Plant | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Replaced 1 pump |

Removed Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Acquire, relocate, elevate, an/or demolish properties in the floodplain | Flood | 1, 2, 5 | X | Remove |
| Purchase weather radio for the concessions stand the City's soccer field | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 4, 5 | X | |

## Marengo Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Marengo's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 68 for the City's mitigation strategy.

Table 70: Marengo Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Update the local emergency operations plan and establish a review and update schedule | All hazards | 1, 2, 3, 4, 5 | X | Multi-Jurisdictional Debris Management Plan updated May 2019 |
| Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | All hazards | 1, 2, 4, 5 | X | Booklets and mass notification completed by Iowa County EMA. |
| Purchase and install backup power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Installed backup generator at May Street lift station. |
| Complete flood control, water, wastewater, and stormwater infrastructure improvements | Flood, Levee and Dam Failure | 1, 2, 3, 5 | X | Sewer upgrades are in progress |
| Acquire, relocate, elevate, and/or demolish properties in the floodplain | Flood, Levee and Dam Failure | 1, 2, 5 | X | No properties have been purchased. |
| Improve outdoor warning system | Tornado and windstorm | 1, 4, 5 | | |

Removed Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Construct a multi-purpose community center with a tornado safe room | Extreme Heat, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 4, 5 | X | |
| Enhance Fire Department training, especially storm spotter training and initial hazardous materials incident response | Hazardous Materials, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 4, 5 | X | Completed/on-going. |

## Millersburg Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Millersburg's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 71 for the City's mitigation strategy.

Table 71: Millersburg Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Develop emergency operations and shelter plan and establish a training, review, and update schedule | All hazards | 1, 3, 4, 5 | X | Funding or volunteer support not yet identified |
| Develop and implement a Public Education Program | All hazards | 1, 2, 4, 5 | X | Researching program options, possibly mass communications and fire awareness. |
| Recruit volunteers for emergency services and provide training | All hazards | 1, 2, 3, 5 | X | New volunteers continue to be recruited |
| Purchase and install backup power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | One critical infrastructure generator project in process |
| Construct a multi-purpose safe room | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 4, 5 | X | No progress, no funds currently available |
| Complete water, wastewater, and stormwater infrastructure improvements | Flood | 1, 2, 3, 5 | X | Improvements completed as funding allows or as needed in emergency situations |
| Install/replace warning sirens as needed | Thunderstorm, lightning, and hail; tornado and windstorm | 1, 4, 5 | | |

## North English Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in North English's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 72 for the City's mitigation strategy.

Table 72: North English Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Distribute disaster preparedness booklets and promote the mass notification system | All hazards | 1, 2, 4, 5 | X | Booklets are available to the public |
| Designate a shelter, develop an operations plan, and determine a review and update schedule | All hazards | 1, 4, 5 | X | Community Center, Fire Station |
| Purchase and install power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Generator will be included in new wastewater treatment plant and new lift station |
| Construct a multi-purpose tornado safe room | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 4, 5 | X | This project is in design and likely to be constructed without HMA funds |
| Complete water, wastewater, and stormwater infrastructure improvements | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Replacing water main (ongoing), repair storm intakes/pipes is in process of new wastewater treatment plant and collection system upgrade |

## Parnell Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Parnell's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 68 for the City's mitigation strategy.

Table 73: Parnell Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Sponsor National Incident Management System (NIMS) Training for elected officials and necessary City staff | All hazards | 1, 2, 3, 4, 5 | X | Training offered through IHSEMD |
| Develop and implement a Public Education Program | All hazards | 1, 2, 4, 5 | X | Some materials are available to the public but a program has not been created yet. |
| Develop shelter operations plan | All hazards | 1, 3, 4, 5 | X | No staff time |
| Backup City records and store in an alternate location | All hazards | 3, 5 | X | No staff time |
| Purchase and install backup power generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | The City has a portable generator and is adding the connection to the water treatment facility |
| Incorporate a tornado safe room into City Hall | Tornado and Windstorm | 1, 3, 5 | X | No funding |
| Install warning siren with remote activation, and backup source of power | Tornado and Windstorm, Thunderstorm, Lightning, and Hail | 1, 4, 5 | X | The City, with Iowa County EMA, installed a siren and backup battery in 2019. |
| Complete stormwater system improvements | Flash flood | 1, 2, 3, 5 | | |

Removed Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Promote volunteer participation in the Parnell First Responders and support training | All hazards | 1, 2, 3, 4, 5 | X | Disbanded |

## Victor Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Victor's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 74 for the City's mitigation strategy.

Table 74: Victor Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | All hazards | 1, 2, 4, 5 | X | Not initiated by City |
| Purchase and install a power generator in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Victor installed a backup generator at the water treatment plant with HMA funding. |
| Complete water, wastewater, and stormwater infrastructure improvements | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Completed as required. Some improvements have been made. |
| Develop a local emergency operations plan and establish a review and update schedule | All hazards | 1, 2, 3, 5 | | |

## Williamsburg Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Williamsburg's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 68 for the City's mitigation strategy.

Table 75: Williamsburg Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Update the City's local emergency operations and shelter plan | All hazards | 1, 2, 3, 4, 5 | X | Project not initiated |
| Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | All hazards | 1, 2, 3, 4, 5 | X | Some information is available to the public. Additional efforts could be made. |
| Purchase and install a generator in the Recreation Center | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | No funding |
| Complete water and wastewater infrastructure improvements | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | Wastewater plant improvements are under development. |
| Purchase new equipment for the Fire and Police Department and enhance response capability, as needed | Infrastructure Failure, Hazardous Materials Incident, Radiological Incident, Transportation Incident | 1, 2, 3, 5 | X | Equipment purchases ongoing |
| Rehabilitate main lift station | Infrastructure Failure | 3, 5 | | |
| Install or replace storm sirens as needed | Thunderstorm, lightning, and hail; tornado and windstorm | 1, 4, 5 | | |

Removed Actions

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Construct a multi-purpose safe room in conjunction with the Recreation Center | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 4, 5 | X | School has a safe room |

## English Valleys Community School District Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in English Valleys CSD's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 76 for the School District's mitigation strategy.

Table 76: English Valleys CSD Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Construct a multi-purpose safe room at the District's athletic complex | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 4, 5 | X | No progress—no funding |
| Purchase and install generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 4, 5 | X | No progress—no funding |
| Distribute disaster preparedness booklets to students | All hazards | 1, 2, 4, 5 | X | No progress—no funding |
| Create hand sanitation stations in major traffic areas | Human Disease | 1, 4, 5 | X | Completed |

## Iowa Valley Community School District Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Iowa Valley CSD's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 77 for the District's mitigation strategy.

Table 77: Iowa Valley CSD Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the District website | All hazards | 1, 2, 4, 5 | X | The planning committee discussed distributing disaster preparedness booklets and mass notification system information provided by Iowa County EMA with registration materials and posting information on the District website. |
| Purchase and install power generators in critical facilities | Infrastructure Failure, Flood | 1, 2, 3, 5 | X | The primary priority is to maintain consistent power for the pumps protecting critical facilities from rain and flood events. A generator for general building power, communications, etc. is a secondary priority. |
| Construct multi-purpose tornado safe room in new District facilities | Thunderstorm, Lightning, and Hail, Tornado and Windstorm | 1, 2, 3, 4, 5 | X | The District plans to discuss building a multi-purpose tornado safe room in the near future. |
| Test new building sites for expansive soils and mitigate risk, if necessary | Expansive Soils | 2, 5 | X | No progress—no funding |

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Install air conditioning units in classrooms | Extreme Heat | 1, 3, 5 | X | The District plans to incrementally add air conditioning units to classrooms |
| Install a security system to limit access to school buildings | Terrorism | 1, 2, 5 | X | Completed |

## Williamsburg Community School District Mitigation Strategy

All identified hazards are addressed by at least one mitigation action in Williamsburg CSD's final mitigation strategy. Several mitigation actions address multiple hazards due to the similar impacts. Mitigations actions for flood or severe weather hazards are often similar. See Table 78 for the District's mitigation strategy.

Table 78: Williamsburg CSD Mitigation Strategy

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Distribute disaster preparedness booklets to students | All hazards | 1, 2, 4, 5 | X | The Iowa County EMA has disaster preparedness booklets, and the Commission may be willing to fund a multi-year project to distribute the booklets. |
| Purchase and install generators in critical facilities | Infrastructure Failure, Severe Winter Storm, Thunderstorm, Lightning, Hail, Tornado and Windstorm | 1, 2, 3, 5 | X | Priority facilities are the main school facilities primarily for technology and food storage to maintain communication capabilities and avoid food loss. The jr./sr. high school has a generator that powers the tornado safe room. Mary Welsh does not have a generator. |
| Complete fire safety planning and improvements in the Junior and Senior High | Infrastructure Failure | 1, 2, 3, 5 | X | No progress has been made. |
| Secure and harden existing entries to the jr./sr. high school and Mary Welsh Elementary | Terrorism | 1, 2, 5 | | |

Table 78: Williamsburg CSD Mitigation Strategy, continued

| Proposed Mitigation Action | Hazard(s) Addressed | Goal(s) Addressed | Inclusion in Existing Plan | Update/Notes |
|---|---|---|---|---|
| Develop automated communication between the school and law enforcement | Terrorism | 1, 2, 3, 5 | | |
| Install motion detecting lights throughout the district, both interior and exterior | Terrorism | 1, 5 | | |

# Action Plan

To determine how a mitigation strategy should be completed, an action plan and timeline for mitigation actions was determined through a prioritization process that considered local priorities identified in the Community Attributes section of this plan, local capabilities identified in the Operations and Resources section of the plan, potential benefit, and estimated cost. Ultimately, mitigation actions were assigned a priority level, which determines the potential timeline for completion. Refer to Table 79 and Table 80.

Table 79: Benefit vs. Cost Criteria

| Type | Benefit | Cost |
|---|---|---|
| High | Results are likely immediate and/or widespread reduction of risk from hazard(s) addressed; generally supported by the community; lead agency has capabilities | Existing funding is not adequate to complete the project; funding may only be available through grants/assistance; anticipated to cost greater than $100,000 |
| Medium | Results are likely a long-term reduction of risk from hazard(s) addressed and/or results are not widespread; potential community opposition; lead agency has capabilities | Requires amending the budget and/or requires a bond to complete the project; anticipated to cost between $10,000 and $100,000 |
| Low | Results are difficult to determine and/or may not result in long-term reduction of risk from hazard(s) addressed;<br>definite community opposition; lead agency may encounter capability issues | Existing funding is adequate or the project can be completed through volunteer and/or staff time; anticipated to cost less than $10,000 |

Table 80: Mitigation Action Priority Level Criteria

| Priority Level | Potential Project Timeline |
|---|---|
| 1 | 1–5 years |
| 2 | 5–10 years |
| 3 | 10–15 years |

For most jurisdictions, not all mitigation actions considered in the prioritization process met exact criteria. The planning team in each jurisdiction developed the final action plan to ensure priority levels reflect local priorities and capabilities. It should be noted, not all jurisdictions identified all three priority levels for mitigation actions. Some jurisdictions have adopted a shorter term focus for completing mitigation actions.

Requirement §201.6 (c)(3)(iii-iv): (c) The plan shall include the following:… (3) A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:… (iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs. (iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

In addition to the potential benefit, cost, and priority level of a mitigation action, the action plan also identifies who in the jurisdiction is the mitigation action lead, potential partners, and funding sources. In the action plan for each jurisdiction, some of the identified potential partners and funding sources are abbreviated. Table 81 is reference for the abbreviations. All other partners and funding sources are explanatory.

Table 81: Potential Partner and Funding Abbreviations

| Potential Partner or Funding | Abbreviation |
|---|---|
| Iowa Homeland Security and Emergency Management Division | HSEMD |
| Iowa Department of Natural Resources | Iowa DNR |
| Iowa Department of Transportation | IDOT |
| Iowa County Emergency Management Agency | Iowa County EMA |
| East Central Iowa Council of Governments | ECICOG |
| Pre-Disaster Mitigation | PDM |
| Hazard Mitigation Grant Program | HMGP |
| Flood Mitigation Assistance | FMA |
| Community Development Block Grant | CDBG |

## Iowa County Action Plan

The Iowa County planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 82 for the County's action plan.

Table 82: Iowa County Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Develop policy for road closure due to flooding | County Engineer | Sheriff's Office, Iowa County EMA | High | Low | County |
| 1 | Purchase and install generators or replace obsolete generators in critical facilities | County Engineer | Iowa County EMA | High | Medium | County, PDM, HMGP, others to be identified |
| 1 | Upgrade levee pumps and flood gate control system | County Engineer | Army Corps of Engineers, FEMA | High | Medium | County, PDM, HMGP, others to be identified |
| 1 | Expand the outdoor warning siren system | EMA Coordinator | Sheriff's Office, County Engineer | High | Medium | County, PDM, HMGP, others to be identified |
| 1 | Elevate roads to prevent roadway and bridge shutdown | County Engineer | IDOT, Army Corps of Engineers | High | High | County, PDM, HMGP, others to be identified |
| 1 | Acquire, relocate, elevate, and/or demolish properties in flood hazard areas | Chair of Board of Supervisors | County staff, as assigned | High | High | County, PDM, HMGP, others to be identified |

Table 82: Iowa County Action Plan, continued

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Construct tornado safe rooms in critical facilities or in vulnerable areas | County Engineer | EMA Coordinator, Sheriff's Office | High | High | County, PDM, HMGP, others to be identified |
| 1 | Distribute emergency preparedness booklets and promote the mass notification system | EMA Coordinator | Sheriff's Office, cities, fire and police departments | Medium | Low | County, others to be identified |
| 1 | Construct paved shoulders where water overtops road and causes road undermining and roadside washouts | County Engineer | IDOT, Army Corps of Engineers | High | Low | County, HMGP, others to be identified |
| 1 | Construct road/dam structures to help reduce downstream flash flooding | County Engineer | IDOT, Army Corps of Engineers | Medium | Medium | County, HMGP, others to be identified |
| 1 | Install or replace culverts to mitigate flood loss | County Engineer | IDOT | Medium–High | Medium–High | County, HMGP, others to be identified |

## Ladora Action Plan

The Ladora planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 83 for the City's action plan.

Table 83: Ladora Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Build and maintain levee to protect water and wastewater infrastructure | Public Works Superintendent | Consulting Engineer | High | Low | City, others to be identified |
| 1 | Purchase and install backup power generators for critical facilities | Public Works Superintendent | --- | High | Low-High | City, PDM, HMGP, others to be identified |
| 1 | Replace insufficient pumps at the Water Treatment Plant | Public Works Superintendent | --- | High | Medium | City, others to be identified |
| 1 | Complete a sewer lining project to reduce water inflow and infiltration | Public Works Superintendent | Consulting Engineer | High | Medium-High | City, PDM, HMGP, CDBG, others to be identified |
| 1 | Distribute disaster preparedness booklets and promote the mass notification system | City Clerk | Iowa County EMA | Medium | Low | Iowa County EMA, others to be identified |
| 1 | Construct a new community center with a tornado safe room | Mayor and City Council | Consulting Architect, HSEMD, FEMA | High | High | City, PDM, HMGP, others to be identified |
| 1 | Replace outdoor warning siren, when coverage is insufficient | Public Works Superintendent | Iowa County EMA | High | Medium | City, PDM, HMGP, others to be identified |

## Marengo Action Plan

The Marengo planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 82 for the City's action plan.

Table 84: Marengo Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Purchase and install backup power generators in critical facilities | City Administrator | Public Works Superintendent | High | Low-High | City, PDM, HMGP, others to be identified |
| 1 | Complete flood control and storm water system improvements | City Administrator | Public Works, Engineering Consultant, Army Corps of Engineers | High | Medium-High | City, PDM, HMGP, FMA, others to be identified |
| 1 | Acquire, relocate, elevate, and/or demolish properties in the floodplain | City Administrator | HSEMD, FEMA, ECICOG | High | High | City, PDM, HMGP, FMA, others to be identified |
| 1 | Update the local emergency operations plan and establish a review and update schedule | City Administrator | Fire Chief, Iowa County Sheriff's Office, Iowa County EMA | Medium | Low | City, others to be identified |
| 1 | Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | City Administrator | Iowa County EMA | Medium | Low | Iowa County EMA, others to be identified |
| 1 | Outdoor waring system improvements | Public Works | City Administrator, Iowa County EMA | Medium | Low | City, PDM, HMGP, FMA, others to be identified |

## Millersburg Action Plan

The Millersburg planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 85 for the City's action plan.

Table 85: Millersburg Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Purchase and install backup power generators in critical facilities | Public Works Superintendent | --- | High | Medium-High | City, PDM, HMGP, others to be identified |
| 1 | Construct a multi-purpose safe room | Mayor and City Council | Consulting Architect, HSEMD, FEMA | High | Medium-High | City, PDM, HMGP, others to be identified |
| 1 | Develop emergency operations and shelter plan and establish a training, review, and update schedule | Mayor and City Council | Iowa County EMA | Medium | Low | City, others to be identified |
| 1 | Develop and implement a Public Education Program | City Clerk | Iowa County EMA | Medium | Low | City, others to be identified |
| 1 | Recruit volunteers for emergency services and provide training | Fire Chief | Iowa County EMA | Medium | Low-High | City, others to be identified |
| 1 | Install/replace warning sirens as needed | Fire Chief | Iowa County EMA | High | Medium | City, HMGP, PDM, others to be identified |
| 2 | Complete storm water management improvements | Public Works Superintendent | Consulting Engineer | High | Low-High | City, PDM, HMGP, CDBG, others to be identified |

## North English Action Plan

The North English planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 86 for the City's action plan.

Table 86: North English Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Purchase and install power generators in critical facilities | Municipal Works Director | --- | High | Low-Medium | City, PDM, HMGP, others to be identified |
| 1 | Complete water, wastewater, and stormwater infrastructure improvements | Municipal Works Director | Consulting Engineer | High | Low-High | City, PDM, HMGP, CDBG, others to identified |
| 1 | Distribute disaster preparedness booklets and promote the mass notification system | Mayor | Iowa County EMA | Medium | Low | Iowa County EMA, others to be identified |
| 1 | Designate a shelter, develop an operations plan, and determine a review and update schedule | Mayor | Iowa County EMA | Medium | Low | City, others to be identified |
| 2 | Construct a multi-purpose tornado safe room | Mayor | Consulting Architect | High | Medium-High | City, PDM, HMGP, others to be identified |

## Parnell Action Plan

The Parnell planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 87 for the City's action plan.

Table 87: Parnell Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Complete a Public Education Program including promotion of the Iowa mass communication system | Mayor | Iowa County EMA | High | Low | City |
| 1 | Develop shelter operations plan | Mayor | Iowa County EMA | High | Low | City |
| 1 | Backup City records and store in an alternate location | City Clerk | --- | High | Low | City |
| 1 | Purchase and install backup power generator in critical facilities | Mayor | Iowa County EMA | High | Medium | City, PDM, HMGP, others to be identified |
| 1 | Install warning siren with remote activation, and backup source of power | Mayor | Public Works Superintendent, Iowa County EMA | High | Medium | City, PDM, HMGP, others to be identified |
| 1 | Sponsor National Incident Management System (NIMS) Training for elected officials and necessary City staff | Mayor | Iowa County EMA | Medium | Low | City |
| 2 | Incorporate a tornado safe room into City Hall | Mayor | Iowa County EMA | High | High | City, PDM, HMGP, others to be identified |
| 2 | Complete stormwater system improvements | Mayor | --- | High | Medium –High | City, PDM, HMGP, others to be identified |

## Victor Action Plan

The Victor planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 88 for the City's action plan.

Table 88: Victor Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Complete water, wastewater, and stormwater infrastructure improvements | Mayor | Consulting Engineer | High | Low-High | City, PDM, HMGP, CDBG, others to be identified |
| 1 | Purchase and install a power generator in critical facilities | Mayor | --- | High | Medium | City, PDM, HMGP, others to be identified |
| 1 | Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | Mayor | Library, Post Office, Iowa County EMA | Medium | Low | City, Iowa County EMA, others to be identified |
| 1 | Develop a local emergency operations plan and establish a review and update schedule | Mayor | Fire Department and Quick Responders, Iowa County EMA | Medium | Low | City |

## Williamsburg Action Plan

The Williamsburg planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 89 for the City's action plan.

Table 89: Williamsburg Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Complete water and wastewater infrastructure improvements | Public Works Director | Consulting Engineer | High | Low-High | City, PDM, HMGP, FMA, CDBG, others to be identified |
| 1 | Purchase new equipment for the Fire and Police Department and enhance response capability, as needed | Fire Chief, Police Chief | Iowa County EMA | High | Low-High | City, Assistance to Firefighter Grants, others to be identified |
| 1 | Purchase and install a generator in the Recreation Center | Mayor | Public Works Director | High | Medium | City, PDM, HMGP, others to be identified |
| 1 | Update the City's local emergency operations and shelter plan | Mayor | All City Departments, Iowa County EMA | Medium | Low | City, others to be identified |
| 1 | Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the City website | City Clerk | Iowa County EMA, Library Director, local organizations | Medium | Low | City, Iowa County EMA, others to be identified |
| 1 | Rehabilitate main lift station | Public Works Director | HR Green Engineering | High | High | Bonds and City |
| 1 | Install or replace storm sirens as needed | Fire Chief, Police Chief | IA County EMA | High | High-Medium | City, Grants and others to be identified |

## English Valleys Community School District Action Plan

The English Valleys CSD planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 90 for the School District's action plan.

Table 90: English Valleys CSD Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Construct a multi-purpose safe room at the District's athletic complex | Superintendent | Consulting Architect | High | High | District, PDM, HMGP, others to be identified |
| 1 | Purchase and install generators in critical facilities | Superintendent | Iowa County EMA | High | Medium-High | District, PDM, HMGP, others to be identified |
| 1 | Distribute disaster preparedness booklets to students | Superintendent | Iowa County EMA | Medium | Low | Iowa County EMA |
| 1 | Create hand sanitation stations in major traffic areas | Superintendent | Iowa County Public Health | Medium | Low | District, others to be identified |

## Iowa Valley Community School District Action Plan

The Iowa Valley CSD planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 91 for the District's action plan.

Table 91: Iowa Valley CSD Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Purchase and install power generators in critical facilities | Superintendent | --- | High | Low-High | District, PDM, HMGP, others to be identified |
| 1 | Test new building sites for expansive soils and mitigate risk, if necessary | Superintendent | Consulting Engineer | High | Low-High | District, PDM, HMGP, others to be identified |
| 1 | Install a security system to limit access to school buildings | Superintendent | Consulting Security Company | High | Medium-High | District, others to be identified |
| 1 | Construct multi-purpose tornado safe room in new District facilities | Superintendent | Consulting Architect | High | High | District, PDM, HMGP, others to be identified |
| 1 | Distribute disaster preparedness booklets, promote the mass notification system, and add hazard-related information to the District website | Superintendent | Iowa County EMA | Medium | Low | Iowa County EMA, others to be identified |
| 2 | Install air conditioning units in classrooms | Superintendent | --- | High | Medium | District, others to be identified |

## Williamsburg Community School District Action Plan

The Williamsburg CSD planning committee prioritized the mitigation actions in the jurisdiction's mitigation strategy to determine the potential benefit, cost, and priority level. Mitigation actions with a high priority level are expected to be addressed by the jurisdiction during the life of this plan. Refer to Table 92 for the District's action plan.

Table 92: Williamsburg CSD Action Plan

| Priority Level | Proposed Mitigation Action | Lead | Potential Partner(s) | Benefit | Cost | Potential Funding Source(s) |
|---|---|---|---|---|---|---|
| 1 | Complete fire safety planning and improvements in the Junior and Senior High | Superintendent | Fire Marshall | Medium | Low-High | District, others to be identified |
| 1 | Purchase and install generators in critical facilities | Superintendent | --- | High | Medium-High | District, PDM, HMGP, others to be identified |
| 1 | Secure and harden existing entries to the jr./sr. high school and Mary Welsh Elementary | Superintendent | | High | High | District |
| 1 | Develop automated communication between the school and law enforcement | Superintendent | Iowa County EMA | High | Medium | District |
| 1 | Install motion detecting lights throughout the district, both interior and exterior | Superintendent | | High | High | District |
| 3 | Distribute disaster preparedness booklets to students | Superintendent | Iowa County EMA | Medium | Low | Iowa County EMA, others to be identified |

# Plan Incorporation and Maintenance

> Requirement §201.6 (c)(4)(i): [The plan shall include the following:] (4) [A plan maintenance process that includes:] (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

In order for a multi-jurisdictional hazard mitigation plan to be effective and ultimately a worthwhile use of resources in each participating jurisdiction, there must be an established procedure to incorporate it into other plans, as well as to monitor, evaluate, and update it. As indicated throughout this plan, jurisdictions in Iowa County vary in type and size, so plan incorporation and maintenance procedures will also vary. For example, larger jurisdictions may establish formal requirements while others may complete a periodic, informal plan review. Overall, local preferences determine plan incorporation and maintenance.

In each jurisdiction, a particular staff member is responsible for remaining aware of the jurisdiction's mitigation strategy and encouraging the completion of mitigation actions. In addition, this staff member will also be responsible—with a reminder from the planning consultant, the East Central Iowa Council of Governments—for completing a periodic review, formal or informal. If an update for a specific jurisdiction is needed during the five year life of this plan, the staff member will initiate an amendment process with the planning consultant.

In addition, the planning consultant will be involved in periodic plan reviews by providing information about funding opportunities and a reminder of the established maintenance procedure. The planning consultant will either attend review meetings, or the jurisdiction will provide relevant information to the planning consultant. As the regional planning agency, the planning consultant works with each participating jurisdiction on a regular basis.

During the plan effective period, there may changes in local conditions or priorities that result in the need to amend a mitigation strategy. The planning consultant will provide assistance to a jurisdiction that amends its mitigation strategy and communicate with Iowa County Emergency Management Agency (EMA) during all steps in the process, which are the following:

1. The jurisdiction will work with the planning consultant to review the existing plan/mitigation strategy and develop the proposed mitigation action(s) to be amended into the jurisdiction's mitigation strategy.
2. The jurisdiction's governing body will allow public comment on the proposed amendment by either addressing the issue in a regular meeting or reconvening the hazard mitigation planning committee. The amendment will be approved by motion or resolution by the jurisdiction's governing body.
3. The planning consultant will submit the amendment to the mitigation strategy and action plan to Iowa Homeland Security and Emergency Management Department (HSEMD). Once the amendment is approved by HSEMD, the planning consultant will distribute the plan amendment information to all jurisdictions included in the plan.

Local jurisdictions may incorporate the plan or plan components into other local plans or planning mechanisms. The comprehensive plan for the City of Williamsburg, for example, references the multi-jurisdictional hazard mitigation plan and outlines goals for mitigating and responding to disasters.[xxiv] Refer to Appendix E—Williamsburg Comprehensive Plan Hazard Goal. Plans and planning mechanisms that may benefit from incorporating or referencing the hazard mitigation plan include, but are not limited to, the following:

> Requirement §201.6 (c)(4)(ii): [The plan shall include the following:] (4) [A plan maintenance process that includes:] (ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

- Updates of the zoning code that may include additional regulations on buildings near identified hazard areas, which may include steep slopes, unstable soils, special flood hazard areas, proximity of residential areas to transportation routes, hazardous materials, and other hazards;
- Updates to comprehensive plans that include mitigation-related goals;
- Updates to watershed plans that address flood risk reduction;
- Updates to the subdivision ordinance relating to setback on properties that pose a higher than average risk from infrastructure failure or hazardous materials incidents;
- Updates to the building code that may include adoption of a full set of building codes or adoptions of more stringent building codes;
- Updates to the floodplain maps or floodplain regulations;
- Updates to the capital improvement plan, which may include mitigation of infrastructure, flood, or other hazards;
- Any new additions to the city/county code or administrative policies that may include but are not limited to solid waste regulations, landscape codes, evacuation plans, response plans, fire mitigation programs, and construction of retrofit programs;
- An overview of how the information contained in the hazard analysis and risk assessment was used in any other planning documents.

Since the plan is multi-jurisdictional and the county initiated this particular plan, a complete plan update will be initiated by Iowa County approximately three years from plan approval. Iowa County EMA is responsible for completing plan updates. Future plan updates may be funded with Hazard Mitigation Assistance grant funding and prepared by a planning consultant that coordinates with Iowa County. For the plan maintenance procedure in each participating jurisdiction, refer to Table 93.

> Requirement §201.6 (c)(4)(iii): [The plan shall include the following:] (4) [A plan maintenance process that includes:] (iii) Discussion on how the community will continue public participation in the plan maintenance process.

Evaluation of the plan will occur during the plan update process. Whether or not mitigation actions are completed will determine the overall effectiveness of the plan. The impacts of hazard events during the life of the plan and results of mitigation actions will determine whether or not an effective mitigation strategy was established for each jurisdiction. All participating jurisdictions are committed to continuous improvement in future plan updates.

Through plan monitoring and review, jurisdictions will continue to seek public input. Each jurisdiction will make the plan available to the public for review at any time. Grant applications or reallocation of funding to complete mitigation actions must be approved by local officials, which will occur at public meetings where public input is allowed. In addition, a complete plan update will involve one, or more, hazard mitigation planning meeting that is open to the public.

Table 93: Iowa County Plan Incorporation and Maintenance

| Jurisdiction | Staff Member | Plan Incorporation | Monitor and Review | Evaluation and Update |
|---|---|---|---|---|
| Iowa County | Planning committee | Formal adoption and the monitor and review process | January | To begin approximately three years after approval |
| Ladora | Cindy Delaney Jensen | | September | |
| Marengo | Karla Marck | | February | |
| Millersburg | Amy Greene | | June | |
| North English | Tara Heyne | | October | |
| Parnell | Jennifer Weldon | | April/May | |
| Victor | Fred Stiefel | | July | |
| Williamsburg | City Council | | June/July | |
| English Valleys CSD | Mark Olmstead | | June | |
| Iowa Valley CSD | Mark Olmstead | | June | |
| Williamsburg CSD | Board of Education | | March | |

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