



Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024



Jurisdictions include Washington County cities, school districts, and unincorporated areas

This plan maintains Hazard Mitigation Assistance funding eligibility for participating jurisdictions from January 22, 2019 to January 22, 2024.

Prepared by the East Central Iowa Council of Governments in partnership with Washington County and Iowa Homeland Security and Emergency Management Department

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Introduction



Hazard Mitigation Planning Overview

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 Washington 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) Grant Program, Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance (FMA) program. HMGP grant funding is made available to a state 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 provide eligibility for HMA are contained in Title 44 of the Code of Federal Regulations §201.6 as of October 1, 2017. DMA 2000 repealed previously established mitigation planning provisions and replaced them

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.

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 in order 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.

Washington County Multi-Jurisdictional Hazard Mitigation Plan

PLAN BACKGROUND

This plan is a multi-jurisdictional plan update for Washington County, Iowa, and participating local jurisdictions within or overlapping county boundaries. The previous plan was active January 2013–January 2018. The development of the plan update was funded by a PDM planning grant awarded to Washington County in January 2017. To fulfill the requirements of the grant, Washington County contracted with a planning consultant, the East Central Iowa Council of Governments (ECICOG), which is a regional planning agency. Washington County regularly contracts with ECICOG because of its longstanding partnership with Washington County and their 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 planning consultant balanced grant requirements, applicable federal legislation, and local priorities to provide Washington County an approved, value-added plan update.

Plan development began in April 2017 after Washington County received 2016 PDM grant funding and contracted with a planning consultant. Plan development was a multi-year process that involved collaboration among local officials, staff, and residents. The planning consultant completed research and mapping, facilitated public meetings and comment period, and assisted jurisdictions with the plan adoption process. The plan was submitted to the Iowa Homeland Security and Emergency Management Department (IHSEMD) and the FEMA for review on August 31, 2018. A final version of this plan was approved on January 22, 2019. 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, and for this plan, the planning area for a multi-jurisdictional plan typically includes an entire county. The planning area includes the unincorporated areas, cities, and school districts. See Table 1 for a full list of jurisdictions included in this plan update and their participation in the previous plan.

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

Jurisdiction	2013–2018 Plan	2019–2024 Plan
County		
Washington County	✓	✓
City		
Ainsworth	✓	✓
Brighton	✓	✓
Crawfordsville	✓	✓
Kalona	✓	✓
Riverside		✓
Washington	✓	✓
Wellman		✓
West Chester	✓	✓
School District		
Highland Community School District		✓
Mid-Prairie Community School District		✓
WACO Community School District ¹		✓
Washington Community School District		✓

Riverside and Wellman did not participate in the previous plan. After the plan had been approved, both jurisdictions started the process of being amended into the existing multi-jurisdictional plan in 2015. Ultimately, they decided to wait until the multi-jurisdictional plan update to complete the process.

Plan Development

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, IHSEMD, and FEMA Region VII. The primary goals of the coordinator are to ensure the planning process and final plan focus on the mitigation priorities of participating jurisdictions and fulfill regulatory requirements.

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.

GRANT FUNDING

In January 2017, Washington County was awarded PDM funding from the State of Iowa to update their hazard mitigation plan. Washington County committed to coordinating the plan development process with ECICOG and participating jurisdictions. The primary point of contact with Washington County was the Washington County Emergency Management Agency.

PLANNING CONSULTANT

In April 2017, the County contracted with the East Central Iowa Council of Governments (ECICOG), a regional planning agency. Washington County has worked with the agency since it joined the intergovernmental council in 1975. Planning staff at ECICOG possess specific knowledge and experience in hazard mitigation planning, having prepared the previously approved *Washington County Multi-Jurisdictional Hazard Mitigation Plan 2013–2018* and several multi-jurisdictional hazard mitigation plans in Iowa, Johnson, and Linn County. For more information about ECICOG, visit the agency website at www.ecicog.org.

Initially, Alicia Presto, a planner at ECICOG, was the primary consultant coordinating plan development. Starting in October 2017, Tom Gruis, also a planner at ECICOG, became the primary consultant to complete the plan development process, which ended January 2019.

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. The previously approved *Washington County Multi-Jurisdictional Hazard Mitigation Plan 2013–2018* served as a reference for existing priorities and a gauge for mitigation strategy progress.

Other documents incorporated into the content of this plan include local regulatory documents, planning and procedure documents, and maps. Jurisdictions included in the plan are diverse in purpose and size, so the types of documents available vary for each jurisdiction. In each jurisdiction's

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.

Operations & Resources, 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 *2013 Iowa Hazard Mitigation Plan* prepared by the IHSEMD.

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 Washington County. The databases used are cited throughout the plan. To incorporate local perspectives, discussion with planning committee members and local media coverage were also used to include current information.

To ensure this plan meets regulatory requirements, the March 2013 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

The planning consultant worked directly with a primary contact in each jurisdiction. Providing assistance to the planning consultant, the primary contact identified and personally invited members of the local community to serve on the local planning committee, scheduled one or more planning meetings, and posted public meeting notices. To maintain and open plan development process, one public meeting was held in each jurisdiction. Each person who attended the planning meetings, regardless of whether or not they were initially identified by the primary contact, was considered a member of the jurisdiction's planning committee. A schedule of local planning meetings is shown in Table 2.

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

Table 2: Schedule of Local Planning Meetings

Jurisdiction	Local Planning Meeting Date
County	
Washington County	November 14, 2017
City	
Ainsworth	December 19, 2017
Brighton	October 25, 2017
Crawfordsville	November 14, 2017
Kalona	November 28, 2017
Riverside	November 6, 2017
Washington	October 17, 2017
Wellman	October 20, 2017
West Chester	September 9, 2017
School District	
Highland Community School District	November 29, 2017
Mid-Prairie Community School District	October 25, 2017
Washington Community School District	October 25, 2017

For the local planning meetings, a consistent set of agenda items 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 members’ review. For review and future updates of this plan, the members of a planning committee can provide valuable context. The documentation for each local planning meeting is included in the appendix. Documentation for all planning meetings includes the following items: 1) public notice, 2) agenda and minutes, and 3) sign-in sheet.

Planning Meeting Agenda

1. Consultant and planning committee introductions
2. Hazard mitigation planning overview
3. Hazard Mitigation Assistance funding programs overview
4. Review and update risk assessment
5. Review and update critical facilities
6. Review and update vulnerable populations
7. Review and update operations and resources
8. Review and update mitigation strategy
9. Prioritize mitigation strategy
10. Discuss next steps in plan development process

PROGRESS REPORTS

The consultant provided progress updates directly to a jurisdiction’s primary contact as it pertained to their components of the plan update. For overall progress, periodic updates were provided to the Washington County Auditor and Emergency Management Coordinator. The planning consultant also prepared the required quarterly progress reports for Washington County’s planning grant. The completed reports were submitted to both the state and the Washington County Emergency Management Agency.

PUBLIC COMMENT

The 30-day public comment period for this plan began September 14, 2018 and ended October 15, 2018. A draft of the plan was available on the East Central Iowa Council of Governments’ 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. The surrounding counties include Iowa, Johnson, Louisa, Henry, Jefferson, and Keokuk. 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.

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 East Central Iowa Council of Governments’ website, the planning consultant’s email, or by mail. During the public comment period, two comments were received. Table 3 shows the comments received and the updates to the plan that were made in response.

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.

Table 3: Public Comments and Response

Comment	Response/Plan Update
<p>Received 9/19/2018</p> <p>Using the same base map for all the maps is not a good map to use for depicting the roads and railroads within Washington County. Consider using a map from the Iowa DOT.</p> <p>I think there should be some consistency in identifying the vulnerable populations in all of the communities. Some maps have retirement/care facilities/churches/schools marked and others do not. On the county map (#50), Bethel Mennonite Church was left off. I also think the Lake Darling Youth Center (different from the park) should be identified. The unincorporated communities of Richmond and Rubio and potentially large subdivision (10 or more lots) should be considered as those are large population centers where many people could be gathered during a potential hazardous event.</p> <p>On Map 32, the secondary road shed in Kalona is located just north of the Kalona sewage lagoons, not at the intersection of Hwy 22 & Hwy 1.</p> <p>Jacob Thorius</p>	<p>The planning consultant contacted the Iowa Department of Transportation (IDOT) regarding their base maps. The GIS service through which their base maps could be accessed was on a deprecated server which was scheduled to be retired. The IDOT representative stated that they do not have any custom base maps in their current service. The planning consultant included the IDOT Highway and Transportation Map for Washington County and a link to the full PDF.</p> <p>The vulnerable populations are decided by each jurisdiction’s planning committee. The planning consultant provided a similar explanation of vulnerable populations at each local planning meeting. The comment was provided by a member of the County’s planning committee, so the planning consultant added the facilities to the vulnerable populations maps.</p> <p>The planning consultant corrected the critical facilities map with the noted secondary road shed.</p>
<p>Received 10/12/2018</p> <p>I would like to comment on the designation for Vulnerable Populations in Wellman, Iowa. In reviewing the Hazard Mitigation Plan draft for 2019-2024, I noted that the Mobile Home park known as Flint Creek Estates was omitted from the plan. This area hosts a number of mobile homes that, due to its proximity to Flint Creek, could potentially become isolated from the remainder of the city in the event of flooding or other catastrophic event. A similar mobile home park in Ainsworth, was included in the plan. Thanks for your attention to this matter.</p> <p>Mark Philpot</p>	<p>The planning consultant conferred with the City of Wellman. The comment came from a member of their City Council. The vulnerable populations map was updated accordingly.</p>

PLAN WRITING

This plan was written by the planning consultant at the East Central Iowa Council of Governments 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. In addition to comments received during the public comment period, the planning committee in each jurisdiction provided feedback.

PLAN REVIEW AND REVISION

During the public comment period, the draft version of this plan was concurrently reviewed by Iowa’s hazard mitigation planner and FEMA Region 7 plan reviewers. Required plan edits included:

- Widening the geographic scope of the levee and dam hazard and re-stating vague descriptions dam hazard categories and “major” and “non-major” classifications;
 - The revised description of the levee and dam failure hazard is on page 109.
- Ensuring the priority levels for levee and dam failure are appropriate; and
 - The FEMA review questioned why levee and dam failure was excluded by all jurisdictions (it is included by Wellman) and stated that levee and dam failure should not be excluded by the County since dams and levees are present. Because all but one jurisdiction excluded the levee and dam failure hazard, the planner reconsidered the risk assessment for levee and dam failure and adjusted the probability score by one, which resulted in the hazard receiving a 3 instead of a 2 in the countywide risk assessment. See page 109 for the description of the hazard and page 132 for the countywide risk assessment The County has revised the priority level of the hazard from excluded to a 3, refer to page 133.
- Adding information about the types properties that are Repetitive Loss Properties.
 - This information has been added to the description of Repetitive Loss Properties on page 51.

PLAN REVIEW SCHEDULE

Public Comment Period: September 14, 2018–
October 15, 2018

State Review Submission: August 31, 2019

FEMA Final Review Submission: January 14, 2019

The review also reiterated that written documentation of the adoption of the plan by each jurisdiction, i.e. a resolution, is required for jurisdictions to maintain eligibility for FEMA’s Hazard Mitigation Assistance grants.

Plan Approval and Adoption

This multi-jurisdictional hazard mitigation plan was submitted for public comment, review, and approval on August 31, 2018. 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 January 9, 2019. After necessary edits were completed and Washington County adopted the initial draft of the plan through a resolution, the plan was approved on January 22, 2019.

PLAN APPROVAL AND INITIAL ADOPTION DATE

Plan Approval: January 22, 2019

Plan Adoption: December 18, 2018

¹ WACO CSD did not fully participate in the planning process because they have only one school in Washington County—WACO Elementary School in Crawfordsville. WACO CSD completed the planning process for Henry County, where their other facilities are located. The WACO CSD mitigation strategies from the *Henry County, Iowa, Multi-Jurisdictional Pre-Disaster Mitigation Plan 2014* are included in this plan. WACO CSD was consulted for this plan’s development, and no additional strategies were developed for their facility in Washington County.

Plan Goals



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 current hazard mitigation plan and example goals provided by the planning consultant.

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.

Current Hazard Mitigation Goals

1. Protect critical facilities, infrastructure and other community assets from the impacts of hazards.
2. Protect the health, safety and property of residents in the planning area.
3. Improve education and awareness regarding hazards, risk and reducing vulnerability in the planning area.
4. Ensure that public funds are used in the most efficient manner.

Example Hazard Mitigation Goals

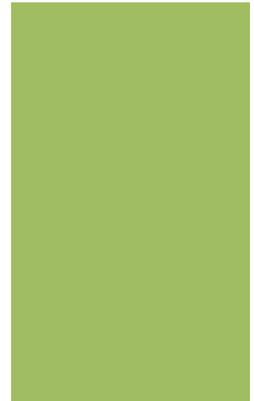
1. Protect the health and safety of residents, visitors, staff, and emergency personnel (paid or volunteer) during and after hazard events
2. Minimize losses to existing and future structures in hazard areas. Critical facilities are priority structures.
3. Maintain local services and infrastructure in order to reduce community, economic, and environmental disruption during and after hazard events.
4. Educate residents and visitors about hazards and the resources available.
5. Use public funds in a cost effective and fair manner.

Attendees decided to adopt the example goals except for one addition the last goal, which is adding the word "efficient."

Hazard Mitigation Goals Update

1. Protect the health and safety of residents, 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 and visitors about hazards and the resources available.
5. Use public funds in an efficient, cost effective, and fair manner.

Community Profile



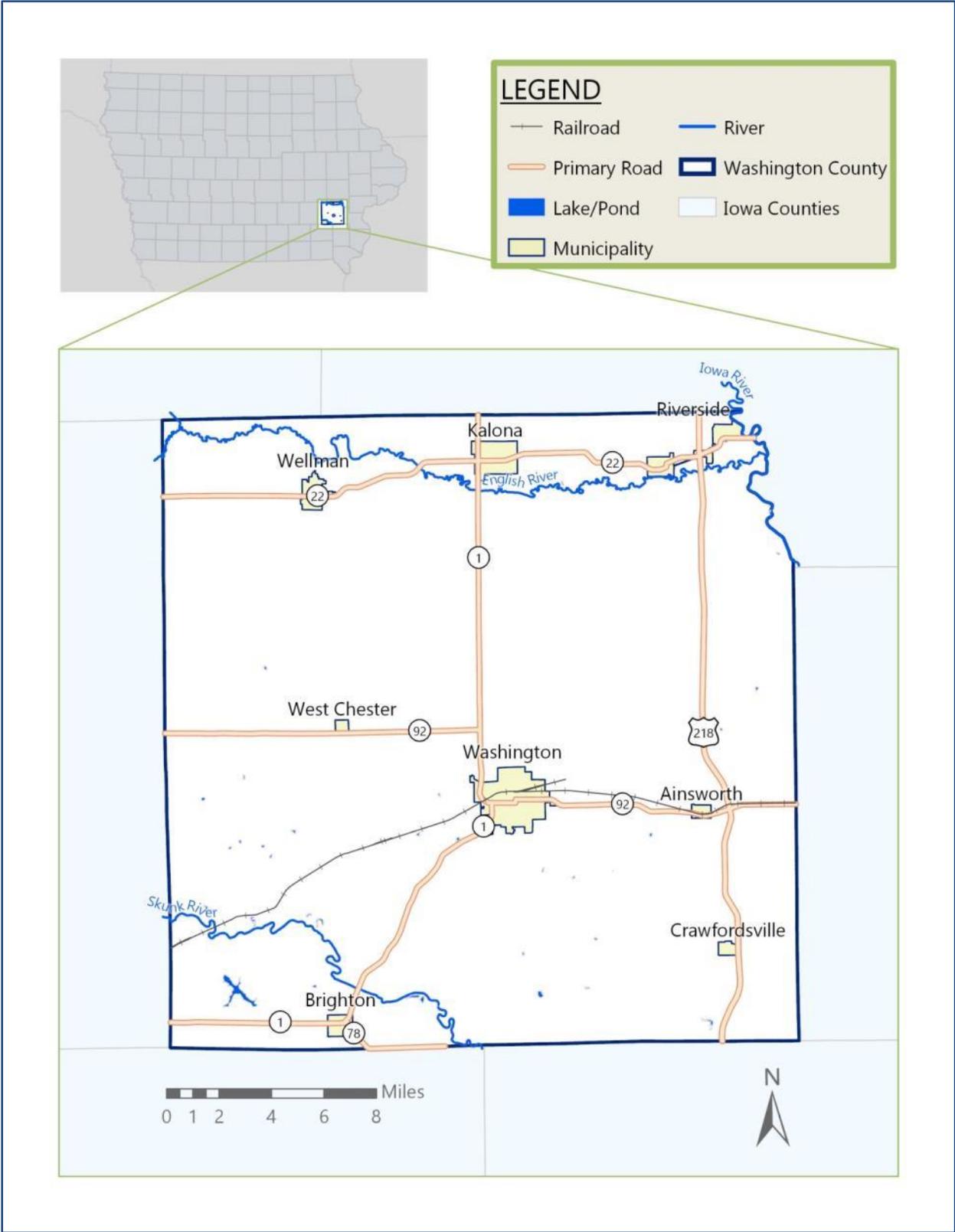
PLANNING AREA AND POPULATION

Washington County is located in southeast Iowa. The county experienced growth between the 2000 and 2010 Census, from 20,670 to 21,704 residents, or 5.0%. The U.S. Census Bureau Population Estimates for 2016 exhibits further growth since 2010, with an estimate of 22,281, or 2.7% since 2010. Population growth is expected to continue in Washington County. If the growth rate remains constant through 2020, the County would experience growth of 4.5% for the decade. Refer to Map 1 for the location of cities within the Washington County Planning Area.

According to the U.S. Census Bureau, Washington County is part of the Iowa City Metropolitan Statistical Area (MSA). Iowa City is located in Johnson County, which lies to the north of Washington County and is the only other county in the MSA. Iowa City is home to the University of Iowa and the University of Iowa Hospitals and Clinics. With a student population of 33,564¹ in 2017 and a hospital staff of 11,620² in fiscal year 2017, the University institutions are a major draw of residents and visitors. From 2010 to 2016, the area grew from 152,586 to an estimated 168,828 residents. The percent increase for the area was 10.64%, almost four times faster than for Washington County alone. The MSA is shown in Map 2.

More residents, 8,186, live in unincorporated areas of the county than in Washington, the largest city in the county, which had an estimated population of 7,424 in 2016. The remaining cities had fewer than 3,000 residents. Within the county, the cities of Riverside and Brighton surround the median, with populations 1,039 and 659, respectively. The smallest city completely within the county is West Chester, with 148 residents. 2010 U.S. Census counts and 2016 U.S. Census estimates for the cities in the planning area are shown in Table 4.

Map 1: Washington County Planning Area



Map 2: Iowa City Metropolitan Statistical Area

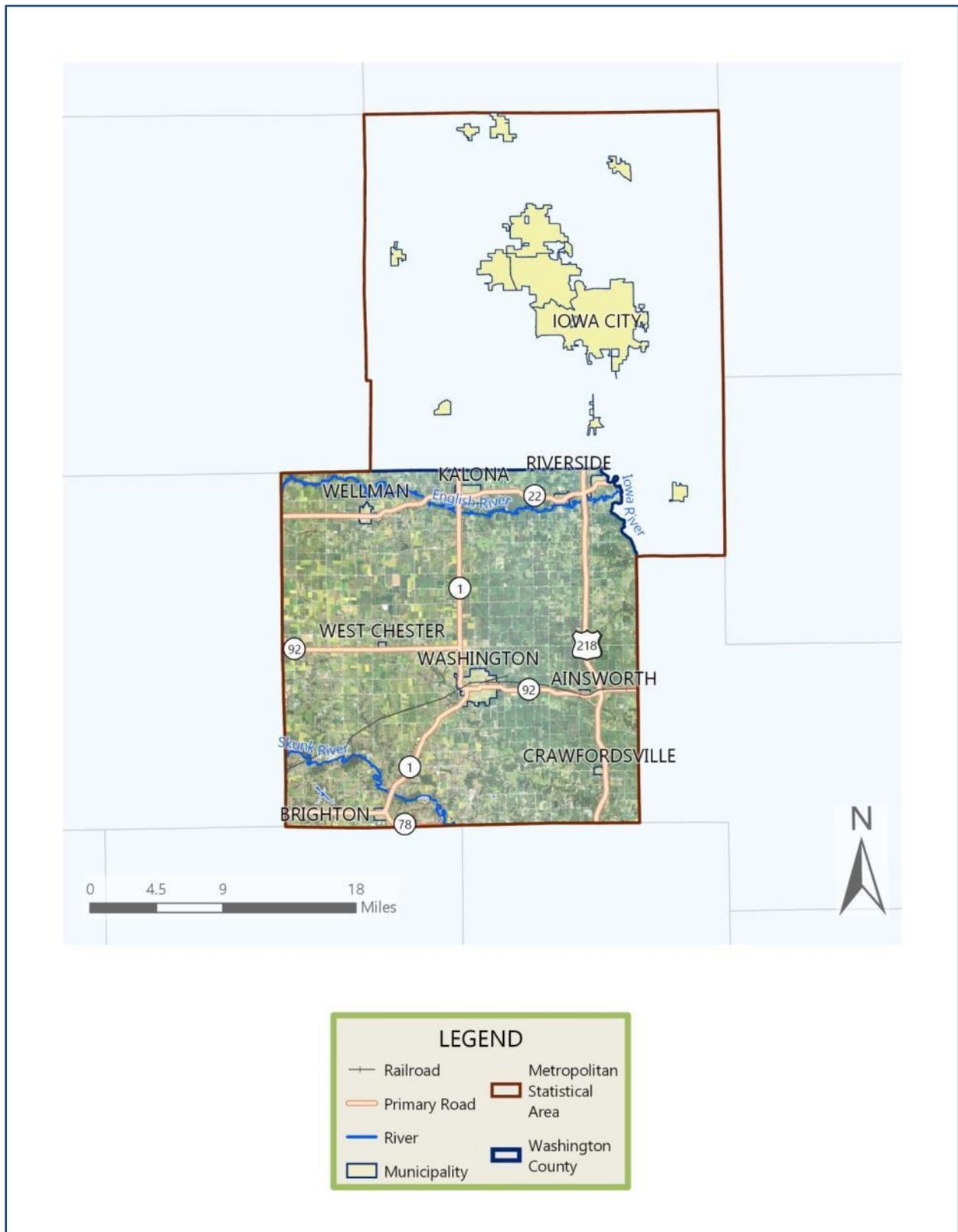


Table 4 includes the percent change in population for the metropolitan statistical area, county, each jurisdiction, and the unincorporated area of the county. From 2010–2016, each area experienced growth. Reviewing full population count data from the 2000 and 2010 censuses, a similar geographic trend is shown in Map 3. While one census tract on the west side of the county experienced a small, 1.5%, decrease in population, the other areas of the county experienced moderate growth in the east and southeast, 2.02%–2.67%, or high growth, 15.57%, in the northeast. The area of high growth from 2000–2010 is consistent with the growth from 2010–2016; the two cities with the highest population growth in that six-year period—Kalona and Riverside, with 7.24% and 4.63% change, respectively³—are in the northeastern part of the county, closer to Iowa City. 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.

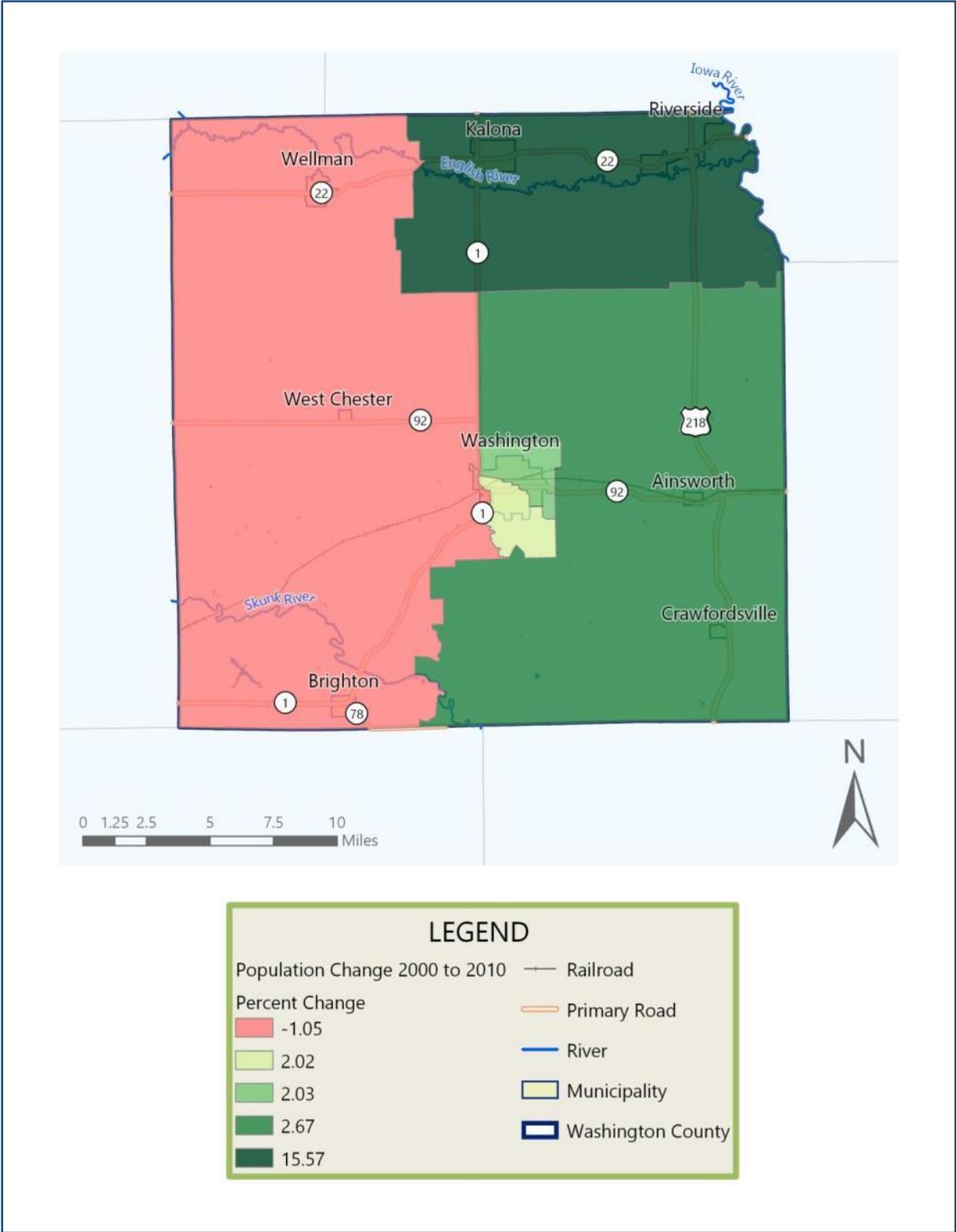
Requirement §201.6 (d)(3): (d) Plan review... (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it within 5 years in order to continue to be eligible for mitigation project grant funding.

Table 4: Washington County 2010 Census Count and 2016 Census Estimate

Jurisdiction	2010 Census	2016 Population Estimate	Percent Change
Iowa City Metropolitan Statistical Area	152,586	168,828	10.64%
Washington County	21,704	22,281	2.66%
Washington County Unincorporated	8,032	8,186	1.92%
Ainsworth	567	584	3.00%
Brighton	652	659	1.07%
Coppock (part)—not part of planning area	13	13	0.00%
Crawfordsville	264	270	2.27%
Kalona	2,363	2,534	7.24%
Riverside	993	1,039	4.63%
Washington	7,266	7,424	2.17%
Wellman	1,408	1,424	1.14%
West Chester	146	148	1.37%

Source: State of Iowa Data Center and U.S. Census Bureau Annual Estimate of the Resident Population, February 2018

Map 3: Washington County Population Change 2000–2010



Data Source: 2000 and 2010 U.S. Census

SCHOOL DISTRICTS

There are four community school districts with facilities in Washington County that provide instruction to kindergarten- through twelfth-grade students. In many areas, school districts also provide amenities to the public, such as a library or recreation. In addition to county and city governments, school districts were included in this plan to maintain Hazard Mitigation Assistance (HMA) funding eligibility to mitigate the potential impacts of hazards on their students, staff, and visitors. Refer to Map 4 for school districts in Washington County. District facilities are shown starting on page 164. School facilities are shown in the Critical Facilities Maps, starting with Map 43 on 164.

The largest school district in Washington County in terms of enrollment is Washington Community School District, which had 1,745 students enrolled in the 2016–2017 school year. The smallest district in the county is WACO, which had 481 students enrolled in the 2016–2017 school year. From the 2010–2011 school year, the two larger school districts, Mid-Prairie and Washington, saw their enrollments increase slightly, while the two smaller school districts, Highland and WACO, saw their enrollments decrease slightly. Refer to Table 5 for enrollments by district for both academic years.

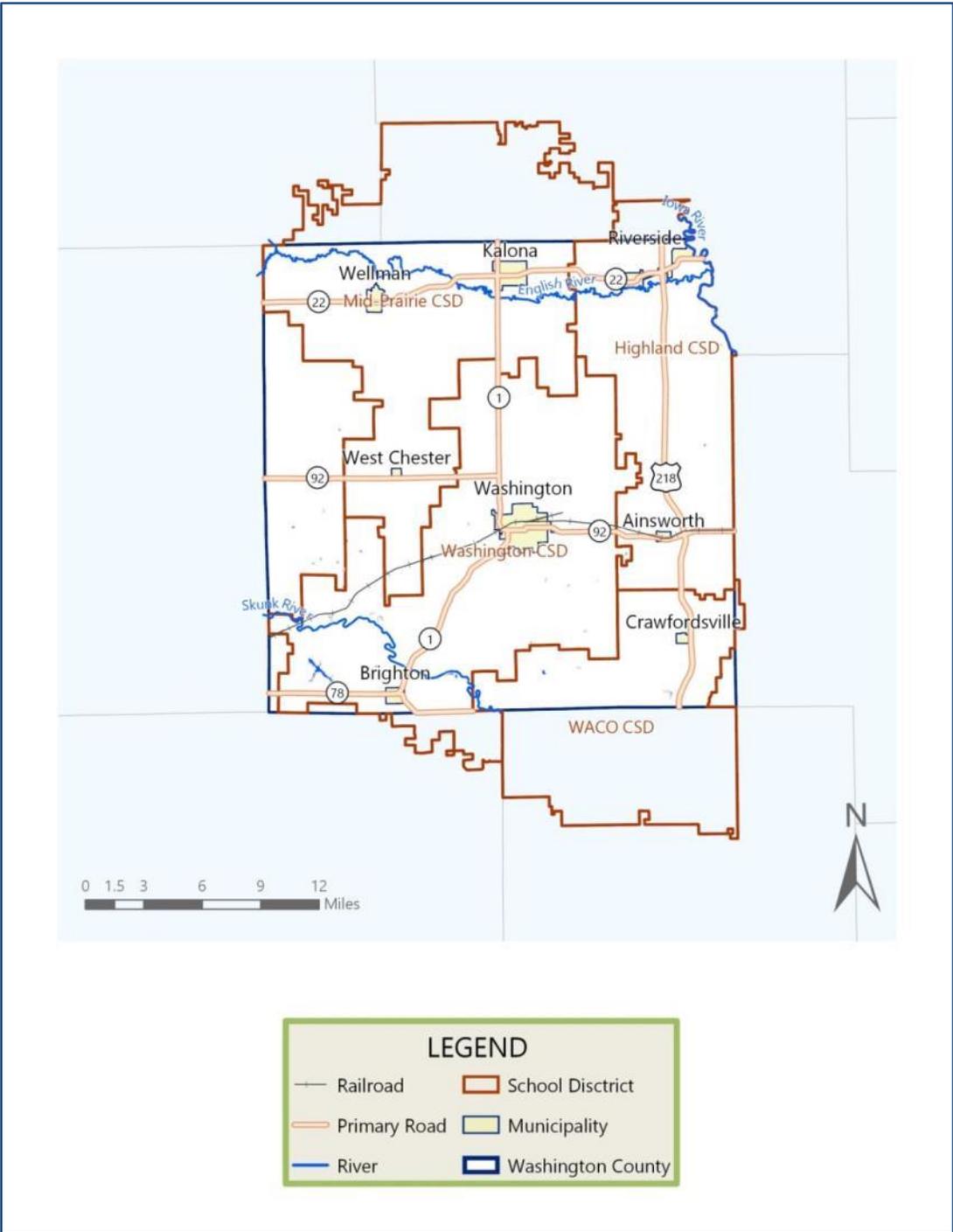
Table 5: Washington County School District Enrollment 2010–2011 and 2016–2017 School Years

District	2010-2011 Enrollment	2016-2017 Enrollment	Percent Change
Highland	654.4	629.3	-3.84%
Mid-Prairie	1,180.2	1,258.4	6.63%
WACO	520.9	481.2	-7.62%
Washington	1,740.2	1,745.1	0.28%
Total	4,095.7	4,114.0	0.45%

Source: Iowa Department of Education, February 2018

For the Washington County Multi-Jurisdictional Hazard Mitigation Plan, only one WACO Community School District (CSD) facility is being considered, as the remaining facilities are located within Henry County and are considered under that county’s hazard mitigation plan. The mitigation strategies for WACO CSD reflect those in the Henry County hazard mitigation plan.

Map 4: Washington County Planning Area School Districts



¹ <https://admissions.uiowa.edu/future-students/university-iowa-student-profile>, accessed February 2018

² <https://uihc.org/basic-facts>, accessed February 2018

³ Population change for cities is compared to census tracts because data is not collected at the Census Tract level for the population estimates.

Risk Assessment



INTRODUCTION

A multi-jurisdictional risk assessment was completed in a basic three-step process for Washington 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 2013 Iowa Hazard Mitigation Plan, a statewide risk assessment identifies a broad spectrum of hazards that can occur in the state, including natural, technological, and human-caused hazards. For Washington 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 Washington County exist, so detailed profiles for each hazard are prepared to reflect those variations. All hazards included in Washington County's risk assessment are listed below.

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
- Flash Flood
- Grass or Wildland Fire
- Human Disease
- Landslide
- River Flood
- Severe Winter Storm
- 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

This list of hazards is a simplified list of the hazards evaluated for the previously approved plan. Several of these categories combine hazards that were previously considered separately. Refer to Table 6 for the list of combined hazards.

Table 6: Combined Hazards

Combined Hazard	Hazards
Infrastructure failure	Energy failure, infrastructure failure, and structural fire
Transportation incident	Transportation incident and waterway or waterbody incident
Thunderstorm, lightning, and hail	Thunderstorm and lightning, and hailstorm
Tornado and windstorm	Tornado and windstorm

HAZARD IMPACT ASSESSMENT

To understand the potential impact of hazards that can occur in Washington County, profiles were prepared using historical data, existing hazard mitigation plans, local knowledge, and the risk assessment criteria in the 2013 Iowa Hazard Mitigation Plan. Hazard profiles include a hazard description, including the potential hazard area. Although Washington 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 historical occurrences, probability of future occurrences, potential magnitude and severity, amount of warning time available, and typical duration of each hazard.

Requirement §201.6 (c)(2)(i): (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.

Requirement §201.6 (c)(2)(i): (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.

HAZARD PRIORITIZATION CRITERIA

The information provided in the hazard impact assessment—probability, magnitude and severity, warning time, and duration—reflects the hazard prioritization criteria used in the 2013 Iowa Hazard Mitigation Plan. To determine the extent a mitigation strategy should focus on one or more hazards, the full set of hazards that can potentially affect

Washington County were prioritized utilizing these criteria. Each criterion of the prioritization process is detailed in Table 7–Table 10. In the hazard profiles, each element of the assessment is discussed in the context of Washington County. In the following chapter, the scores for all four criteria for each hazard are tabulated, and a priority level based on a weighted average of those scores is assigned, completing the multi-jurisdictional risk assessment.

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 7.

Table 7: 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 8.

Requirement §201.6 (c)(2)(ii): (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: (ii) A description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include and overall summary of each hazard and its impact on the community.

Table 8: 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 9.

Table 9: 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 10.

Table 10: 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 Henry County, moved through part of Washington County, and then continued into Louisa 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 Washington County, even if some of those effects occurred outside of Washington County.

Conversely, NCEI data is for reported effects, so damage that occurred may not be represented in the data. For example, the wind event with the highest magnitude, 59 knots, has an episode narrative that states, “Numerous high profile vehicles and trees were toppled by the winds, and many homes and farm buildings suffered damage due to sustained winds 35 to 45 mph with 50 to 70 mph gusts,” while the reported property damage is \$0.00. 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 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 disease in Iowa. The IDALS website reports only three Animal Health Alert Network alerts since August 2012¹.

In 2014–2015, the U.S. saw the largest ever outbreak of highly pathogenic avian influenza, with Iowa as 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 disease². The outbreak led to an estimated \$1.6 billion in direct losses and a \$3.3 billion impact in the US economy³ (1–10). In Iowa, the affected area was in the northwestern part of the state. There were no reported incidents in Washington County⁴; 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, has significantly decreased⁵. Chronic Wasting Disease (CWD), which affects deer, is present in the state. Five areas in Iowa have confirmed cases of CWD in captive White Tail Deer. Four of those herds have been depopulated. CWD has also been observed in wild deer populations in three Iowa counties. All diagnosed cases, both domestic and wild, are outside of Washington County.⁶ West Nile Virus has affected horses in Iowa over the past five years⁷. The most reported cases in one year was 15 in 2016. In

2017, only 2 cases were reported, and the average over five years is 7.2. The only year with reported cases in Washington County is 2016, with a total of three for the county. In addition to Scrapie, CWD, and West Nile Virus, there were 12 confirmed cases of rabies in Iowa in 2015, which was 20% lower than the previous year, and 8 of those cases were observed in wild animals.⁸

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 a bacterium that can destroy a corn plant referred to as Goss's wilt. 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 ash trees. The beetle larvae feed below the bark of the tree, cutting off the water and nutrient conducting vessels of the tree, causing death, generally in 2–4 years. The presence of the borer was confirmed in Washington County in 2016 near Brighton and in 2017 near Washington.⁹ A statewide quarantine is in place to prevent the spread of the insect to other states. Iowans are discouraged from transporting fire wood 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 Washington County. According to the *2013 Iowa Hazard Mitigation Plan*, the probability of an outbreak in Iowa is also unlikely. Having been confirmed in the county, an Emerald Ash Borer outbreak is possible.

MAGNITUDE AND SEVERITY

If a major outbreak of an animal, plant, or crop disease were to occur in Washington 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 Washington County is countywide due to the widespread nature of this hazard. Typically, rural areas in Washington County are more severely impacted by this hazard.

HISTORICAL OCCURRENCES

From 1998 through 2017, Washington County has experienced five major periods of drought recorded over several months. All recorded damage was crop damage, totaling \$27.6 million in the drought-affected area. None of the recorded crop damage occurred after 2005. Nine of the seventeen months where drought was recorded were outside the growing season, April–September.

Table 11: Washington County Drought Events 1998-2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	08/01/2003	0	0	0.00K	14.880M
WASHINGTON (ZONE)	07/01/2005	0	0	0.00K	10.340M
WASHINGTON (ZONE)	08/01/2005	0	0	0.00K	2.410M
WASHINGTON (ZONE)	09/01/2005	0	0	0.00K	0.00K
WASHINGTON (ZONE)	10/01/2005	0	0	0.00K	0.00K
WASHINGTON (ZONE)	11/01/2005	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/01/2005	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/01/2006	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/01/2006	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/01/2006	0	0	0.00K	0.00K
WASHINGTON (ZONE)	09/01/2011	0	0	0.00K	0.00K
WASHINGTON (ZONE)	10/01/2011	0	0	0.00K	0.00K

Table 11: Washington County Drought Events 1998-2017, continued

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	07/17/2012	0	0	0.00K	0.00K
WASHINGTON (ZONE)	08/07/2012	0	0	0.00K	0.00K
WASHINGTON (ZONE)	11/01/2012	0	0	0.00K	0.00K
WASHINGTON (ZONE)	09/03/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	10/01/2013	0	0	0.00K	0.00K
Count/Total		17	0	0.00K	27.630M

Source: National Centers for Environmental Information, January 2018

PROBABILITY

Based on the major periods of drought, the probability estimate for drought conditions occurring in Washington County is between 20% and 30% in any given year. Multiple short-term drought conditions or long-term drought conditions could occur in Washington County, Iowa, and the Midwest region of the United States. Overall, the probability estimate is based on historical occurrences, the *2013 Iowa Hazard Mitigation Plan*, and local knowledge in Washington County.

MAGNITUDE AND SEVERITY

Droughts are typically widespread, affecting a large area. If a drought occurs in Washington County, it is likely most of eastern Iowa or even the entire Midwest would be 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 water supply.

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. Infrastructure, as well, would be affected due to drying soils and low water levels around dams.

In Washington County, widespread drought conditions could severely damage 10% up to 25% of property, primarily crops. Although the potential magnitude and severity of drought conditions would be considered negligible countywide, the direct impacts on rural areas may be critical. If drought conditions were severe enough to significantly reduce water supply, urban areas in Washington County could be directly impacted.

WARNING TIME

Drought warning time 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 Washington County's drought history, most drought events affect the state for a period of a few months. Of the five recorded drought events in Washington County from 1998–2017, the average duration was 3.4 months.

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 of rock beneath the earth's surface. The three general classes of earthquakes are tectonic, volcanic, and artificially produced.

POTENTIAL HAZARD AREA

The potential hazard area for an earthquake in Washington County is countywide.

HISTORICAL OCCURRENCES

According to the Iowa Geological and Water Survey, twelve earthquakes with epicenters in Iowa have been reported. The first reported earthquake occurred in 1867 near Sidney in southwest Iowa. The most recent earthquake occurred in 1948 near Oxford, which is approximately 14 miles north of Washington County. The most severe earthquake occurred near Davenport in southeast Iowa in 1934, but there was only minor damage reported. None of these events were instrumentally recorded.

Other earthquakes with an epicenter outside of Iowa have mildly affected the state. According to the United States Geological Service, the earliest reported earthquakes that were felt in Iowa occurred in 1811 and 1812 and originated in the New Madrid Seismic Zone. Other earthquake originating in Illinois and Missouri have been felt in Iowa, and each event has resulted in minimal or no damage.

PROBABILITY

Iowa is located in low-risk earthquake zones, Seismic Zones 0 and 1, which indicates a low probability of a major earthquake affecting the state. Iowa is northwest of the New Madrid Seismic Zone, which has the potential to produce large earthquakes that can impact the state, including Washington County. Based on recurrence intervals for small earthquakes, scientists estimate a 90% chance of a Richter magnitude 6.0 earthquake in the New Madrid Seismic Zone by 2040, which may likely be the next earthquake to affect Washington County. It should be noted, a 5.2 magnitude earthquake occurred in April 2008.

MAGNITUDE AND SEVERITY

In the past, earthquakes with an epicenter in Iowa have not had a major impact in Washington County. Assuming low magnitude earthquakes will continue to occur in Iowa, impacts will likely be minor in Washington County, if any. Earthquakes that originate outside of Iowa could potentially impact the state and Washington County. Estimated effects of a Richter scale 6.5 magnitude earthquake along the New Madrid Seismic Zone suggest that southern Iowa could experience impacts as severe as trembling buildings, some broken dishes and cracked windows. For most areas, impacts will be vibrations similar to the passing of a heavy truck like rattling of dishes, creaking walls, and swinging of suspended objects. The impacts of an earthquake originating in the New Madrid Seismic Zone would likely be minor in Washington County or negligible.

WARNING TIME

Earthquake forecasting is an inexact science. Even in areas that are well monitored, scientists rarely predict earthquakes. Realistically, there would be minimal or no warning time before an earthquake in Washington County.

DURATION

An earthquake occurs in just a few seconds, but a community can be affected for hours, weeks, and even years after the event. Due to an overall low risk, an earthquake event would likely impact Washington County for a few hours at the most.

There are two common scales for categorizing the magnitude of an earthquake: the Richter Scale and the Modified Mercalli Intensity Scale. The Richter scale, a logarithmic scale, measures the amount of energy released by an earthquake. An increase of 0.2 on the scale corresponds to a doubling of energy.

The Mercalli Intensity Scale measures the magnitude of an earthquake according to the effects of the event, e.g. “VIII Severe—Damage slight in specially designed structures; considerable damage in ordinary substantial buildings...” Despite different measurements, the scales are correlated because additional effects are more likely to occur from an event of certain magnitude. The relationship is shown in the table below.

Richter Scale	Mercalli Intensity	Description
1.0–1.9	I	Micro
2.0–2.9	I–II	Minor
3.0–3.9	III–IV	
4.0–4.9	IV–VI	Light
5.0–5.9	VI–VII	Moderate
6.0–6.9	VIII to X	Strong
7.0–7.9	X–XII	Major
8.0–8.9		Great
9.0+		

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.

POTENTIAL HAZARD AREAS

The potential hazard areas include areas of the county with high clay content soil. Refer to the risk assessment maps, Map 5–Map 8.

HISTORICAL OCCURRENCES

There are no documented expansive soil events for the state or Washington County. Due to the time period over which impacts from expansive soils occur, there may be expansive soil events in the state that were not documented. The availability of data on expansive soils varies across the United States. Clay content information is available, but the presence of high clay content does not necessarily indicate expansive soils.

PROBABILITY

Based on the lack of historical occurrences in the state and Washington County, the probability of a major expansive soils event is unlikely but is possible based on the presence of high clay content soil throughout the county.

MAGNITUDE AND SEVERITY

Expansive soils events have minimal, if any, direct impacts on humans. Impacts commonly involve swelling clays beneath areas covered by buildings, slabs of concrete, and/or asphalt. The most extensive damage from expansive soils occurs to highways and streets.

Houses and one-story commercial buildings are more susceptible to being damaged from expansive soils than multi-story buildings, which are usually heavy enough to counter swelling pressure. Common damage to buildings include sticking doors, uneven floors, and cracked foundations, floors, walls, ceilings, and windows.

WARNING TIME

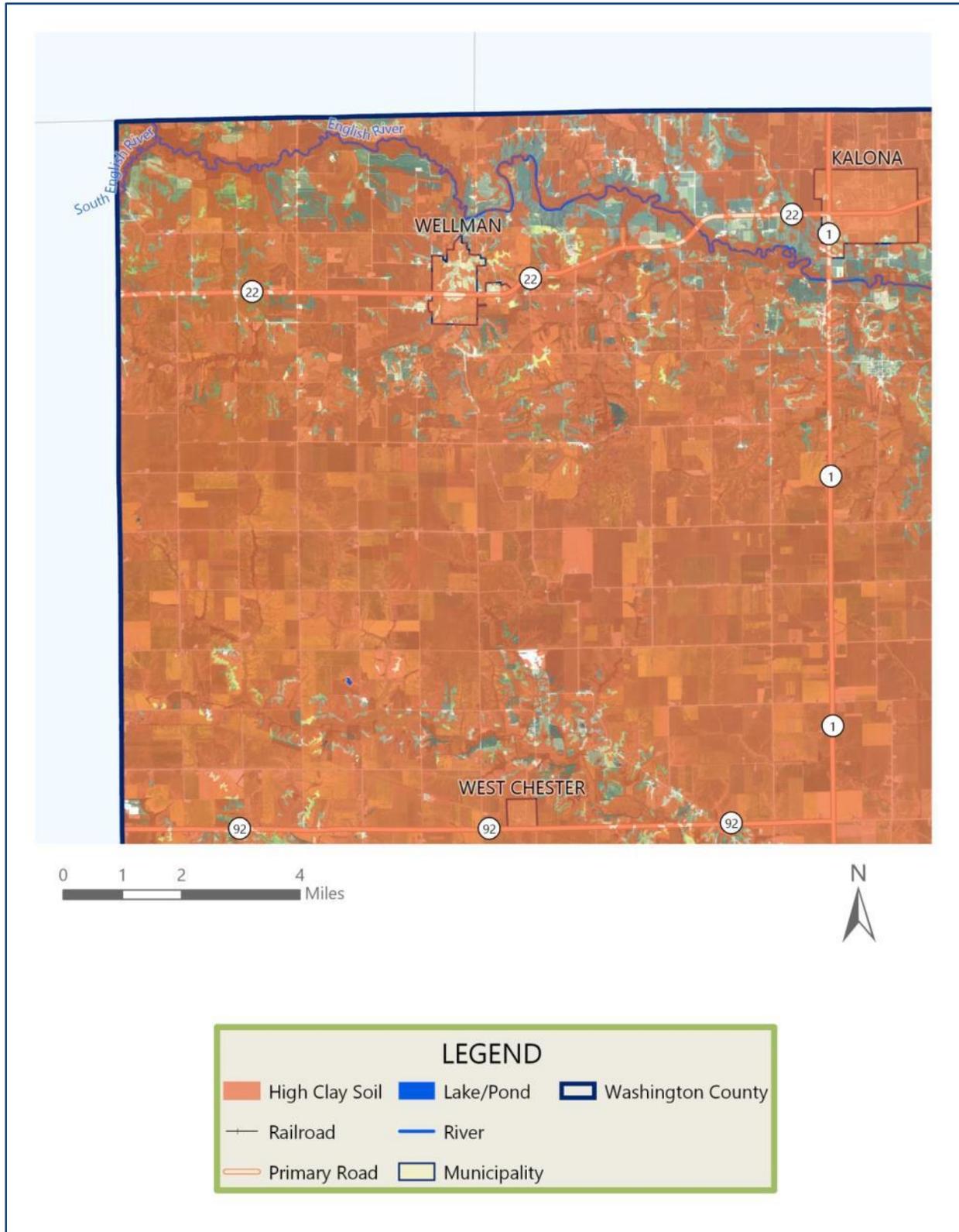
The warning time for expansive soils is consistent with other geologic hazards, which occur slowly over time. Often times, expansive soils are realized after damage occurs.

DURATION

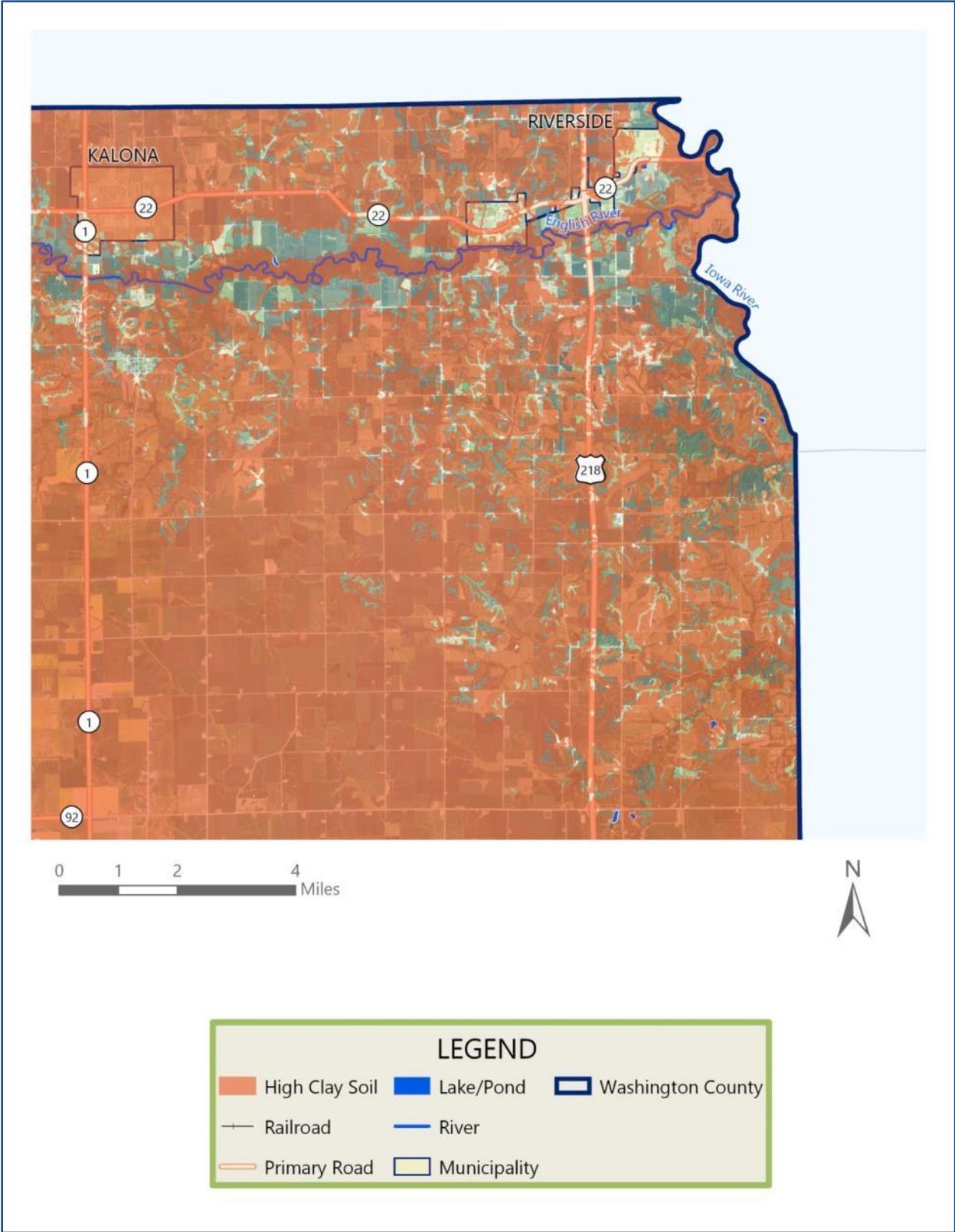
The response to expansive soils is limited in Iowa with the most severe cases resulting in washed out roads. Response to expansive soils in Iowa is usually coupled with response to river and flash flood events.

RISK ASSESSMENT MAPS

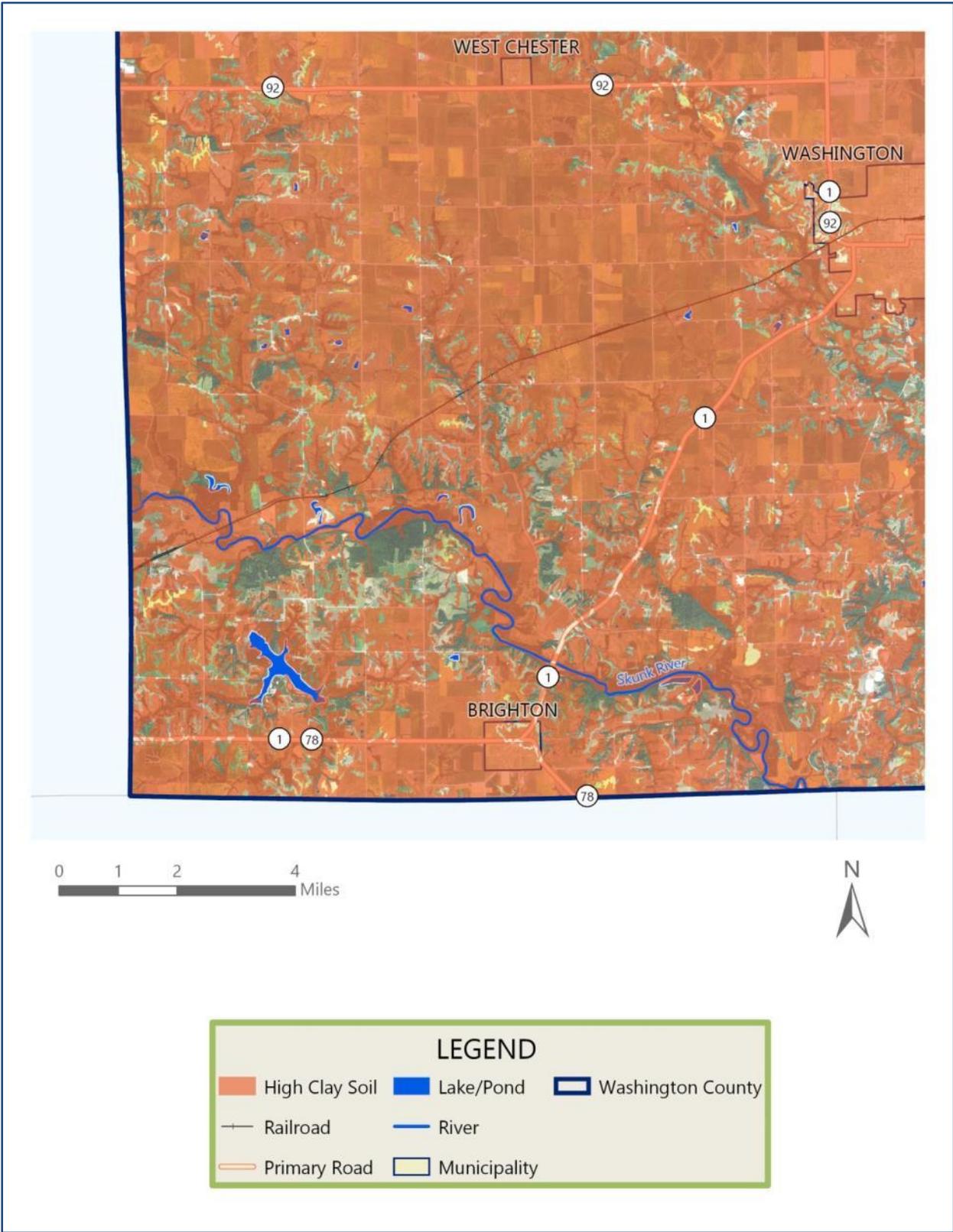
Map 5: Washington County Section 1 High Clay Soil



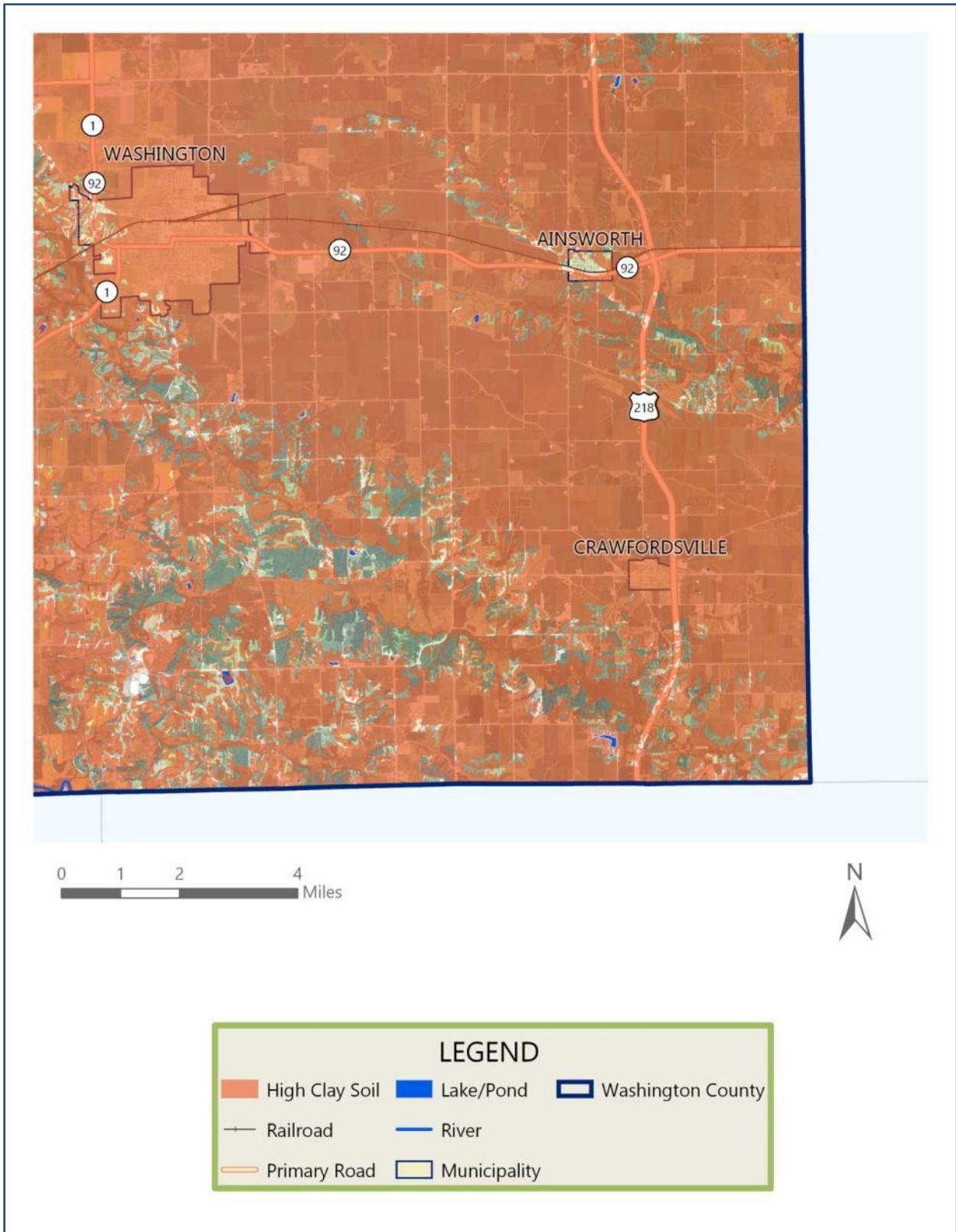
Map 6: Washington County Section 2 High Clay Soil



Map 7: Washington County Section 3 High Clay Soil



Map 8: Washington County Section 4 High Clay Soil



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 Washington County is Countywide.

HISTORICAL OCCURRENCES

From 1998 through 2017, Washington County has four recorded heat events. Refer to Table 12. As defined by the National Centers for Environmental Information (NCEI), a heat event is whenever heat index values meet or exceed locally established advisory thresholds. A heat event as defined by the NCEI does not fully meet the description of an extreme heat event in Iowa, but data from the NCEI is the most comprehensive data available.

Table 12: Washington County Heat and Excessive Heat Events 1998–2017

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	07/19/1999	Heat	0	0	0.00K	0.00K
WASHINGTON (ZONE)	08/31/2000	Heat	0	0	0.00K	0.00K
WASHINGTON (ZONE)	07/04/2012	Excessive Heat	0	0	0.00K	0.00K
WASHINGTON (ZONE)	08/26/2013	Heat	0	0	0.00K	0.00K
Count/Total	4		0	0	0.00K	0.00K

Source: National Centers for Environmental Information, January 2018

In addition to NCEI data, the Iowa Environmental Mesonet maintained by Iowa State University provides a searchable database of National Weather Service (NWS) watches, warnings, and advisories since November 2005. The first excessive heat warning in that dataset was issued in August of 2010. From that date through 2017, 13 excessive heat watches or warnings have been issued in Washington County. Refer to Table 13. Two or more watches or warnings were issued in 2011, 2012, 2016, and 2017.

Table 13: Washington County Excessive Heat Watches and Warnings 2005–2017

Event ID	Phenomena	Significance	Issued
1	Excessive Heat	Warning	Wed Aug 11 2010 15:14:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Watch	Fri Jul 01 2011 10:00:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Warning	Sat Jul 16 2011 12:00:00 GMT-0500 (Central Daylight Time)
2	Excessive Heat	Watch	Sat Jul 16 2011 12:00:00 GMT-0500 (Central Daylight Time)
2	Excessive Heat	Warning	Tue Aug 02 2011 03:50:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Watch	Thu Jun 28 2012 07:00:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Warning	Wed Jul 04 2012 03:23:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Warning	Mon Jul 13 2015 14:20:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Warning	Wed Jul 20 2016 13:00:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Watch	Thu Jul 21 2016 07:00:00 GMT-0500 (Central Daylight Time)
2	Excessive Heat	Warning	Sun Jul 24 2016 11:00:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Watch	Wed Jul 19 2017 12:00:00 GMT-0500 (Central Daylight Time)
1	Excessive Heat	Warning	Wed Jul 19 2017 12:00:00 GMT-0500 (Central Daylight Time)

Source: Iowa Environmental Mesonet, Iowa State University, March 2018

PROBABILITY

Based on NCEI data and NWS excessive heat watches and warnings, Washington County experiences an extreme heat event in more than 33% of years; however, as previously noted, the NCEI and NWS definitions of extreme heat do not fully meet the description of an extreme heat event in Iowa. The *2013 State Hazard Mitigation Plan* estimated the probability of an extreme heat event in Iowa as between 10% and 19% in any given year.

MAGNITUDE AND SEVERITY

An extreme heat event typically affects a large geographic area, sometimes as much as an entire region in the United States. If an extreme heat event were to occur in Washington County, the entire county and beyond would 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 urban areas, the heat island effect and air stagnations can exacerbate the already dangerous conditions for humans and animals during an extreme heat event. In Washington County, Washington is the most urban and dense area. In rural areas, which is most of the county, livestock loss and reduced crop yields can occur in extreme heat events; however, crop damages have not been attributable to any one heat event in the NCEI database. 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 Washington County would likely be negligible 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 NWS will initiate alert procedures when the heat index is expected to exceed 105 degrees for a least 3 hours or when the heat index is expected near or above 105 degrees for successive days.

DURATION

By definition, an extreme heat event is three consecutive days with a 90+ degree Fahrenheit for at least three successive days or one day with a 100+ degree Fahrenheit temperature or heat index. Based on past extreme heat events in the state and Washington 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, Map 9-Map 17, which depict the flood hazard zones at the county level and for individual municipalities that contain flood hazard areas. 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 Washington 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. Many jurisdictions in the planning area have identified at least minor flash flood issues, and most have persistent issues due to insufficient storm water management.

HISTORICAL OCCURRENCES

From 1998–2017, there were 23 flash flood events documented in Washington County. Refer to Table 14: Washington County Flash Flood Events 1998–2017. It should be noted that the National Centers for Environmental Information (NCEI) identifies the area where a flash event began in Washington County and not necessarily the only areas of the county impacted by the event.

Table 14: Washington County Flash Flood Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
COUNTYWIDE	10/17/1998	0	0	0.00K	0.00K
WASHINGTON	06/22/2007	0	0	0.00K	0.00K
WELLMAN	06/22/2007	0	0	0.00K	0.00K
AINSWORTH	06/22/2007	0	0	100.00K	0.00K

Table 14: Washington County Flash Flood Events 1998–2017, continued

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON	07/16/2007	0	0	0.00K	0.00K
KALONA ARPT	06/03/2008	0	0	0.00K	0.00K
WASHINGTON	06/12/2008	0	0	0.00K	0.00K
WEST CHESTER	06/27/2008	0	0	0.00K	0.00K
WASHINGTON	06/21/2009	0	0	100.00K	0.00K
RIVERSIDE	06/21/2009	0	0	100.00K	0.00K
CLAY	08/26/2009	0	0	10.00K	0.00K
RIVERSIDE	08/27/2009	0	0	0.00K	0.00K
WASHINGTON	06/15/2010	0	0	10.00K	0.00K
WELLMAN	06/23/2010	0	0	100.00K	0.00K
WELLMAN	08/03/2010	0	0	1.000M	0.00K
WELLMAN	08/10/2010	0	0	100.00K	0.00K
WELLMAN	06/14/2011	0	0	250.00K	0.00K
WASHINGTON ARPT	05/03/2012	0	0	0.00K	0.00K
WELLMAN	04/17/2013	0	0	250.00K	0.00K
KALONA	06/30/2014	0	0	0.00K	0.00K
WELLMAN	06/30/2014	0	0	0.00K	0.00K
KALONA ARPT	08/09/2015	0	0	0.00K	0.00K
HASKINS	08/28/2016	0	0	50.00K	0.00K
Count/Total	23	0	0	2.070M	0.00K

Source: National Centers for Environmental Information, January 2018

For the reported flash flood events, there were no deaths or injuries reported, but there was over \$2,000,000 in property damage from 11 of the 23 events. Almost half of the damage occurred in Wellman in August 2010, and 7 of the events realized damages of \$100,000 or more.

In Washington County, 27 river flood events occurred from 1998–2017. Refer to Table 15. More property damage occurred from river flooding than from flash flooding during that time period. With over \$3,000,000 in damages from 10 of the events, the average loss for events with documented losses is \$315,000. As with flash flooding, Wellman has experienced the most property damage loss from this hazard.

Table 15: Washington County River Flood Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
COUNTYWIDE	07/09/1998	0	0	0.00K	0.00K
COUNTYWIDE	07/21/1998	0	0	0.00K	0.00K
WASHINGTON	04/08/1999	0	0	0.00K	0.00K
COUNTYWIDE	07/04/2000	0	0	0.00K	0.00K
COUNTYWIDE	02/24/2001	0	0	0.00K	0.00K

Table 15: Washington County River Flood Events 1998–2017, continued

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	05/12/2002	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/05/2004	0	0	0.00K	0.00K
WASHINGTON (ZONE)	05/30/2004	0	0	0.00K	0.00K
WASHINGTON (ZONE)	06/01/2004	0	0	0.00K	0.00K
WELLMAN	06/01/2008	0	0	198.00K	0.00K
WELLMAN	06/21/2009	0	0	250.00K	0.00K
RIVERSIDE	06/22/2009	0	0	250.00K	0.00K
WELLMAN	08/27/2009	0	0	500.00K	0.00K
WELLMAN	05/13/2010	0	0	500.00K	0.00K
WELLMAN	06/13/2010	0	0	500.00K	0.00K
RIVERSIDE	06/15/2010	0	0	125.00K	0.00K
WELLMAN	08/03/2010	0	0	500.00K	0.00K
RIVERSIDE	08/04/2010	0	0	75.00K	0.00K
RUBIO	08/13/2010	0	0	250.00K	0.00K
WELLMAN	04/17/2013	0	0	0.00K	0.00K
RIVERSIDE	04/18/2013	0	0	0.00K	0.00K
KALONA ARPT	05/27/2013	0	0	0.00K	0.00K
BRIGHTON	05/29/2013	0	0	0.00K	0.00K
WELLMAN	06/30/2014	0	0	0.00K	0.00K
RIVERSIDE	07/01/2014	0	0	0.00K	0.00K
KALONA	08/11/2015	0	0	0.00K	0.00K
KALONA ARPT	12/15/2015	0	0	0.00K	0.00K
Count/Total	27	0	0	3.148M	0.00K

Source: National Centers for Environmental Information, January 2018

Flooding is a persistent natural hazard in Washington County causing millions of dollars in property damage. In certain areas of the county, several properties have been damaged by multiple flood events. These properties are considered repetitive flood loss properties. The Federal Emergency Management Agency’s (FEMA) definition of a repetitive flood loss property is a property that has received two more claim payments of more than \$1,000 within a ten-year period through the National Flood Insurance Program. As of November 2017, there were two repetitive flood loss properties in Washington County—one in Kalona and one in Wellman. Both properties have had only the minimum number of claims to qualify as a repetitive flood loss properties. One property made claims for \$84,884 in losses and the other made claims for \$17,805. Refer to Table 16.

Table 16: Repetitive Loss Properties by Jurisdiction

Community Name	Building Payments	Contents Payments	Total Payments	Average Payment	Losses	Properties	Property Type
Kalona	\$81,565	\$3,319	\$84,884	\$42,442	2	1	Single Family
Wellman	\$17,806	\$0.00	\$17,806	\$8,904	2	1	Single Family

Source: Iowa Department of Natural Resources, November 2017

Repetitive loss properties are a concern not only because the residents who live in these structures are exposed to the negative impacts of flood multiple times but because these properties are a significant draw on the funds available in the National Flood Insurance Program.

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 annually or biannually in Washington County. Multiple flash floods have occurred in most years since 2007. Flash flood events are considered highly likely. More river flood events have been documented in Washington County over the same period. River flood events are also considered highly likely. The probability estimate for flood hazards in Washington County is based on historical occurrences and local knowledge.

MAGNITUDE AND SEVERITY

With flood hazard mapping from multiple sources, vulnerability of life and property to river flooding is well identified in Washington County. FEMA has delineated the probable extent of the 100-year flood hazard areas, Zone A, in Washington County. These maps are Flood Insurance Rate Maps (FIRMs), which show areas that have a 1% chance in any given year to be affected by floods. For the designated flood zones in Washington 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). IFIS is a web interface with interactive flood mapping and forecasting features that can be used to understand potential flood risk. Currently, Kalona is the only Washington County community that is included in the Flood Map Scenarios; however, current stream gauge information is provided countywide, refer to Figure 1 and Figure 2. To explore the information available for Washington County, visit the Iowa Flood Information System at the following website:

<http://ifis.iowafloodcenter.org/ifis/en/>. In the future, more detailed flood risk information will be

provided through the RiskMap program, which is partnership between FEMA and Iowa Department of Natural Resources 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. Recreational vehicles and mobile homes located in low-lying areas can also be swept away by the water.

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 over 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 humans 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 like IFIS increases the predictability of flash floods. Depending on the location in the watershed, warning times can be increased. The National Weather Service forecasts the height of flood crests, the data, and time the flow is expected to occur at a particular location.

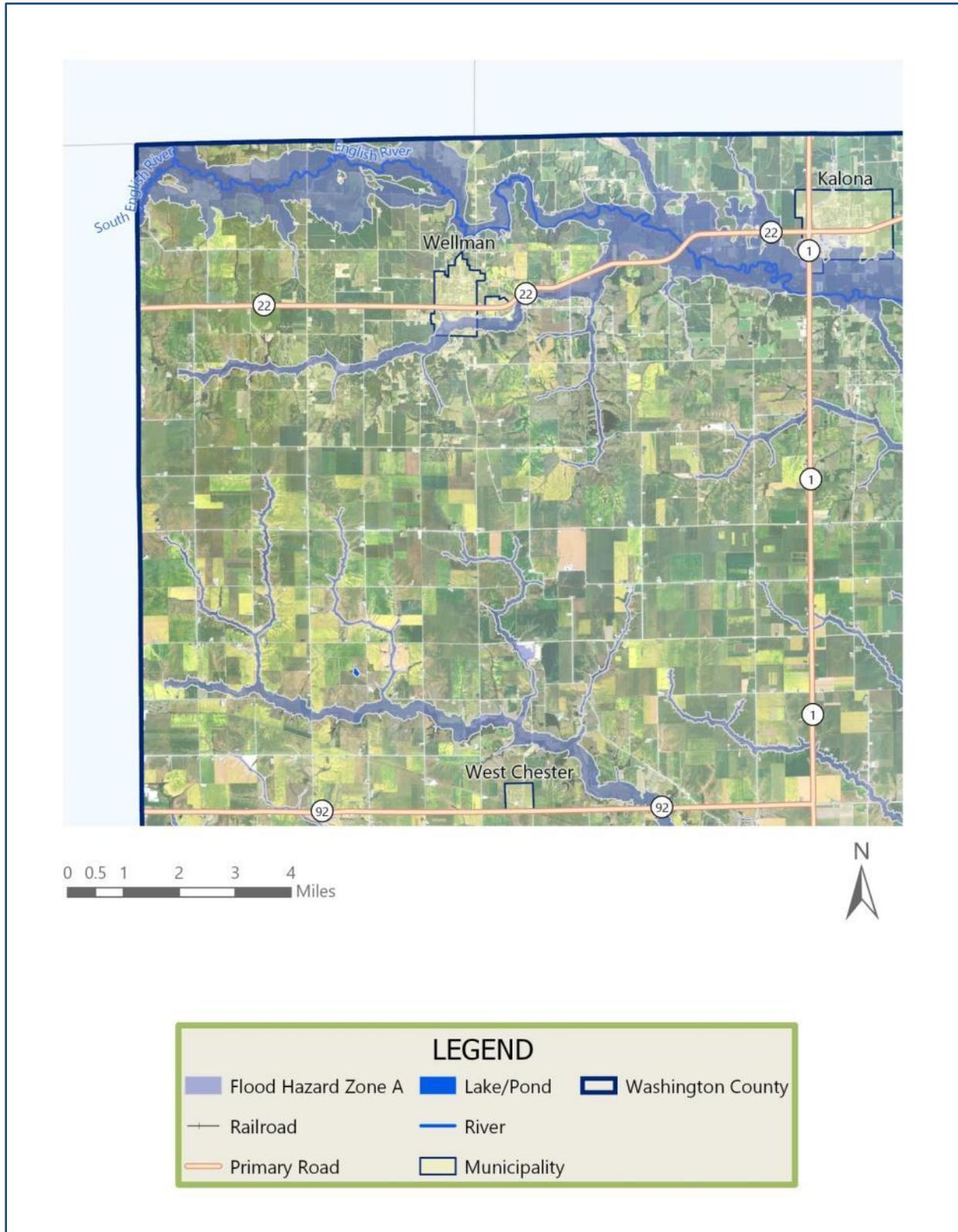
Gages along streams and rain gages provide information for flood warnings. Advance warning is possible for river flood events because a flood usually develops over the course of several days. The National Weather Service provides flood forecasts for Iowa, and now, IFIS provides information and forecasts. 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

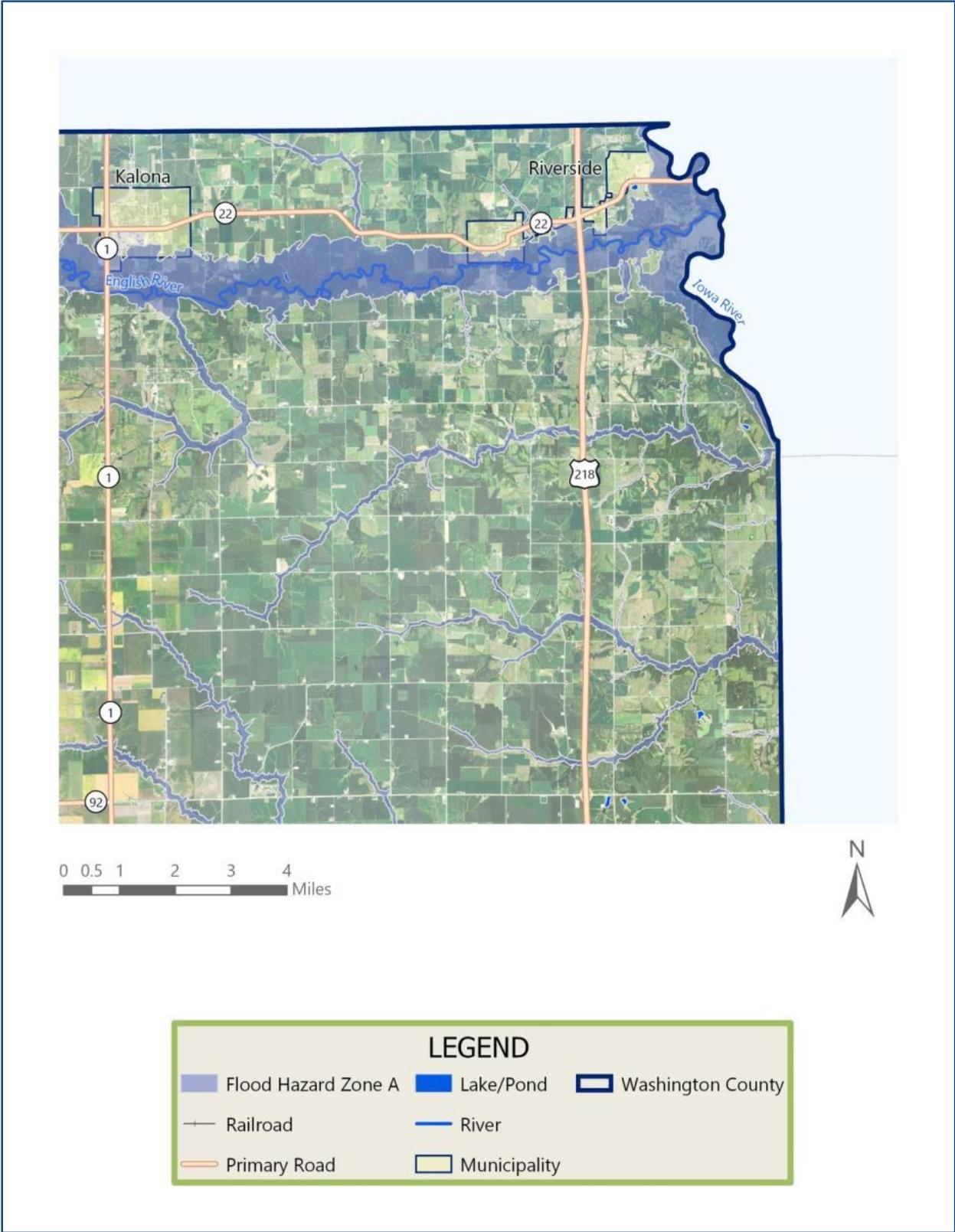
Response to a flash flood event is usually shorter term relative to a river flood event, requiring just days or weeks depending on the severity of the event. Response to a river flood event is usually extensive and requires days and even up to years to adequately recover.

RISK ASSESSMENT MAPS

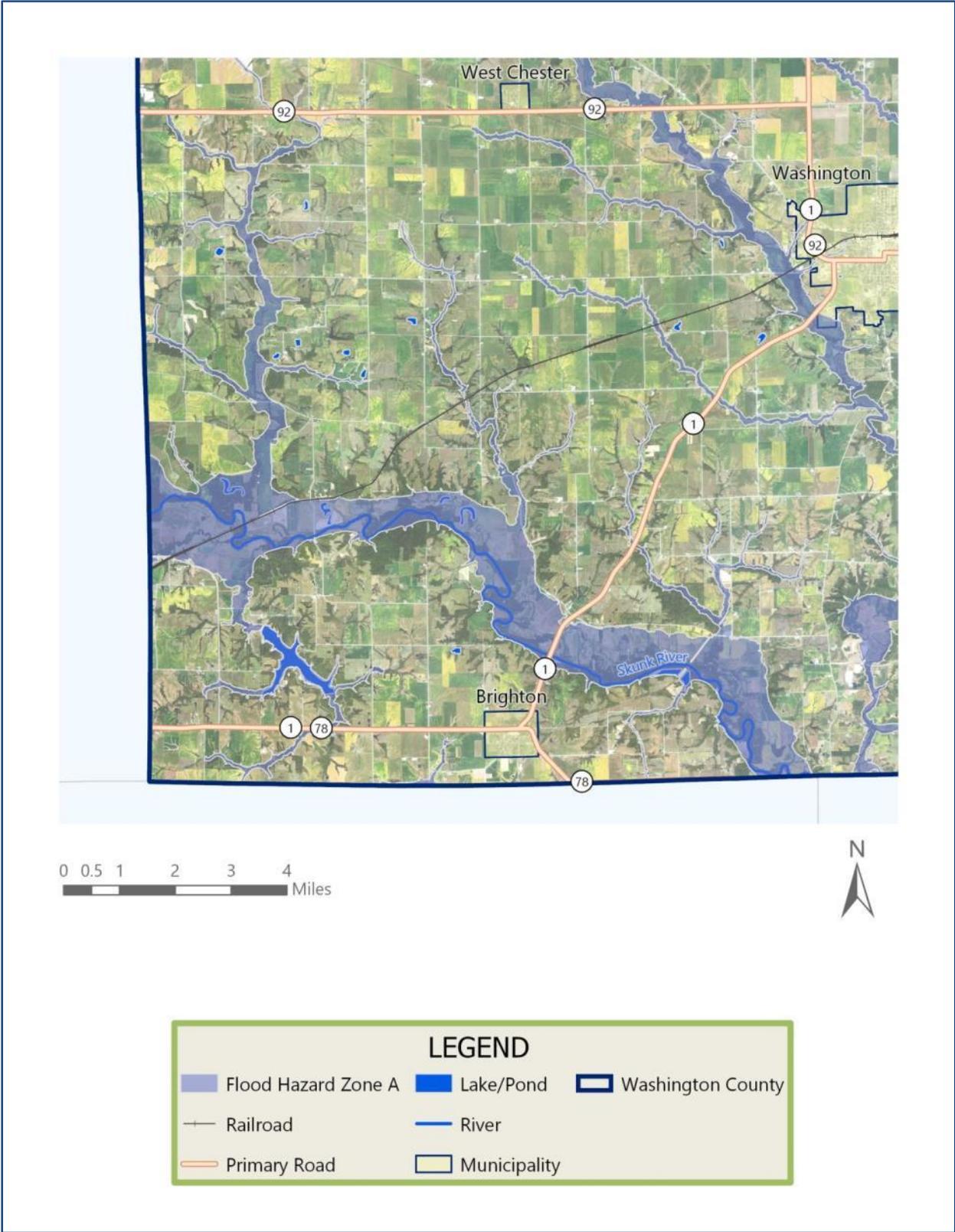
Map 9: Washington County Section 1 Flood Hazard Zones



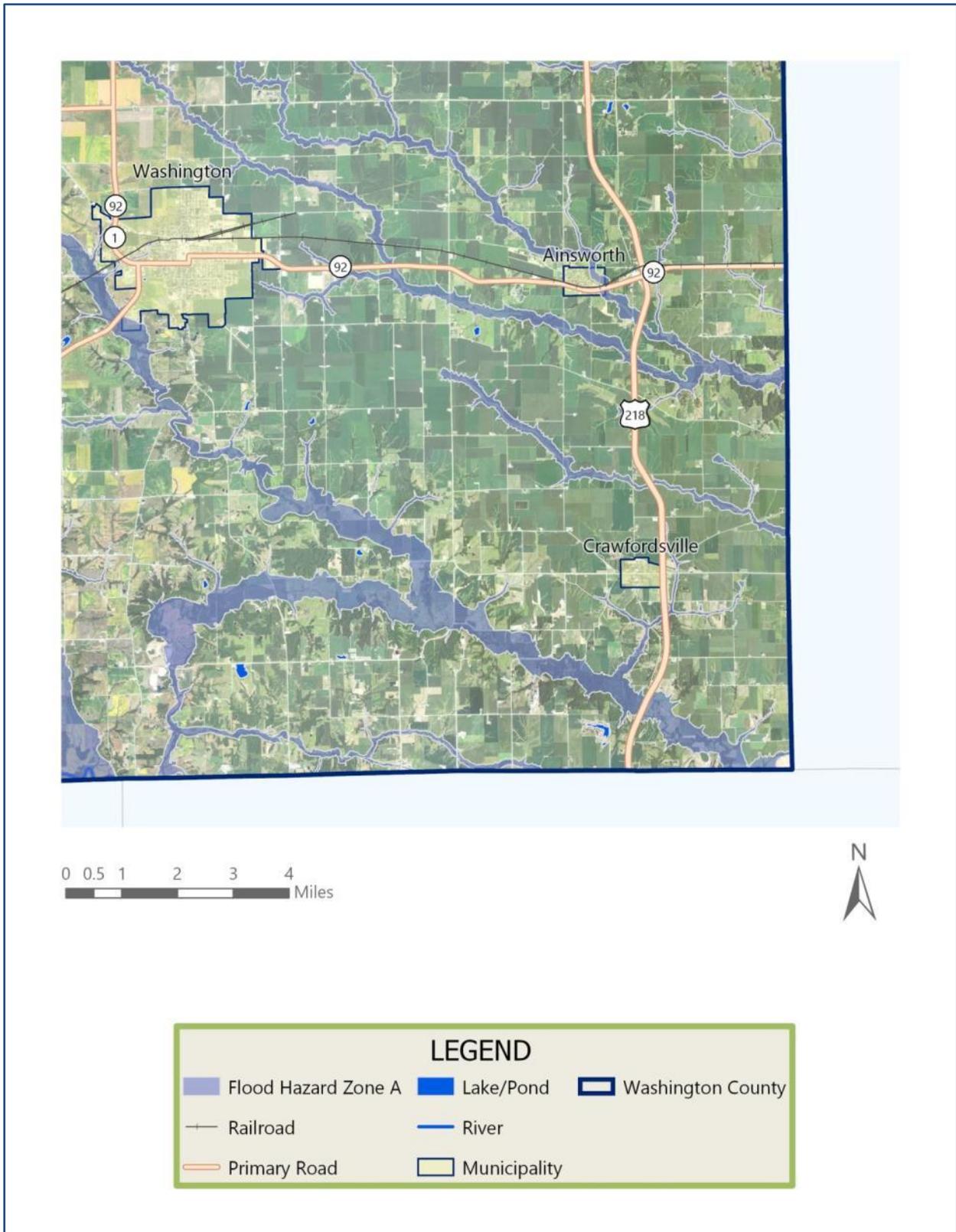
Map 10: Washington County Section 2 Flood Hazard Zone



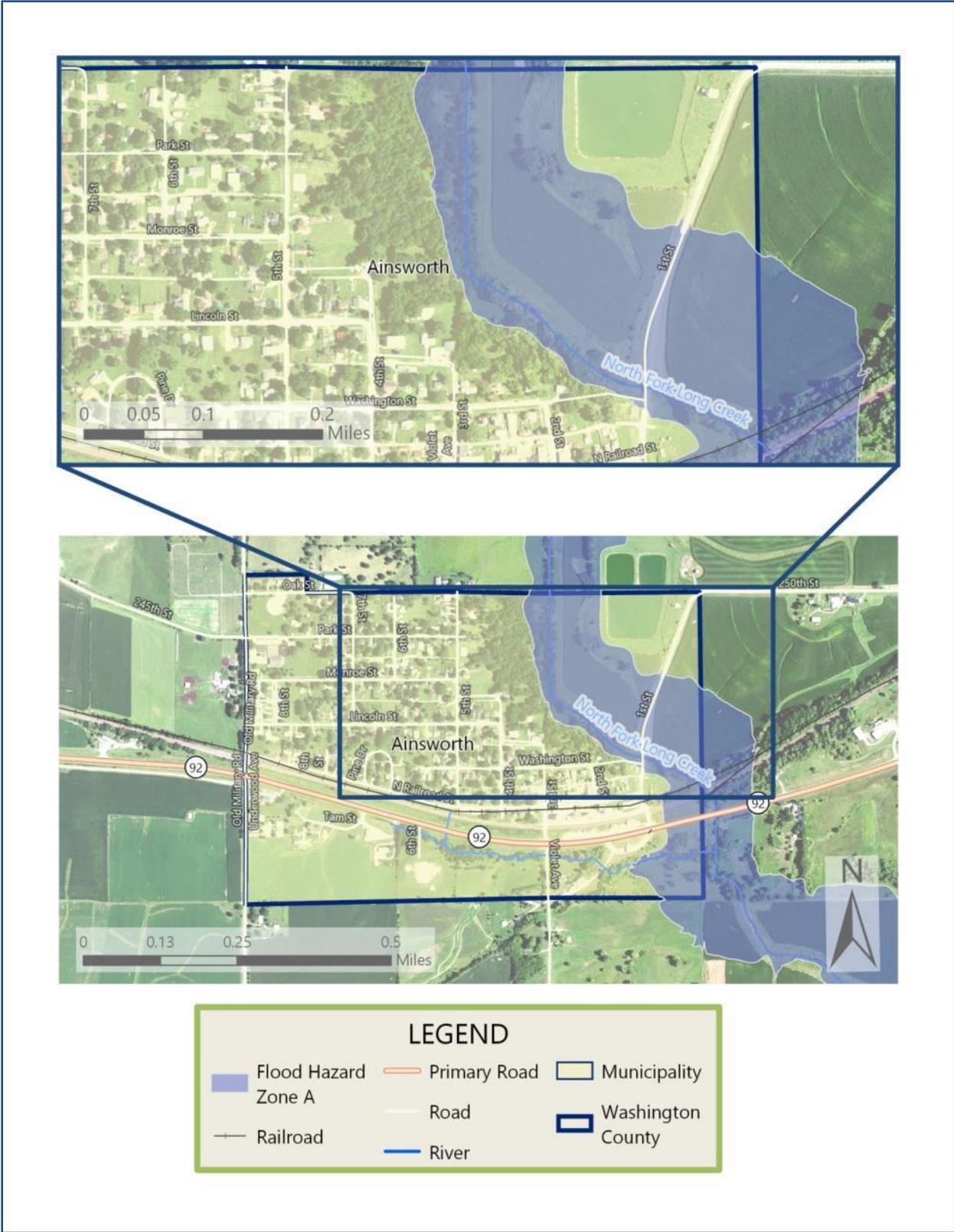
Map 11: Washington County Section 3 Flood Hazard Zones



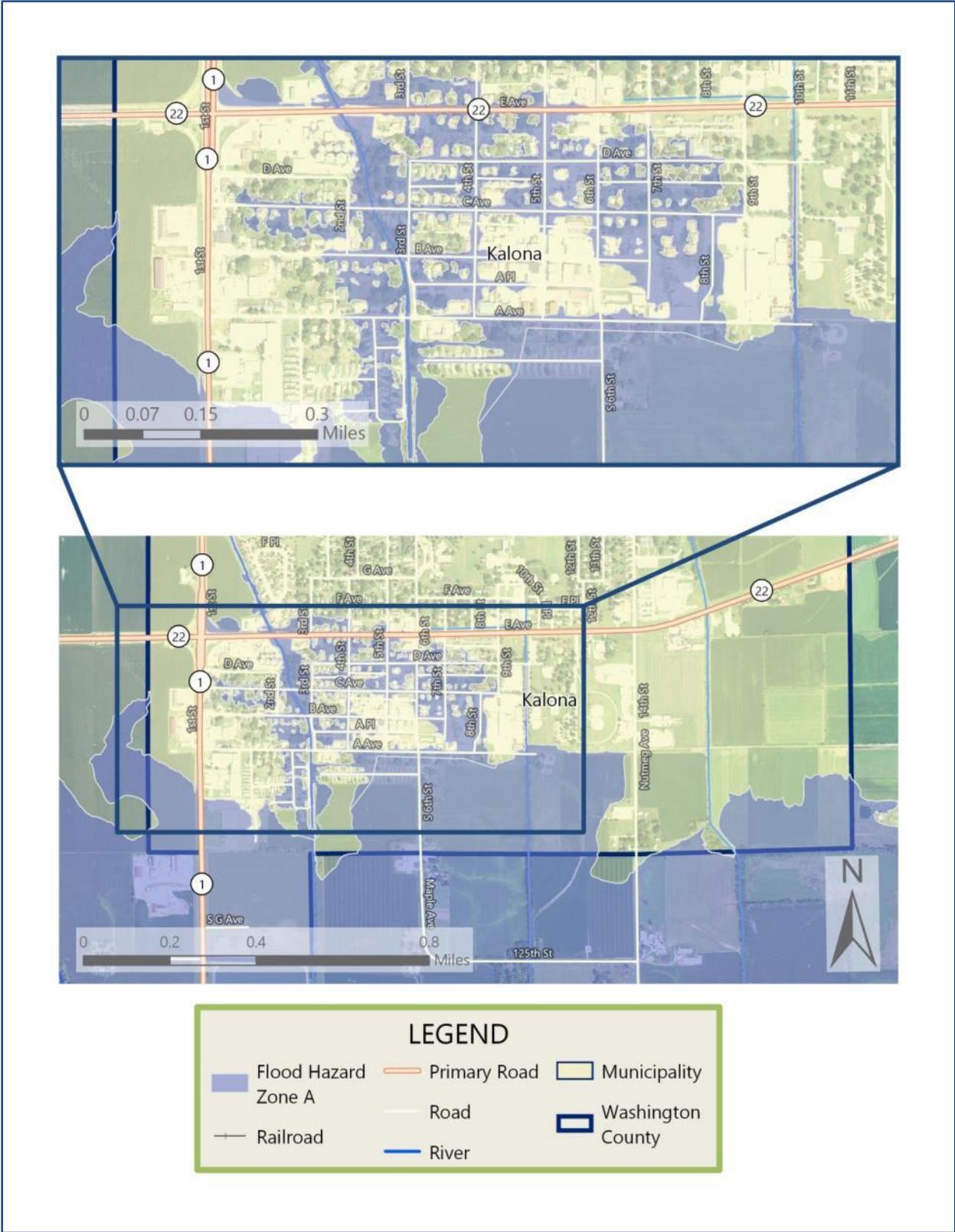
Map 12: Washington County Section 4 Flood Hazard Zones



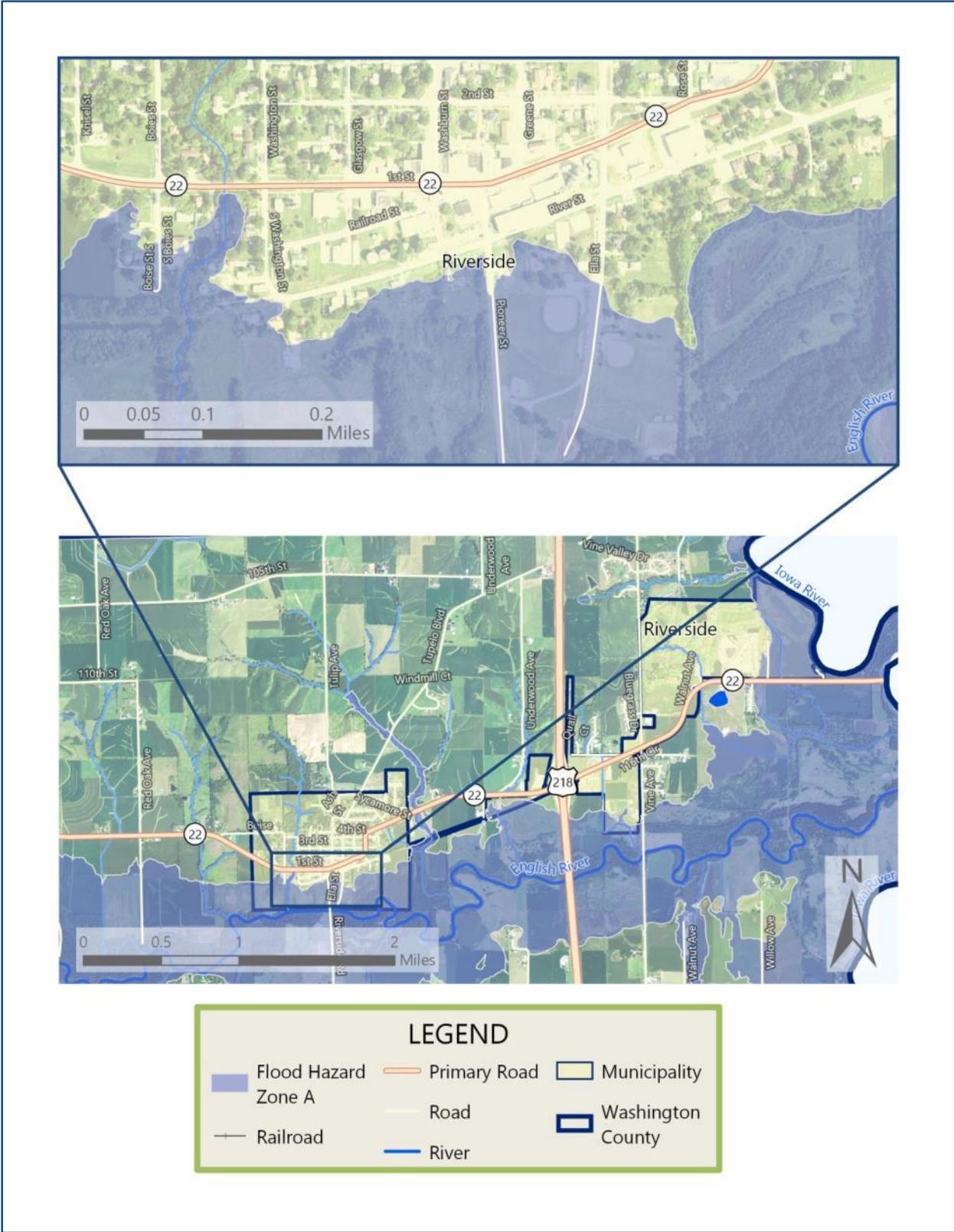
Map 13: Ainsworth Flood Hazard Zones



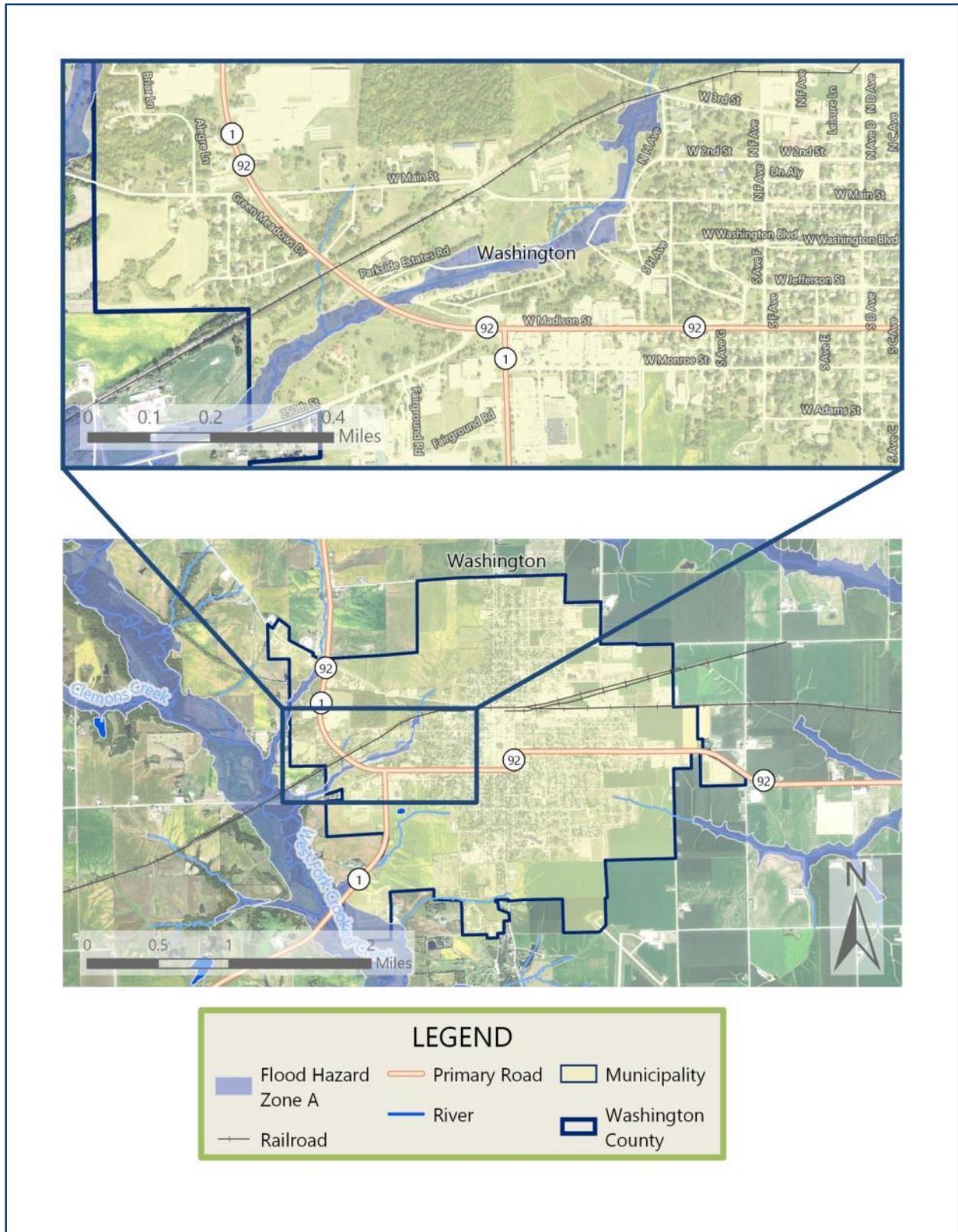
Map 14: Kalona Flood Hazard Zones



Map 15: Riverside Flood Hazard Zones



Map 16: Washington Flood Hazard Zones



Map 17: Wellman Flood Hazard Zones

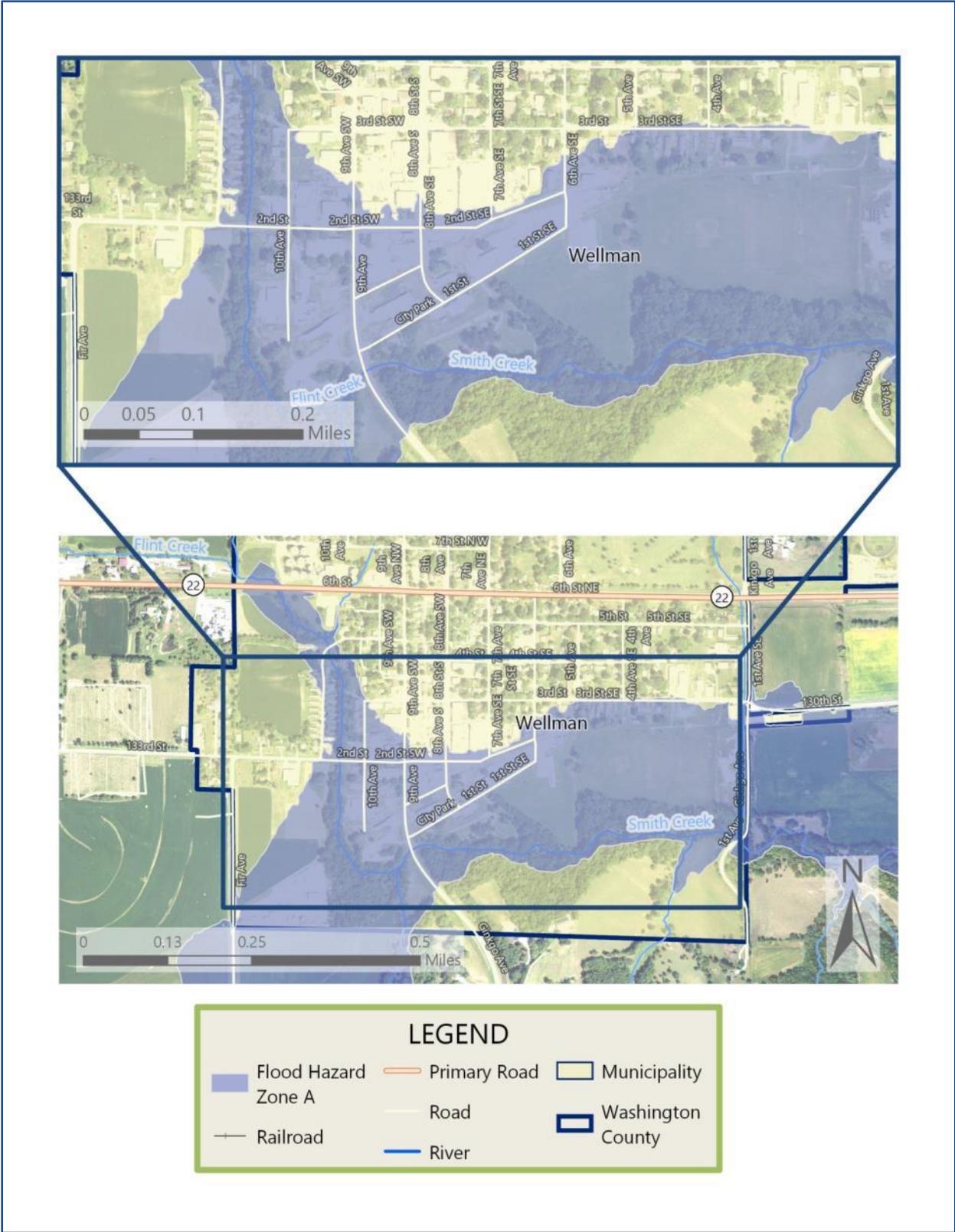


Figure 1: Iowa Flood Information System Flood Map Scenario

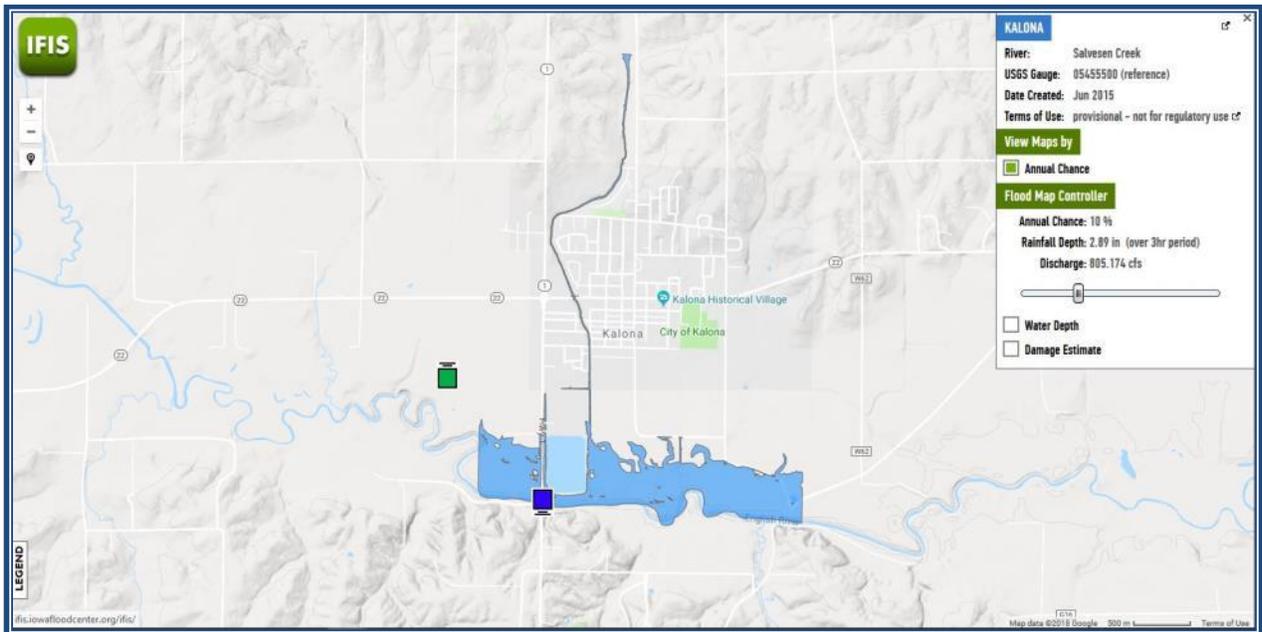
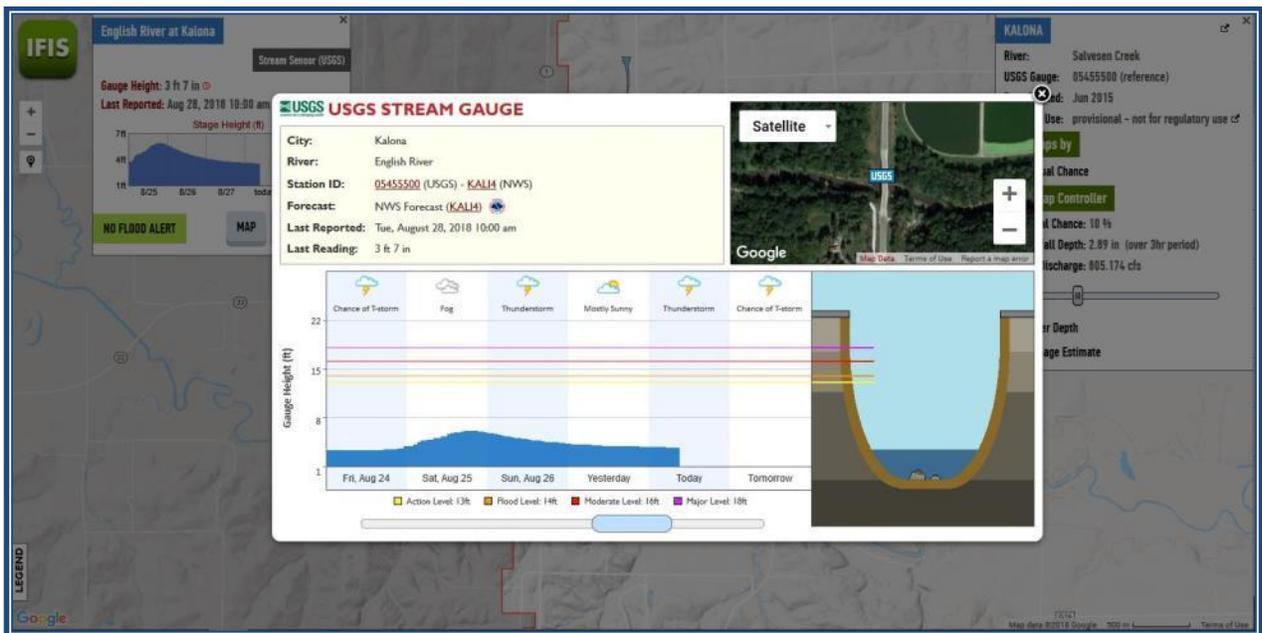


Figure 2: Iowa Flood Information System Stream Gauge Data



GRASS OR 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.

POTENTIAL HAZARD AREA

The potential hazard area for major grass and wildland fires in Washington County is primarily rural, wooded, and grassy right-of-way areas. Some recreation areas in Washington County are wooded and/or grassy, so they are also potential hazard areas.

HISTORICAL OCCURRENCES

In Iowa, there have been no grass or wildland fire events that would be considered historically significant. Grass fires are reported throughout Washington County every year, but none of these fires were substantial enough to be a major threat to life and property. Prescribed burning is used in Washington County to manage vegetation and the risk of grass and wildland fire events.

PROBABILITY

Manageable grass fires will occur in Washington County on an annual basis. The estimated probability of a major grass fire occurring is likely, which is between 20% and 30% probability in any given year. It should be noted that the probability of occurrence may be relatively high during dry and drought conditions. The probability estimate for grass and wildland fire events in Washington County is based primarily on local knowledge.

MAGNITUDE AND SEVERITY

Wildfires are most destructive in the western United States, but this particular hazard has become a frequent and damaging phenomenon nationwide. People choosing to live in rural, grassy, and wooded areas are extremely vulnerable to fires. The emergency response personnel who respond to grass and wild land fire are also extremely vulnerable.

Iowa is most often affected by grass fires, which are usually contained and extinguished before there is a threat to life and property. Most grass fires are contained to highway and rail right-of-way ditches and are less than a few acres in size. Wind can turn a small flame into a multi-acre grassfire within a matter of minutes. Fires often burn large portions of field crops during harvest. A dry field can ignite easily from a spark or overheated equipment. Overall, the potential extent is dependent upon conditions such as moisture, wind, and land cover. Areas throughout Washington County are vulnerable, especially rural, grassy, and wooded areas.

WARNING TIME

Most grass and wildland fires occur without warning and spread quickly. Overall, warning time depends upon conditions such as moisture, wind, and land cover. Methods for forecasting fire potential have become more accurate, and a useful outlook is issued by the National Interagency Fire Center and the National Oceanic and Atmospheric Agency (NOAA) Storm Prediction Center.

DURATION

The majority of Iowa wildfires occur within a short duration in grassy areas. Grass and wildland fires in Washington County are normally within the response capabilities of the municipal fire departments.

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 Washington 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. Washington County Public Health investigates these diseases and maintains reports, which are shared with the Iowa Department of Public Health (IDPH) and the Center for Disease Control (CDC). IDPH releases an annual report of notifiable and other diseases. Table 17 displays the cases for common reportable diseases for Washington County for the even years from 2006–2016. 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 2014 and 2016 of outbreaks in Iowa by county. In the 2012 and earlier reports, outbreaks were reported by region rather than county. In both 2014 and 2016, Washington County had outbreak investigations conducted only for influenza, which is not a reportable disease but is monitored by IDPH.^{10,11}

Table 17: Common Reportable Disease by County 2006–2016

Communicable Disease/ Infectious Condition	2006	2008	2010	2012	2014	2016
Campylobacteriosis	6	2	5	2	12	13
Chlamydia		41	48	55	39	
Cryptosporidiosis	2	1	1	1	1	1
E. coli (STEC)	0	2	2	4	0	2
Giardia	1	1	1	0	0	0
Gonorrhea		4	3	10	3	
Hepatitis A	1	0	0	0	0	0
Hepatitis B, chronic	0	1	0	0	1	0
Legionellosis	0	0	1	0	0	0
Lyme disease	0	0	2	1	2	5
Mumps	16	0	0	0	0	1

Table 17: Common Reportable Disease by County 2006–2016, continued

Communicable Disease/ Infectious Condition	2006	2008	2010	2012	2014	2016
Pertussis	33	8	0	3	0	0
Salmonellosis	6	3	3	5	3	3
Shigellosis	0	1	2	0	0	3
Tuberculosis		0	0	0	1	

Source: Center for Acute Disease Epidemiology, Iowa Department of Public Health, even-year annual reports of notifiable diseases

In the 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.¹² 135 influenza-related deaths occurred during that season, and Iowa reported “widespread” statewide influenza activity to the CDC, which is the highest level of activity, for 12 consecutive weeks. While the rate of infections from influenza increases and decreases annually in a fairly predictable manner, many people will have some immunity from previous exposures 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 the influenza causes a global outbreak. People have little to no immunity to these viruses because there is not past exposure to them or similar viruses. They can also occur any time of year, i.e. they are not seasonal.¹³ According the *2013 Iowa Hazard Mitigation Plan*, there have been four influenza pandemics in Iowa since 1900. The pandemics occurred approximately 30 years apart. The most recent, the H1N1 outbreak in 2009–2010, killed fewer people in Iowa than the 2016–2017 seasonal flu, 41 compared to 135.¹⁴

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 and vaccinations can mitigate against loss from the virus. Flood and wastewater infrastructure failure events are likely to occur, and in many occurrences, water safety was a concern. Overall, the probability of a major human disease event occurring in Washington County is unlikely but there is a possibility of occurrence.

MAGNITUDE AND SEVERITY

If a human disease event were to occur, a widespread area will be affected by the type, and severity of the event will determine the extent. 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. According to the *2013 Iowa Hazard Mitigation Plan*, more than 20% of Iowa's population is considered high risk. 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. Washington County Public Health, IDPH, and the 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.

POTENTIAL HAZARD AREA

The potential hazard area for landslides in Washington County is primarily limited to areas of the county with steep slopes. It should be noted that steep slopes are an estimate of the potential hazard area, because a landslide could occur in other areas of Washington County. Refer to the risk assessment maps, Map 18–Map 22. Ainsworth is highlighted in Map 22 because it is the only jurisdiction with steep slopes near developed areas.

HISTORICAL OCCURRENCES

There are no documented landslide events in Washington County.

PROBABILITY

Landslides typically do not occur in Washington County because the specific soil and topographic conditions are not present. For this risk assessment, steep slopes are considered a potential risk for landslide type events. Overall, the probability of a landslide occurring in Washington County is unlikely but possible.

MAGNITUDE AND SEVERITY

People occupying structures overlooking steep slopes or located at the bottom of a steep slope are vulnerable. These types of structures are a small percentage of homes and commercially occupied structures in Iowa. In Washington County, only Ainsworth has house development that is near, but not on, steep slopes, refer to Map 22. For these properties, the slopes are just over a 15% grade, between 15%–18%. Injuries and deaths are unlikely unless a landslide occurred suddenly leaving no time to evacuate. Historic landslide events in Iowa have affected just the immediate surrounding area with no widespread impacts.

WARNING TIME

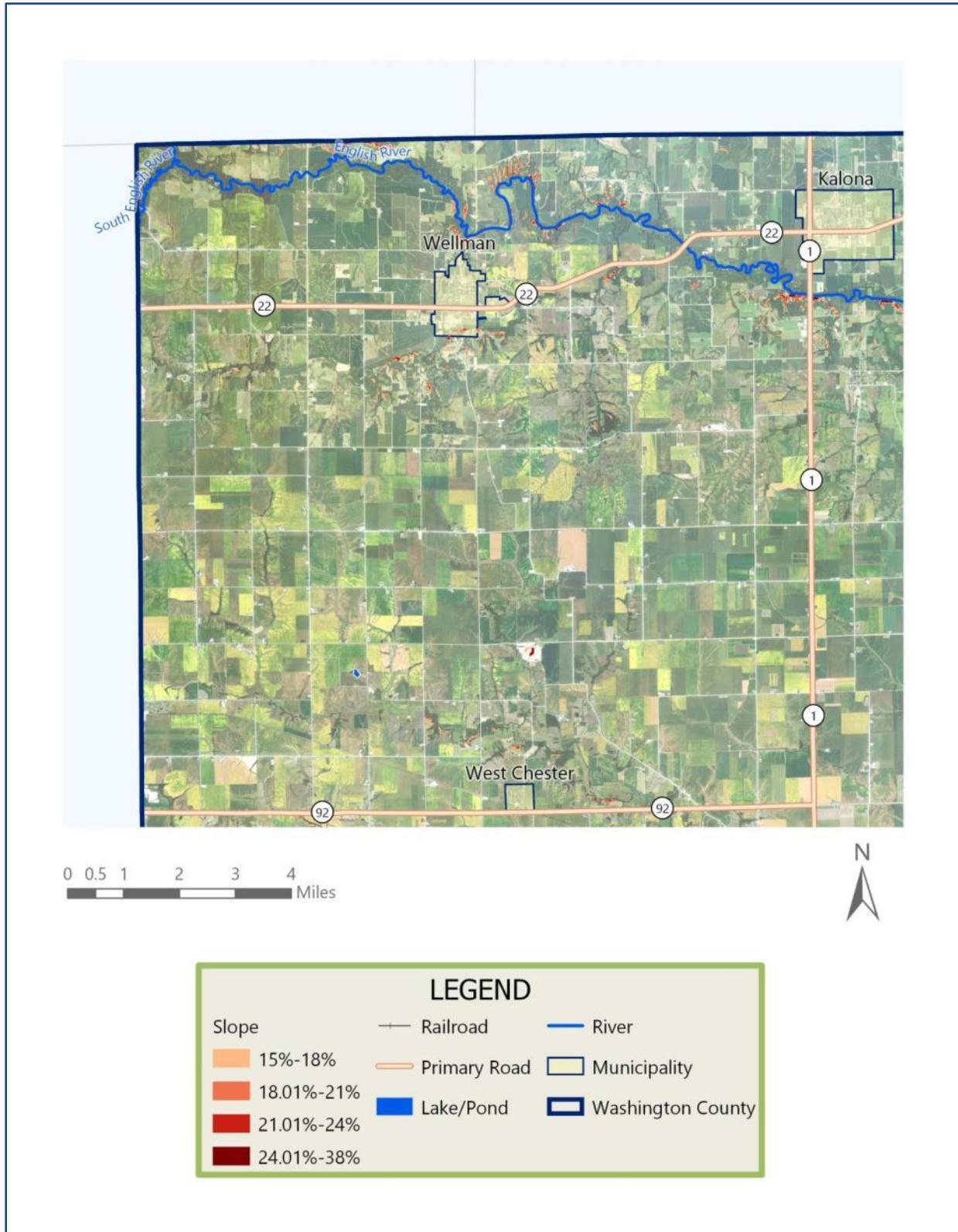
Landslides are often involved in or triggered by other natural hazards. Landslides and flooding are often related because precipitation, runoff, and ground saturation combine to destabilize soil and rock. For this reason, landslides can be detected if high potential landslide areas are monitored.

DURATION

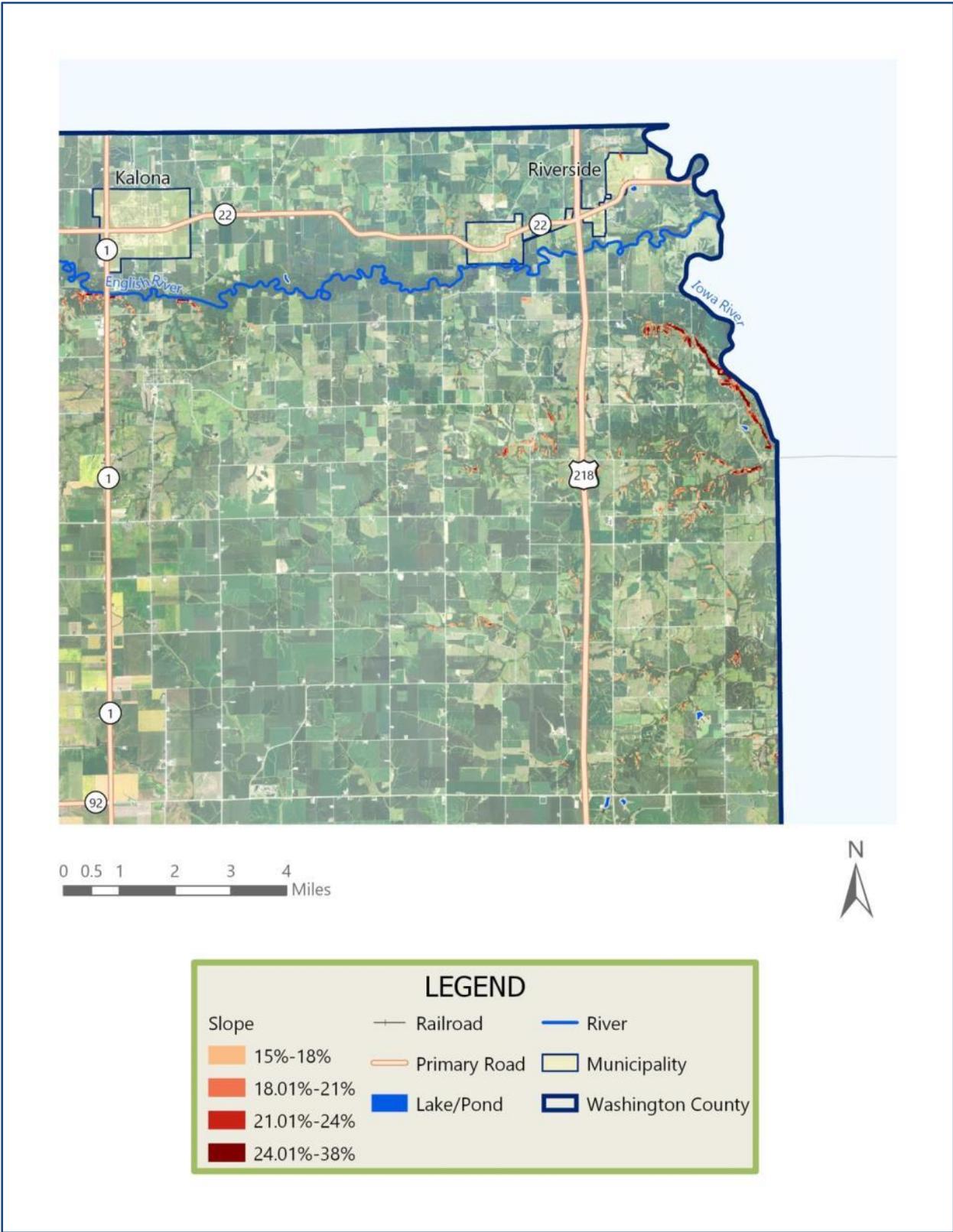
Response to a landslide is usually limited to the site where the landslide occurred unless a transportation route is involved. Traffic must be redirected and facilities must be restored, which can prolong the amount of time the landslide affects a community. For the fairly minor landslide that can occur in Iowa, the duration is most likely short term.

RISK ASSESSMENT MAPS

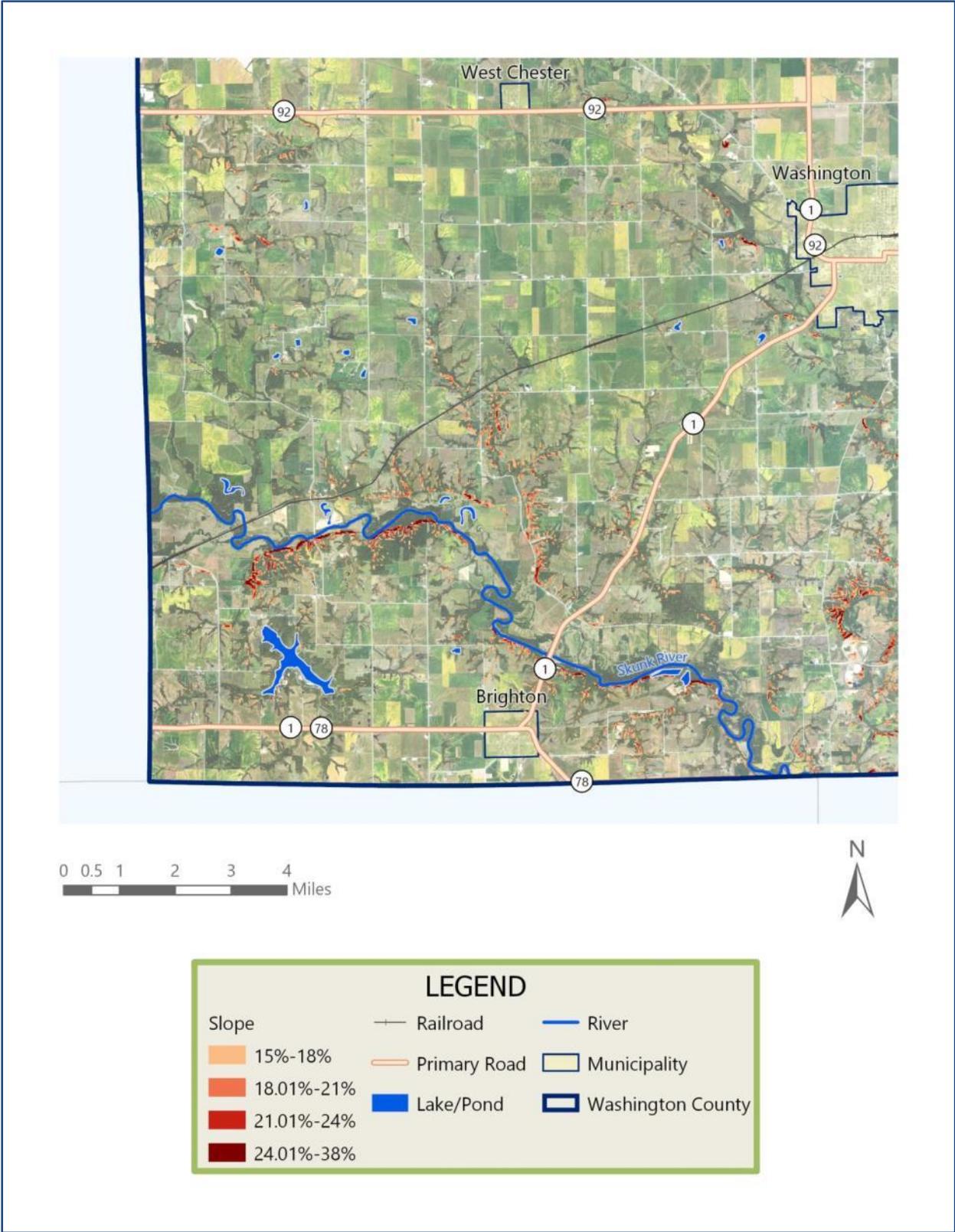
Map 18: Washington County Section 1 Step Slopes



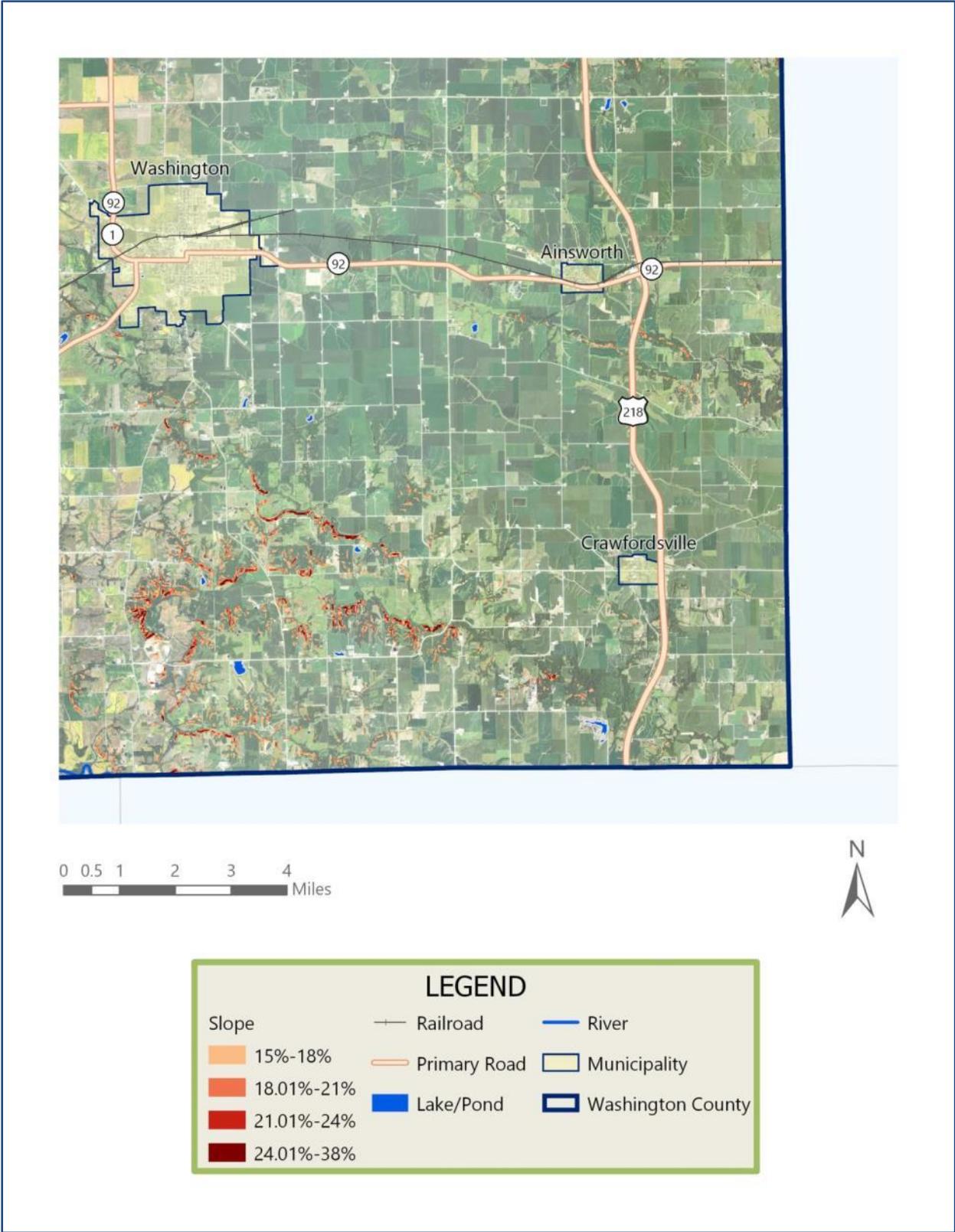
Map 19: Washington County Section 2 Steep Slopes



Map 20: Washington County Section 3 Steep Slopes



Map 21: Washington County Section 4 Steep Slopes



Map 22: Ainsworth Steep Slopes



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 Washington County is countywide.

HISTORICAL OCCURRENCES

From 1998–2017, there were 37 recorded winter storm events in Washington County. In most years, there were one or more winter storm events. The only years without a winter storm event were 2004–2006, 2011, and 2016–2017, although a blizzard and heavy snow event occurred in Washington County in 2004 and 2011. For all the winter storm events, there were no deaths, injuries, or damage reported. Refer to Table 18.

Table 18: Washington County Winter Storm Events, 1998-2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	12/30/1998	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/01/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/05/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/08/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/15/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/16/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/19/1999	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/03/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/17/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/19/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/29/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/17/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/10/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/08/2001	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/15/2001	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/30/2002	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/01/2002	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/14/2003	0	0	0.00K	0.00K

Table 18: Washington County Winter Storm Events, 1998-2017, continued

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	03/04/2003	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/12/2007	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/22/2007	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/03/2008	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/05/2008	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/16/2008	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/07/2009	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/06/2010	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/11/2012	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/29/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/21/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/26/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	03/04/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/21/2013	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/04/2014	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/05/2015	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/01/2015	0	0	0.00K	0.00K
WASHINGTON (ZONE)	11/20/2015	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/28/2015	0	0	0.00K	0.00K
Count/Total	37	0	0	0.00K	0.00K

Source: National Centers for Environmental Information, January 2018

In addition to winter storms, there have been four blizzard events recorded in Washington County from 1998–2017. There were no deaths, injuries, or damage reported. Refer to Table 19.

Table 19: Washington County Blizzard Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	12/21/2008	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/09/2009	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/01/2011	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/20/2012	0	0	0.00K	0.00K
Count/Total	4	0	0	0.00K	0.00K

Source: National Centers for Environmental Information, January 2018

Another type of severe winter weather is a heavy snow event. From 1998–2017, there have been nine heavy snow events recorded in Washington County. No deaths or injuries were reported; however, \$5,000 in property damage was recorded in the January and March 2004 heavy snow events. Refer to Table 20.

Table 20: Washington County Heavy Snow Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	12/01/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/01/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/13/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/18/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/20/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/28/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/26/2001	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/04/2004	0	0	5.00K	0.00K
WASHINGTON (ZONE)	03/15/2004	0	0	5.00K	0.00K
Count/Total	9	0	0	10.00K	0.00K

Source: National Centers for Environmental Information, January 2018

In Iowa, ice storms typically cause the human and property losses associated with severe winter weather, if any. From 1998–2017, there were eight ice storm events in Washington County. No deaths or injuries were reported; however, the January 2005 and February 2007 events had \$10,000 and \$377,000 in property damaged recorded, respectively. According to the National Centers for Environmental Information, the February 2007 event was the worst ice event since January 22, 1965. Many areas were covered by an inch of ice, and some locations reported nearly two inches of ice. Strong winds, with gusts over 50 mph, combined with the force of accumulated ice brought down power lines, power poles, and entire trees. Incredibly, no direct deaths were reported for this ice event. Refer to Table 21.

Table 21: Washington County Ice Storm Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	12/15/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/28/2001	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/05/2005	0	0	10.00K	0.00K
WASHINGTON (ZONE)	02/24/2007	0	0	377.00K	0.00K
WASHINGTON (ZONE)	12/01/2007	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/10/2007	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/18/2008	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/20/2010	0	0	0.00K	0.00K
Totals:	8	0	0	387.00K	0.00K

Source: National Centers for Environmental Information, January 2018

Extreme cold and wind chill are components of Iowa’s severe winter weather because they create dangerous conditions. From 1998–2017, there were five extreme cold or wind chill events. None resulted in any recorded injuries, deaths, or property damage. Three of the five events occurred in 2000. Refer to Table 22.

Table 22: Washington County Extreme Cold/Wind Chill Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	12/16/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/21/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	12/23/2000	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/02/2007	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/14/2009	0	0	0.00K	0.00K
Count/Total	5	0	0	0.00K	0.00K

Source: National Centers for Environmental Information, January 2018

PROBABILITY

Historical occurrences indicate that several winter storm events can occur annually in Washington County. According to the *2013 Iowa Hazard Mitigation Plan*, most counties will experience two or three winter storms each season, with an extreme storm every three to five years. When considering probability, though, the local planning committees considered the probability of the severe winter storm events that could cause injury, death, or shutdown facilities. In Washington County, winter storm events occur frequently, but most jurisdictions have procedures to reduce the risk of injury, death, or damage from these events. Based on local knowledge, a severe winter storm is likely with a probability of 33% or more 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, Washington 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 those 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 infeasible to those in need due to impassable roads.

Regarding the transportation system, the Iowa Department of Transportation, county road departments, and local governments are responsible for snow removal and the treatment of roads to prevent slick conditions from snow and ice. 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 feed, water, and shelter for livestock—may be difficult to fulfill.

In Washington 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 a storm causes major power outages. This severity estimate is based on historical occurrences, the *2013 Iowa Hazard Mitigation Plan*, and local knowledge.

WARNING TIME

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

Radio, television, weather alert radios, and even smartphone 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 storm events occurring in a 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 cause by erosion of limestone in subsurface areas.

POTENTIAL HAZARD AREA

The potential hazard area for sinkholes is relatively limited in Washington County. There are areas with potential karst topography, which presents more favorable conditions for sinkholes because of the presence of soluble bedrock, generally under a relatively small layer of soil. However, there are no documented sinkholes in the county. There are also only four documented mines in the county. Refer to the risk assessment maps, Map 23–Map 26. This potential hazard area is an estimate, because sinkholes could potentially occur anywhere in Washington County.

HISTORICAL OCCURRENCES

There are no documented sinkholes in Washington County.

PROBABILITY

According to the *2013 Iowa Hazard Mitigation Plan*, the probability for a sinkhole event statewide is between 10% up to 19% in any given year. Because no sinkholes have been documented, the probability in Washington County of a sinkholes forming is likely less than 10% in any given year. Additionally, there are only four historic coal mines in Washington County, all in unincorporated areas, so the risk of mine subsidence is also low. Refer to the risk assessment maps. Sinkholes remain a possibility, as potential karst topography indicates the potential for sinkholes to develop, and sinkholes can occur outside of those regions, as well.

MAGNITUDE AND SEVERITY

Sinkholes can aggravate flooding potential and collapses due to the sudden formation of sinkholes or the collapse of an abandoned mine may destroy buildings, roads, and utilities. Damage consists primarily of direct structural damage, property loss, and depreciation of land values. Generally, land subsidence poses a greater risk to property than to life. Damage to property, facilities, and infrastructure would only occur if the event undermined foundations.

In Washington County, areas that could potentially be affected by sinkholes are likely limited to areas with potential karst topography. Any sinkholes or potential for sinkholes are typically mitigated in the design and/or construction process for infrastructure and structures.

WARNING TIME

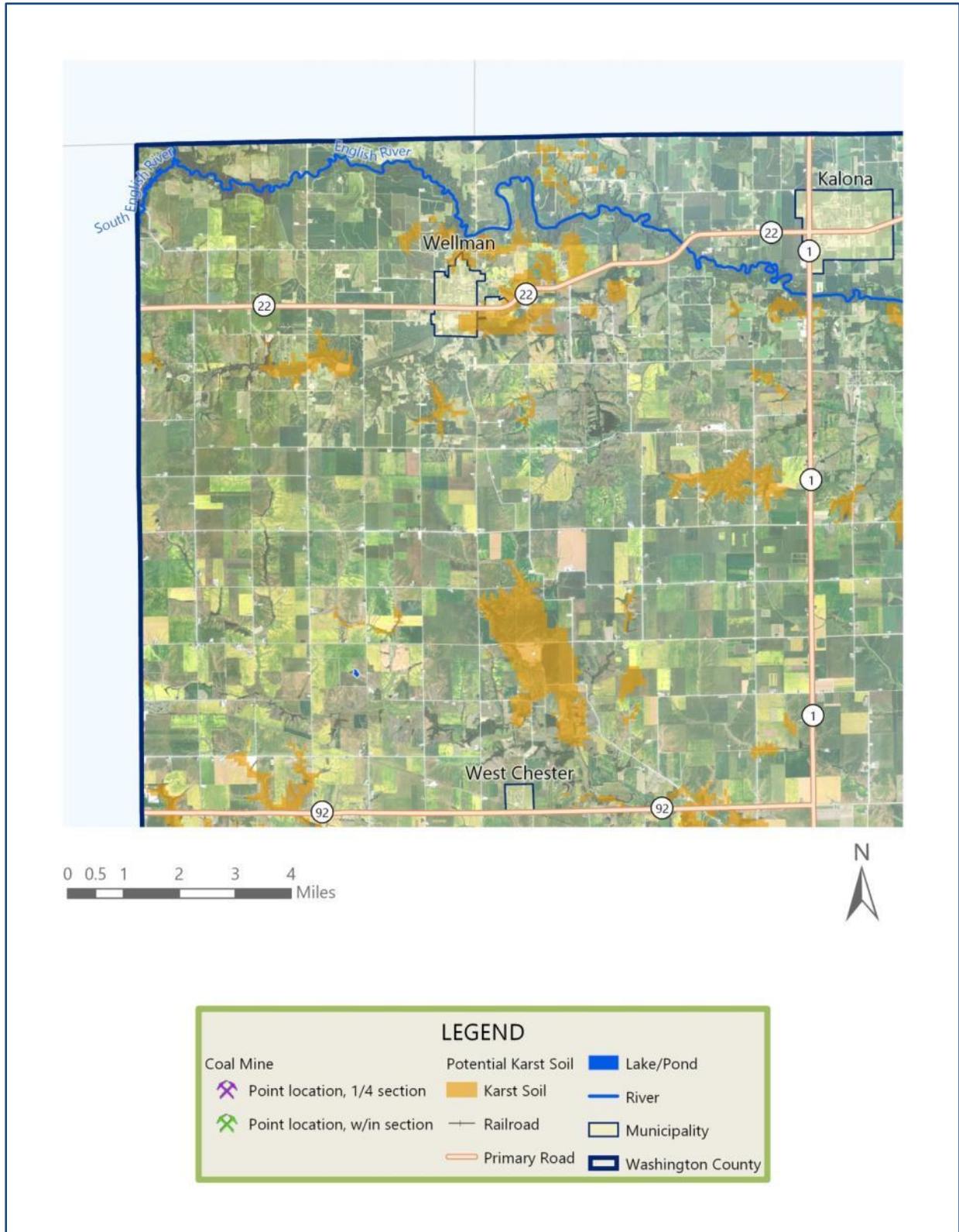
Regional lowering occurs gradually over time, while the collapse of infrastructure such as streets can occur suddenly. It is possible for a sinkhole to form over time but not be detected until sudden or major collapse, so warning time can be quite minimal.

DURATION

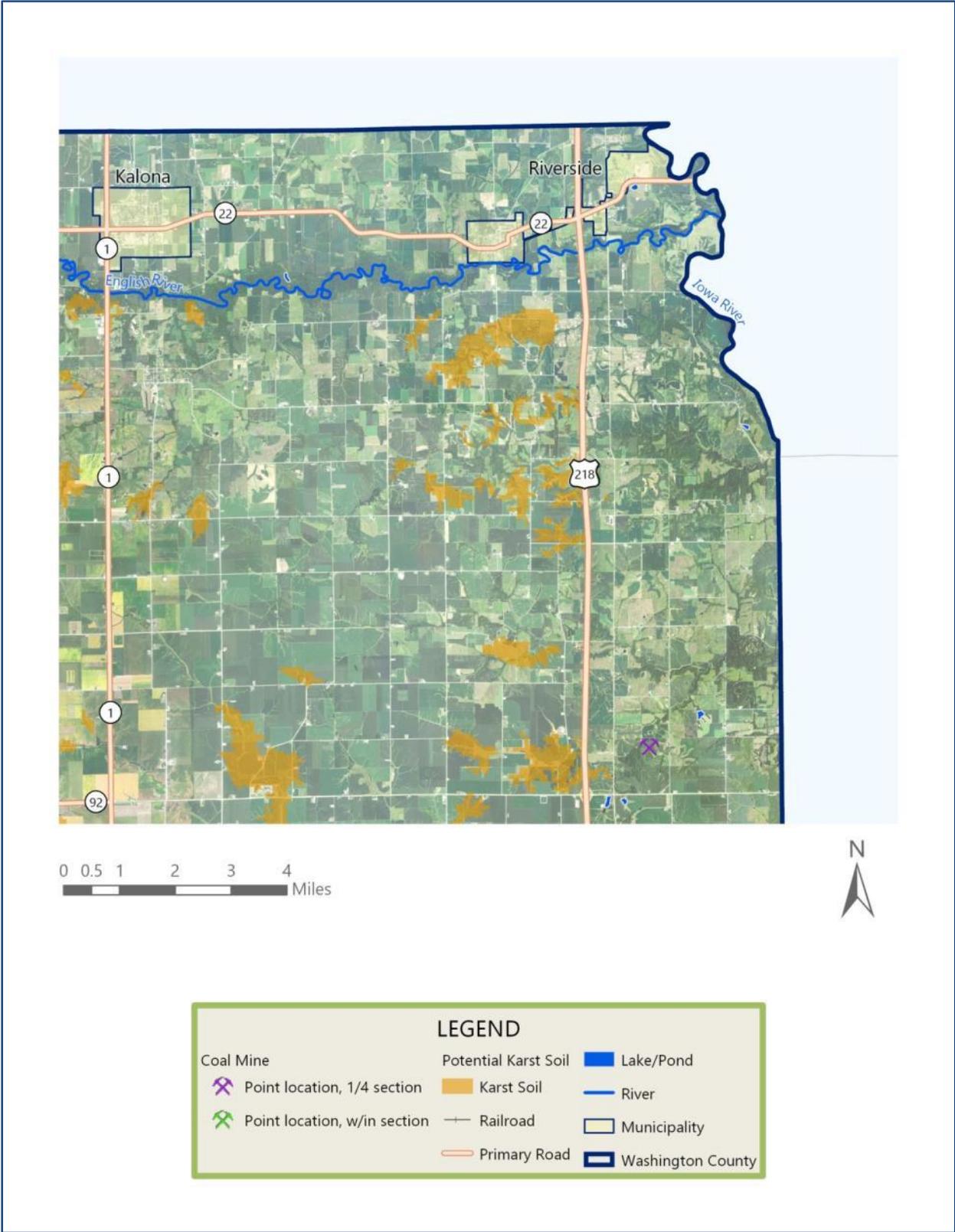
The response tied to sinkholes is related to securing the immediate threat to life and property, including immediate reroute of traffic from the affected infrastructure and search and rescue in the case of structural collapse.

RISK ASSESSMENT MAPS

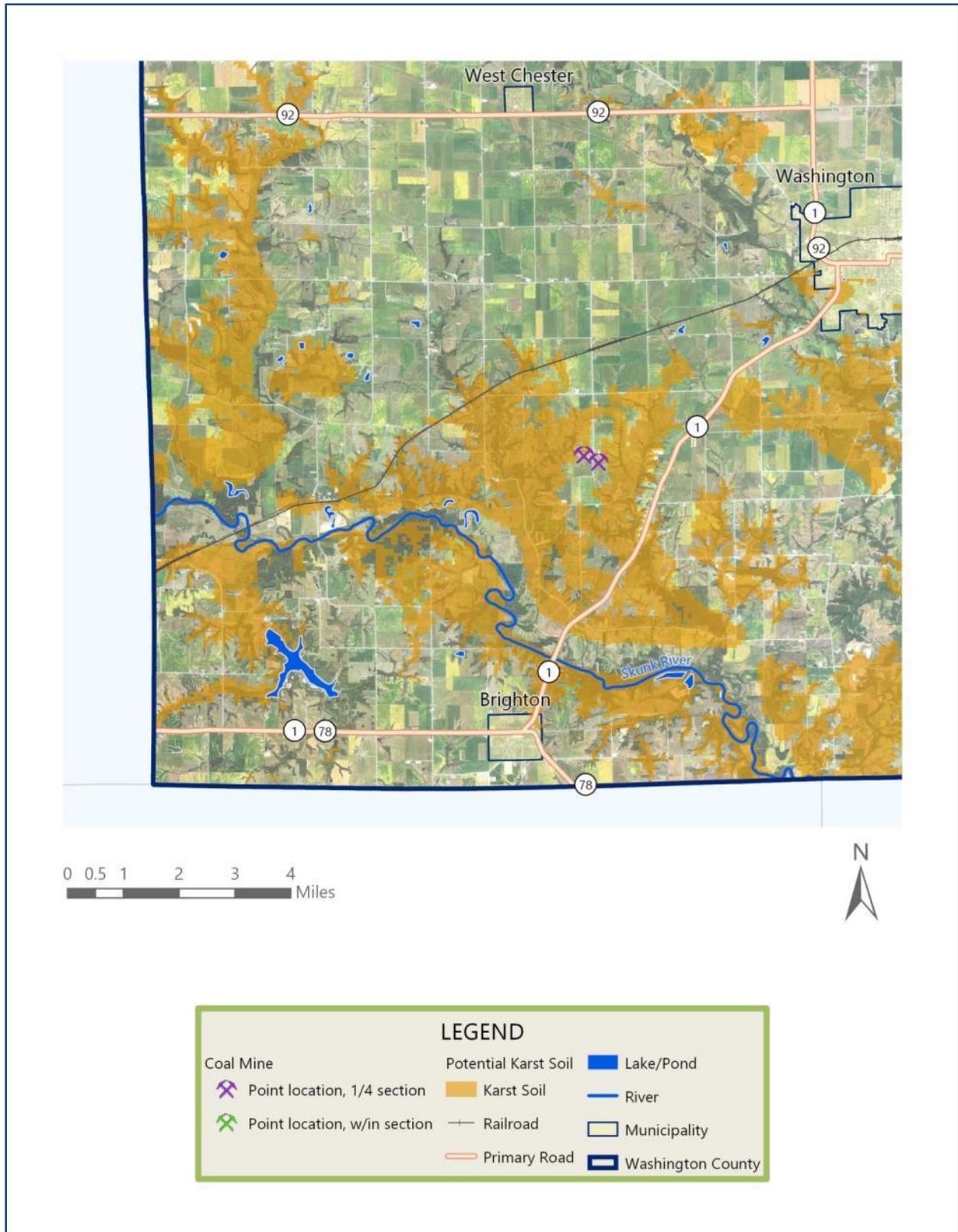
Map 23: Washington County Section 1 Potential Karst Soil



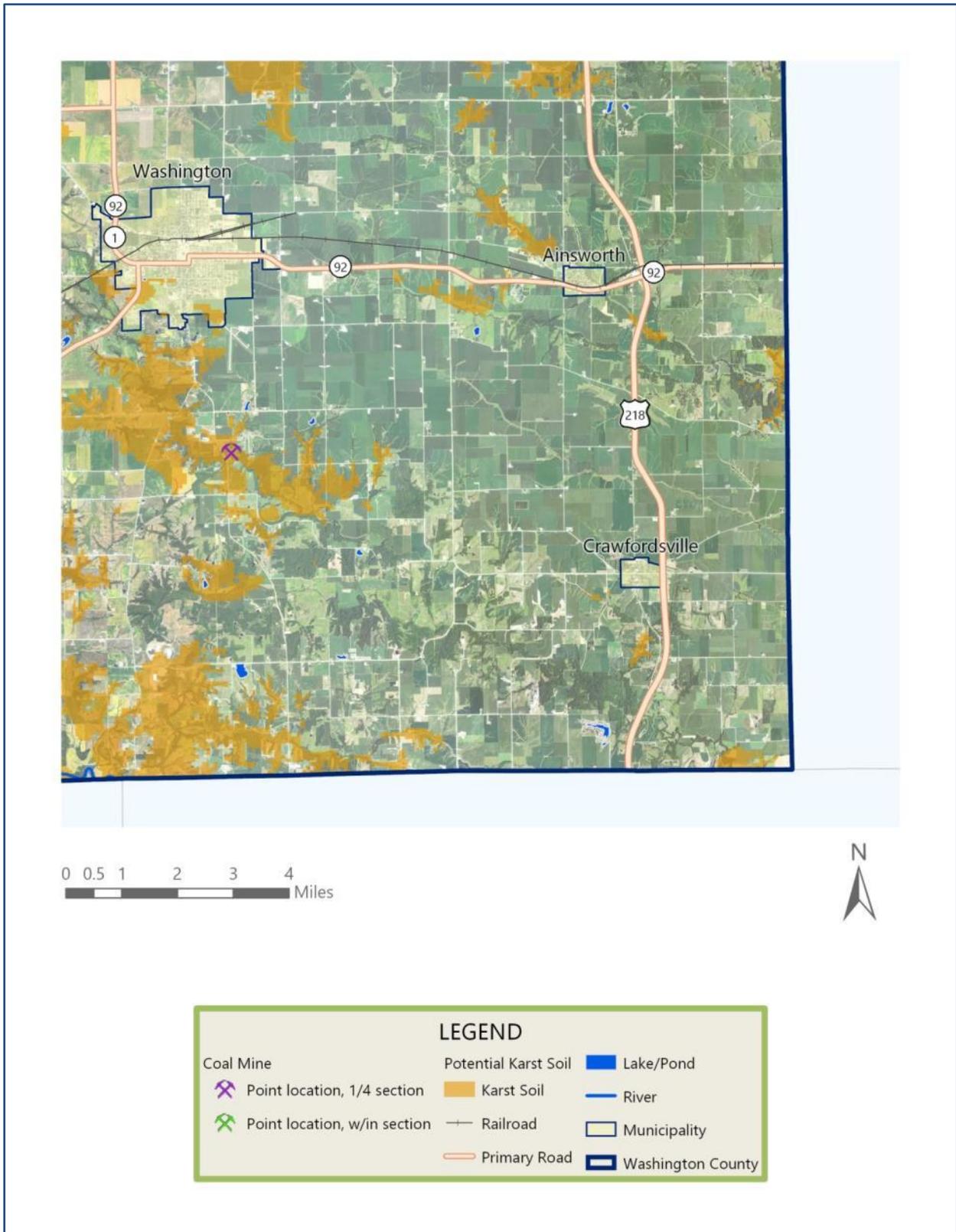
Map 24: Washington County Section 2 Potential Karst Soil



Map 25: Washington County Section 3 Potential Karst Soil



Map 26: Washington County Section 4 Potential Karst Soil



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 Washington County is countywide.

HISTORICAL OCCURRENCES

From 1998–2017, there have been 50 days with a total of 86 thunderstorm events recorded in Washington County. Thunderstorms are the most frequently occurring natural hazard in Washington County. There are several thunderstorms most years. From the recorded thunderstorm events, there have been no deaths or injuries. Recorded property damage from these events stands at \$21.417 million, while crop damage totaled \$1.035 million. Notably, one thunderstorm event, June 29, 1998, alone accounts for \$21 million of the property damage total. During that storm, straight-line winds were measured at 123 mph near Washington. 15 homes were destroyed, 50 sustained major damage, and 200 other homes received minor damages. Businesses were similarly affected. Barns, grain bins, and other agricultural buildings were destroyed. The NCEI summary reports 30,000 acres of corn worth \$5.5 million were destroyed,

despite those figures not being reflected in the tabular data. Many of the jurisdictions within Washington County have recorded property damage in one or more thunderstorm event. Refer to Table 23.

Table 23: Washington County Thunderstorm Wind Events 1998-2017

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON	06/28/1998		0	0	1.50K	0.00K
COUNTYWIDE	06/29/1998	83 kts.	0	0	21.000M	0.00K
WASHINGTON		107 kts.	0	0	0.00K	0.00K
WASHINGTON	05/16/1999		0	0	2.00K	0.00K
WEST CHESTER			0	0	1.00K	0.00K
BRIGHTON	06/06/1999	53 kts.	0	0	0.00K	0.00K
AINSWORTH	07/27/1999		0	0	10.00K	0.00K
WASHINGTON	05/18/2000		0	0	5.00K	0.00K
WASHINGTON	06/13/2000		0	0	1.00K	0.00K
WASHINGTON		53 kts. E	0	0	0.00K	0.00K
KALONA	07/02/2000		0	0	25.00K	0.00K
WASHINGTON	08/09/2000		0	0	2.00K	0.00K
WASHINGTON	08/09/2000	60 kts. M	0	0	10.00K	0.00K
COUNTYWIDE	09/11/2000		0	0	0.00K	1.000M
WASHINGTON	06/14/2001	52 kts. E	0	0	0.00K	0.00K
WASHINGTON	09/07/2001	61 kts. E	0	0	0.00K	0.00K
WASHINGTON	03/09/2002	57 kts. E	0	0	0.00K	0.00K
AINSWORTH		57 kts. E	0	0	0.00K	0.00K
WELLMAN	08/21/2002	61 kts. E	0	0	0.00K	0.00K
BRIGHTON	05/10/2003	56 kts. EG	0	0	100.00K	0.00K
WASHINGTON	07/09/2003	60 kts. EG	0	0	50.00K	5.00K
WASHINGTON	08/25/2003	55 kts. EG	0	0	50.00K	5.00K
WASHINGTON	10/29/2004	51 kts. MG	0	0	1.00K	0.00K
BRIGHTON	06/08/2005	52 kts. EG	0	0	3.00K	0.00K
RIVERSIDE	08/11/2005	57 kts. EG	0	0	1.00K	10.00K
WASHINGTON ARPT	04/02/2006	53 kts. MG	0	0	0.50K	0.00K
WASHINGTON		61 kts. EG	0	0	4.00K	0.00K
WASHINGTON		74 kts. EG	0	0	25.00K	0.00K
HASKINS		65 kts. EG	0	0	10.00K	0.00K
WASHINGTON		74 kts. EG	0	0	5.00K	0.00K
RIVERSIDE		61 kts. EG	0	0	2.00K	0.00K
HASKINS	04/16/2006	57 kts. EG	0	0	3.00K	0.00K
RIVERSIDE	06/06/2006	52 kts. EG	0	0	0.00K	3.00K
HASKINS	07/03/2006	52 kts. EG	0	0	0.00K	6.00K
HASKINS		52 kts. EG	0	0	0.00K	6.00K
WASHINGTON	07/17/2006	57 kts. EG	0	0	1.00K	0.00K
WELLMAN	06/21/2007	56 kts. EG	0	0	0.00K	0.00K
WASHINGTON		65 kts. EG	0	0	5.00K	0.00K

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 23: Washington County Thunderstorm Wind Events 1998-2017, continued

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
RIVERSIDE	07/16/2007	61 kts. EG	0	0	0.00K	0.00K
KALONA		56 kts. EG	0	0	0.00K	0.00K
WASHINGTON		53 kts. MG	0	0	0.00K	0.00K
RICHMOND		52 kts. EG	0	0	0.00K	0.00K
KALONA		65 kts. EG	0	0	25.00K	0.00K
WASHINGTON ARPT		61 kts. EG	0	0	0.00K	0.00K
RIVERSIDE		61 kts. EG	0	0	0.00K	0.00K
WASHINGTON		52 kts. EG	0	0	0.00K	0.00K
BRIGHTON		06/08/2008	70 kts. EG	0	0	0.00K
BRIGHTON	61 kts. EG		0	0	0.00K	0.00K
WASHINGTON	56 kts. EG		0	0	0.00K	0.00K
WASHINGTON	56 kts. EG		0	0	0.00K	0.00K
WASHINGTON	07/21/2008	61 kts. EG	0	0	0.00K	0.00K
CLAY	07/27/2008	52 kts. EG	0	0	0.00K	0.00K
BRIGHTON	08/05/2008	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON ARPT	05/08/2009	60 kts. EG	0	0	0.00K	0.00K
BRIGHTON	06/19/2009	61 kts. EG	0	0	0.00K	0.00K
RICHMOND	06/23/2009	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON ARPT	06/27/2009	51 kts. MG	0	0	0.00K	0.00K
AINSWORTH		52 kts. EG	0	0	25.00K	0.00K
WEST CHESTER	05/29/2011	52 kts. EG	0	0	0.00K	0.00K
WELLMAN	05/29/2011	52 kts. EG	0	0	5.00K	0.00K
WASHINGTON	08/07/2011	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON	05/19/2013	50 kts. EG	0	0	0.00K	0.00K
KALONA		61 kts. EG	0	0	0.00K	0.00K
WASHINGTON	06/24/2013	54 kts. EG	0	0	0.00K	0.00K
WASHINGTON	09/19/2013	61 kts. EG	0	0	20.00K	0.00K
WASHINGTON ARPT	06/16/2014	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON		58 kts. MG	0	0	0.00K	0.00K
WASHINGTON		58 kts. MG	0	0	0.00K	0.00K
WASHINGTON	06/17/2014	51 kts. MG	0	0	0.00K	0.00K
BRIGHTON	08/31/2014	52 kts. EG	0	0	1.00K	0.00K
WASHINGTON		52 kts. EG	0	0	0.00K	0.00K
BRIGHTON	07/28/2015	61 kts. EG	0	0	2.00K	0.00K
BRIGHTON		52 kts. EG	0	0	2.00K	0.00K
WELLMAN	05/24/2016	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON	07/13/2016	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON		54 kts. MG	0	0	0.00K	0.00K
WELLMAN	03/06/2017	61 kts. MG	0	0	0.00K	0.00K
KALONA		57 kts. MG	0	0	0.00K	0.00K

Table 23: Washington County Thunderstorm Wind Events 1998-2017, continued

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
WEST CHESTER	05/17/2017	70 kts. EG	0	0	3.00K	0.00K
RUBIO		60 kts. EG	0	0	1.00K	0.00K
WELLMAN		60 kts. EG	0	0	0.00K	0.00K
WELLMAN		65 kts. EG	0	0	15.00K	0.00K
WASHINGTON		58 kts. MG	0	0	0.00K	0.00K
WELLMAN	07/11/2017	50 kts. EG	0	0	0.00K	0.00K
HASKINS	08/10/2017	52 kts. EG	0	0	0.00K	0.00K
HASKINS		52 kts. EG	0	0	0.00K	0.00K
Count/Total	86 (50 days)		0	0	21.417M	1.035M

Wind Magnitude Definitions:

Estimated Gust: 'EG', Estimated Sustained: 'ES', Measured Gust: 'MG', Measured Sustained: 'MS'

Source: National Centers for Environmental Information, January 2018

From 1998–2017, there have also been two major recorded lightning events. One event each was recorded in Ainsworth and Washington, with \$75,000 in reported property damage. No deaths or injuries occurred. Refer to Table 24.

Table 24: Washington County Lightning Events 1998-2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON	08/13/2010	0	0	50.00K	0.00K
AINSWORTH	05/25/2011	0	0	25.00K	0.00K
Count/Total	2	0	0	75.00K	0.00K

Source: National Centers for Environmental Information, January 2018

Because thunderstorms are often accompanied by hail, hail events are also frequent in Washington County. From 1998–2017 there have been 43 days with a total of 67 recorded hail events in Washington County. No deaths or injuries were recorded during those events. Property damages for all events is \$2.27 million, and crop damages totaled \$97,000. \$2 million of the total property damage occurred during a hail event that occurred in May 2000. During that event, many homes’ roofs and siding were damaged, and all the car dealerships in Washington recorded damage from golf ball-size hail. Two events include reported damages of \$100,000 and \$150,000, and the remainder are \$10,000 and under or no reported damage. Refer to Table 25.

Table 25: Washington County Hail Events 1998–2017

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
BRIGHTON	05/15/1998	1.50 in.	0	0	0.00K	0.00K
WASHINGTON	06/06/1999	2.75 in.	0	0	0.00K	0.00K
WASHINGTON	05/18/2000	1.75 in.	0	0	2.000M	50.00K
WASHINGTON		1.50 in.	0	0	0.00K	0.00K
WASHINGTON		1.75 in.	0	0	0.00K	0.00K
WASHINGTON		1.75 in.	0	0	0.00K	0.00K
WELLMAN	09/11/2000	1.75 in.	0	0	0.00K	0.00K
WELLMAN		0.88 in.	0	0	0.00K	0.00K
WEST CHESTER	04/09/2001	0.75 in.	0	0	0.00K	0.00K
CRAWFORDSVILLE	04/30/2003	0.75 in.	0	0	0.00K	0.00K
BRIGHTON		0.75 in.	0	0	0.00K	0.00K
RIVERSIDE		1.75 in.	0	0	100.00K	0.00K
BRIGHTON	08/01/2003	1.75 in.	0	0	150.00K	25.00K
WASHINGTON	05/20/2004	0.75 in.	0	0	0.00K	5.00K
WELLMAN		0.75 in.	0	0	0.00K	5.00K
WELLMAN		0.88 in.	0	0	0.00K	5.00K
WASHINGTON	09/25/2005	1.25 in.	0	0	10.00K	0.00K
WASHINGTON	03/12/2006	1.00 in.	0	0	3.00K	0.00K
BRIGHTON		0.88 in.	0	0	0.00K	0.00K
WASHINGTON ARPT	04/05/2006	0.75 in.	0	0	0.00K	0.00K
HASKINS		0.75 in.	0	0	0.00K	0.00K
RIVERSIDE	06/06/2006	1.75 in.	0	0	3.00K	3.00K
RIVERSIDE		2.00 in.	0	0	4.00K	4.00K
WASHINGTON	03/31/2007	1.00 in.	0	0	0.00K	0.00K
AINSWORTH		1.00 in.	0	0	0.00K	0.00K
WASHINGTON		0.88 in.	0	0	0.00K	0.00K
WASHINGTON	07/16/2007	1.75 in.	0	0	0.00K	0.00K
BRIGHTON		1.75 in.	0	0	0.00K	0.00K
RICHMOND		0.88 in.	0	0	0.00K	0.00K
AINSWORTH		0.88 in.	0	0	0.00K	0.00K
AINSWORTH	06/25/2008	0.75 in.	0	0	0.00K	0.00K
BRIGHTON	03/07/2009	1.00 in.	0	0	0.00K	0.00K
RIVERSIDE	06/21/2009	0.75 in.	0	0	0.00K	0.00K
RIVERSIDE	04/03/2011	1.75 in.	0	0	0.00K	0.00K
RIVERSIDE	05/22/2011	0.88 in.	0	0	0.00K	0.00K
WASHINGTON ARPT	06/14/2011	0.75 in.	0	0	0.00K	0.00K
CRAWFORDSVILLE	05/03/2012	1.50 in.	0	0	0.00K	0.00K
RIVERSIDE	05/28/2012	1.00 in.	0	0	0.00K	0.00K
WASHINGTON	06/29/2012	1.00 in.	0	0	0.00K	0.00K
WASHINGTON		1.00 in.	0	0	0.00K	0.00K
NOBLE	04/17/2013	1.00 in.	0	0	0.00K	0.00K
WEST CHESTER		0.88 in.	0	0	0.00K	0.00K
WEST CHESTER	05/19/2013	1.75 in.	0	0	0.00K	0.00K
KALONA	08/06/2013	0.75 in.	0	0	0.00K	0.00K
WASHINGTON	02/20/2014	0.75 in.	0	0	0.00K	0.00K
WELLMAN	04/12/2014	0.75 in.	0	0	0.00K	0.00K

Table 25: Washington County Hail Events 1998–2017, continued

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
BRIGHTON	04/28/2014	0.75 in.	0	0	0.00K	0.00K
BRIGHTON	05/11/2014	1.75 in.	0	0	0.00K	0.00K
CRAWFORDSVILLE	05/12/2014	1.00 in.	0	0	0.00K	0.00K
CRAWFORDSVILLE		1.25 in.	0	0	0.00K	0.00K
RIVERSIDE	06/16/2014	0.75 in.	0	0	0.00K	0.00K
WASHINGTON	07/22/2014	0.88 in.	0	0	0.00K	0.00K
WASHINGTON		0.75 in.	0	0	0.00K	0.00K
WASHINGTON		1.00 in.	0	0	0.00K	0.00K
WASHINGTON		1.00 in.	0	0	0.00K	0.00K
RIVERSIDE	04/09/2015	1.25 in.	0	0	0.00K	0.00K
HASKINS	08/02/2015	0.88 in.	0	0	0.00K	0.00K
AINSWORTH	09/17/2015	0.75 in.	0	0	0.00K	0.00K
KALONA	04/10/2017	0.88 in.	0	0	0.00K	0.00K
KALONA	04/15/2017	1.00 in.	0	0	0.00K	0.00K
RIVERSIDE		1.00 in.	0	0	0.00K	0.00K
KALONA		0.88 in.	0	0	0.00K	0.00K
RIVERSIDE	05/17/2017	1.50 in.	0	0	0.00K	0.00K
WELLMAN	06/15/2017	0.88 in.	0	0	0.00K	0.00K
RICHMOND	07/10/2017	1.00 in.	0	0	0.00K	0.00K
HASKINS	08/10/2017	1.00 in.	0	0	0.00K	0.00K
HASKINS		1.50 in.	0	0	0.00K	0.00K
Count/Total	67 (43 days)		0	0	2.270M	97.00K

Source: National Centers for Environmental Information, January 2018

In combination, the thunderstorm, lightning, and hail hazard is the most frequently occurring natural hazard in Washington County. Every community in the county has been affected. For the damages reported in the NCEI dataset, the hazard has the second-highest property and crop damage total.

PROBABILITY

Iowa experiences on average between 30 and 50 thunderstorm days per year. Several of these thunderstorm days include Washington 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 Washington County, it is highly likely that a thunderstorm, lightning, or hail event will occur at least once each year, if not several times during a severe summer season. Thunderstorm and lightning events are the most frequently occurring hazards in Washington County. This probability estimate is based on historical occurrences, the *2013 Iowa Hazard Mitigation Plan*, and local knowledge.

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 Washington County.

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, and business. Mobile homes especially are at risk from strong winds. 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 cause of the most weather-related deaths in the U.S. Livestock and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning. 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 Washington County, when future thunderstorm events occur, the magnitude and severity will likely be limited. From 1998–2017, no injuries or deaths were reported, but they remain possibilities in a thunderstorm event. Only one event with significant damages had a countywide impact. More often, a thunderstorm event would affect 10% to 25% of Washington County. Facility shutdowns or power outages 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 they hail. Typically, a hail event occurs within a 15 mile diameter around the center of the storm. Historical events in Washington County have been widespread overall due to the storms moving through an entire community. No deaths or injuries were recorded for

any hail events from 1998–2017; however, humans, pets, and livestock outdoors during a storm are vulnerable. Hail can cause widespread damage to buildings, infrastructure, and vehicles. Damage to buildings is usually limited to windows, roofs, and exteriors.

Agricultural crops are extremely vulnerable because a hailstorm can strip leaves or completely destroy plants. The peak time for hailstorms events to occur in Iowa coincides with the agricultural season, making hail damage a common risk. Factoring agricultural crop damage, hailstorm 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 crop and hazard insurance.

In a future hail event in Washington 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 duration would likely last less than one 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 and television and radio. 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 severity of a thunderstorm event, the negative impacts can affect a community for a short period of time. Thunderstorm events that occur in conjunction with other hazards like flash flood, flood, hail, tornado, etc., often affect a community for an extended period of time due to damage and shutdown of facilities and services. A thunderstorm and lightning event alone would likely impact Washington 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 Washington County is countywide.

HISTORICAL OCCURRENCES

From 1998–2017, there have been 11 recorded tornado events in Washington County. In total, these events caused 28 injuries, \$9.68 million in property damage, and \$10,000 in crop damage. All 28 injuries and \$9 million of the property damages were incurred during one event in May 1998. During that storm, an F3 tornado developed two miles southwest of Washington and travelled 30 miles northeast. In Washington, the tornado damaged a church, homes, an apartment complex housing elderly residents, and a livestock sale barn. 14 single-family homes were destroyed, and another 14 received major damage. In unincorporated Washington County, 14 farmsteads received moderate or heavy damage. 27 individuals sustained minor injuries requiring medical treatment. One person was hospitalized after their automobile was picked up and rolled by the tornado. Refer to Table 26. For the locations that are outside of Washington County, they are the starting points of storms that travelled through Washington County.

Table 26: Washington County Tornadoes 1998-2017

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON	05/15/1998	F3	0	28	9.000M	0.00K
KALONA	04/11/2001	F0	0	0	0.00K	0.00K
WASHINGTON	06/12/2002	F0	0	0	0.00K	0.00K
WASHINGTON	04/02/2006	F2	0	0	25.00K	0.00K
RIVERSIDE	04/02/2006	F1	0	0	5.00K	0.00K
KALONA	06/06/2006	F0	0	0	0.00K	0.00K
WASHINGTON	07/16/2007	EF1	0	0	100.00K	0.00K
NOBLE	05/03/2012	EF2	0	0	500.00K	0.00K
NOBLE	06/20/2015	EF1	0	0	50.00K	10.00K
CLAY	05/17/2017	EF1	0	0	0.00K	0.00K
HASKINS	05/17/2017	EF1	0	0	0.00K	0.00K
Count/Total	11		0	28	9.680M	10.00K

Source: National Centers for Environmental Information, January 2018

A funnel cloud is a visible predictor for a tornado event. In Washington County, there have been three recorded funnel clouds from 1998–2017. Refer to Table 27.

Table 27: Washington County Funnel Cloud Events 1998–2017

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON	06/29/1998	0	0	0.00K	0.00K
KALONA	04/08/1999	0	0	0.00K	0.00K
KALONA	06/12/2002	0	0	0.00K	0.00K
Count/Total	3	0	0	0.00K	0.

Source: National Centers for Environmental Information, January 2018

High-wind events also pose a hazard to people and property. From 1998–2017, there have been two strong wind events and seven high wind events. A high wind event is a windstorm with measurable wind speed that matches or exceeds gale force. Among all windstorm events, there were no deaths or injuries reported. Total reported property damage was \$10,250, and no crop damage was recorded. Refer to Table 28 and Table 29.

Table 28: Washington County Strong Wind Events 1998–2017

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	05/10/2010	42 kts. MG	0	0	0.05K	0.00K
DES MOINES (ZONE)	05/10/2010	43 kts. EG	0	0	10.00K	0.00K
Count/Total	2		0	0	10.05K	0.00K

Source: National Centers for Environmental Information, January 2018

Table 29: Washington County High Wind Events 1998–2017

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
WASHINGTON (ZONE)	11/09/1998	59 kts.	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/25/2001	47 kts. M	0	0	0.00K	0.00K
WASHINGTON (ZONE)	02/11/2003	37 kts. MS	0	0	0.00K	0.00K
WASHINGTON (ZONE)	01/24/2006	51 kts. MG	0	0	0.00K	0.00K
WASHINGTON (ZONE)	10/26/2008	50 kts. EG	0	0	0.00K	0.00K
WASHINGTON (ZONE)	05/15/2009	52 kts. EG	0	0	0.00K	0.00K
WASHINGTON (ZONE)	06/13/2011	56 kts. EG	0	0	0.20K	0.00K
Count/Total	7		0	0	0.20K	0.00K

Source: National Centers for Environmental Information, January 2018

PROBABILITY

According to the *2013 Iowa Hazard Mitigation Plan*, Iowa is considered to be on the edge of “Tornado Alley,” an area of the United States that experiences the majority of tornadoes each year. The plan noted 224 tornado events from 2000–2013, making it a common occurrence statewide. Washington County averaged one tornado every two years from 1998–2017. In Iowa and Washington County, most tornadoes occur in the spring and summer months; however, statewide, tornadoes have occurred in every month of the year. Windstorms also occur about once every two years on average, and when they occur, they can result in a wider—potentially miles wide—path of destruction than might be caused by a tornado.

Based on historical occurrences, it is highly likely that a tornado or windstorm will occur in Washington County within the next five years. Either hazard meets that criteria, but as the *2013*

Iowa Hazard Mitigation Plan points out, “It is often difficult to separate windstorms and tornado damage when winds get above 64 knots.” This probability estimate is based on historical occurrences, the *2013 Iowa Hazard Mitigation Plan*, and local knowledge.

MAGNITUDE AND SEVERITY

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.

The most severe tornado events that have occurred in Washington County are F2 and F3 rated, but the majority are lower, F0 and F1. For 2007 and later, NCEI recorded tornadoes with the Enhanced Fujita scale, which utilizes more criteria to rate tornado severity. Based on historical occurrences, Washington County will most likely be affected by an EF0 or EF1 tornado in the next five years, although a higher magnitude tornado is possible.

The most severe windstorm event that occurred in Washington County from 1998–2017 had a wind speed of 59 knots, or 68 mph, which is rated an 11 on the Beaufort Wind Scale. Storms of that nature can be accompanied by widespread damage. Based on historical occurrences, Washington County will most likely be affected by windstorm events rated 10 and 11 on the Beaufort Scale, although hurricane winds, rated a 12, 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.

For Iowa and Washington County, it is important to note that 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 that can reduce crop yields. Both circumstances can cause economic hardship for the agricultural sectors of Iowa and Washington County's economy.

If a tornado or windstorm were to occur in Washington County, the magnitude and severity would likely be limited. A rare 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; however, more significant outcomes in one or more of these facets is possible. This magnitude and severity estimate is based on historical occurrences, parameters defined in the *2013 Iowa Hazard Mitigation Plan*, 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 Washington County will likely have minimal warning time: less than six hours to no warning. This warning time estimate is based on historical occurrences, the *2010 Iowa Hazard Mitigation Plan*, and local knowledge.

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 and pose an inconvenience. Windstorm warnings are issued when existing or imminent high winds pose a threat to life and property. Similar to tornado warnings, the typical warning time for a windstorm is 30 minutes.

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 Washington 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 Washington 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 *2010 Iowa Hazard Mitigation Plan*, 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 or along transportation infrastructure, including pipelines, are immediate potential hazard areas, refer to Map 27 and Map 28. Washington County contains 166 miles of gas transmission pipelines and 82 miles of hazardous liquid pipelines. If materials are released in the air or water, the potential hazard area may be expanded downwind or downstream of the incident.

HISTORICAL OCCURRENCES

From 1998–2017, there have been 23 hazardous materials incidents in Washington County that involved 500 or more pounds or gallons of hazardous materials. Most incidents in Washington 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 30 for hazardous materials incidents involving 500 or more pounds or gallons, although none exceeded local capabilities.

Table 30: Washington County Hazardous Materials Events 500 Gallons/Pounds+ 1998–2017

Reported Date	Mode	Type	Material	Amount	Unit
6/13/2001	Manure	Manure	Manure	2000	gal
12/31/2003	Theft	Fertilizer/Pesticide	Ammonia (anhydrous) - Agricultural	3862	lbs
5/11/2004	Transportation	Fertilizer Pesticide	32% nitrage	1600	gal
4/19/2005	Transportation	Fertilizer Pesticide	12.5 % nitrogen solution	500	gal
8/24/2006	Handling And Storage	Fertilizer/Pesticide	Ammonia (anhydrous) - Agricultural	700	lbs
4/18/2007	Handling And Storage	Fertilizer Pesticide	32% liquid fertilizer	500	gal
1/8/2009	Handling And Storage	Animal/Vegetable Product	waste water from Bio-Diesel refinery process	2700	gal
1/13/2009	Handling And Storage	Ammonia (anhydrous)	Anhydrous ammonia	500	lbs
8/24/2009	Handling And Storage	Fertilizer/Pesticide	Ammonia (anhydrous) - Agricultural	800	lbs
1/13/2010	Transportation	Animal/Vegetable Product	Corn	6000	lbs
3/2/2010	Fire	Petroleum	oil and water	20000	gal
5/27/2010	Handling And Storage	Fertilizer/Pesticide	Ammonia (anhydrous) - Agricultural	1500	lbs
11/17/2011	Manure	Manure	Manure	1500	gal
4/17/2012	Handling And Storage	Fertilizer/Pesticide	Durango Herbicide (GF-1279)	500	gal
4/17/2012	Handling And Storage	Fertilizer/Pesticide	Atrazine	500	gal
4/17/2012	Handling And Storage	Fertilizer/Pesticide	Instinct Nitrogen Stabilizer	500	gal
11/20/2012	Manure	Manure	Manure	2000	gal
4/1/2013	Handling And Storage	Petroleum	Fatty acid emulsion	10000	gal
7/24/2013	Transportation	Fertilizer/Pesticide	Anhydrous Ammonia - Ag related	4000	lbs
2/11/2014	Fire	Petroleum	Motor oil	2000	gal
3/19/2014	Manure	Manure	Manure	500	gal
10/27/2014	Manure	Manure	Manure	6000	gal
11/30/2017	Manure	Manure	Hog Manure	4000	gal

Source: Iowa Hazardous Substance Incident Tracking Database, January 2018

The National Pipeline Mapping System reports two pipeline incidents in Washington County. Both were hazardous liquid accidents. They occurred in February and March 2016. There were no fatalities or injuries.

PROBABILITY

Minor hazardous materials incidents occur frequently in Washington 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 of a major hazardous materials incident occurring in Washington County is occasional, which is a probability between 10% and 19% in any given year. This probability estimate is based on historical occurrences and local capability to manage the common types of hazardous materials incidents.

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 a 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 quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristics of the hazardous material or the volume of the product involved, the affected area can be as small as a room in a building or as large as five 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 Washington County, there are fixed facilities with hazardous materials—farm cooperatives, manufacturers, waste and water treatment facilities, etc. Additionally, Washington County has major travel routes, including a U.S. highway, several state highways, railroad lines, and pipelines. Refer to Map 27.

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

WARNING TIME

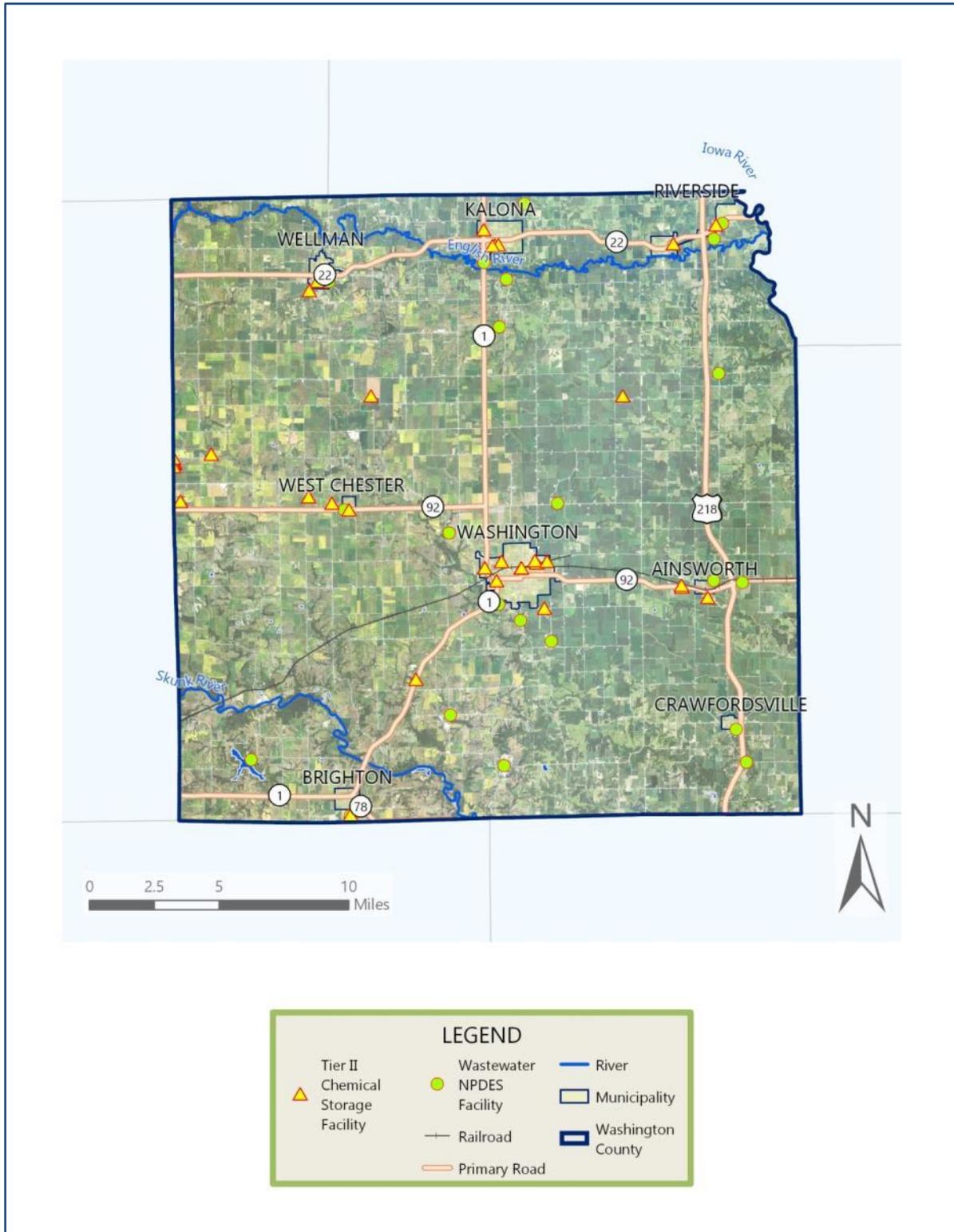
Hazardous materials incidents usually occur rapidly with minimal or no warning. Even if reported immediately, people in the area have very little time to react and/or evacuate. During some events, sheltering in place is the best alternative to evacuation because there is no time to evacuate safely. Public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

DURATION

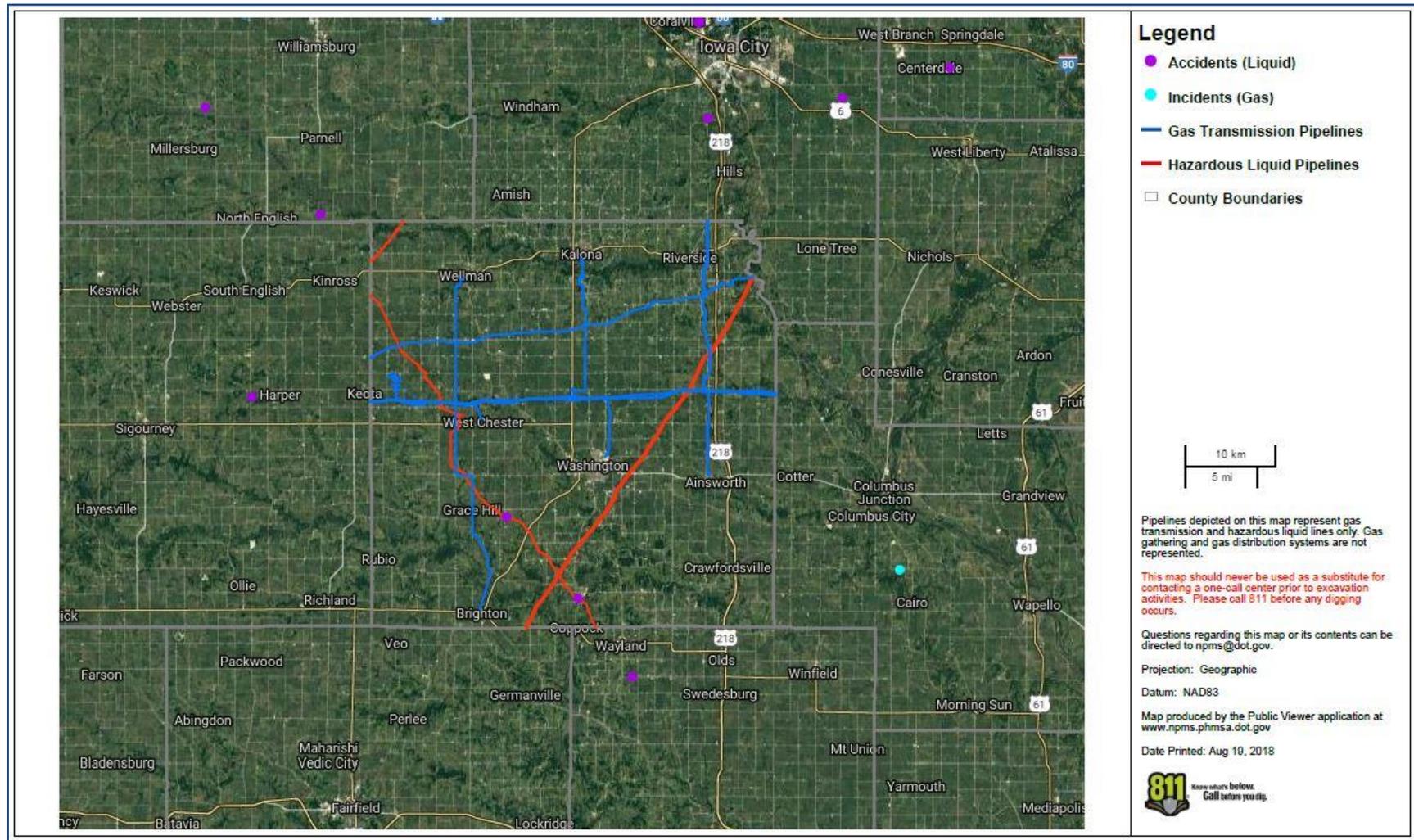
A hazardous materials incident can affect a community for a short period of time if the amount of material is relatively small and well-contained. On the other hand, a hazardous materials incident can be widespread, extremely dangerous, and require long-term remediation and recovery. Response to a hazardous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

RISK ASSESSMENT MAPS

Map 27: Washington County Tier II and Wastewater Facilities and Transportation Routes



Map 28: Washington County Pipeline and Incidents



Source: Pipeline and Hazardous Materials Safety Administration

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 Washington County is countywide.

HISTORICAL OCCURRENCES

There have been no widespread communication failures in Washington County. Occasional issues arise due to the age of the system; however, Washington County is in the process of updating their emergency communications equipment.

There are typically multiple power outages throughout Washington County each year. The most recent and widespread power outage occurred during a severe winter storm that included freezing rain, which accumulated enough to bring down power poles.

The majority of major and minor infrastructure failure, such as roads, bridges, or water infrastructure, is due to natural hazards that occur in Washington County. The persistent infrastructure failure that occurs in Washington 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 Washington 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 Washington County, but typically, local capabilities are sufficient to respond and control the fire.

PROBABILITY

No widespread communications failures have occurred in Iowa or Washington 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.

In Washington County, there have been structural failures, primarily structural damage from severe weather events. Throughout Washington 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 Washington 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 Washington 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 Washington County.

MAGNITUDE AND SEVERITY

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.

An extended interruption of electric, petroleum, or natural gas service by an actual or impending acute shortage of usable energy could create a potential health problem for the population. 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.

Any structure in Washington 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 Washington 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. Classification descriptions 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

There are 55 dams located throughout Washington County. The potential hazard area for dam failure is generally the areas surrounding and downstream of the dam. Refer to the risk assessment map, Map 29.

There are 10.18 miles of levees that are either completely contained within the county or have some portion of their length cross into the county. None of the levees are located close to a city within Washington County. The location of levees is from data gathered by the Iowa Department of Natural Resources, and none are included in the National Levee Database. Refer to the risk assessment map, Map 29.

HISTORICAL OCCURRENCES

There have been no major failures of dams or levee structures in Washington County.

PROBABILITY

The Iowa Department of Natural Resources 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-feet. Low hazard dams with a product of the storage, in acre-feet, and height, in feet, exceeds 30,000 are also considered major. The Lake Darling Dam is the only major dam in Washington County, and the only dam that is a moderate hazard. Five major, high-hazard dams are located in the county to the north, Johnson County. Four of those dams are likely high-hazard because they are in a metropolitan area. The largest storage capacity for those three is held by the North Branch Ralston Creek Dam, which does not impound water under normal circumstances, at 1016 acre-feet—about 1/3 of the normal storage of the Lake Darling Dam. The other three hold 300 acre feet or less under normal circumstances.

A large major dam, which is federally owned and not subject to state inspection, is sited over 14 miles from Washington County. Damming the Iowa River, the Coralville Reservoir Dam's normal storage area is 53,750 acre-feet, or close to 60 times the size of Lake Darling. The only Washington County jurisdiction near the Iowa River is Riverside, most of which is closer to the English River, a tributary to the Iowa River. Additionally, most of the city's structures are above 640 feet of elevation while the Iowa River sits below 620 feet, so impacts from a failure at Coralville Reservoir Dam seem unlikely.

Major dams are regularly inspected and maintained, so it is unlikely a major dam failure would occur. The *2013 Iowa Hazard Mitigation Plan* estimated the probability of a dam or levee failure associated with a heavy flooding event as between 10% and 20% in any given year; however, Washington County has only 1 of the 269 major dams in Iowa and 55 of the 3,800 inventoried dams in the state and there are no historical occurrences of dam failure in the county. The probability of a dam or levee failure is likely less than 10% in any given year.

MAGNITUDE AND SEVERITY

Overall, dam classification determines the potential effects if failure were to occur. Of the 55 dams in Washington County, none are rated high hazard, one is moderate hazard, and the remaining are low-hazard dams. The magnitude of the hazard is based on the people who and property that would be affected by a dam failure, not the condition of the dam. High-hazard dams are required to be inspected every two years, while moderate-hazard dams with sufficient storage capacity are required to be inspected every five years.

Most of the dams are low risk, so failure would likely be limited to the loss of the dam, livestock, farm outbuildings, agricultural lands, and lesser used roads. The loss of human life would be unlikely. One dam is moderate risk, so failure would likely be limited to damage of isolated homes or cabins, industrial or commercial buildings, moderately traveled road. There may also

be an interruption of major utility services. Moderate-risk dams are considered to not pose a substantial risk of loss of human life.

WARNING TIME

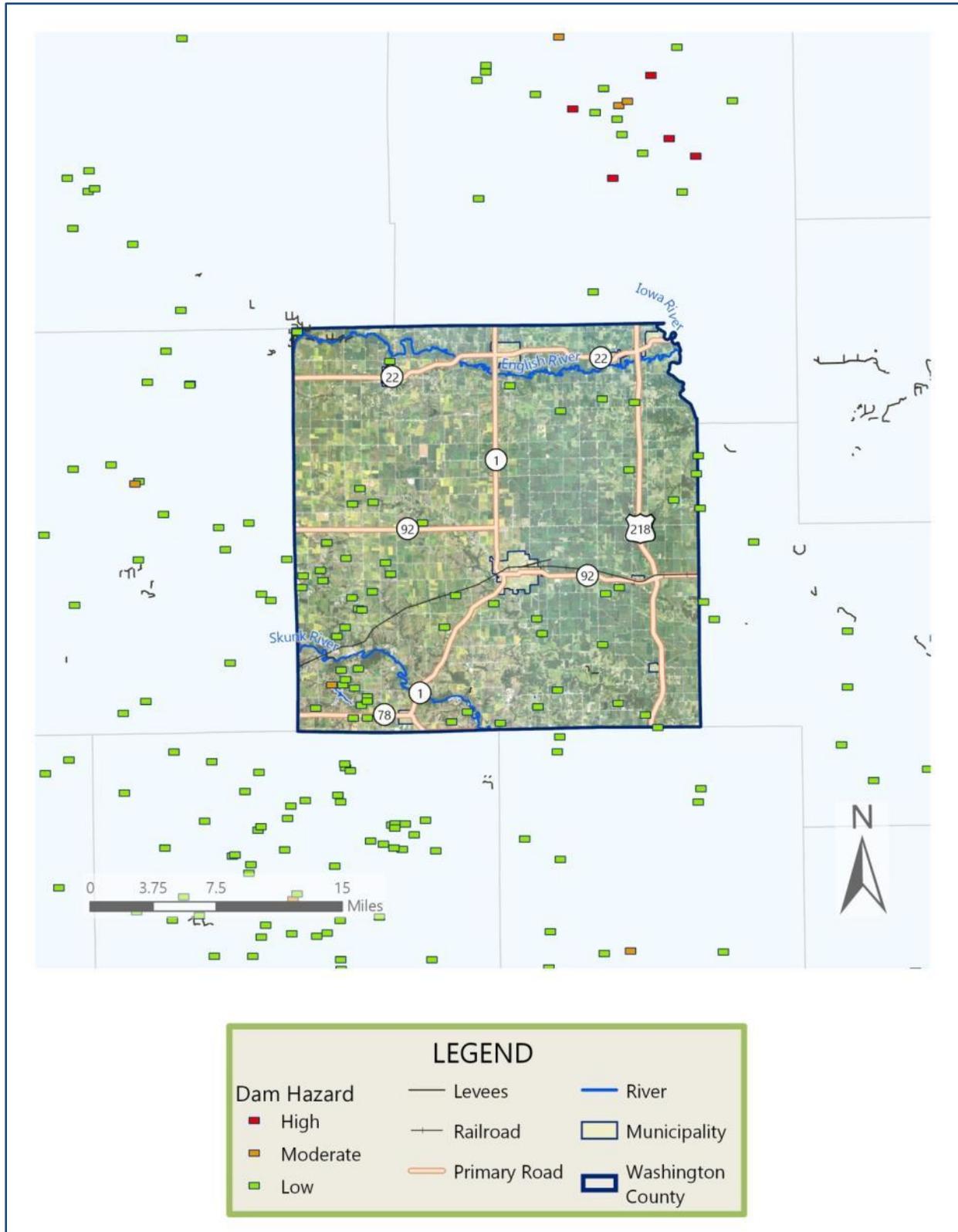
There is usually little to no warning in the event of a dam or levee break unless a potential failure is being monitored. Because of close monitoring, if major local dams were to fail, there would likely be several hours for people in the surrounding and vulnerable downstream areas to evacuate.

DURATION

While the immediate effects of a dam or levee failure is estimated to be limited in Washington County—damage to isolated homes, industrial buildings, or moderately traveled roads; no substantial risk of loss of life—long-term 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 MAP

Map 29: Levees and Dams In and Around Washington County



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 Washington County is countywide. Fallout from a fixed radiological incident—the release of radiological material at a fixed facility—is potentially greater in the northern part of the county, which is within 50 miles of the Duane Arnold Energy Center, in Linn County. Radiation from natural sources—e.g. the sun, radon in rock and soil, etc.—, which accounts for 71% of radiation exposure in the United States, can occur anywhere in the county. Individuals may be exposed to small amounts of radioactive materials at healthcare facilities in drugs or x-ray or other radiological equipment. Areas near transportation routes where radioactive materials are transported are also potential hazard areas.

HISTORICAL OCCURRENCES

There is not 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 does have one nuclear power plant located within its borders. Duane Arnold Energy Center is located near Palo in Linn County. 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 proper packaging and handling methods. In addition, the shipment of radioactive waste is closely regulated. The likelihood of an incident is unlikely but still possible.

MAGNITUDE AND SEVERITY

The Duane Arnold Energy Center has 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. Approximately the northern half of Washington County is within the 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 sub-areas.

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 Washington County is countywide, but transportation infrastructure and surrounding areas are the primary potential hazard areas. Map 30 is an image of the Iowa Department of Transportation (IDOT) Highway and Transportation Map for Washington County, which presents the location of all transportation infrastructure in the county. The full PDF can be accessed on the IDOT website.¹ For an air transportation incident, any area below a flight path in Washington County could be affected. There is only one airport in Washington County, southeast of Washington. For a road or rail incident, any area in close proximity to road or rail line, respectively, is a potential hazard area, with at-grade crossings being potential hazard area for both modes. For a waterway incident, any body of water and the surrounding areas could be affected.

HISTORICAL OCCURRENCES

From 1998–2017, there have been four airway incidents in Washington County. Three incidents record the Washington Municipal Airport, while one is blank in that field. All four incidents were non-fatal and occurred close to the airport. See Table 31 and Map 31.

Table 31: Airway Incidents 1998–2017

Date	Location	Severity
8/3/2011	Washington, IA	Non-fatal
8/16/2009	Washington, IA	Non-fatal
7/23/2008	Washington, IA	Non-fatal
9/16/2002	Washington, IA	Non-fatal

Source: National Transportation Safety Board Database, 12/1/2017

Overall, highway transportation incidents in Washington 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. According to the Iowa Department of Transportation, Washington County has averaged less than one recorded crash per day every year from 2008–2017. Refer to Table 1. On average, there were 2.7 fatalities each year during that period. Crashes in Washington County have declined somewhat from 2008. The majority of crashes each year are property-damage-only incidents, with an average of 66.52% in all years.

Table 32: Washington County Auto Crashes 2008–2017

Crash Year	Fatal	Major Injury	Minor Injury	Possible/Unknown	Property Damage Only	Total
2008	2	19	31	52	214	318
2009	3	15	25	44	201	288
2010	2	16	28	37	191	274
2011	1	15	29	36	152	233
2012	4	15	24	36	142	221
2013	2	7	21	34	134	198
2014	4	21	28	40	150	243
2015	3	9	26	36	194	268
2016	3	15	27	51	129	225
2017	3	9	29	42	170	253
Total	27	141	268	408	1,677	2,521

Source: Iowa Department of Transportation, May 2018

A major transportation incident concern in participating jurisdictions is train incidents involving vehicles at highway and railroad crossing. There is one major railroad in Washington County.

According to the Federal Railroad Administration, there are 48 at-grade crossings in the County. 25 are on public roads and 23 are on private roads. From 1998–2017, there were two rail incidents in Washington County. One fire/violent rupture in 2001 caused \$18,000 in damages, and one derailment in 2009 resulted in \$328,500 in damages. Since 1978, only one highway-rail impact has been recorded, in 1990, which resulted in 1 death.

The remaining type of transportation incident is a waterway incident. According to the *2013 Iowa Hazard Mitigation Plan*, there have been no waterway incidents involving large water vessels in Iowa. Across the state, there have been numerous waterway incidents that involve a single person or private boats with only a few people on board. See Table 33 for information about the type of recreational boating accidents in Iowa. Comprehensive accident data is not widely available at the local or county level.

Table 33: Iowa Recreational Boating Accidents 2005–2016

Accident Event	Accidents	Vessels	Injuries	Deaths
Capsizing	41	41	29	19
Collision with commercial vessel	2	4	1	1
Collision with Fixed Object	45	48	35	1
Collision with Floating Object	9	9	4	0
Collision with government vessel	1	2	0	0
Collision with Recreational Vessel	55	110	35	7
Collision with submerged object	11	11	5	2
Collision with Vessel	41	83	31	2
Departed vessel	1	1	0	1
Ejected from vessel	2	2	2	0
Fall in vessel	17	18	21	0
Fall Overboard	35	37	20	16
Fire/explosion (fuel)	11	11	8	0
Fire/explosion (non-fuel)	2	2	2	0
Flooding/swamping	36	38	14	5
Grounding	32	32	5	0
Other	8	8	10	0
Person Departed Vessel	14	15	6	6
Person ejected from vessel	22	22	21	5
Person Struck by Propeller	10	11	9	1
Person Struck by Vessel	8	11	8	0
Sinking	1	1	0	0
Skier Mishap	66	68	70	1
Total	470	585	336	67

Source: United States Coast Guard Boating Safety Resource Center Database, May 2018

Major water recreation areas in Washington County include Lake Darling—near Brighton— the English River, the Iowa River, and the Skunk River. There are ponds and creeks located throughout Washington County that are used for recreation.

PROBABILITY

From 1998–2017, there have been four air transportation incidents in Washington County, and all incidents were non-fatal. Flight paths over the county, especially around the Washington County Municipal Airport, present a risk for an air transportation incident to occur within the county. With four events over a 20-year period, the probability of an air transportation incident occurring is low. As part of the larger transportation incident hazard, an air transportation incident has an unlikely or occasional probability. There is a 20% chance based on historical occurrences, but there have been long periods without incidents and no fatalities.

Auto crashes occur in Washington County every year, averaging more than one every two days. Overall, a highway transportation incident is likely. These accidents can result in property damage, injury, or death; however, over half are property-damage-only incidents. Washington County has seen a slight decrease in the number of crashes in recent years, but the number of traffic accidents may increase as the population in Washington and Johnson counties grows. Furthermore, there is significant commuter traffic in Washington County. According to U.S. Census Bureau Longitudinal Employer-Household Dynamic, in 2015 approximately 6,502 residents of Washington County commuted outside of the county for their primary job while 3,670 residents from outside of the county commuted into the county for their primary job. In fact, more Washington County residents worked outside of the county than inside the county, 6,502 compared to 4,132. 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 Washington County.

Train incidents have been recorded twice in a twenty-year period, so there is a 10% chance based on historical occurrences. There were no highway-train incidents during that period.

There have been few waterway incidents across Iowa and none in Washington County that have exceeded local capabilities. Statewide, 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. There is only one airport in Washington County, the Washington Municipal Airport. Compared to many other hazards, an air transportation accident would occupy a relatively small area. For the location of the airport in Washington 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.

Washington County is crisscrossed by city streets, county roads, Iowa highways, and a U.S. highway. Refer to the risk assessment maps for major transportation infrastructure in Washington 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 are transporting hazardous materials.

One major railway crosses Washington 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—25 public crossings and 48 total crossings. 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. Derailments can affect areas beyond at-grade crossings. 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 Washington 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 *2013 Iowa Hazard Mitigation Plan*, 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 Washington County, and warnings are often issued several hours before the flooding may occur.

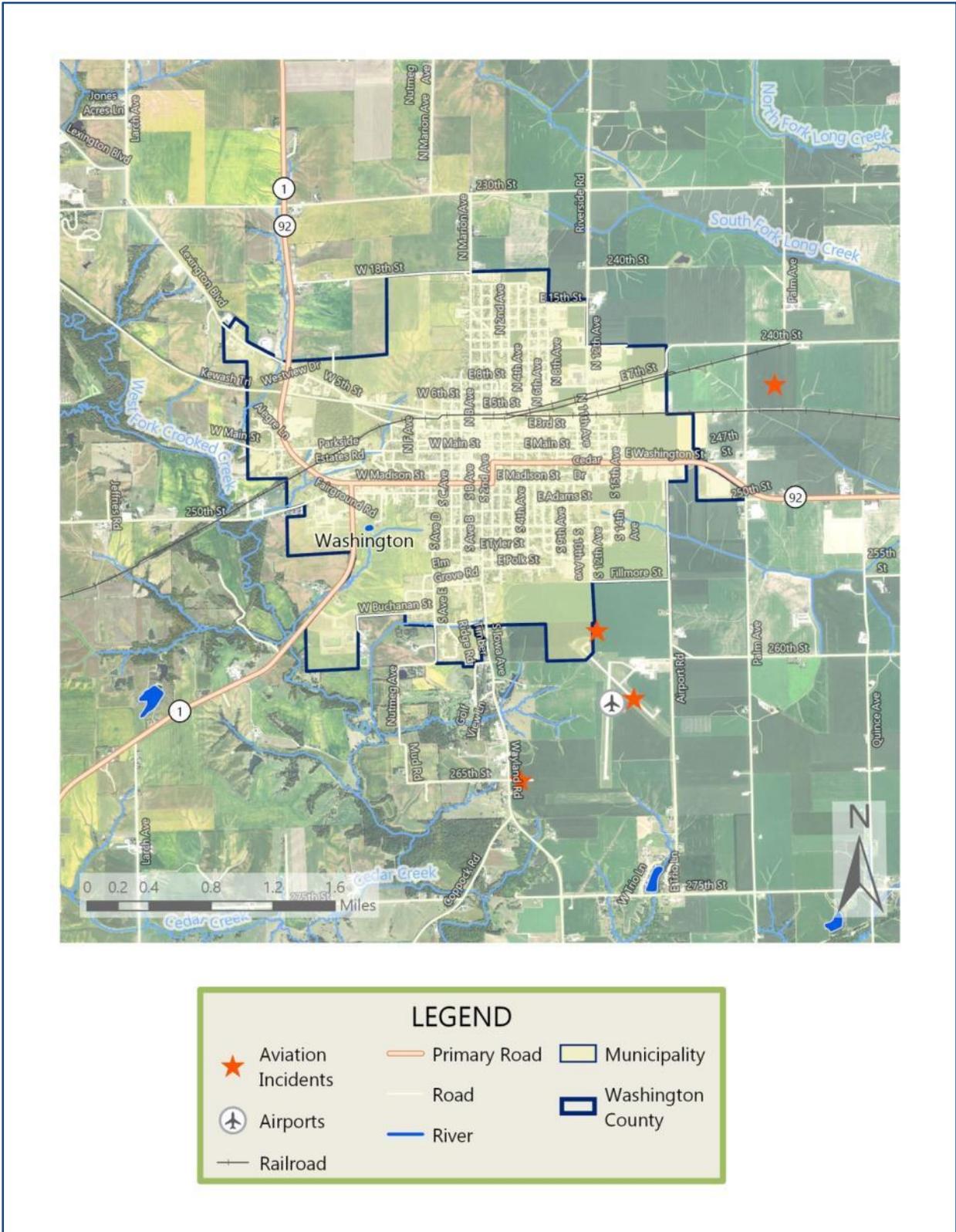
Like other transportation incidents, a railway incident would occur with no warning. There may be a limited amount of time to warn those in the pathway of the harmful effects.

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.

Map 31: Locations of Airway Incidents 1998–2017



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 hazard area for a terrorism event in Washington County is countywide.

HISTORICAL OCCURRENCES

Washington 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 Washington County, in an all-out military attack on the United States, it is unlikely that Iowa and Washington 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 Washington 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 potentially 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 Washington County complete training to teach staff response protocol 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 Washington 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 Washington County will be affected by the event. Aside from public disorder type events, a terrorism event in Washington 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 terrorism is an unlikely threat, precautions must be taken to ensure the safety of the people and property involved. Explosions are usually instantaneous, and 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, 1998–2017, Washington County has been in a Presidentially Declared Disaster Area six times, which is approximately once every three years. Refer to Table 34 for the hazard events that led to those declarations and the Public Assistance and Individual Assistance approved in response.² Two declarations were in response to winter weather, which would be classified as a severe winter storm hazard event within this plan. The remaining four 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 34: Washington County Presidential Disaster Declarations 1998–2017

Date	Declaration	Hazard	Public Assistance/ Individual Assistance
August 5, 2014	DR-4187	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	\$14,466,320
July 29, 2010	DR-1930	Severe Storms, Flooding, and Tornadoes	\$52,245,942/ \$26,438,629
May 27, 2008	DR-1763	Severe Storms, Tornadoes, and Flooding	\$1,155,312,887/ \$138,749,926
January 4, 2008	DR-1737	Severe Winter Storms	\$28,052,065
March 14, 2007	DR-1688	Severe Winter Storms	\$65,370,067
July 2, 1998	DR-1230	Severe Weather, Tornadoes and Flooding	Not reported
Total	Six declarations		Public Assistance \$1,315,447,281 Individual Assistance \$165,188,555

Source: FEMA, March 2018

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—severe winter storm—and summer weather—flash

flood, river flood; thunderstorm, lightning, and hail; and tornado and windstorm—hazards are all rated with the highest priority level and have wrought extensive loss across the planning area.

¹ <https://www.iowaagriculture.gov/animalIndustry/AHAN.asp>, accessed 9/29/2017

² U.S. Dept. of Agriculture. Highly Pathogenic Avian Influenza Response Plan: The Red Book. 2017. P. 1-7

³ Ibid. P. 1-10

⁴ U.S. Dept. of Agriculture. Highly Pathogenic Avian Influenza Infected Premises. Updated 6/8/2016. P. 5.

⁵ U.S. Dept. of Agriculture. National Scrapie Eradication Program Fiscal Year 2016 Report. 2016.

⁶ https://www.nwhc.usgs.gov/disease_information/chronic_wasting_disease/, accessed 5/11/2018

⁷ https://www.nwhc.usgs.gov/disease_information/chronic_wasting_disease/, accessed 5/11/2018

⁸ Birhane, M. G., Cleaton, J.M., Monroe, B. P., Wadhwa, A., Orciari, L. A., Yager, P.,...Wallace, R.M. (2017). Rabies surveillance in the United States during 2015. *Journal of the American Veterinary Medical Association*, Vol. 250, No. 10. 1121, 1123–1125.

⁹ <https://www.extension.iastate.edu/psep/Publications/EAB/FAQ-EAB-4Counties-JUNE222018.pdf>, accessed 6/25/2018

¹⁰ Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2014. P. 49

¹¹ Ibid. P. 23

¹² Ibid. P. 52

¹³ <https://www.cdc.gov/flu/pandemic-resources/>, <https://www.cdc.gov/flu/pandemic-resources/basics/about.html>, accessed 6/27/2018

¹⁴ Iowa Department of Public Health. Iowa Surveillance of Notifiable and Other Diseases: Annual Report 2009. P. 12

¹ <https://iowadot.gov/maps/digital-maps/pdfview/washington#25693689-city-and-county-maps>, accessed 11/1/2018

² For each declaration, the Public Assistance and Individual Assistance funding is for the disaster area, which is larger than Washington County.

Hazard Prioritization



As noted in the previous chapter, to determine the extent a mitigation strategy should focus on one or more hazards, all hazards were prioritized using the following criteria: probability, magnitude and severity, warning time, and duration. Descriptions of the criteria are shown in Table 7–Table 10, starting on page 28. Weighted averages were calculated to determine the priority level for the multi-jurisdictional risk assessment. Refer to Table 35 for the weight of each criterion. 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. Additionally, the local planning committee for each jurisdiction that participated in the previous hazard mitigation plan was able to review the previous priority level and determine if changes were necessary to reflect current conditions and priorities. Priorities for the previous and updated plan are included to document changes. For combined hazards, the priority level for hazards previously considered separately was averaged to determine the overall priority level.

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.

Table 35: Weight of Hazard Prioritization Criteria

Criterion	Weight
Probability	0.45
Magnitude and Severity	0.30
Warning Time	0.15
Duration	0.10

With the weight value applied to each factor, the sum of the assessment criteria is used to determine the priority level of each hazard. The priority level determines how much focus is given to the hazard in the overall mitigation strategy. See Table 36 for the description of each priority level. The priority level determined for each hazard may not completely reflect the description of each level. The priority level that most accurately fits a hazard is applied, or due to local conditions and/or the planning committee, priority level may be adjusted.

Table 36: 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

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

The multi-jurisdictional hazard risk assessment results for Washington County are included in Table 37. 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 37: Washington County Multi-Jurisdictional Hazard Analysis and Risk Assessment

Hazard	Type	Probability	.45	Magnitude and Severity	.30	Warning Time	.15	Duration	.10	Total	Priority Level
Animal, Plant, Crop Disease	Natural	2	.90	2	.60	4	.60	4	.40	2.50	2
Drought	Natural	3	1.80	2	.60	1	.15	4	.40	2.50	1
Earthquake	Natural	1	.45	1	.30	4	.60	1	.10	1.45	3
Expansive Soils	Natural	1	.45	1	.30	1	.15	1	.10	1.00	3
Extreme Heat	Natural	3	1.35	2	.60	1	.15	4	.40	2.50	2
Flash Flood	Natural	4	1.80	2	.60	3	.45	1	.10	2.95	1
Grass or Wildland Fire	Natural	2	.90	1	.30	1	.15	1	.10	1.45	3
Hazardous Materials Incident	Technological	2	.90	1	.30	4	.60	4	.40	2.20	2
Human Disease	Natural	1	.45	2	.60	2	.30	4	.40	1.75	2
Infrastructure Failure	Technological	3	1.35	2	.60	4	.60	4	.40	2.95	1
Landslide	Natural	1	.45	1	.30	2	.30	1	.10	1.15	3
Levee and Dam Failure	Technological	1	.45	1	.30	4	.60	1	.10	1.45	3
Radiological Incident	Technological	1	.45	1	.30	4	.60	4	.40	1.75	3
River Flood	Natural	4	1.80	2	.60	1	.15	4	.40	2.35	1
Severe Winter Storm	Natural	4	1.80	1	.30	3	.45	2	.20	2.75	1
Sinkholes	Natural	1	.45	1	.30	2	.30	1	.10	1.15	3
Terrorism	Human Caused	1	.45	2	.60	4	.60	2	.20	1.85	2
Thunderstorm, Lightning and Hail	Natural	4	1.80	2	.60	2	.30	2	.20	2.9	1
Tornado and Windstorm	Natural	4	1.80	2	.60	3	.45	2	.20	3.05	1
Transportation Incident	Technological	2	.90	1	.30	4	.60	2	.20	2.00	2

WASHINGTON 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 38.

Table 38: Washington County Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	1	1
Drought	Natural	1	1
Earthquake	Natural	3	3
Expansive Soils	Natural	3	3
Extreme Heat	Natural	1	1
Flash Flood	Natural	1	1
Grass or Wildland Fire	Natural	1	1
Hazardous Materials Incident	Technological	1	1
Human Disease	Natural	1	1
Infrastructure Failure	Technological	2	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	3
Radiological Incident	Technological	2	2
River Flood	Natural	2	2
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	2	1

Washington County changed the priority level of two hazards. The priority level for infrastructure failure was increased due to the significant role some infrastructure plays in emergency response, e.g. communications infrastructure. The priority level for levee and dam failure was increased because of the presence of levees and dams within the county. The priority level for transportation incident was increased due to the US and State highways that traverse the County.

AINSWORTH 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: Ainsworth Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	3	3
Drought	Natural	2	2
Earthquake	Natural	2	3
Expansive Soils	Natural	3	3
Extreme Heat	Natural	2	2
Flash Flood	Natural	1	2
Grass or Wildland Fire	Natural	1	3
Hazardous Materials Incident	Technological	1	1
Human Disease	Natural	3	3
Infrastructure Failure	Technological	1	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	2	2
River Flood	Natural	3	3
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	1

The Ainsworth planning committee changed the priority level of four hazards: earthquake, flash flood, grass or wildland fire, and transportation incident. The priority level was increased for transportation incident because of their proximity to U.S Highway 218 and State Highway 92. The priority level for earthquake was lowered to reflect the countywide risk assessment. The priority level for flash flood was lowered because new culverts had been installed near the highway, greatly reducing some of the community’s worst flash flooding. The committee also felt it was appropriate to lower the grass or wildland fire priority level because the jurisdiction that would be affected by and have to respond to a grassland fire would be the County.

BRIGHTON 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: Brighton Hazard Prioritization

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

The Brighton planning committee changed the priority level of five hazards. The priority level for earthquake was decreased, which is in line with the countywide assessment and was considered appropriate by the planning committee. The priority level for human disease was updated from excluded to a 3 because of the possibility that a loss could occur from a communicable disease. The priority level for infrastructure failure was increased to reflect Brighton’s infrastructure, which is older. Radiological incident is no longer excluded because the committee wanted to recognize that radiological materials could be transported on Highway 1, which runs through town. The committee also decided to no longer exclude terrorism. It was ranked as a 3 because the committee felt that terrorism was possible but unlikely in their small community.

CRAWFORDSVILLE HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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: Crawfordsville Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	Excluded	Excluded
Drought	Natural	2	2
Earthquake	Natural	3	3
Expansive Soils	Natural	1	3
Extreme Heat	Natural	1	1
Flash Flood	Natural	2	2
Grass or Wildland Fire	Natural	3	3
Hazardous Materials Incident	Technological	1	1
Human Disease	Natural	1	1
Infrastructure Failure	Technological	1	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	Excluded	3
River Flood	Natural	3	3
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

The Crawfordsville planning committee changed the priority level of two hazards: expansive soils and radiological incident. The expansive soils priority was decreased to reflect the countywide risk assessment and local experience. The Crawfordsville planning committee was not aware of any expansive soils incidents in Crawfordsville. The committee also updated the radiological incident priority level to a 3 from previously being excluded. The committee felt this was appropriate to acknowledge the traffic on nearby US Highway 218.

KALONA HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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: Kalona Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	3	3
Drought	Natural	1	3
Earthquake	Natural	3	3
Expansive Soils	Natural	2	3
Extreme Heat	Natural	1	1
Flash Flood	Natural	1	1
Grass or Wildland Fire	Natural	2	2
Hazardous Materials Incident	Technological	2	1
Human Disease	Natural	3	3
Infrastructure Failure	Technological	3	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	Excluded	3
River Flood	Natural	3	1
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	2	2

The Kalona planning committee changed the priority level of six hazards: drought, expansive soils, hazardous materials incident, infrastructure failure, radiological incident, terrorism, and transportation incident. The drought priority level was decreased to reflect local conditions, i.e. drought does not present as large a negative impact on an urban area like Kalona as the agricultural areas in the county. The expansive soils priority was decreased to reflect local conditions and the countywide assessment. The hazardous materials incident and radiological incident priority levels were increased to reflect the highway traffic that passes through the town. The infrastructure failure priority level was raised to reflect the large amount of infrastructure that Kalona maintains. The river flood priority level was increased to match local conditions, refer to Map 14.

RIVERSIDE HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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. Riverside completed the hazard prioritization process in the fall of 2015 with the intention of being amended into the existing multi-jurisdictional plan, but ultimately they waited until the update process for this plan to join. The priority level in their previous prioritization exercise and the new priority level for a hazard are indicated to document how local conditions and priorities have changed in the jurisdiction. Refer to Table 43.

Table 43: Riverside Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	2	2
Drought	Natural	2	2
Earthquake	Natural	1	3
Expansive Soils	Natural	3	3
Extreme Heat	Natural	1	1
Flash Flood	Natural	1	1
Grass or Wildland Fire	Natural	2	3
Hazardous Materials Incident	Technological		1
Human Disease	Natural	1	2
Infrastructure Failure	Technological	1	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	2	3
River Flood	Natural	1	1
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	2	1

The Riverside planning committee changed the priority level of six hazards: earthquake, grass or wildland fire, hazardous materials incident, human disease, radiological incident, and transportation incident. The priority level for earthquake was decreased, which is in line with the countywide assessment and was considered appropriate by the Riverside planning committee. The grass or wildland fire priority level was increased, bringing it in line with the countywide assessment and the conditions in Riverside. The priority level for hazardous materials incident was increased because a new truck wash is under construction, which could bring more

hazardous materials in transport into the jurisdiction. The human disease priority level was decreased to be consistent with the countywide plan. Likewise, the radiological incident priority level was lowered. Finally, the committee felt that a higher priority level for transportation incident was more appropriate because of US Highway 218 and Iowa Highway 22, which run through the community.

WASHINGTON HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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: Washington Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	3	2
Drought	Natural	2	2
Earthquake	Natural	2	3
Expansive Soils	Natural	3	3
Extreme Heat	Natural	2	2
Flash Flood	Natural	1	1
Grass or Wildland Fire	Natural	1	2
Hazardous Materials Incident	Technological	1	1
Human Disease	Natural	3	3
Infrastructure Failure	Technological	1	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	2	2
River Flood	Natural	3	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

The priority levels for four hazards were updated by Washington’s planning committee to reflect current conditions and priorities: animal, plant, and crop disease; earthquake; grass or wildland fire; and river flood. The priority levels for animal, plant, and crop disease and river flood were raised to a higher priority level. For both hazards, this change matched the priority levels with the countywide assessment. The planning committee also noted that the city has dealt with the emerald ash borer infestation. The committee also felt a higher river flooding priority level was appropriate because there are some affected areas within the city when waterway flooding rises past the 100-year flood level. The updated earthquake hazard priority level matches the countywide assessment. The grass or wildland fire priority level was lowered, but remains higher than the countywide assessment, due to grassy areas the City maintains close to fields just outside their jurisdiction.

WELLMAN HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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. Wellman reviewed the priorities from their previously approved single-jurisdiction hazard mitigation plan. The priority level in the single-jurisdiction plan and the new priority level for a hazard are indicated to document how local conditions and priorities have changed in the jurisdiction. Refer to Table 45.

Table 45: Wellman Hazard Prioritization

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

The Wellman planning committee reviewed the hazard priorities for Wellman from their previously approved single jurisdiction hazard mitigation plan, 2009–2014. The committee updated the priority level for radiological incident, decreasing it from a 2 to a 3. The committee believed that priority level was appropriate for their community, which does not have x-ray or other radiological facilities in town. They did not exclude the hazard because of the state highway that runs through their community. The committee believed the other hazard priorities reflected conditions in Wellman.

WEST CHESTER HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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 46.

Table 46: West Chester Hazard Prioritization

Hazard	Type	Current Priority Level	Priority Level Update
Animal, Plant, Crop Disease	Natural	Excluded	3
Drought	Natural	2	2
Earthquake	Natural	2	3
Expansive Soils	Natural	3	3
Extreme Heat	Natural	2	2
Flash Flood	Natural	2	1
Grass or Wildland Fire	Natural	Excluded	3
Hazardous Materials Incident	Technological	1	1
Human Disease	Natural	Excluded	3
Infrastructure Failure	Technological	1	1
Landslide	Natural	3	3
Levee and Dam Failure	Technological	Excluded	Excluded
Radiological Incident	Technological	Excluded	3
River Flood	Natural	3	3
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	2	2

The priority levels for five hazards were updated by West Chester’s planning committee to reflect current conditions and priorities. Three hazards—animal, plant, and crop disease; grass or wildland fire; human disease; and radiological incident—were not included in the City’s current risk assessment. The planning committee added these hazards to West Chester’s risk assessment with a low priority level, which indicates the potential but low risk of occurrence.

Earthquake was medium priority and the planning committee decreased the priority level. An earthquake has the potential to occur in the area, but there are no cost effective solutions to mitigate potential risk. The final hazard that was updated is flash flood, and the priority level was increased. Flash flood is a recurring, costly hazard in West Chester, and it is a high priority.

Hazards that remain excluded from the City's risk assessment include levee and dam failure and sinkholes. There are no levees within or near the West Chester area, and there are no dam sites upstream that pose a major a risk. Sinkholes was excluded because there is minimal or no risk.

HIGHLAND COMMUNITY SCHOOL DISTRICT HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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. Highland Community School District is a new participant of the multi-jurisdictional plan, so the local planning committee completed the hazard prioritization exercise for the first time for this plan update, and only one priority level is indicated. Refer to Table 47.

Table 47: Highland CSD Hazard Prioritization

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

The Highland CSD planning committee established priorities for the district that reflect conditions and concerns that are relevant to the district. The committee referenced the countywide hazard analysis and risk assessment in their consideration of the hazards. Because of the scope of their responsibilities and the features of their property, the committee excluded two hazards: landslide and levee and dam failure. The district’s property does not contain any steep slopes and there are no nearby levees or dams.

Highland CSD's priorities align with the ranking from the hazard analysis and risk assessment for several hazards. The committee set a lower priority, however, on the following hazards: animal, plant, and crop disease; drought; flash flood; infrastructure failure; and river flood. The District does not maintain animals or crops that could be affected by disease. A severe drought could affect the availability of water in their well system but would not likely cause other significant losses. The District has not had previous issues with flash flooding, and it is not near any rivers; however, river flood was rated as a 2 because the Highland CSD (CSD) school in Riverside is not far from a 100-year flood zone, and transportation to District facilities could be affected by river flooding. The District also maintains an amount of infrastructure that is small relative to the cities and county participating in the plan.

The committee set a higher priority on the following hazards: grass or wildland fire, hazardous materials incident, human disease, radiological incident, terrorism, and transportation incident. Because the middle school, high school, and district offices are in a rural part of the county, Grass or wildland fire was rated higher because the possibility of a hazard event is more likely than in an urban setting. Human disease was ranked higher because of the large student population that is hosted at District facilities on a daily basis. Hazardous materials incident and radiological incident were rated higher because of the District's very close proximity to US Highway 218. Transportation incident was rated higher because the District operates several school buses on a daily basis throughout the school year. Terrorism was rated higher also as the district hosts a vulnerable population regularly.

MID-PRAIRIE COMMUNITY SCHOOL DISTRICT HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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. Mid-Prairie Community School District is a new participant of the multi-jurisdictional plan, so the local planning committee completed the hazard prioritization exercise for the first time for this plan update, and only one priority level is indicated. Refer to Table 48.

Table 48: Mid-Prairie CSD Hazard Prioritization

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

The Mid-Prairie CSD planning committee established priorities for the district that reflect conditions and concerns that are relevant to the district. The committee referenced the countywide hazard analysis and risk assessment in their consideration of the hazards. Because of the scope of their responsibilities and the features of their property, the committee excluded six hazards: animal, plant, and crop disease; drought; landslide; levee and dam failure; radiological incident; and sinkholes. The district is unaffected by animal, plant, and crop disease. There are not any actions the district could undertake to mitigate drought conditions, and the negative

effects from a drought for the district would be small to negligible. The remaining excluded hazards are extremely unlikely due to the lack of certain features, e.g. levees, radiological materials, etc., or to the geology or topography of the district's property, which is not conducive to sinkholes or landslides.

Many of Mid-Prairie CSD's priorities align with the rankings from the hazard analysis and risk assessment. The committee set a lower priority on extreme heat because the district's facilities are air conditioned. Human disease was set at a lower priority because in the event of a severe outbreak, school would be cancelled. Infrastructure failure was also given a lower priority because the district maintains far less infrastructure than the local government jurisdictions in the planning area. Finally, terrorism was rated higher as the district hosts a vulnerable population regularly.

WASHINGTON COMMUNITY SCHOOL DISTRICT HAZARD PRIORITIZATION

The jurisdiction’s planning committee used the multi-jurisdictional risk assessment prepared for the planning areas 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. Mid-Prairie Community School District is a new participant of the multi-jurisdictional plan, so the local planning committee completed the hazard prioritization exercise for the first time for this plan update, and only one priority level is indicated. Refer to Table 49.

Table 49: Washington CSD Hazard Prioritization

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

The Washington CSD planning committee established priorities for the district that reflect conditions and concerns that are relevant to the district. The committee referenced the countywide hazard analysis and risk assessment in their consideration of hazards. Because of the scope of their responsibilities and the features of their properties, the committee excluded eight hazards: animal, plant, and crop disease; expansive soils; grass or wildland fire; landslide; levee and dam failure; radiological incident; river flood; and sinkholes. These hazards were excluded for the following reasons: the district is unaffected by animal, plant, and crop disease; the district

has no knowledge of expansive soils, potential karst soil, or sinkholes on their properties; district properties do not contain steep slopes or radiological materials; and the district is not in a position to be affected by levee and dam failure or river flooding.

The committee decided that a priority level lower than the countywide risk assessment would be appropriate for the following hazards: drought, extreme heat, flash flooding, hazardous materials incident, human disease, infrastructure, and transportation incident. There are not any actions the district could undertake to mitigate drought conditions, and the negative effects from a drought would be small to negligible. Extreme heat was prioritized lower because the district has weather policies in place to respond to weather conditions. Flash flooding has not historically been a problem for the district's properties. The district does not keep hazardous materials. Some district buildings contain asbestos; however, the district has an abatement plan in place in the event any asbestos is disturbed. Human disease is prioritized lower because schools, unlike cities, are able to close during an outbreak. The district maintains much less infrastructure than local governments and has no public roads, so the district prioritized infrastructure failure and transportation incidents lower than in the countywide assessment.

The remaining hazards—earthquake; severe winter storms; terrorism; thunderstorm, lightning, and hail; and tornado and windstorm—are prioritized at the same level as the countywide assessment.

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, and 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 jurisdictions should approach each hazard. This chapter will document these attributes.

Critical Facilities

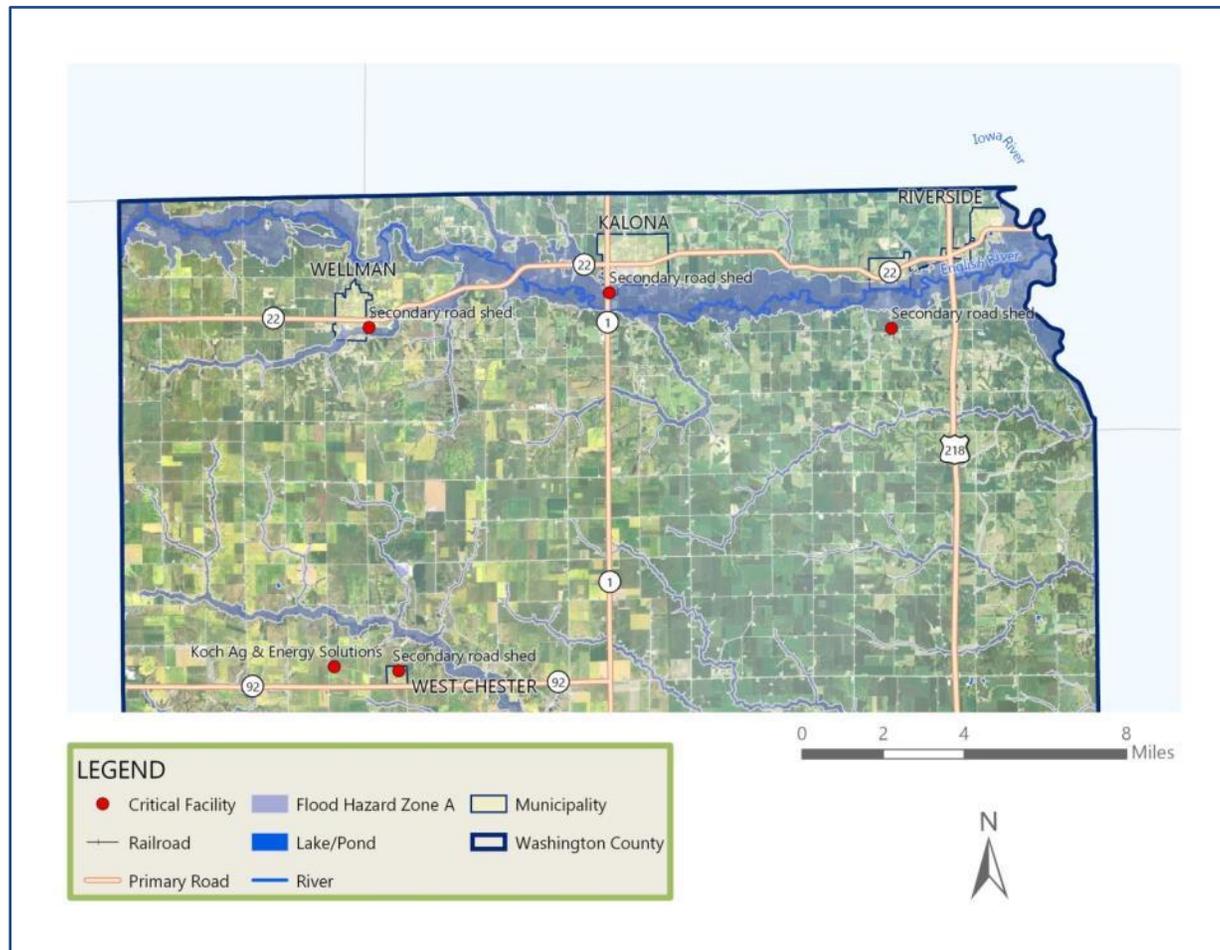
Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in a community. In each jurisdiction, the planning committee identified the primary critical facilities in their community. Generally, all jurisdiction property and infrastructure 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.

The school district critical facilities maps will also display the locations of private schools in the counties. They were not indicated as critical facilities during the planning meetings for any of the jurisdictions, but all schools are considered to host vulnerable populations, which are considered in the next section.

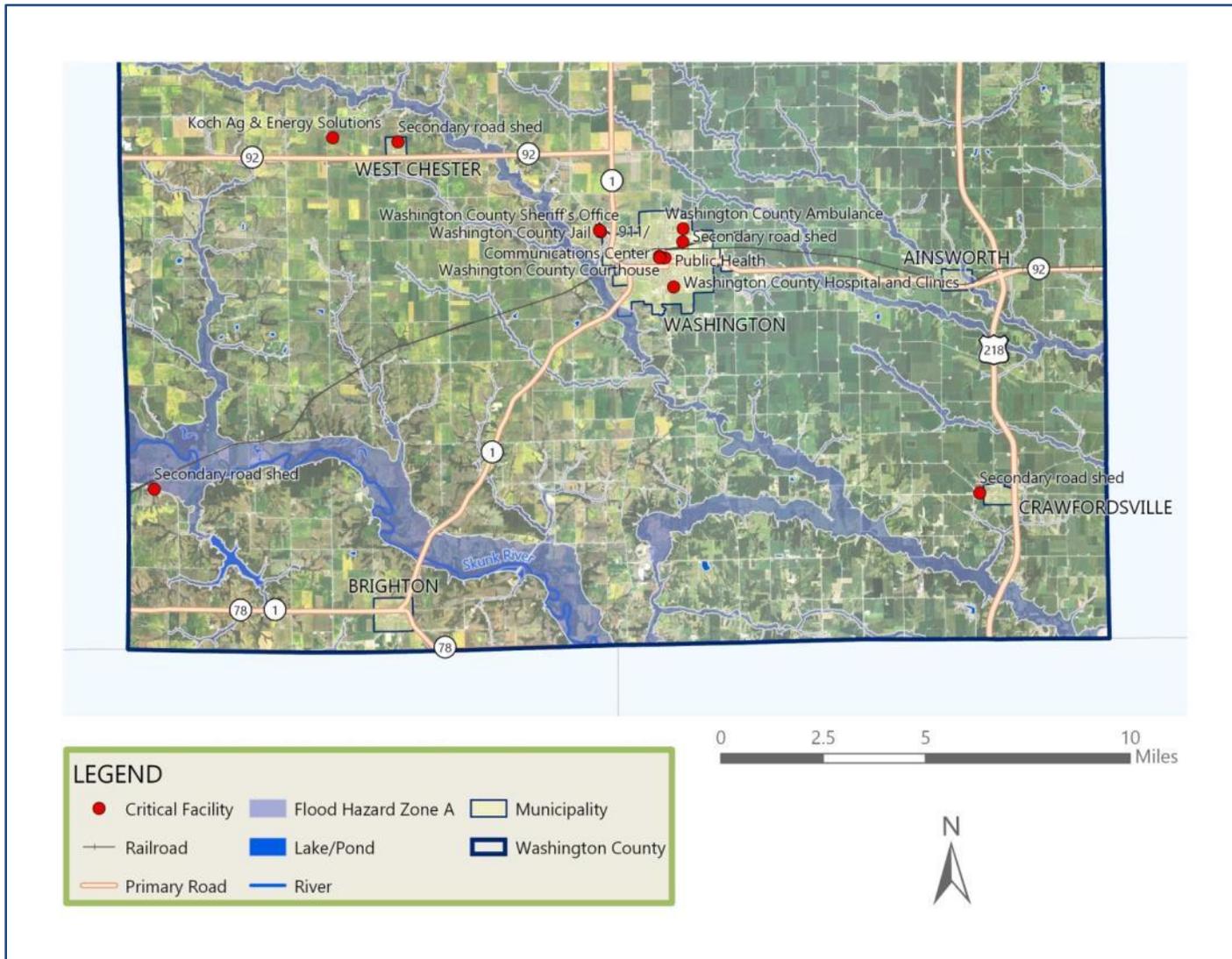
WASHINGTON COUNTY CRITICAL FACILITIES

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In Washington County, all county property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 32 through Map 34.

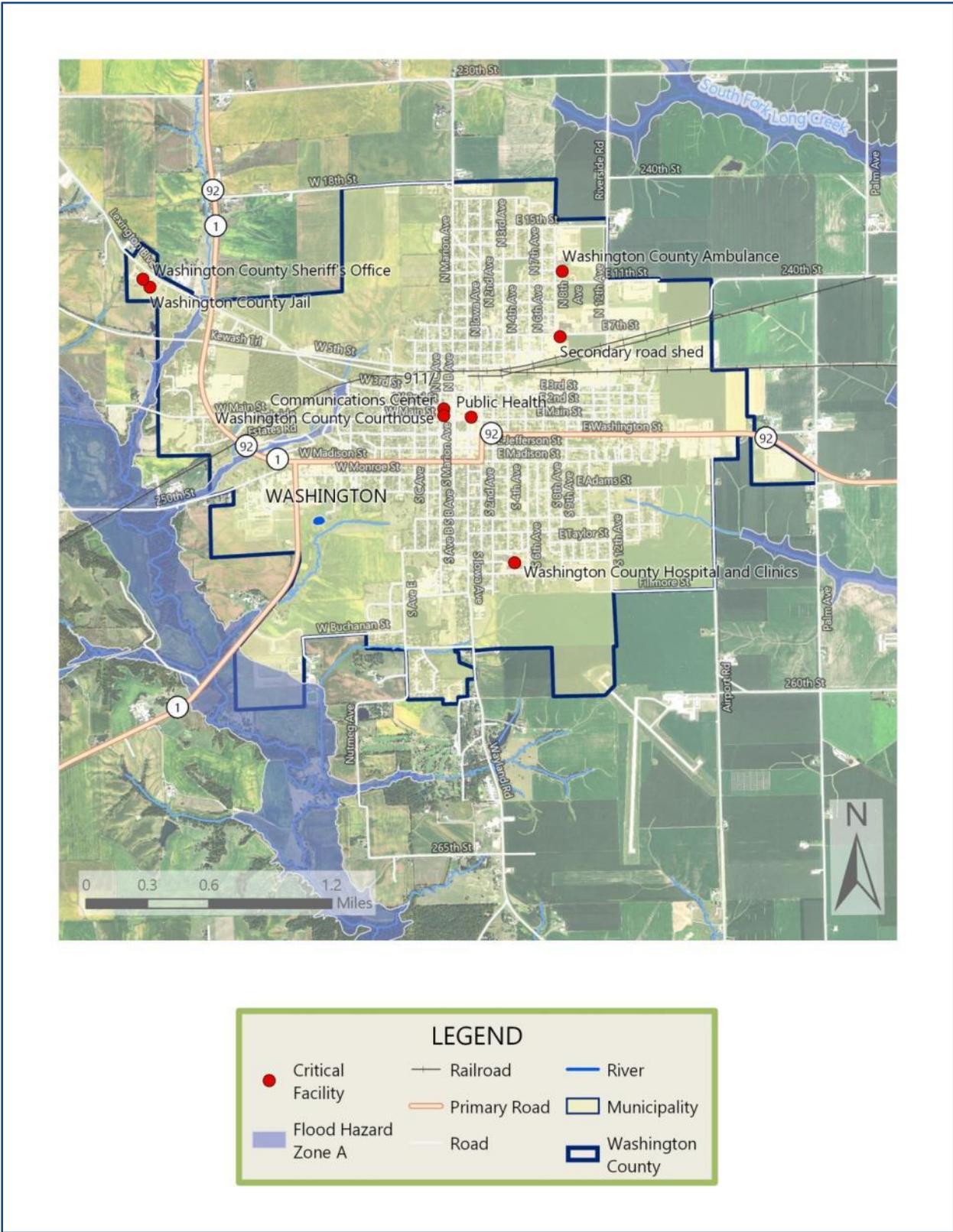
Map 32: Specific Washington County Critical Facilities (north)



Map 33: Specific Washington County Critical Facilities (south)



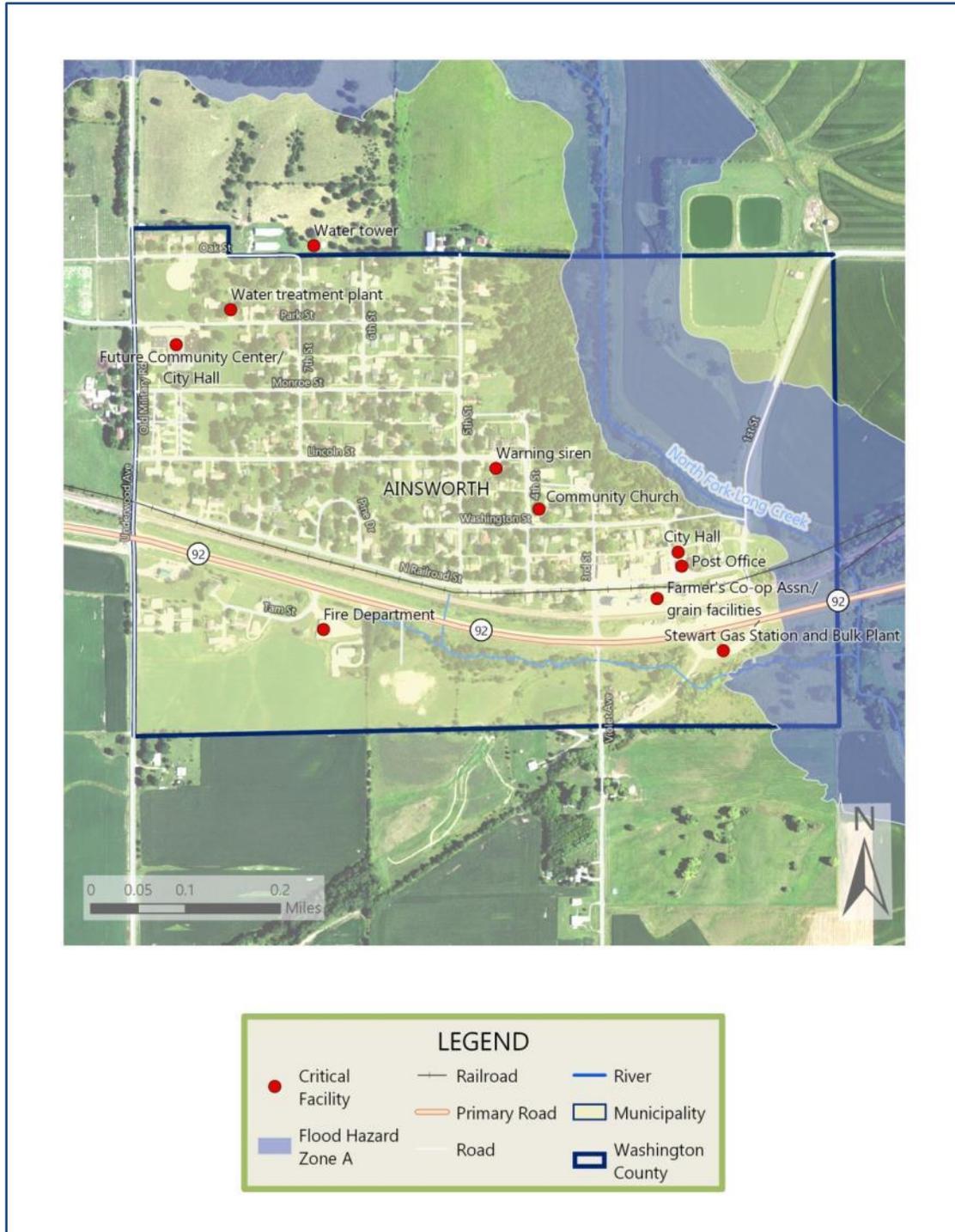
Map 34: Specific Washington County Critical Facilities in Washington



AINSWORTH CRITICAL FACILITIES

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

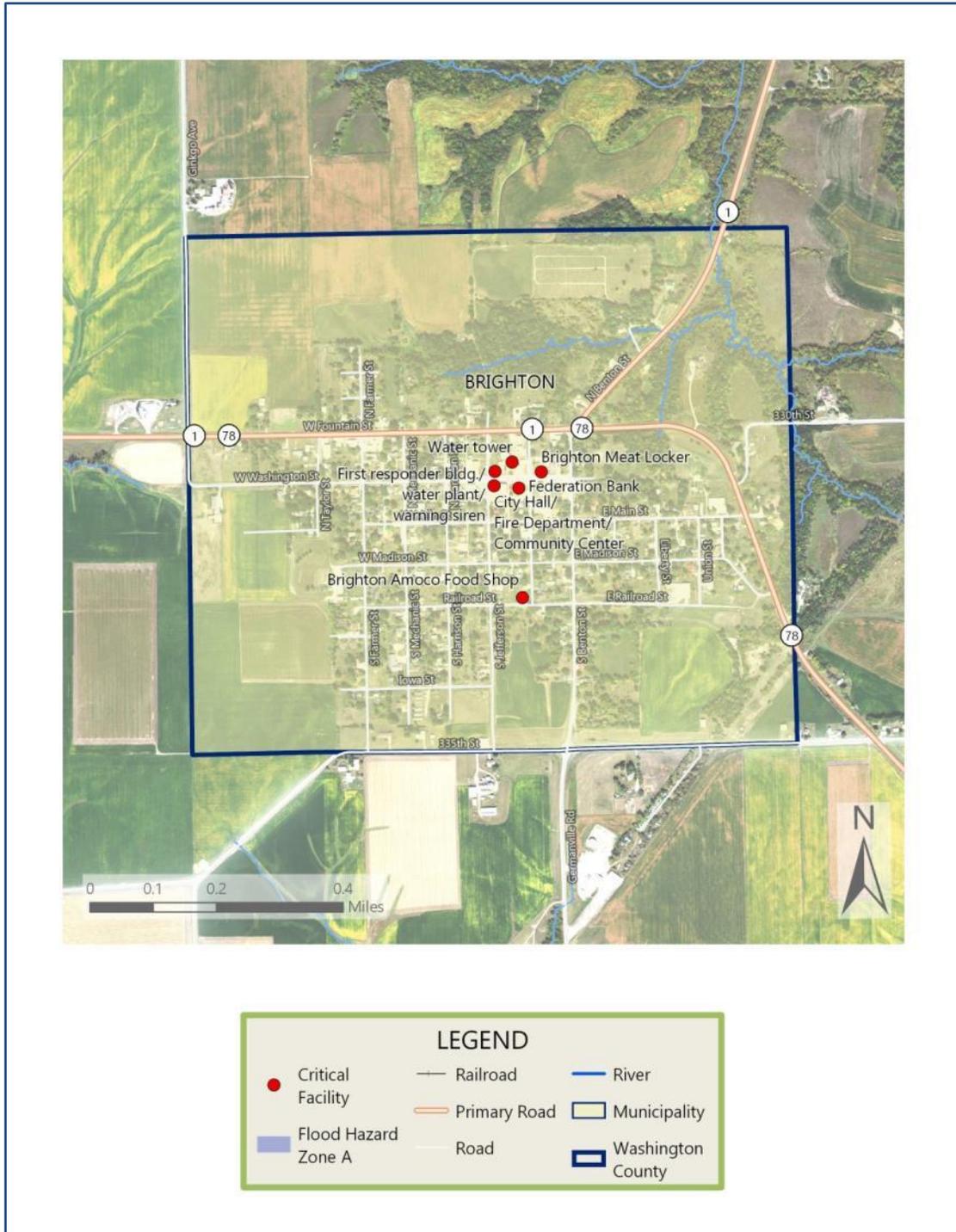
Map 35: Specific Critical Facilities in Ainsworth



BRIGHTON CRITICAL FACILITIES

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

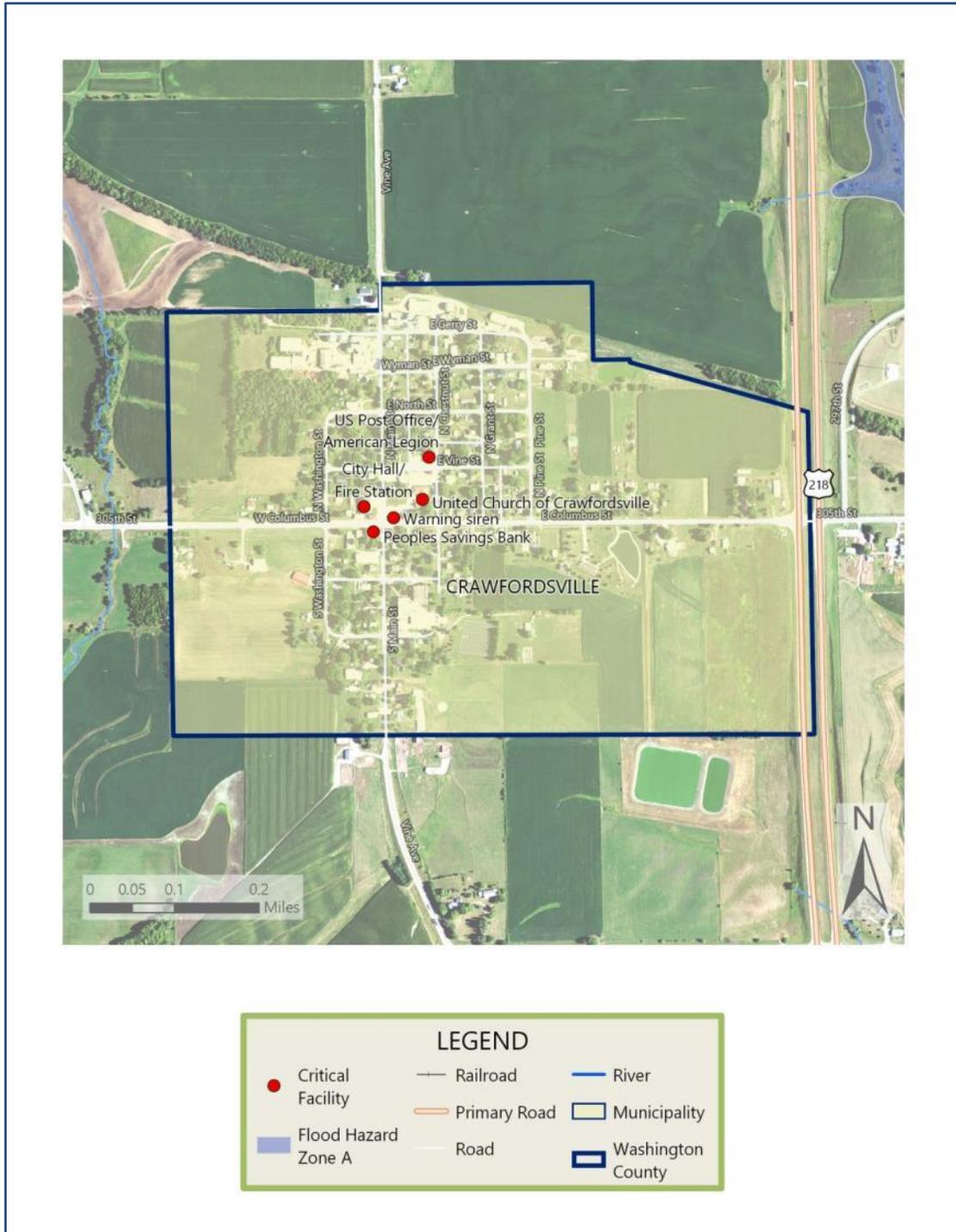
Map 36: Specific Critical Facilities in Brighton



CRAWFORDSVILLE CRITICAL FACILITIES

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

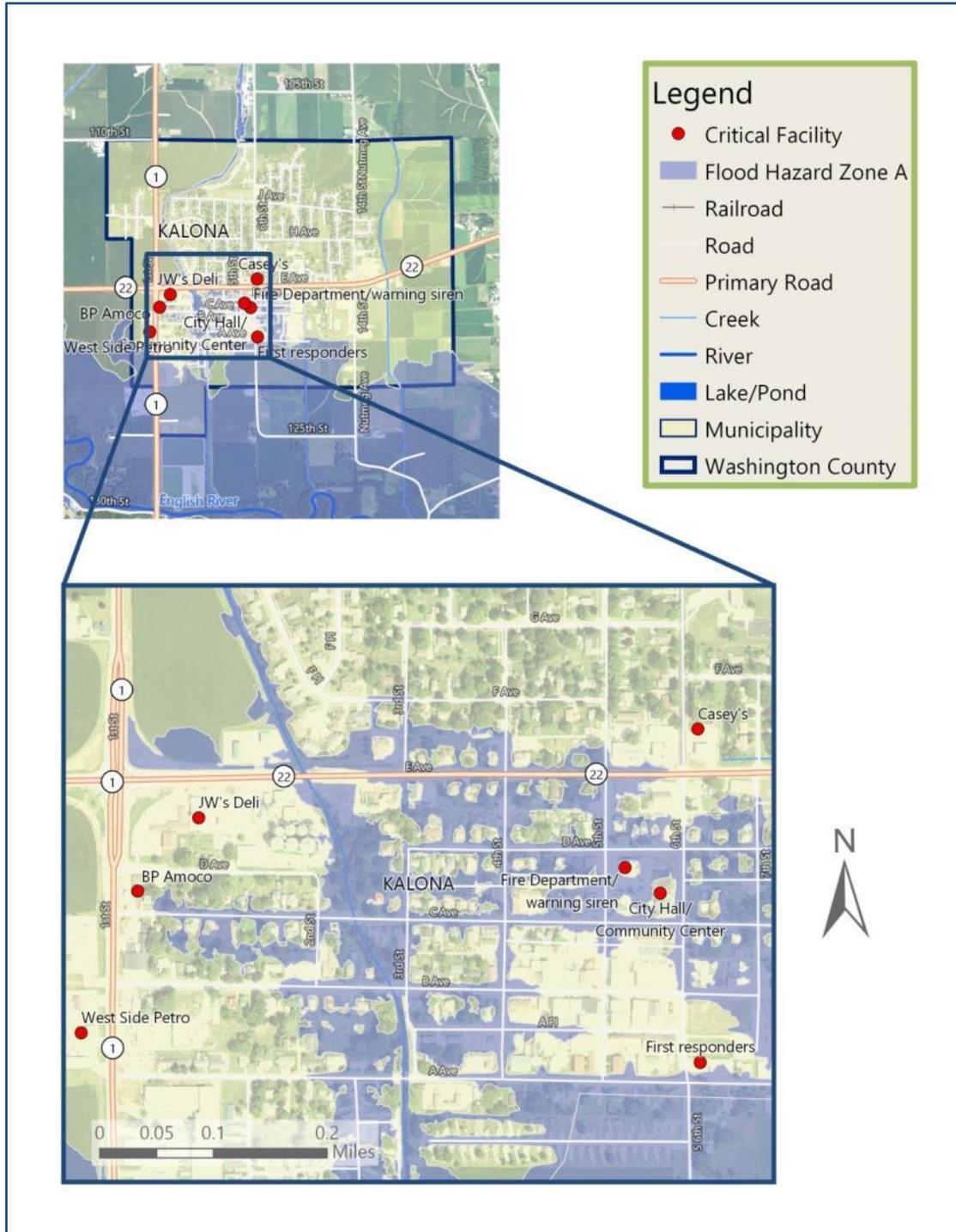
Map 37: Specific Critical Facilities in Crawfordsville



KALONA CRITICAL FACILITIES

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

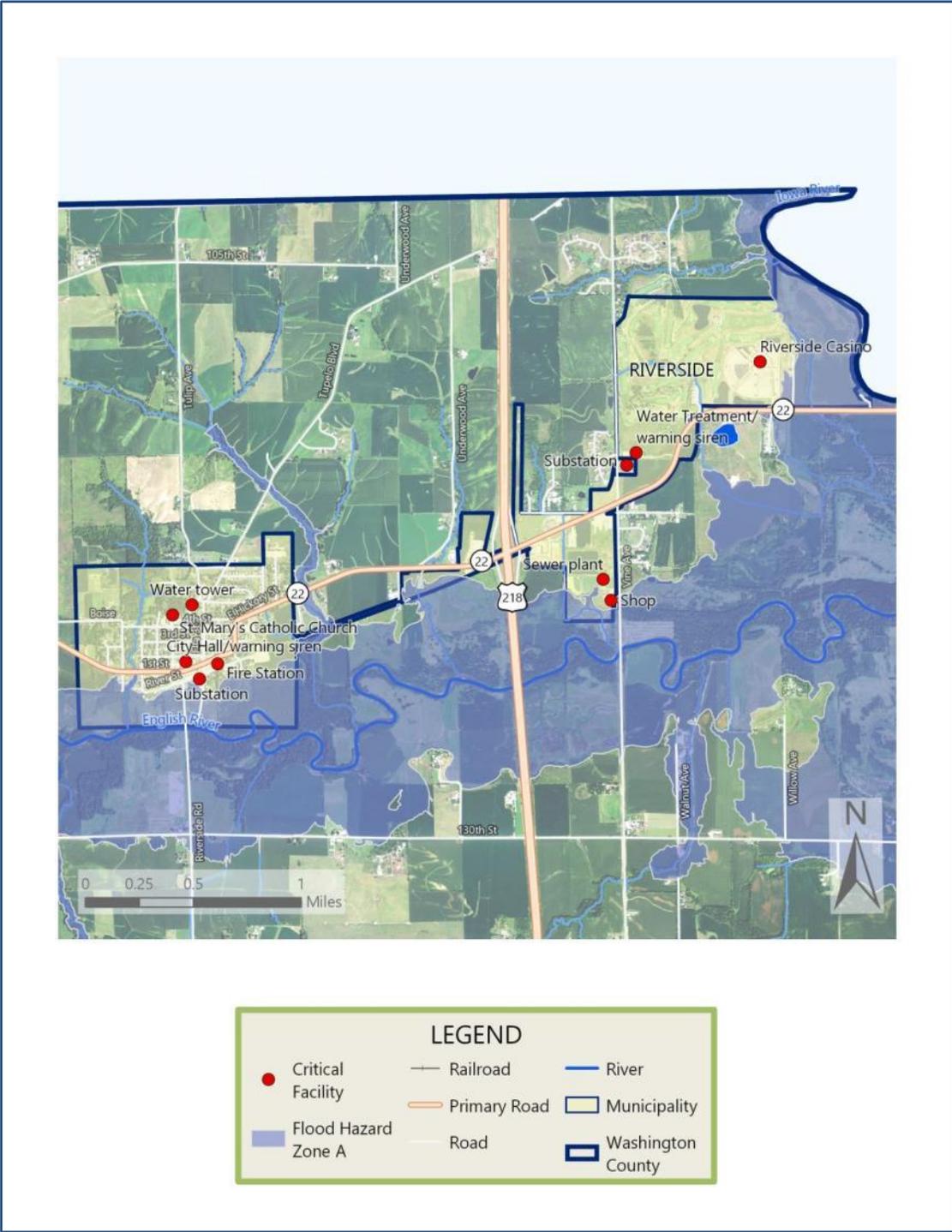
Map 38: Specific Critical Facilities in Kalona



RIVERSIDE CRITICAL FACILITIES

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

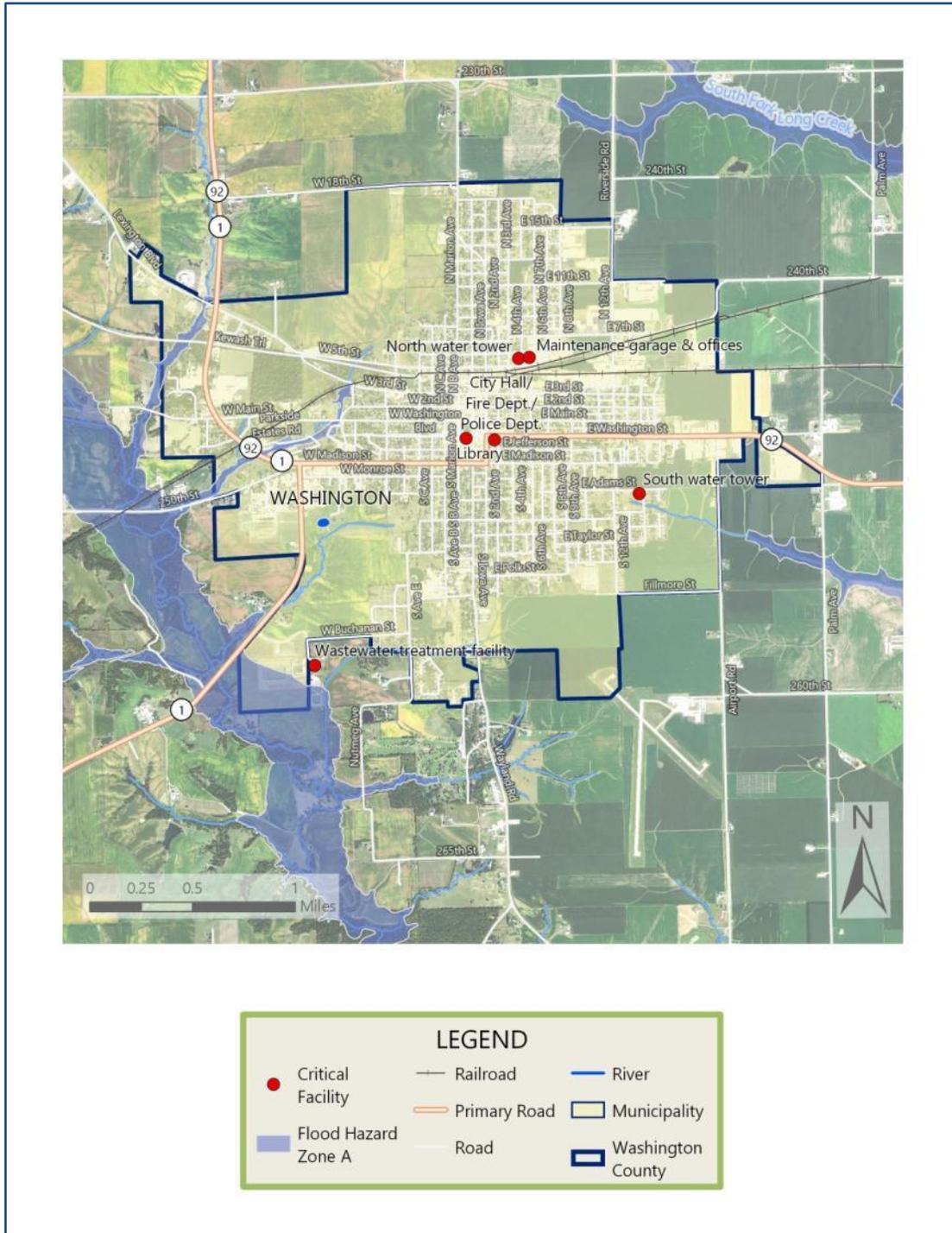
Map 39: Specific Critical Facilities in Riverside



WASHINGTON CRITICAL FACILITIES

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

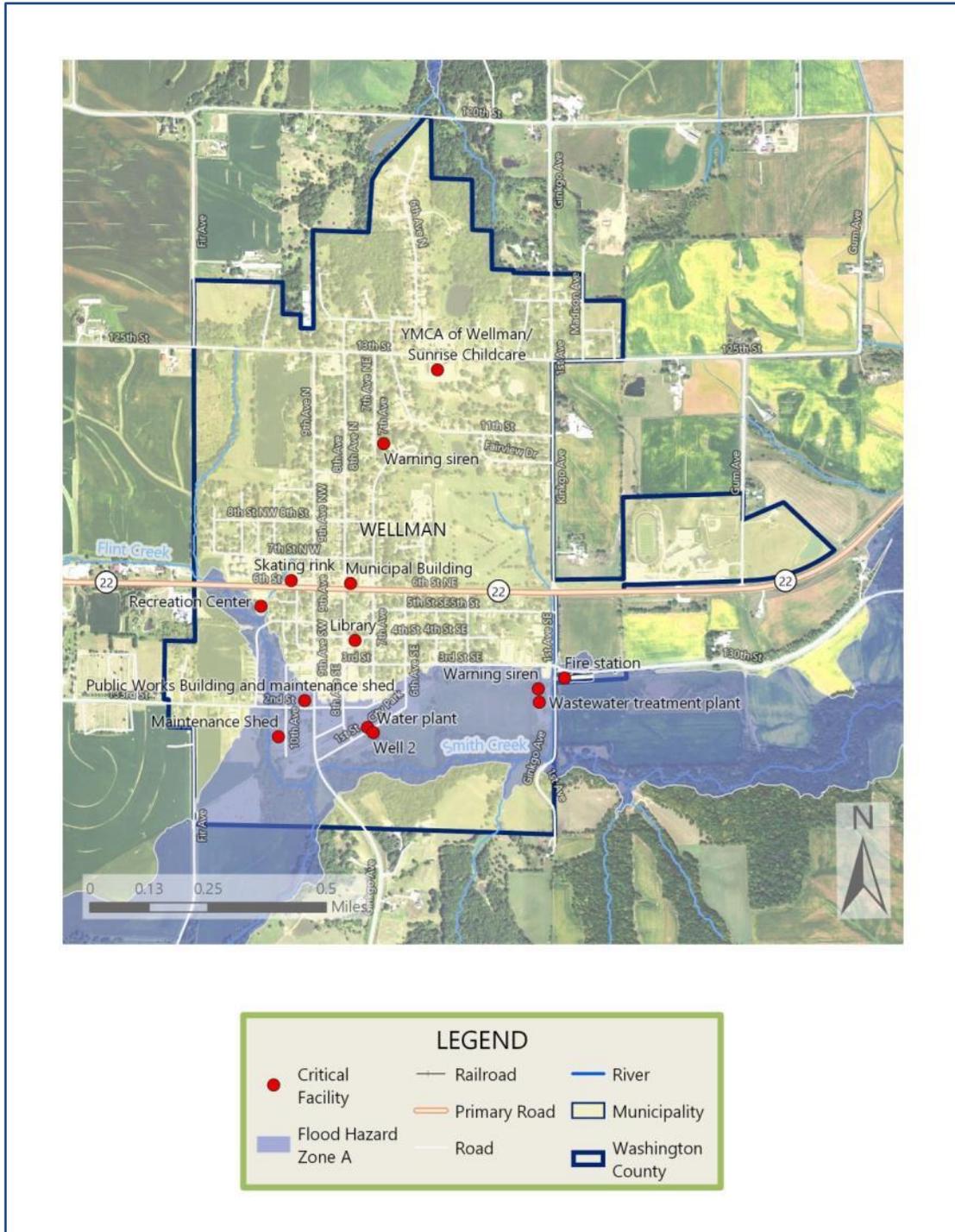
Map 40: Specific Critical Facilities in Washington



WELLMAN CRITICAL FACILITIES

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

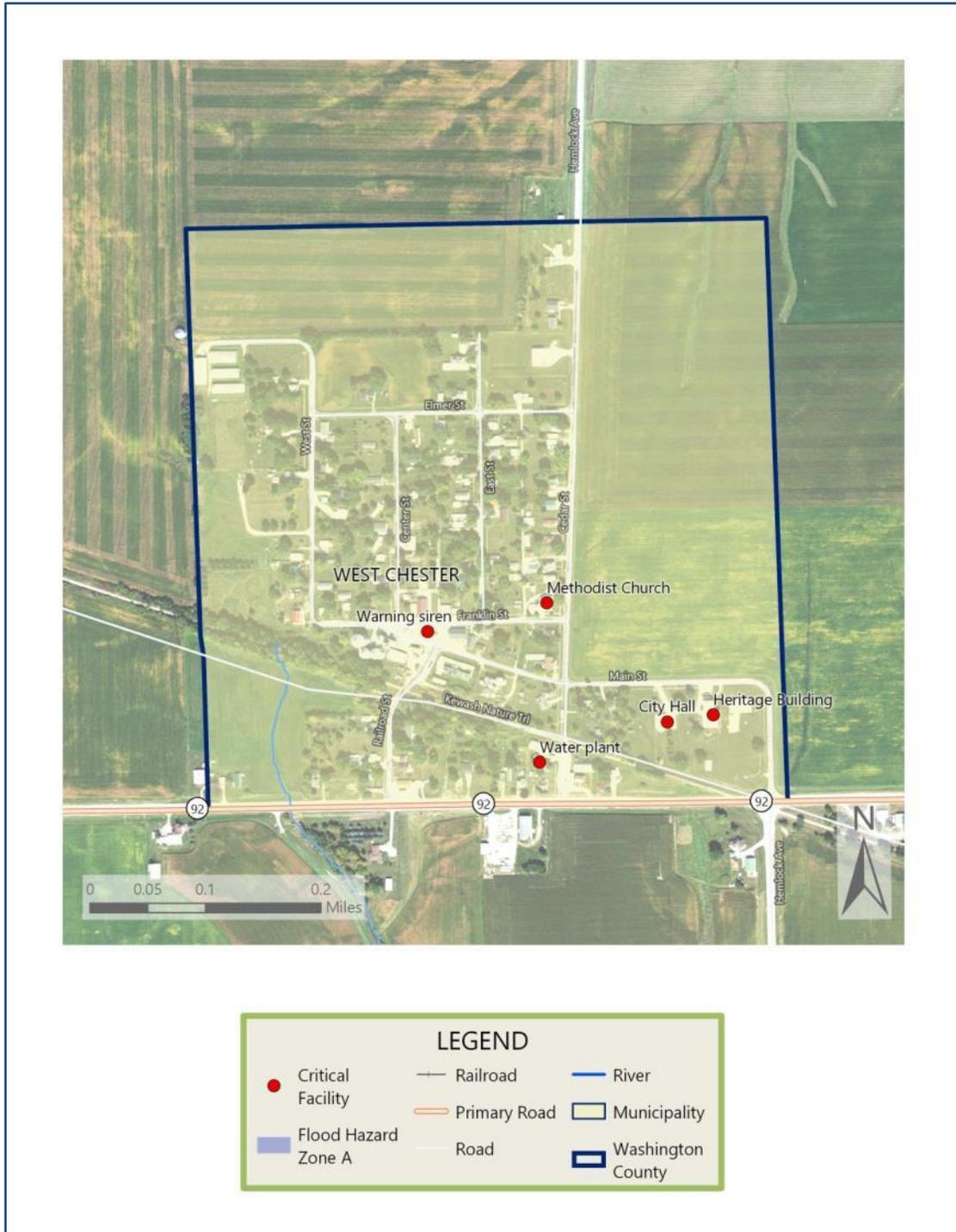
Map 41: Specific Critical Facilities in Wellman



WEST CHESTER CRITICAL FACILITIES

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In West Chester, all city property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 42.

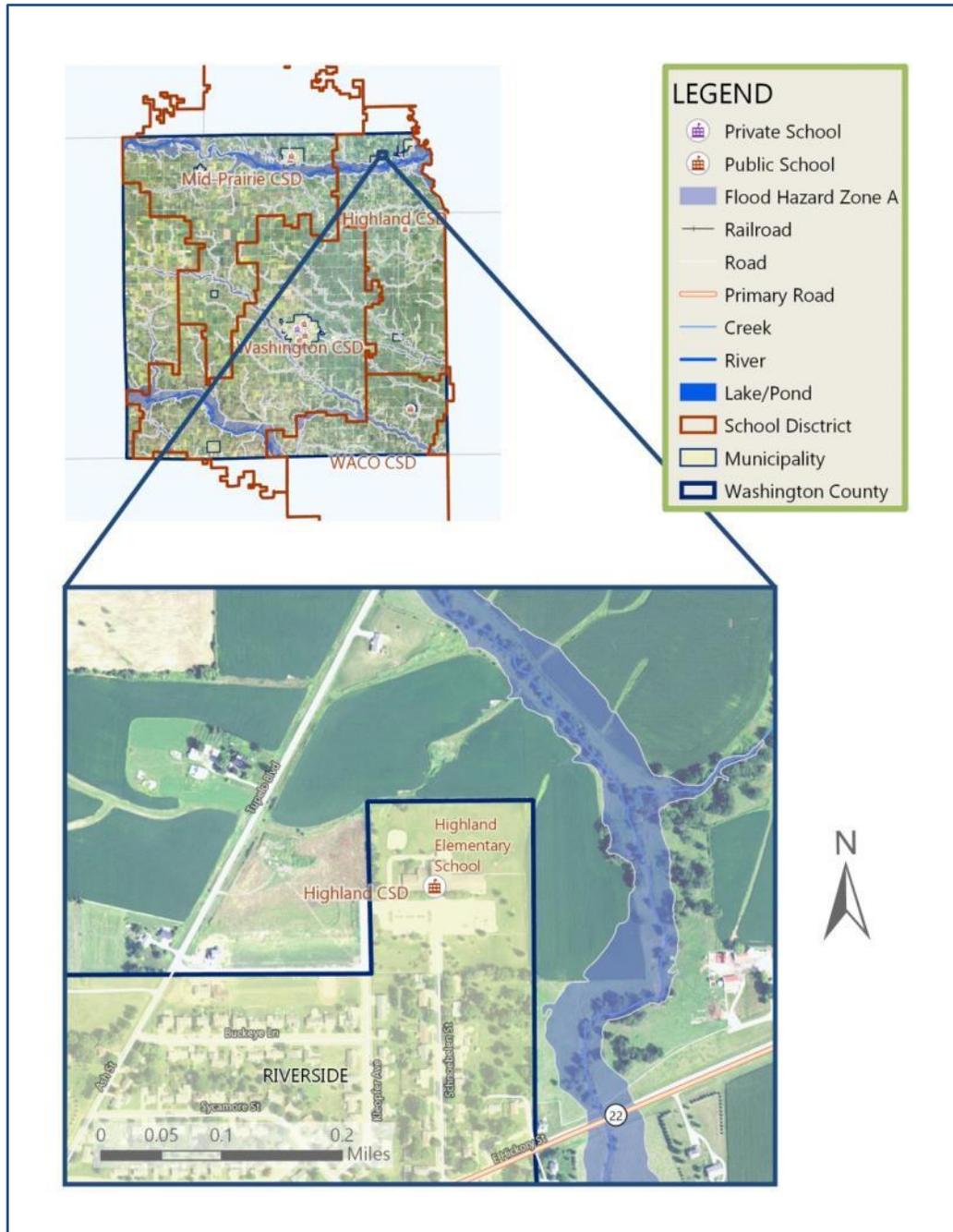
Map 42: Specific Critical Facilities in West Chester



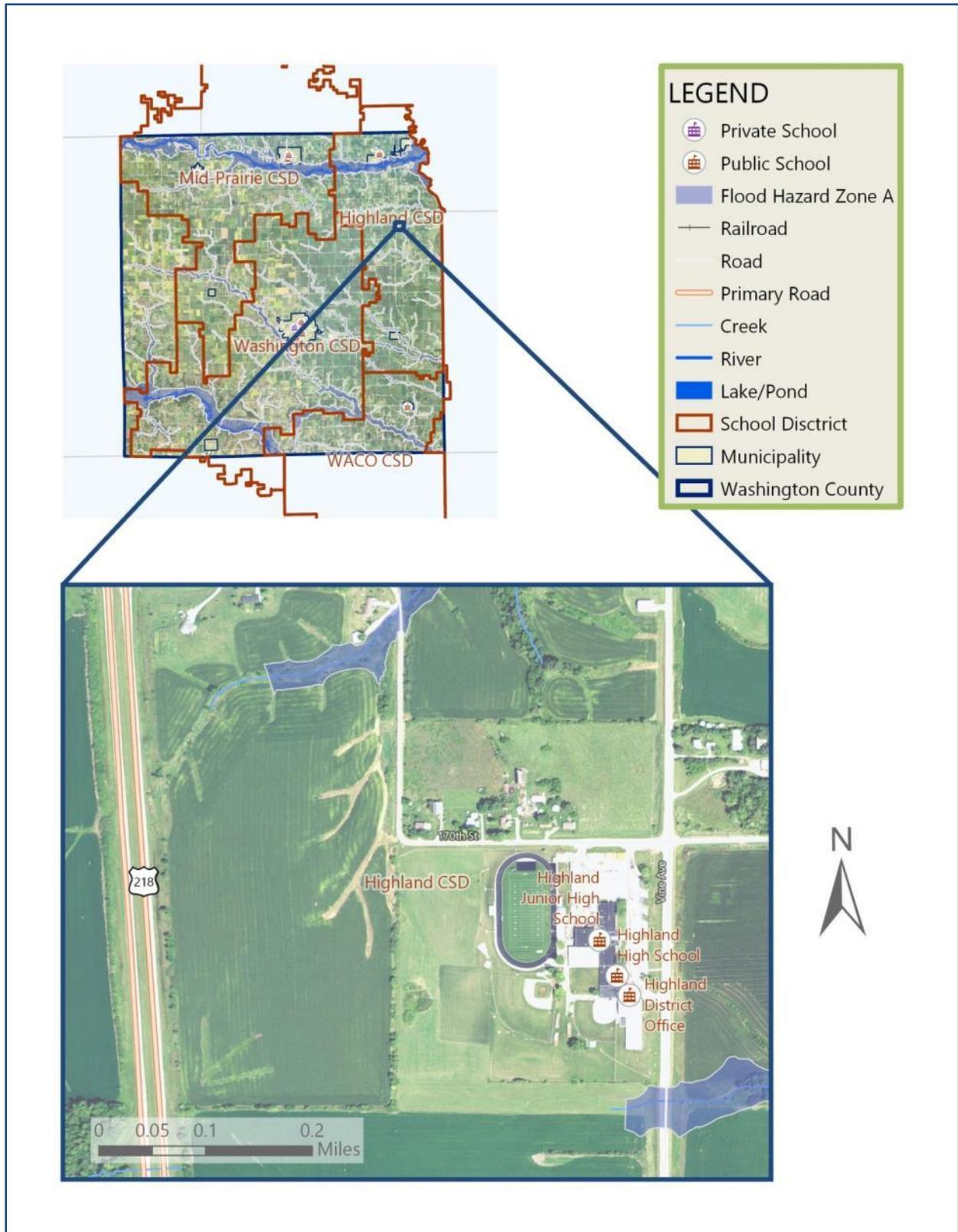
HIGHLAND COMMUNITY SCHOOL DISTRICT CRITICAL FACILITIES

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In the Highland Community School District (CSD), all district property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 43 and Map 44.

Map 43: Specific Critical Facilities in Highland CSD (north)



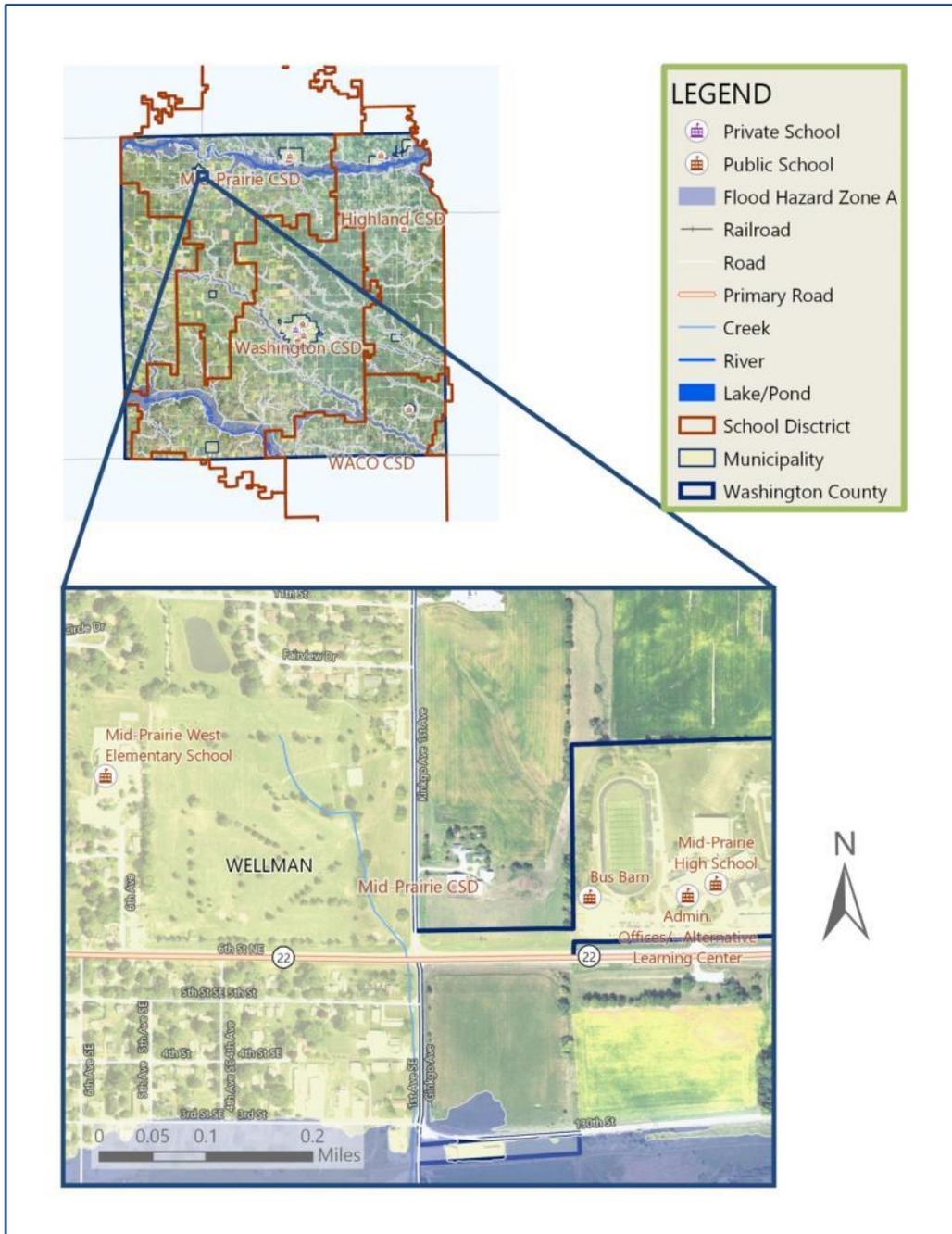
Map 44: Specific Critical Facilities in Highland CSD (south)



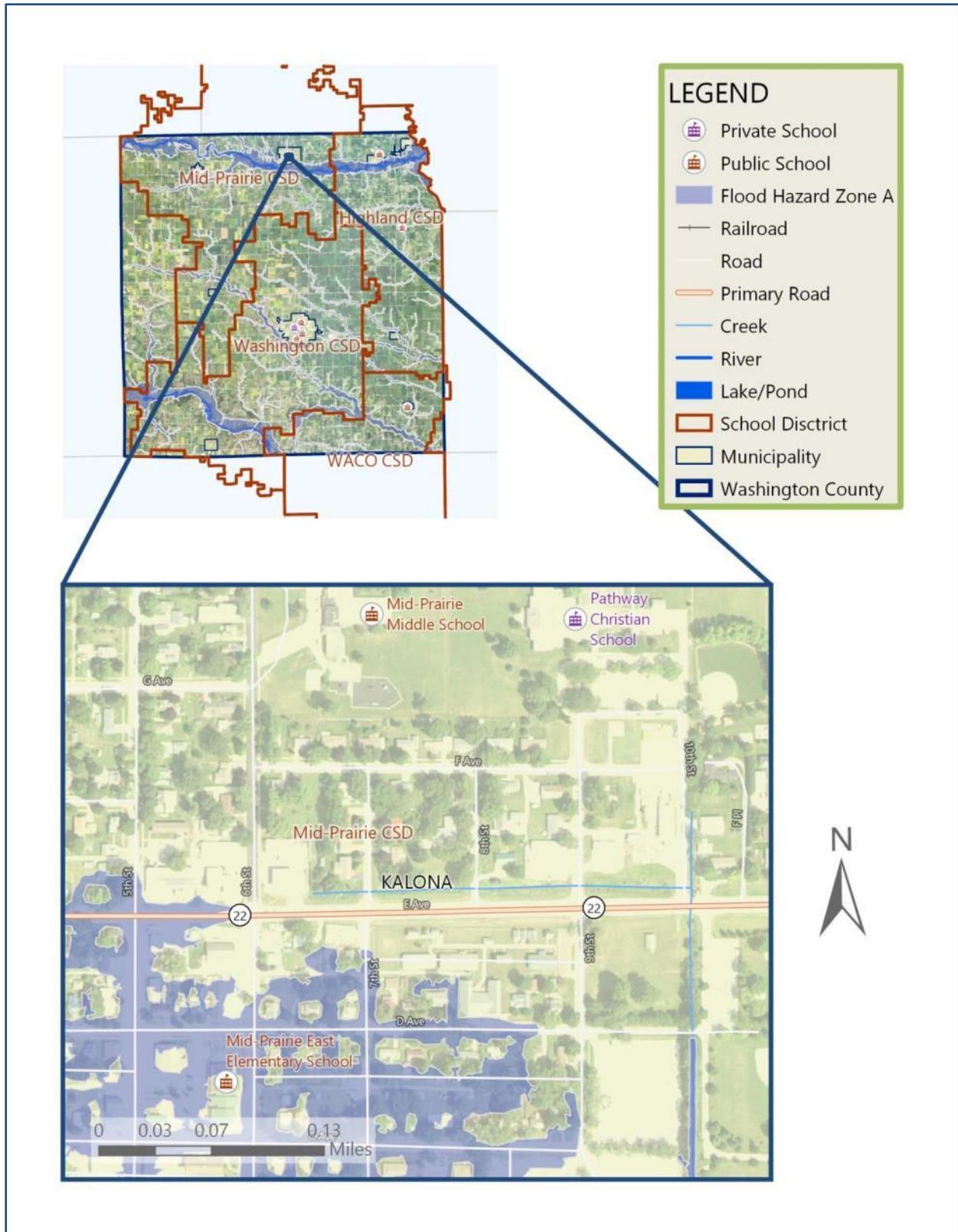
MID-PRAIRIE COMMUNITY SCHOOL DISTRICT CRITICAL FACILITIES

Critical facilities are the buildings, facilities, and infrastructure that provide essential services to the residents and businesses in the community. In the Mid-Prairie Community School District, all district property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 45 and Map 46.

Map 45: Specific Critical Facilities in Mid-Prairie CSD (west)



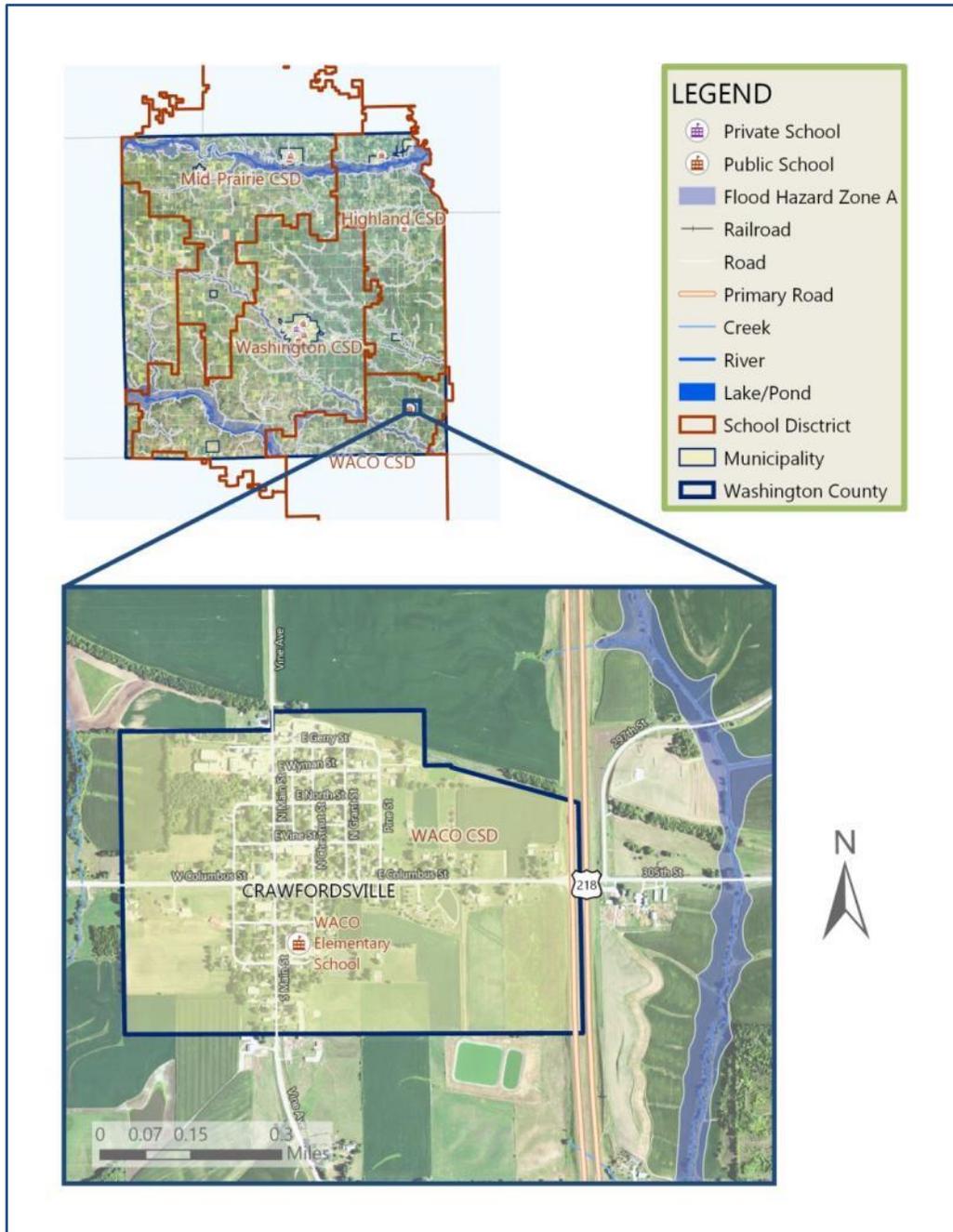
Map 46: Specific Critical Facilities in Mid-Prairie CSD (east, and Pathway Christian School)



WACO 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 the WACO Community School District, all district property and infrastructure are considered critical facilities. WACO CSD has one facility in Washington County, refer to Map 47.

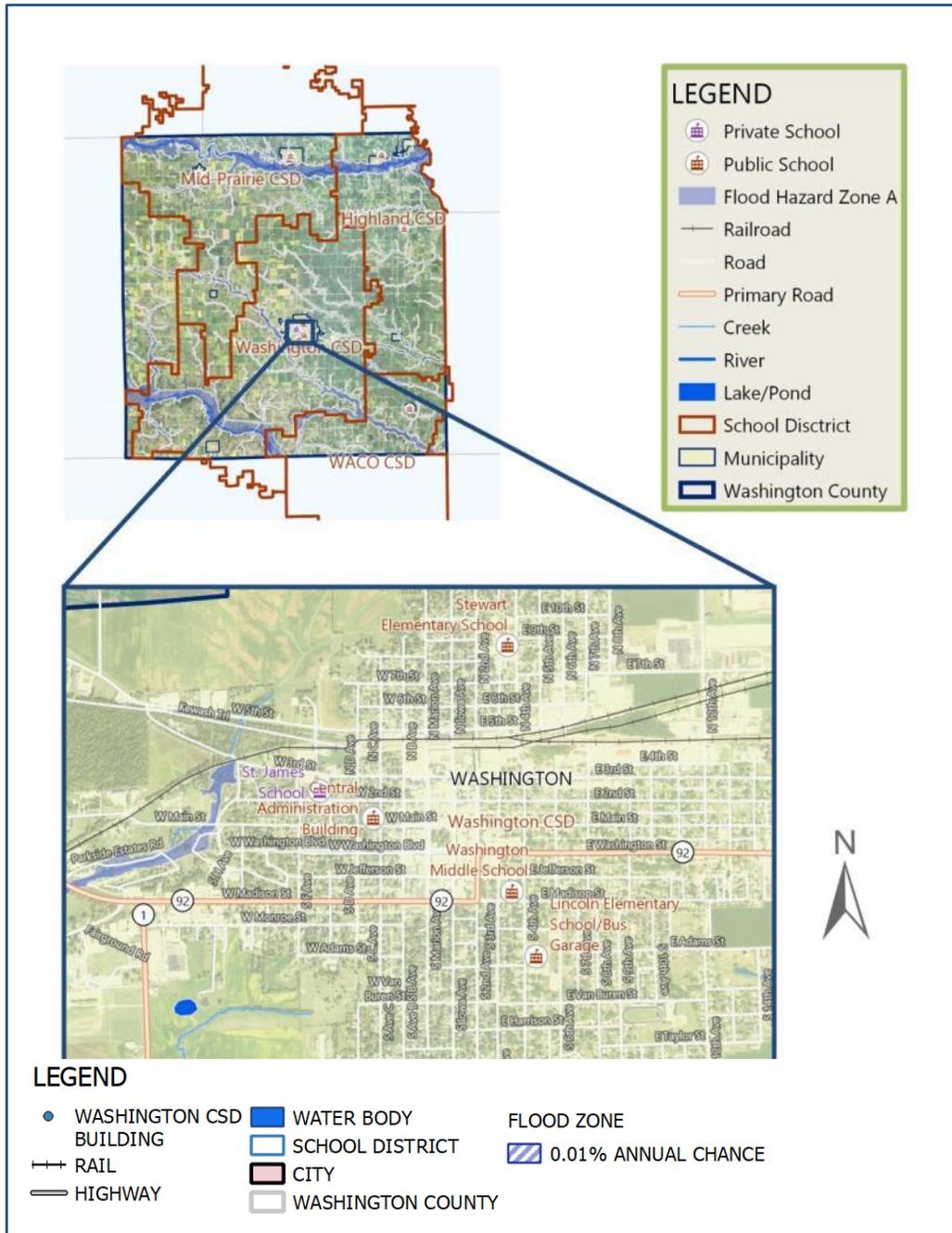
Map 47: Specific Critical Facilities in WACO CSD



WASHINGTON 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 the Mid-Prairie Community School District, all district property and infrastructure are considered critical facilities. For specific critical facilities, refer to Map 48.

Map 48: Specific Critical Facilities in Washington CSD (and St. James School)



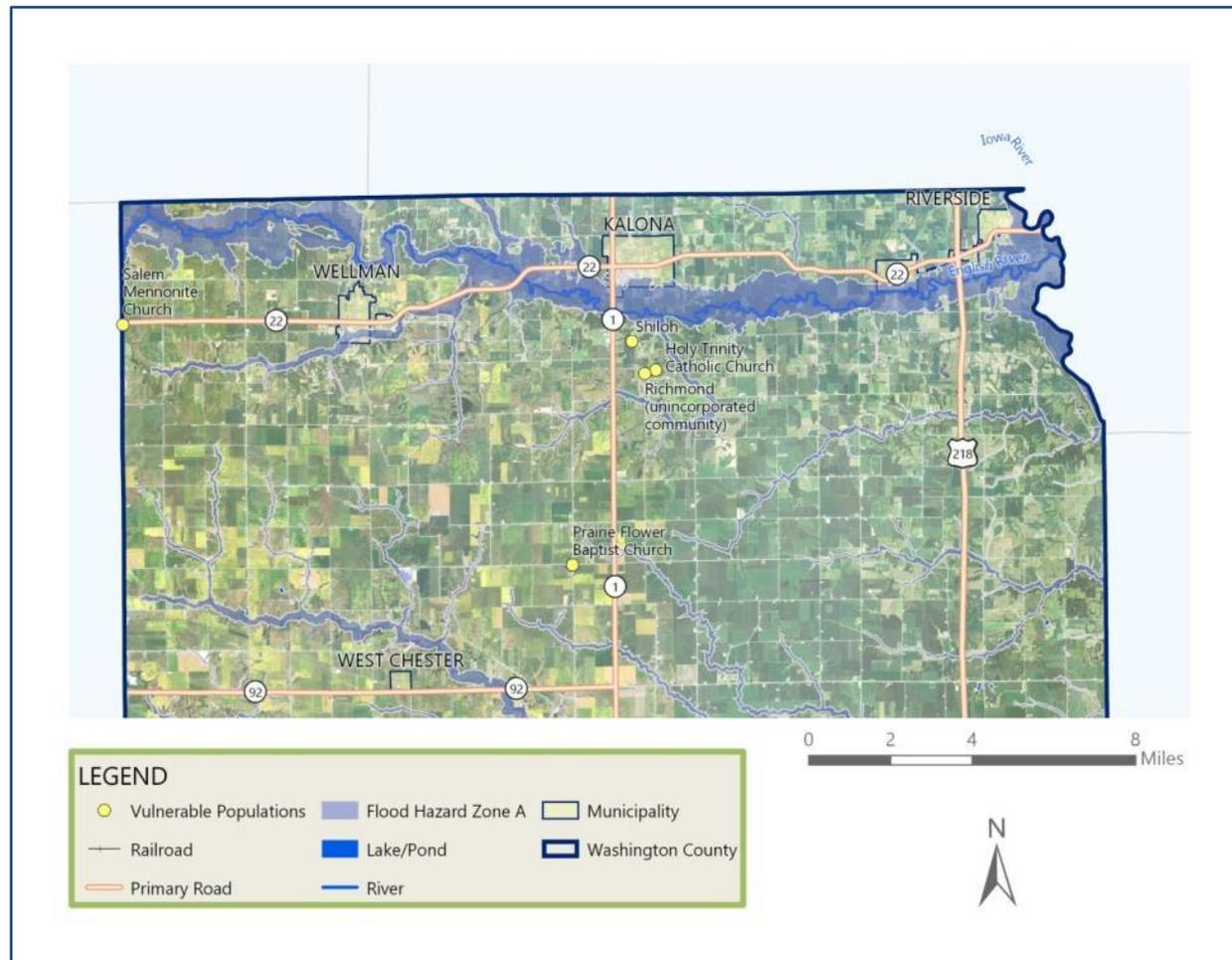
Vulnerable Populations

During and after a hazard event, parts of the population may be less mobile, more susceptible to extended exposure, or less able to respond appropriately to a threat. Hazard mitigation plans consider these vulnerable populations, and examples include the elderly, ill, or disabled living in their home. In many communities throughout the county, there are also facilities that regularly host large vulnerable populations, including retirement facilities, long-term care facilities, daycares, schools, etc. In each jurisdiction, the planning committee identified vulnerable populations within their community, which are displayed in this section. Crawfordsville and West Chester did not identify any vulnerable populations. All schools host vulnerable populations regularly, and are shown in the Critical Facilities section starting on page 164. The vulnerable populations maps include the flood zone layer because it is the only mapped hazard that scored a priority level 1 in the countywide risk assessment. For the school districts, the critical facilities and vulnerable populations facilities are the same; refer to Map 43 to Map 48.

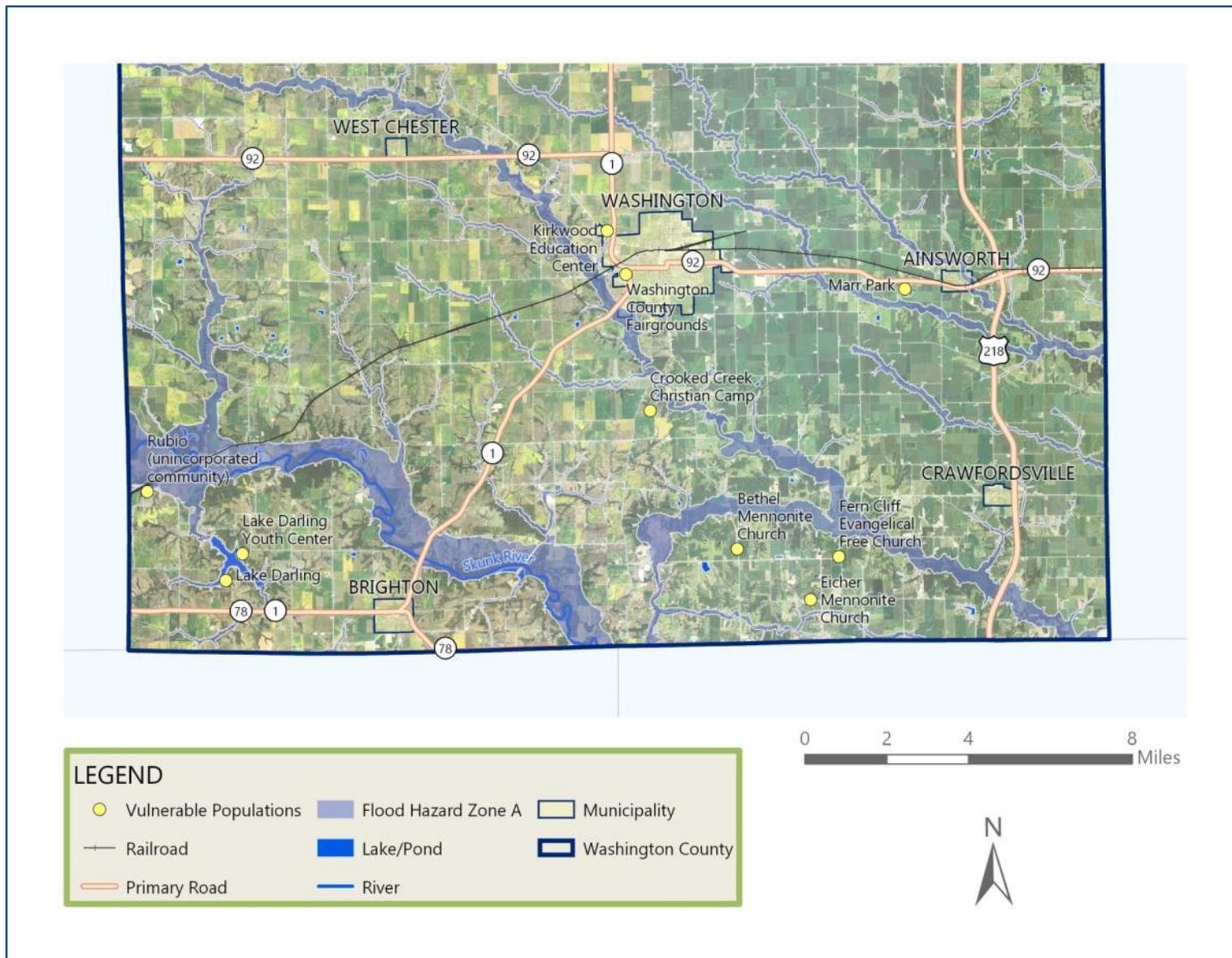
WASHINGTON COUNTY VULNERABLE POPULATIONS

The Washington County 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 49 and Map 50.

Map 49: Specific Vulnerable Populations in Washington County (north)



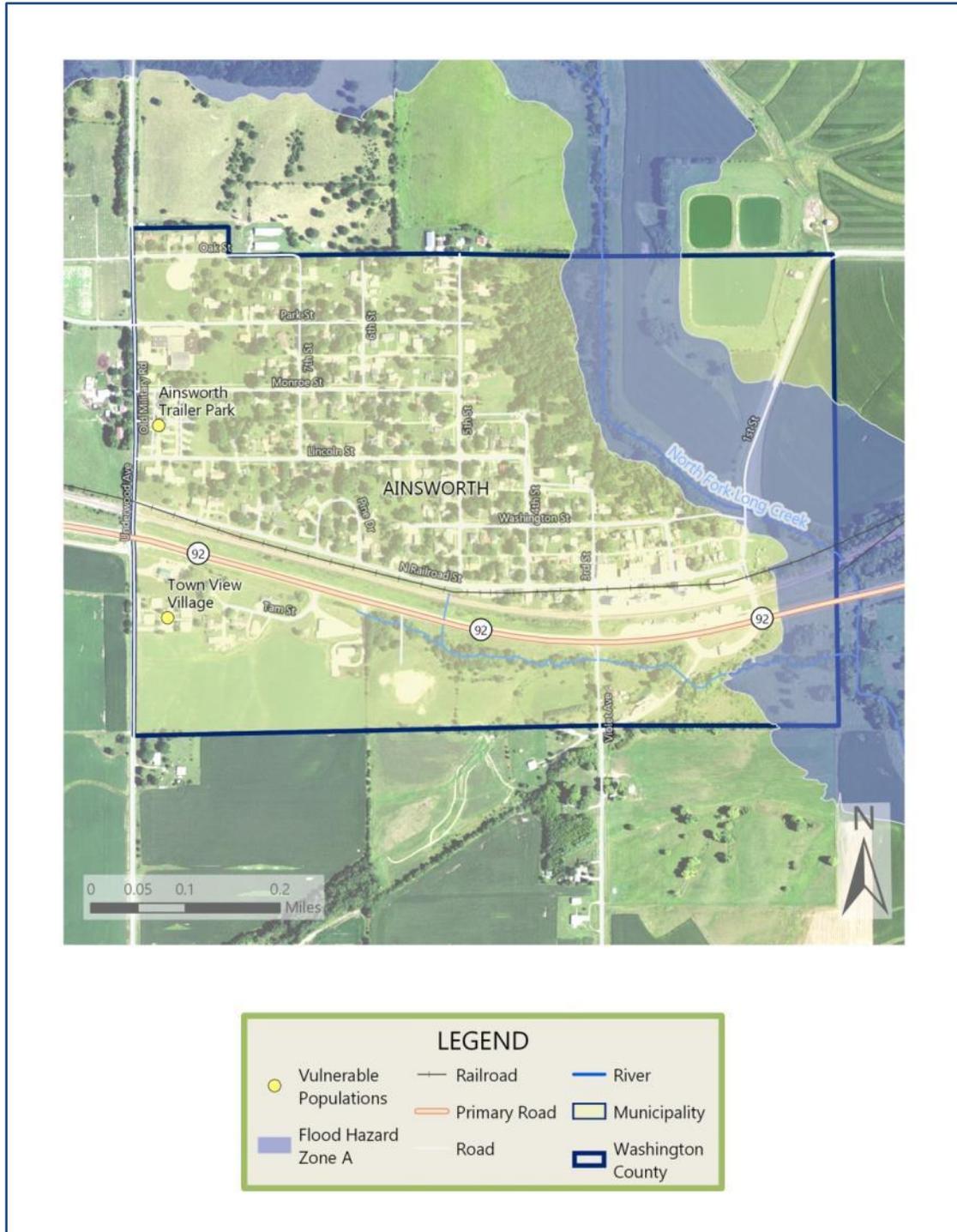
Map 50: Specific Vulnerable Populations in Washington County (south)



AINSWORTH VULNERABLE POPULATIONS

The Ainsworth 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 51.

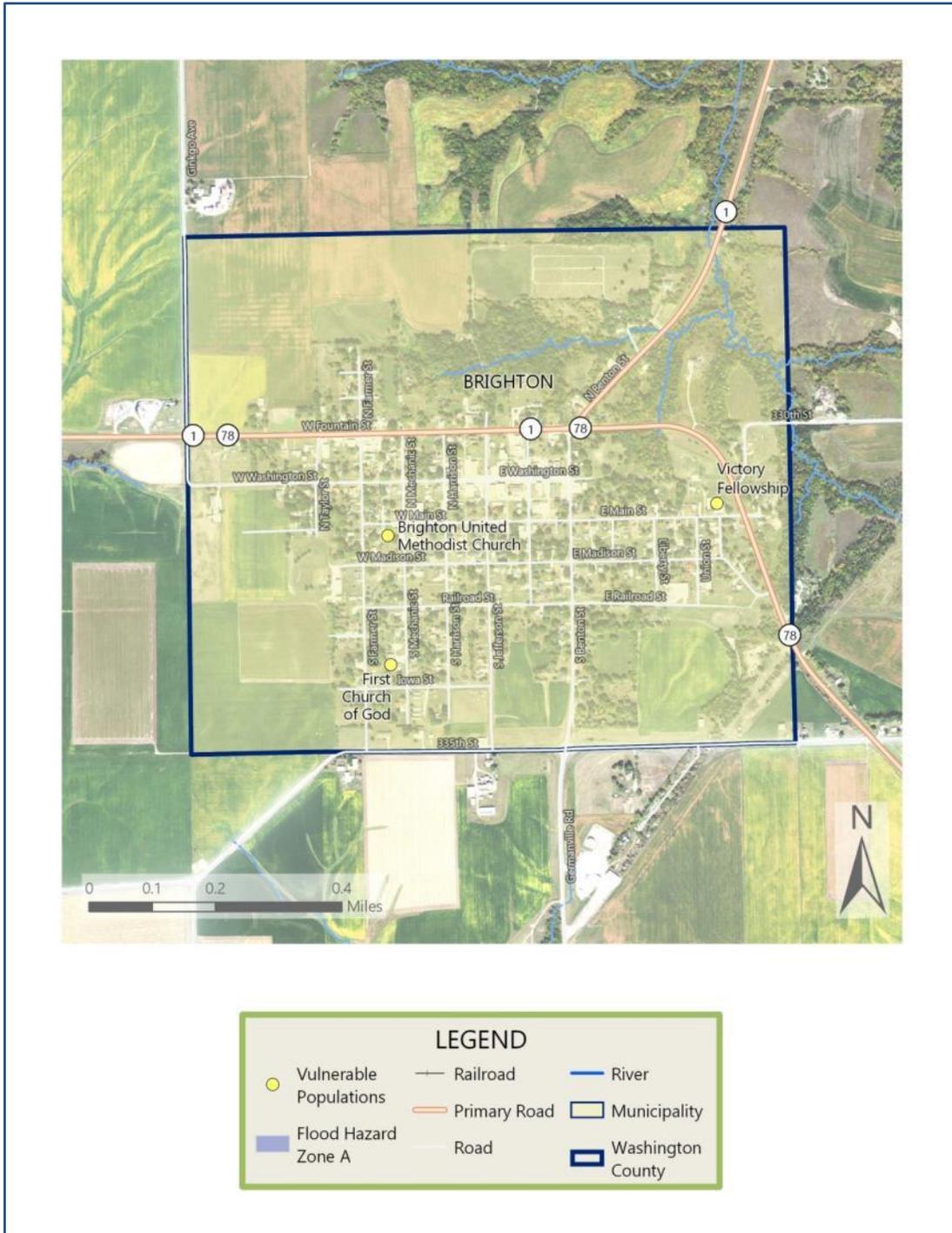
Map 51: Specific Vulnerable Populations in Ainsworth



BRIGHTON VULNERABLE POPULATIONS

The Brighton 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 52.

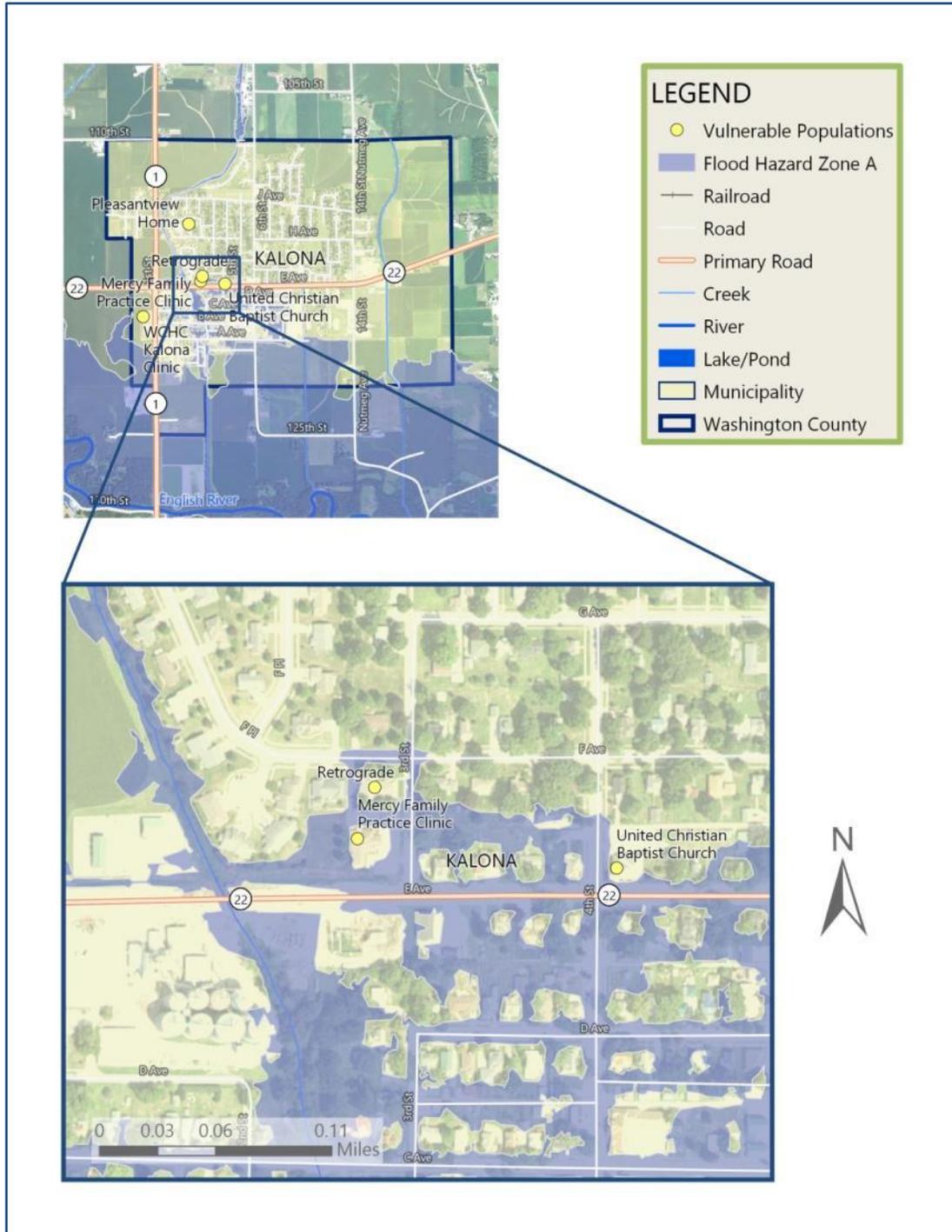
Map 52: Specific Vulnerable Populations in Brighton



KALONA VULNERABLE POPULATIONS

The Kalona 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 53.

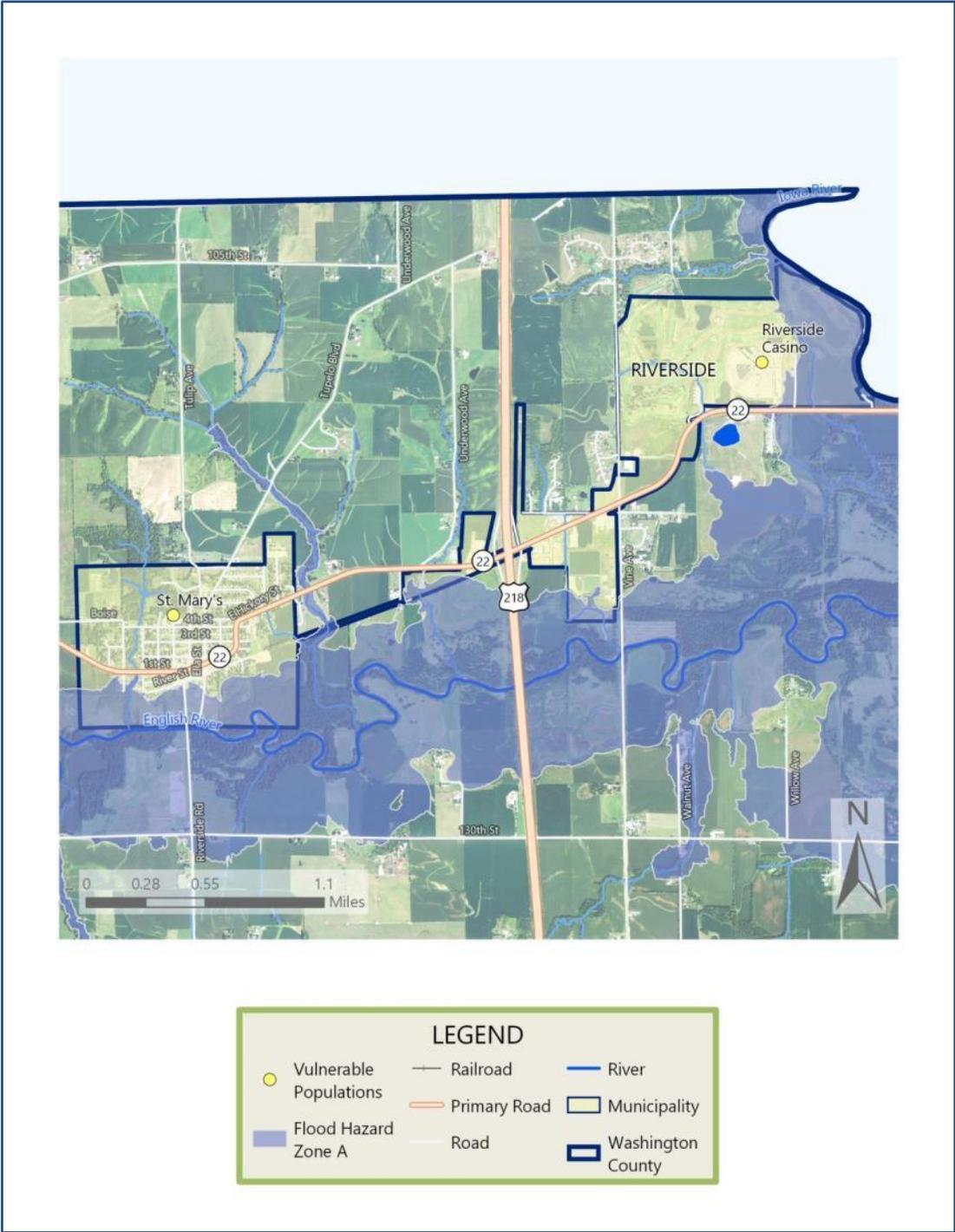
Map 53: Kalona Vulnerable Populations



RIVERSIDE VULNERABLE POPULATIONS

The Riverside 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 54.

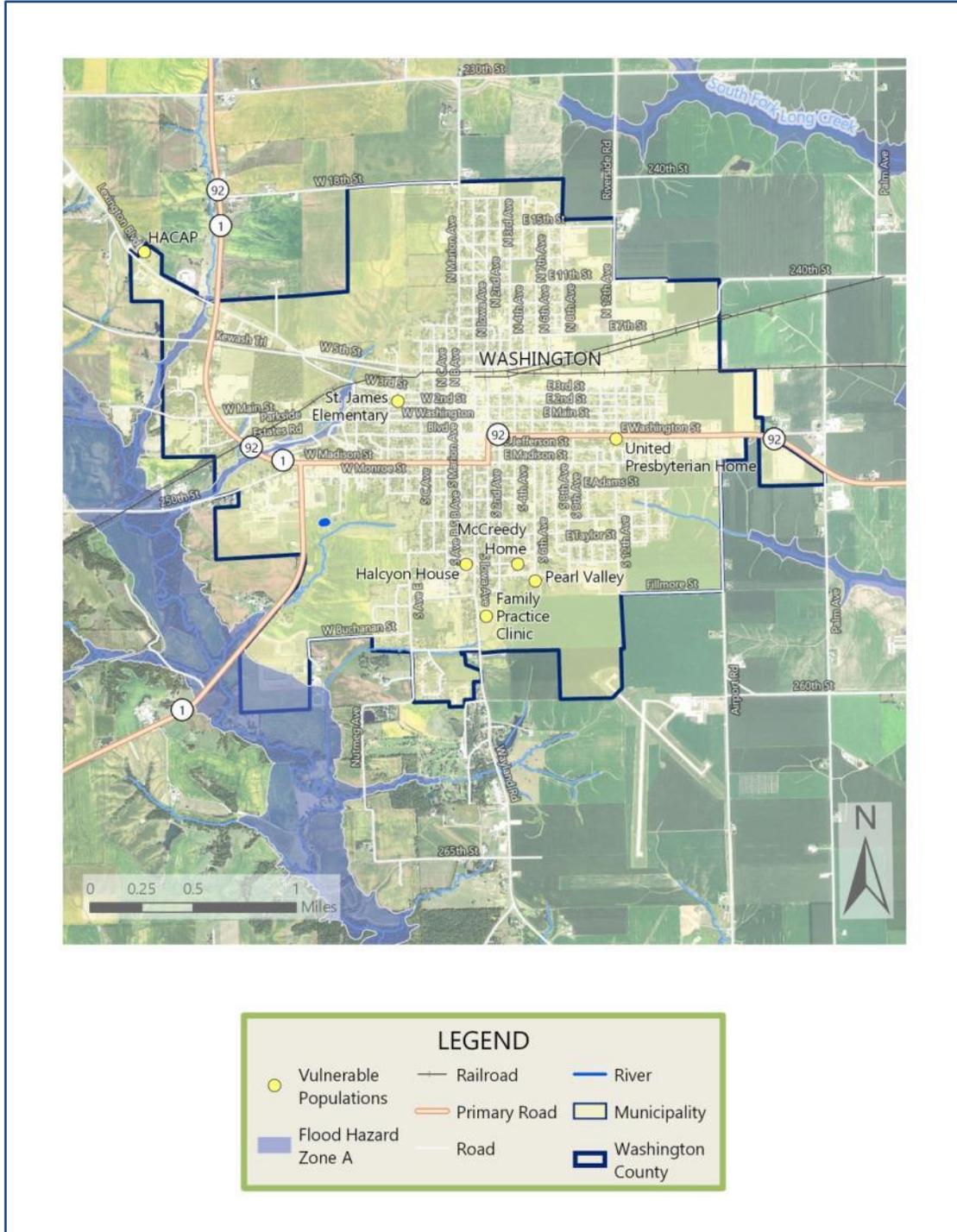
Map 54: Specific Vulnerable Populations in Riverside



WASHINGTON VULNERABLE POPULATIONS

The Washington 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 55.

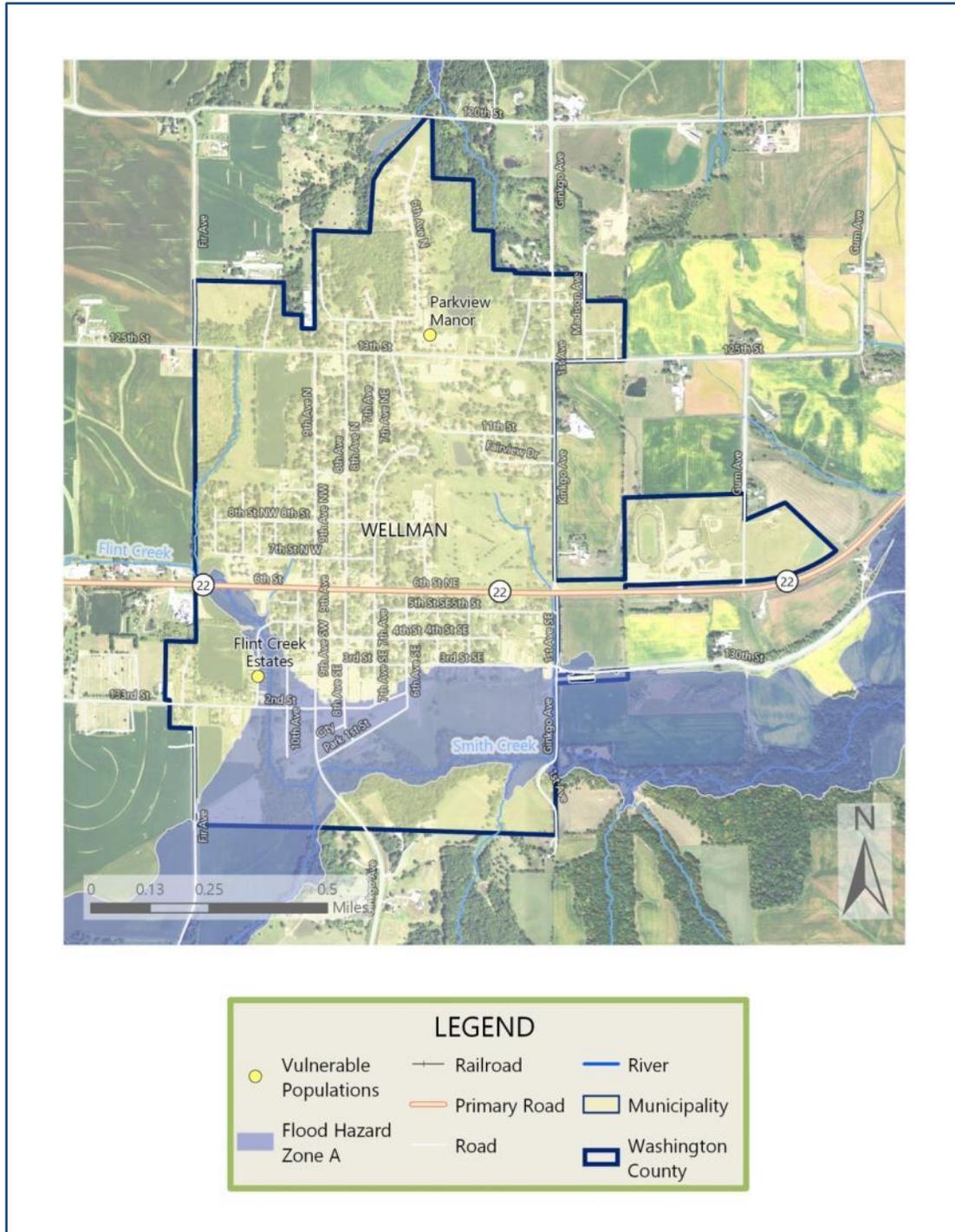
Map 55: Specific Vulnerable Populations in Washington



WELLMAN VULNERABLE POPULATIONS

The Wellman 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 56.

Map 56: Specific Vulnerable Populations in Wellman



Operations and Resources

Local governments in Iowa are subject to Iowa Code, which grants 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.

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.

WASHINGTON COUNTY OPERATIONS AND RESOURCES

Washington 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 50.

Table 50: Washington County Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Board of Supervisors* • Board of Adjustment • Conservation Board • Land Use & Planning Commission* • Washington County Emergency Management Commission* • E911 Commission* • Communications Commission*
Staff and Departments	<ul style="list-style-type: none"> • Assessor • Attorney • Auditor* • Building & Grounds* • Communications/E911* • Conservation • Engineering & Secondary Roads* • Environmental Health* • General Assistance • GIS Services* • Information Technology* • Mental Health & Disability Services (MHDS) • Outreach • Planning & Development* • Public Health & Home Care* • Recorder • Recycling Center • Sheriff* • Treasurer • Veterans Affairs • Washington County Emergency Management Agency* • Weed Commissioner
County Services	<ul style="list-style-type: none"> • Alerts* • Conservation Services • Emergency Services* • Engineering & Secondary Roads* • Financial Services • Floodplain Management* • GIS Services* • Rural Solid Waste and Recycling Center • Health Services • Veterans Affairs

Table 50: Washington County Operations and Resources, continued

Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Emergency Medical Service* • Fire protection mutual aid agreements* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO)—household hazardous materials* • Solid waste and recycling operations • Storm debris removal* • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Washington County Code of Ordinances* • Comprehensive Plan* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Washington County Hazard Mitigation Plan 2013 • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan* • Coordinate with Iowa Department of Natural Resources*
Local Organizations	<ul style="list-style-type: none"> • Mid-Prairie Council of Churches • Bethel Presbyterian Church • Church of the Holy Trinity • Eicher Mennonite Church • Fern Cliff Evangelical Free Church • Prairie Flower Baptist Church • Salem Mennonite Church • Shiloh
Financial and Other Resources	<ul style="list-style-type: none"> • County budget* • Bonds • Grants* • 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 county’s mitigation strategy.

AINSWORTH OPERATIONS AND RESOURCES

Ainsworth 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 51.

Table 51: Ainsworth Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Washington County Emergency Management Commission* • E911 Commission*
Staff and Departments	<ul style="list-style-type: none"> • City Clerk* • Maintenance*
City Services	<ul style="list-style-type: none"> • Clean and secure water supply* • Wastewater management and treatment* • Ainsworth Fire Department* • Street maintenance and improvements* • Vegetation and tree management in public areas* • Snow removal* • Outdoor warning siren system* • City burn pile
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Washington County Sheriff’s Department* • Emergency Medical Service* • Fire protection mutual aid agreements* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Storm debris removal • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Ainsworth Code of Ordinances* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Washington County Hazard Mitigation Plan 2013* • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency* • Coordinate with Washington County Public Health* • Coordinate with Iowa Department of Natural Resources*
Local Organizations	<ul style="list-style-type: none"> •
Financial and Other Resources	<ul style="list-style-type: none"> • City budget* • Bonds • Grants* • 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 county’s mitigation strategy.

BRIGHTON OPERATIONS AND RESOURCES

Brighton 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 if feasible. See Table 52.

Table 52: Brighton Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Clerk, Deputy Clerk* • Fire Chief* • Washington County Emergency Management Commission*
Staff and Departments	<ul style="list-style-type: none"> • Fire Department* • Maintenance and Construction* • Waste Water Treatment Plant* • Water Plant*
City Services	<ul style="list-style-type: none"> • Clean and secure water supply* • Fire protection* • Outdoor warning siren system* • Street maintenance and improvements* • Storm sewer maintenance and improvements* • Vegetation and tree management in public areas* • Wastewater management and treatment* • Snow removal* • Storm debris removal (some service provided by Fire Department)*
Contracted or Agreement Services	<ul style="list-style-type: none"> • Street and storm sewer improvements* • Washington County Emergency Management Agency* • Washington County Sheriff's Office* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO) • Washington County Ambulance* • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Brighton Code of Ordinances* • Washington County Hazard Mitigation Plan 2013* • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan • Coordinate with Washington County Emergency Management Agency* • Coordinate with Washington County Public Health* • Coordinate with Iowa Department of Natural Resources*
Financial and Other Resources	<ul style="list-style-type: none"> • City budget* • Bonds • Grants* • 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 county's mitigation strategy.

CRAWFORDSVILLE OPERATIONS AND RESOURCES

Crawfordsville 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 if feasible. See Table 53.

Table 53: Crawfordsville Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Washington County Emergency Management Commission
Staff and Departments	<ul style="list-style-type: none"> • City Clerk*
City Services	<ul style="list-style-type: none"> • Fire protection* • Clean and secure water supply* • Wastewater management and treatment* • Storm sewer maintenance and improvements* • Outdoor warning siren system* • Street maintenance and improvements* • Snow removal*
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Fire protection mutual aid agreements* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Crawfordsville Code of Ordinances* • Washington County Hazard Mitigation Plan 2013* • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan • Coordinate with Washington County Emergency Management Agency • Coordinate with Washington County Public Health • Coordinate with Iowa Department of Natural Resources
Financial and Other Resources	<ul style="list-style-type: none"> • City budget • Bonds • Grants • 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 county's mitigation strategy.

KALONA OPERATIONS AND RESOURCES

Kalona 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 if feasible. See Table 54.

Table 54: Kalona Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Washington County Emergency Management Commission* • Board of Adjustment • Building Code Board of Appeals • Library Board of Trustees • Parks and Recreation Board • Planning and Zoning Commission* • Tax Increment Finance Board
Staff and Departments	<ul style="list-style-type: none"> • City Administrator* • City Clerk • Water and Waste Water Superintendent* • Streets Superintendent* • Facilities Superintendent* • General Laborer*
City Services	<ul style="list-style-type: none"> • Clean and secure water supply* • Wastewater management and treatment* • Kalona Fire Department* • Kalona First Responders* • Kalona Public Library • Street maintenance and improvements* • Vegetation and tree management in public areas* • Snow removal* • Outdoor warning siren system* • Sharon Hill Cemetery
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Washington County Sheriff’s Department* • Emergency Medical Service* • Fire protection mutual aid agreements* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Storm debris removal* • Muscatine Fire Department for countywide HAZMAT response*

Table 54: Kalona Operations and Resources, continued

Policies, Programs, and Plans	<ul style="list-style-type: none"> • Kalona Code of Ordinances* • Comprehensive Plan* • Zoning Code* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Community Rating System participant* • Washington County Hazard Mitigation Plan 2013* • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency* • Coordinate with Washington County Public Health* • Coordinate with Iowa Department of Natural Resources*
Local Organizations	<ul style="list-style-type: none"> •
Financial and Other Resources	<ul style="list-style-type: none"> • City budget* • Bonds* • Grants* • 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 county’s mitigation strategy.

RIVERSIDE OPERATIONS AND RESOURCES

Riverside 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 if feasible. See Table 55.

Table 55: Riverside Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Washington County Emergency Management Commission* • Planning and Zoning Commission
Staff and Departments	<ul style="list-style-type: none"> • City Clerk* • Utilities* • Parks and Streets* • Water/Waste Water
City Services	<ul style="list-style-type: none"> • Clean and secure water supply* • Wastewater management and treatment* • Riverside Fire Department* • Riverside First Responders* • Street maintenance and improvements* • Vegetation and tree management in public areas* • Snow removal* • Outdoor warning siren system* • Yard waste management • Cemetery maintenance
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Washington County Sheriff’s Department* • Emergency Medical Service* • Fire protection mutual aid agreements* • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Storm debris removal* • Kalona Public Library • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Riverside Code of Ordinances* • Comprehensive Plan* • Zoning Code* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency* • Coordinate with Washington County Public Health* • Coordinate with Iowa Department of Natural Resources*

Table 55: Riverside Operations and Resources, continued

Local Organizations	<ul style="list-style-type: none"> • St. Mary's Catholic Church • Trinity United Methodist Church
Financial and Other Resources	<ul style="list-style-type: none"> • City budget* • Bonds • Grants • 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 county's mitigation strategy.

WASHINGTON OPERATIONS AND RESOURCES

Washington 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 if feasible. See Table 56.

Table 56: Washington Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Washington County Emergency Management Commission* • Airport Commission • Planning and Zoning Commission • Board of Adjustment • Forestry Commission* • Library Board of Trustees • City Historic Preservation Commission • Cable Television Commission • Washington Tree Beautification Committee • Park Board
Staff and Departments	<ul style="list-style-type: none"> • Administration and Finance* • City Cemeteries • Building and Zoning* • Developmental Services* • Fire* • Maintenance and Construction* • Parks and Recreation • Police* • Public Library • Rental Inspections* • Waste Water Treatment Plant* • Water Plant*
City Services	<ul style="list-style-type: none"> • Clean and secure water supply • Fire protection and inspections • Outdoor warning siren system • Street maintenance and improvements • Police protection and education • Public Library • Storm sewer maintenance and improvements • Vegetation and tree management in public areas • Wastewater management and treatment • Snow removal • Storm debris removal
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency • Fire protection mutual aid agreements • East Central Iowa Council of Governments (ECICOG) • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response

Table 56: Washington Operations and Resources, continued

<p>Policies, Programs, and Plans</p>	<ul style="list-style-type: none"> • Washington Code of Ordinances* • Comprehensive Plan 2012* • Washington County Hazard Mitigation Plan 2013* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Comprehensive Regional Development Strategy (CRDS)* • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency • Coordinate with Washington County Public Health • Coordinate with Iowa Department of Natural Resources
<p>Financial and Other Resources</p>	<ul style="list-style-type: none"> • City budget* • Bonds • Grants • 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 county’s mitigation strategy.

WELLMAN OPERATIONS AND RESOURCES

Wellman 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 if feasible. See Table 57.

Table 57: Wellman Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Board of Adjustment* • E911 Board* • Planning and Zoning Commission* • Library Board • Senior Dining Commission • Washington County Communications Commission* • Washington County Emergency Management Commission*
Staff and Departments	<ul style="list-style-type: none"> • Administration* • Public Works* • Utilities (gas and water)* • Fire Department (volunteer)*
City Services	<ul style="list-style-type: none"> • Clean and secure water supply* • Wastewater management and treatment* • Street maintenance and improvements* • Snow removal* • Vegetation and tree management in public areas* • Storm debris removal* • Outdoor warning siren system* • First responders*
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Washington County Sheriff’s Department* • Wellman Volunteer Ambulance* • Fire protection mutual aid agreements* • Wellman Telephone Coop • East Central Iowa Council of Governments (ECICOG)* • Southeast Iowa Multi-County Landfill (SEMCO)* • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • Wellman Code of Ordinances* • Capital Improvement Plan* • Comprehensive plan or others* • Floodplain ordinance and management program* <ul style="list-style-type: none"> ○ National Flood Insurance Program participation ○ Current effective map: 1/16/2013 • Emerald Ash Borer Management Plan* • Comprehensive Regional Development Strategy (CRDS) • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency* • Coordinate with Washington County Public Health • Coordinate with Iowa Department of Natural Resources

Table 57: Wellman Operations and Resources, continued

Financial and Other Resources	<ul style="list-style-type: none">• City budget*• Bonds• Grants• Donations
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*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 county's mitigation strategy.

WEST CHESTER OPERATIONS AND RESOURCES

West Chester 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 if feasible. See Table 58.

Table 58: West Chester Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • Mayor* • City Council* • Treasurer* • Washington County Emergency Management Commission* • E911 Board
Staff and Departments	<ul style="list-style-type: none"> • City Clerk* • Public Works
City Services	<ul style="list-style-type: none"> • Clean and secure water supply • Wastewater management and treatment • Street maintenance and improvements • Vegetation and tree management in public areas • Outdoor warning siren system • West Chester First Responders
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Wellman Fire Department • Washington County Sheriff’s Department • Fire protection mutual aid agreements • Snow removal • East Central Iowa Council of Governments (ECICOG) • Southeast Iowa Multi-County Landfill (SEMCO) • Solid waste and recycling • Storm debris removal • Muscatine Fire Department for countywide HAZMAT response
Policies, Programs, and Plans	<ul style="list-style-type: none"> • West Chester Code of Ordinances* • Washington County Hazard Mitigation Plan 2013* • Comprehensive Regional Development Strategy (CRDS)* • Washington County Emergency Management Plan* • Coordinate with Washington County Emergency Management Agency • Coordinate with Washington County Public Health • Coordinate with Iowa Department of Natural Resources
Financial and Other Resources	<ul style="list-style-type: none"> • City budget* • Bonds • Grants* • 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 county’s mitigation strategy.

HIGHLAND COMMUNITY SCHOOL DISTRICT OPERATIONS AND RESOURCES

Highland 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 if feasible. See Table 59.

Table 59: Highland CSD Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • School Board President • School Board
Staff and Departments	<ul style="list-style-type: none"> • Superintendent* • School Principals* • Administration • English Language Learner (ELL) • Human Resources • Health Services • Library • School Nutrition • Special Education • Technology* • Title 1 • Transportation*
District Services	<ul style="list-style-type: none"> • Instruction • Building maintenance and improvements* • Facilities use & rental • Grounds maintenance* • Snow removal* • Transportation* • Food Service
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Fire protection* • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • School Board Policy* • Emergency Plan* • Weather policies*
Financial and Other Resources	<ul style="list-style-type: none"> • District budget* • Bonds • Grants • 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 county’s mitigation strategy.

MID-PRAIRIE COMMUNITY SCHOOL DISTRICT OPERATIONS AND RESOURCES

Mid-Prairie 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 if feasible. See

Table 60: Mid-Prairie CSD Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • School Board President • School Board • School Improvement and Advisory Committee*
Staff and Departments	<ul style="list-style-type: none"> • Superintendent* • School Principals* • Administration* • English Language Learner (ELL) • Human Resources • Health Services • Library • School Nutrition • Special Education • Technology • Title 1 • Transportation*
District Services	<ul style="list-style-type: none"> • Instruction • Building maintenance and improvements* • Facilities Use & Rental • Grounds maintenance* • Snow removal* • Transportation* • Food Service
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Fire protection—Kalona and Wellman* • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response* • Washington County Sheriff* • Washington County Ambulance*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • School Board Policies*
Financial and Other Resources	<ul style="list-style-type: none"> • District General Fund* • Physical Plant & Equipment Levy (PPEL)* • SAVE (sales tax)* • Bonds* • Grants • 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 county’s mitigation strategy.

WASHINGTON COMMUNITY SCHOOL DISTRICT OPERATIONS AND RESOURCES

Washington 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 if feasible. See Table 61.

Table 61: Washington CSD Operations and Resources

Officials, Commissions, and Committees	<ul style="list-style-type: none"> • School Board President • School Board • School Improvement Advisory Committee* • Oversight Committee • Professional Development Committee • Data Team Committee • Teach Quality Committee
Staff and Departments	<ul style="list-style-type: none"> • Superintendent* • School Principals* • Administration* • Building & Grounds* • English Language Learner (ELL) • Human Resources • Health Services • Library • Food Service • Special Education • Technology • Title 1 • Transportation*
District Services	<ul style="list-style-type: none"> • Building maintenance and improvements* • Facilities Use & Rental • Grounds maintenance* • Snow removal* • Transportation* • Food Service
Contracted or Agreement Services	<ul style="list-style-type: none"> • Washington County Emergency Management Agency* • Fire protection* • Solid waste and recycling • Muscatine Fire Department for countywide HAZMAT response* • Washington County Ambulance*
Policies, Programs, and Plans	<ul style="list-style-type: none"> • School Board Policies* • Crisis Plan*

Table 61: Washington CSD Operations and Resources, continued

Financial and Other Resources	<ul style="list-style-type: none">• District budget*• Bonds*• Grants*• Donations*• Fully insured for property and casualty
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*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 county'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. Washington County, Ainsworth, Brighton, Crawfordsville, Kalona, Washington, and West Chester participated in the previous multi-jurisdictional hazard mitigation plan, which was approved January 17, 2013. Wellman and Riverside, participants in this plan, did not participate in the previous plan. Most jurisdictions that participated in the previous plan completed mitigation actions that significantly reduce the risk of high priority hazards in the community.

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 the mitigation action was 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 and documented progress toward completing mitigation actions.

*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.*

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 5-year life of a hazard mitigation plan, which is often due to the cost of completing large or multi-stage mitigation actions.

WASHINGTON COUNTY PROGRESS UPDATE

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

Table 62: Washington County Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Increase E911 capabilities/implement interoperability of communications	All	1, 3, 5	X	This has been an ongoing project that has added backups, redundancies, and system improvements. It should be completed within three years.
Train response personnel/develop Community Emergency Response Team (CERT)	All	1, 3, 5	X	CERT team development is ongoing
Mass casualty preparation	Tornado, Transportation Incident, Hazardous Materials Incident; Terrorism	1, 3, 5	X	This project is in progress, with continual updates
Develop emergency operations plan	All	1, 3, 4, 5	X	Continual updates
Implement critical infrastructure protections	Terrorism	1, 2, 3, 5	X	Physical barriers have been installed in the courthouse. Additional projects will be considered.
Conduct community outreach	All	1, 4, 5	X	Ongoing outreach by Emergency Management Coordinator
Property maintenance/rehabilitation	Infrastructure Failure, Extreme Heat, Severe Winter Storm	1, 2, 5	X	Ongoing project. Courthouse had a new roof installed since adoption of previous hazard mitigation plan.
Conduct hazardous materials response training	Hazardous Materials Incident	1, 3, 5	X	There are ongoing contracted services to conduct this training.
Inventory/map and install/update early warning system	Thunderstorm, Lightning, and Hail; Tornado and Wind; Hazardous Materials Incident	1, 4, 5	X	EMC is inventorying warning sirens. Marr Park is a possible location for a new siren; others may be considered.
Floodplain maintenance/regulation	River Flood	1, 2, 5	X	A floodplain ordinance was passed and updates have been ongoing.

Much of Washington County's completed mitigation actions are related to preparedness and emergency management coordination. Many of these actions will remain in future updates to the mitigation plan, as they are ongoing in nature. The increased E911 communications project, however, is a large infrastructure project that should be completed within three years. The Emergency Management Coordinator is also conducting an inventory of warning sirens, and the County may consider installing a siren at Marr Park and/or other appropriate locations. Other infrastructure projects, such as added physical barriers and a new roof at the courthouse have been completed, as well. The County also passed and has maintained a floodplain ordinance.

AINSWORTH PROGRESS UPDATE

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

Table 63: Ainsworth Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Interoperability of communications	All	1, 3, 5	X	The County has taken the lead on this project, and it is nearing completion.
Complete system improvements (water)	Animal, Plant, Crop Disease; Drought; Flash Flood; Human Disease; Infrastructure Failure; River Flood	1, 3, 5	X	This is an ongoing action. Recently, and new section of mainline was installed, a mainline loop was completed on the south side that improves water pressure, and ongoing efforts were made to improve water quality.
System improvements (stormwater/waste-water) Previously: <i>System improvements (sewer/waste-water)</i>	Flash Flood, Infrastructure Failure, River Flood	1, 2, 3, 5	X	New culverts were installed near the highway that reduce the effects of flash flooding, 11 manholes were repaired.
Road signage	Transportation Incident	1, 5	X	More reflective road signs have been installed, and this action is ongoing

The County has taken the lead on the “Interoperability of communications” action, which was included in Ainsworth’s actions in the existing plan. It is considered complete and not ongoing, so it will not be part of Ainsworth’s mitigation strategy for this plan. Ainsworth has addressed its water, stormwater, and waste-water systems to create more resilient systems, prevent failures, and mitigate flash flooding. The city has also installed more reflective road signs for higher visibility.

BRIGHTON PROGRESS UPDATE

The city has an existing hazard mitigation plan so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Brighton’s general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 64.

Table 64: Brighton Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Early warning system	Hazardous Materials Incident; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 3, 4, 5	X	An updated early warning siren was installed and working as of February 2013.
Smoke detectors	Infrastructure Failure	1, 2, 5	X	Brighton has distributed some smoke detectors but has no plans to distribute more.
Road signage	Transportation Incident	1, 5	X	Road signs updated in 2013
Train response personnel	All hazards	1, 2, 3, 5	X	Ongoing, always looking for volunteers
Distribute weather radios	Flash flood; River Flood; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm;	1, 4, 5	X	Brighton has distributed weather radios in the past and may do so again
Community outreach	All hazards	4, 5	X	Ongoing, hazard communications are especially prevalent with local churches
Property maintenance/ rehabilitation	Extreme Heat, Infrastructure Failure, Severe Winter Storm	1, 2, 3, 5	X	Upgraded AC at City Hall/Community Center in July 2017, applied for grants for home rehab
System improvements (sewer/waste-water)	Flash Flood, River Flood	1, 2, 3, 5	X	Ongoing project

Brighton has completed mitigation actions related to many different hazards. The first three in Table 64 are considered complete and not ongoing, so they will not be a part of Brighton’s mitigation strategy for this plan. The remaining actions are ongoing and have seen efforts conducted by Brighton since the previous plan was adopted. Several actions are related to hazard preparedness or response; however, infrastructure projects have been completed, too. The air conditioning at the City Hall/Community Center has been upgraded and waste-water system improvements have been made and will continue. Projects that benefit residents have been undertaken, as well, including distributing weather radios and applying for grants for property rehabilitation projects.

CRAWFORDSVILLE PROGRESS UPDATE

The city has an existing hazard mitigation plan so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Crawfordsville’s general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 65.

Table 65: Crawfordsville Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Backup generators/heat source	Infrastructure Failure; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 3, 5	X	A backup generator is installed at City Hall/Fire Station
Distribute weather radios	Flash Flood; River Flood; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 4, 5	X	The Fire Department has distributed radios twice and will again pending funding opportunities.
Provide smoke detectors	Infrastructure Failure	1, 2, 5	X	Smoke detectors have been provided periodically
Make storm drainage improvements	Flash Flood, River Flood	1, 2, 3, 5	X	Ongoing
Basement backflow protection	Flash Flood	1, 2, 5	X	Ongoing

The city’s largest project has been installing a backup generator at the City Hall/Fire Station. The city has also distributed weather radios and smoke detectors. Work has been completed on storm drainage improvement and is ongoing. The city has also begun the process of installing stop valves to prevent backflow into basements.

KALONA PROGRESS UPDATE

The city has an existing hazard mitigation plan so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate Kalona’s general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 66.

Table 66: Kalona Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Floodplain mapping	River Flood	2, 5	X	
Work with U of I Flood Center on mitigation strategy development and implementation	Flash Flood, River Flood	2, 4, 5	X	
Complete storm drainage improvements	Flash Flood, River Flood	1, 2, 5	X	A watershed study was completed by English River Watershed Management Authority that outlines goals for water retention/detention. A University of Iowa Student completed a storm drainage study to evaluate Kalona’s system.
Complete system improvements (sewer/wastewater)	Flood	1, 2, 5	X	The City is adding new valves to the system; new hydrants have been added; a new lift station along the connection to the lagoon has been added; improvements are ongoing.
Conduct community outreach	All hazards	4, 5	X	Outreach is conducted through the Community Rating System program activities and efforts by the Emergency Management Agency. This project is ongoing.
Comply with NFIP	River Flood	2, 5	X	CRS Class 9 will be obtained by 2019.
Stormwater management ordinance	Flash Flood	2, 5	X	This ordinance has been drafted.

Table 66: Kalona Complete Mitigation Actions, continued

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Install permanent generator with automatic backup at water treatment plant or other critical facilities <i>Previously: Backup generators/heat source</i>	Infrastructure Failure; Flash Flood; River Flood; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 2, 3, 5	X	Generators have been installed at City Hall, the Fire Station, and the First Responders building.
Capital improvements planning	Flash Flood, Infrastructure Failure	2, 3, 5	X	This project is ongoing.
Complete system improvements (water)	Animal, plant, and Crop Disease; Flood; Human Disease; Infrastructure Failure	1, 2, 5	X	Improvements are ongoing.
Encourage retention ponds in all new developments	Flash Flood, River Flood	1, 2, 3, 5		This project is ongoing.

Many of Kalona’s completed actions are related to flood hazards. System improvements have been completed, and studies and planning efforts have been undertaken to address flooding through the Community Rating System, floodplain management, and participation in the English River Watershed Management Authority. The first two actions in Table 66 are considered complete and not ongoing, so they will not be a part of Kalona’s mitigation strategy for this plan. The final action is new, but retention ponds are already encouraged in all new developments and have been constructed in some.

WASHINGTON PROGRESS UPDATE

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

Table 67: Washington Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Road signage	Transportation Incident	1, 5	X	High visibility stop and road signs were installed.
Property maintenance/rehabilitation	Extreme Heat, Infrastructure Failure, Severe Winter Storm	1, 2, 3, 5	X	The City has implemented a property maintenance code and a rental inspection program that utilizes the code. It has also hired a 20 hrs./week Code Enforcement Officer. 5 nuisance properties have been demolished in recent years.
System improvements (water)	Animal, Plant, and Crop Disease; Drought; Flash Flood; Human Disease; Infrastructure Failure; River Flood	1, 2, 3, 5	X	This is an ongoing project. Many system improvements are planned in the next five years, including plant upgrades, water tower rehabilitation, and water main replacements.
System Improvements (sewer/waste-water)	Flash Flood, River Flood	1, 2, 3, 5	X	The City would like to have a drainage study conducted to see if there are options for detention/retention/infiltration systems to mitigate flash flooding.

The first action in Table 67 is considered complete and not ongoing, so it will not be a part of Washington’s mitigation strategy for this plan. In addition to completing the road signage project, Washington has also implemented policies and programs that support more resilient housing in Washington. Improvements to the water, stormwater, and waste-water systems have been completed, and planned projects—not counting the drainage study—from the city’s Capital Improvements Plan are noted.

WEST CHESTER PROGRESS UPDATE

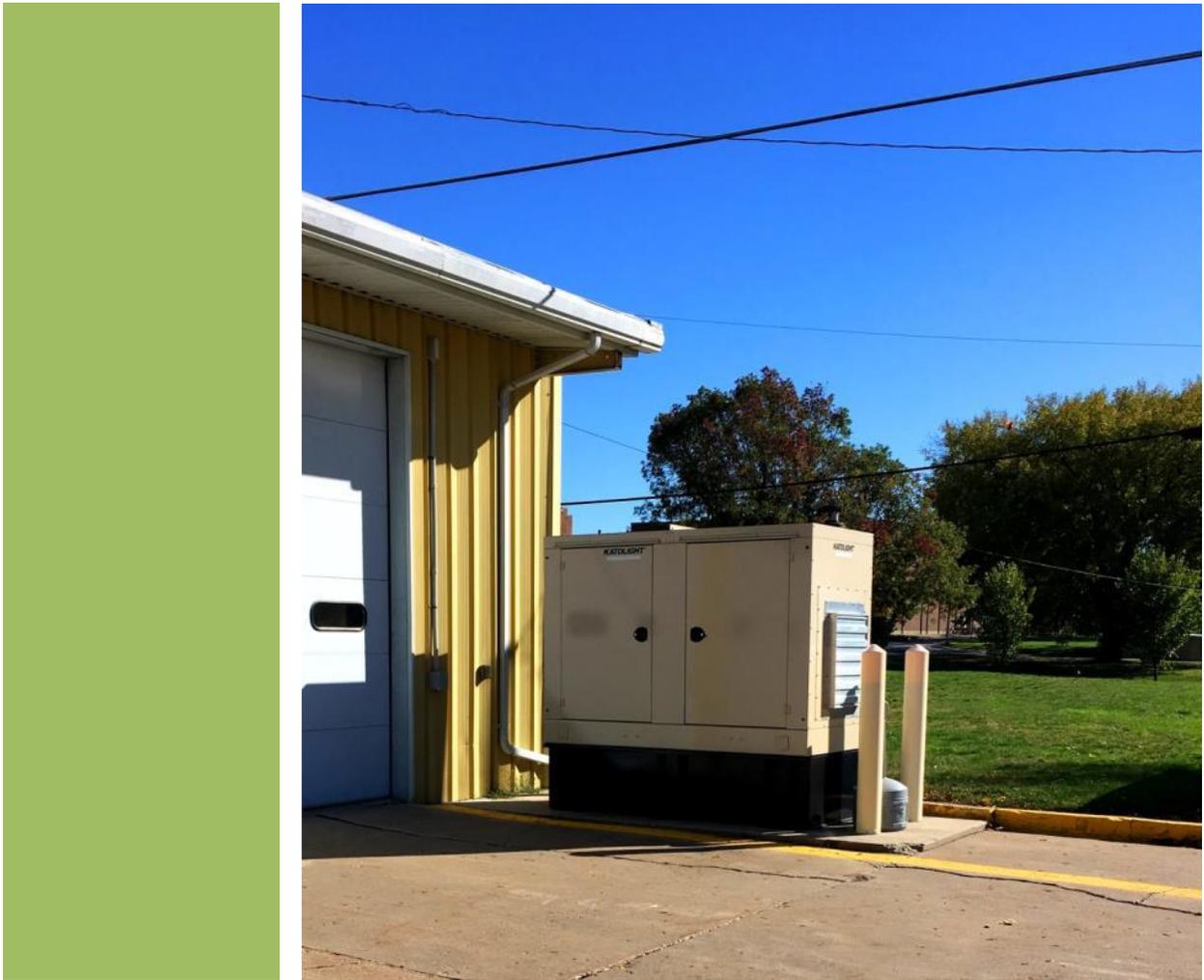
The city has an existing hazard mitigation plan so it is important to document mitigation actions that have been completed since the plan was adopted. Completed mitigation actions demonstrate West Chester’s general commitment and progress toward mitigating or reducing the risk of hazards in the city. Refer to Table 68.

Table 68: West Chester Complete Mitigation Actions

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Purchase and install backup generators in critical facilities	Infrastructure Failure; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 2, 3, 5	X	The water plant was wired to allow generator hookup, if needed.
Complete stormwater management improvements	Flash Flood, Infrastructure Failure	1, 2, 3, 5	X	Approximately three miles of tiling have been installed to prevent flooding in the lower level of structures throughout the city.
Complete water infrastructure improvements	Human Disease; Infrastructure Failure; Severe Winter Storm; Terrorism; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 2, 3, 5	X	The water plant was wired to allow generator hookup, if needed. Improvements were made to the water plant building to prevent damage and secure the building.
Maintain and/or demolish structures with structural and safety issues	Infrastructure Failure; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 2, 5	X	The city demolished 4 houses and 1 barn that were unsafe with assistance from a local grant. One resident demolished their house at the city’s request. One additional house was boarded up by the city. There is a building that a local business may need to address.

Most of the actions completed by West Chester are related to their water and stormwater systems; however, a backup generator(s) could be installed in non-water related facilities in the future. West Chester also addressed structures that were more vulnerable to hazards.

Mitigation Strategy



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.

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.

The planning committee in each participating jurisdiction identified proposed mitigation actions, which are actions beyond current operations and 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. Mitigation action descriptions have been updated from the existing plan to convey an action rather than merely a project—e.g. for Washington County "Response Personnel" has been changed to "train response personnel/develop Community Emergency Response Team (CERT)."

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.

ENGLISH RIVER WATERSHED MANAGEMENT AUTHORITY

Four jurisdictions in Washington County—Washington County, Kalona, Riverside, and Wellman—have referenced the *English River Watershed Improvement & Resiliency Plan* in their mitigation strategies. These jurisdictions are members of the English River Watershed Management Authority (ERWMA), which is a collaboration of cities, counties, and soil and water conservation districts working together to improve water quality and reduce flood risks in the English River Watershed.

ERWMA is one of nine Iowa watershed management authorities (WMA) participating in the Iowa Watershed Approach (IWA) project that was funded through a Department of Housing and Urban Development National Disaster Resilience Competition grant. Through the IWA, dozens of public and private organizations have partnered with the goal of reducing flood hazards and improving water quality in the State of Iowa. The watersheds eligible for IWA funding will have dozens of project sites for constructed features, or best practices, that address this goal, such as farm ponds, wetlands, stormwater detention basins, oxbow restoration, buffer strips, etc.¹

In the English River Watershed, the best practices will be implemented in areas outside of Washington County; however, they may have some effect on the areas in the County that are along the English River because the practices will be constructed upstream. Furthermore, IWA planning and construction projects are intended to be replicable². The goals and activities of WMA's provide an opportunity to integrate hazard mitigation plans and strategies into other planning mechanisms, and vice versa. The Washington County jurisdictions within the English River Watershed have supported the *English River Watershed Improvement & Resiliency Plan* through their mitigation strategies.

WASHINGTON COUNTY MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Washington 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. Refer to Table 69 and Table 70 for the County’s mitigation strategy and removed mitigation actions, respectively.

Table 69: Washington County Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Increase E911 capabilities/implement interoperability of communications	All	1, 3, 5	X	This has been an ongoing project that has added backups, redundancies, and system improvements. It should be completed within three years.
2	Train response personnel/develop Community Emergency Response Team (CERT)	All	1, 3, 5	X	CERT team development is ongoing
3	Mass casualty preparation	Tornado, Transportation Incident, Hazardous Materials Incident; Terrorism	1, 3, 5	X	This project is in progress, with continual updates
4	Develop emergency operations plan	All	1, 3, 4, 5	X	Continual updates
5	Implement critical infrastructure protections	Terrorism	1, 2, 3, 5	X	Physical barriers have been installed in the courthouse. Additional projects will be considered.
6	Increase safety of culverts and bridges	Transportation Incident, Flash Flood	1, 2, 5	X	Replacing bridges as able
7	Conduct community outreach	All	1, 4, 5	X	Ongoing outreach by Emergency Management Coordinator
8	Property maintenance/rehabilitation	Infrastructure Failure, Extreme Heat, Severe Winter Storm	1, 2, 5	X	Ongoing project. Courthouse had a new roof installed since adoption of previous hazard mitigation plan.
9	Maintain county roads	Severe Winter Storm	1, 3, 5	X	

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 69: Washington County Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
10	Distribute weather radios	Flash Flood; River Flood; Thunderstorm, Lightning, And Hail; Tornado and Windstorm	1, 4, 5	X	Radios are distributed occasionally to organizations that may have the public gather on their premises.
11	Obtain StormReady designation	Thunderstorm, Lightning, and Hail; Tornado and Windstorm; Severe Winter Storm	1, 3, 4, 5	X	The Emergency Management Coordinator will continue this project when the 911 project is complete.
12	Build a community safe room at a critical facility	Tornado and Windstorm	1, 5	X	
13	Conduct hazardous materials response training	Hazardous Materials Incident	1, 3, 5	X	There are ongoing contracted services to conduct this training.
14	Install back-up generators/heat source at critical facilities	Flash Flood; Infrastructure Failure; Thunderstorm, Lightning, and Hail; Tornado and Windstorm; Severe Winter Storm	1, 3, 5	X	
15	Inventory/map and install/update early warning system	Thunderstorm, Lightning, and Hail; Tornado and Wind; Hazardous Materials Incident	1, 4, 5	X	EMC is inventorying warning sirens. Marr Park is a possible location for a new siren; others may be considered.

Table 69: Washington County Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
16	Purchase road signage and trailer to designate detour routes around hazard events	Expansive Soils; Extreme Heat; Flash Flood; Hazardous Materials Incident; Infrastructure Failure; Landslide; Levee and Dam Failure; Radiological Incident; Severe Winter Storm; Sinkholes; Terrorism; Thunderstorm, Lightning, and Hail; Tornado and Windstorm; Transportation Incident	1, 5	X	
17	Floodplain maintenance/regulation	River Flood	1, 2, 5	X	A floodplain ordinance was passed and updates have been ongoing.
18	Capital improvements planning—flood related	Flash Flood, River Flood, Infrastructure Failure	1, 2, 3, 5	X	This and the following two actions are in place to support the efforts of the English River Watershed Management Authority, of which the County is a member and board member.
19	Study/evaluate/maintain current mitigation projects	Flash Flood, River Flood	1, 2, 3, 4, 5	X	
20	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	Flash Flood, River Flood	1, 2, 5		
21	Construct new public administration building	Infrastructure Failure	1, 3, 5		Some county offices are in older structures that may be more susceptible to infrastructure failure hazards, like power or communications outages, that could limit the County's response to a hazard event.

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 70: Washington County Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Structural flood mitigation project	Flash Flood, River Flood	1, 2, 5	X	Other flood mitigation actions are still included
Tree maintenance ordinance	Thunderstorm, Lightning, and Hail; Infrastructure Failure; Severe Windstorm	1, 2, 3, 5	X	This was removed because a tree maintenance ordinance has not been adopted, but the County Engineer has the capability to clear the right-of-way to maintain access.
Purchase FCC-compliant radios	All	1, 3, 5	X	This is part of the 911/communications interoperability project.
Smoke detectors	Infrastructure Failure	1, 2, 5	X	The County is no longer providing smoke detectors.

AINSWORTH MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Ainsworth’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. Refer to Table 71 and Table 72 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 71: Ainsworth Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Install community safe room at new or existing critical facilities	Tornado and Windstorm	1, 5	X	
2	Complete system improvements (water)	Animal, Plant, Crop Disease; Drought; Flash Flood; Human Disease; Infrastructure Failure; River Flood	1, 3, 5	X	This is an ongoing action. Recently, and new section of mainline was installed, a mainline loop was completed on the south side that improves water pressure, and ongoing efforts were made to improve water quality.
3	Property maintenance/rehabilitation	Extreme Heat, Infrastructure Failure, Severe Winter Storm	2, 5	X	Maintenance/remodeling will be done on the school building, which is the future site of City Hall and possibly a community center.
4	Road signage	Transportation Incident	1, 5	X	More reflective road signs have been installed, and this action is ongoing
5	Assist with Emergency Assistance Registration	All	1, 3, 5	X	
6	System improvements (stormwater/waste-water) Previously: <i>System improvements (sewer/waste-water)</i>	Flash Flood, River Flood	1, 2, 3, 5	X	New culverts were installed near the highway that reduce the effects of flash flooding, 11 manholes were repaired.

Table 71: Ainsworth Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
7	Install generators at critical facilities	Infrastructure Failure; Flash Flood; River Flood; Tornado and Windstorm; Severe Winter Storm; Thunderstorm, Lightning and Hail	1, 2, 3, 5		
8	Conduct community outreach/education	All	1, 3, 4, 5		The City will coordinate with the County EMA

Table 72: Ainsworth Removed Mitigation Strategy

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Interoperability of communications	All	1, 3, 5	x	The County has taken the lead on this project, and it is nearing completion.

BRIGHTON MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Brighton’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. Refer to Table 73 and Table 74 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 73: Brighton Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	System improvements (sewer/waste-water)	Flash flood, river flood	1, 2, 3, 5	X	Ongoing project
2	Emergency operations plan	All hazards	1, 2, 3, 4, 5	X	Ongoing with county involvement
3	Improve response capabilities	Wildfire, infrastructure failure, terrorism	1, 2, 3, 5	X	Ongoing, purchased 6x6 Ranger in 2016 to help with response to grassland fires.
4	Train response personnel	All hazards	1, 2, 3, 5	X	Ongoing, always looking for volunteers
5	Distribute weather radios	Flash flood; river flood; tornado and windstorm; severe winter storm; thunderstorm, lightning, and hail	1, 4, 5	X	Brighton has distributed weather radios in the past and may do so again
6	Storm drainage improvements	Flash flood, river flood	1, 2, 3, 5	X	Ongoing project
7	Conduct prescribed burning	Grass and wildland fire	1, 2, 5	X	Fire department conducts ongoing
8	Stormwater management ordinance	Flash flooding	1, 4, 5	X	Ongoing project
9	Community outreach	All hazards	4, 5	X	Ongoing, hazard communications are especially prevalent with local churches
10	Emergency assistance registration	All hazards	1, 4, 5	X	Ongoing
11	Property maintenance/rehabilitation	Infrastructure failure, extreme heat, severe winter storm	1, 2, 3, 5	X	Upgraded AC at City Hall/Community Center in July 2017, applied for grants for home rehab

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Table 73: Brighton Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
12	Install community safe room	Tornado and windstorm	1, 5	X	Not installed yet, may consider in new construction
13	System improvements (water)	Flash flood; river flood; infrastructure failure; drought; human disease; animal, plant, and crop disease	1, 2, 3, 5	X	
14	Install generator at first responder/water plant/warning siren building	All hazards	1, 3, 5		

Table 74: Brighton Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Early warning system	Tornado and windstorm; hazard materials incident; thunderstorm, lightning, and hail	1, 3, 4, 5	X	An updated early warning siren was installed and working as of February 2013.
Smoke detectors	Infrastructure failure	1, 2, 5	X	Brighton has distributed some smoke detectors but has no plans to distribute more.
Road signage	Highway transportation incident	1, 5	X	Road signs updated in 2013
Floodproof infrastructure	Flood	1, 2, 3, 5	X	
Structural flood mitigation project	Flash flood, river flood	1, 2, 3, 5	X	

CRAWFORDSVILLE MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Crawfordsville’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. Refer to Table 75 and Table 76 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 75: Crawfordsville Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Conduct community outreach	All	1, 4, 5	X	EMA provides support/information may be posted on the City website.
2	Improve response capabilities	Grass and wild land fire,	1, 3, 5	X	Continually looking for volunteers/conducting training
3	Complete property maintenance/rehabilitation	Infrastructure failure, extreme heat, severe winter storm	1, 2, 5	X	City facilities are updated as necessary and able.
4	Construct a community safe room in a new facility	Tornado and windstorm	1, 5	X	
5	Distribute weather radios	Flash flood; river flood; thunderstorm, lightning, and hail; tornado and windstorm; severe winter storm	1, 4, 5	X	The Fire Department has distributed radios twice and will again pending funding opportunities.
6	Emergency assistance registration	All	1, 4, 5	X	May add information to City website
7	Provide smoke detectors	Infrastructure failure	1, 2, 5	X	Smoke detectors have been provided periodically
8	Make storm drainage improvements	Flash flood, river flood	1, 2, 3, 5	X	Ongoing
9	Basement backflow protection	Flash flood	1, 2, 5	X	Ongoing

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Table 76: Crawfordsville Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Backup generators/heat source	Infrastructure failure; thunderstorm, lightning, and hail; tornado and windstorm; severe winter storm	1, 3, 5	X	A backup generator is installed at City Hall/Fire Station
Emergency operations plan (for school)	All	1, 2, 3, 4, 5	X	This action is completed by the school district
Critical infrastructure protections	Terrorism		X	This is no longer a necessary item as Crawfordsville purchases their water and they have a contract with the Sheriff's Department.

KALONA MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Kalona’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. Refer to Table 77 and Table 78 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 77: Kalona Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Create easements/buffers along ditches and other drainage areas	Flash flood, river flood	1, 2, 5	X	Easements and buffers have been added. This project is ongoing.
2	Cleaning/dredging ditches to increase capacity	Flash flood, river flood	1, 2, 5	X	Ditches have been cleaned. This project is ongoing.
3	Acquisitions—at least one property may need to be acquired to implement easements along waterways	River flood	1, 2, 5	X	No properties have been purchased. This action may be considered in the future.
4	Capital improvements planning	Flood, infrastructure failure	2, 3, 5	X	This project is ongoing.
5	Complete system improvements (water)	Flood; infrastructure failure; human disease; animal, plant, and crop disease	1, 2, 5	X	Improvements are ongoing.
6	Increase safety of culverts and bridges	Flash flood	1, 2, 5	X	This project is ongoing.
7	Expand early warning system	Thunderstorm, lightning, and hail; tornado and windstorm; hazardous materials incident	1, 4, 5	X	New sirens may need to be added to the west or the north due to new developments.

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Table 77: Kalona Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
8	Complete storm drainage improvements	Flood	1, 2, 5	X	A watershed study was completed by English River Watershed Management Authority that outlines goals for water retention/detention. A University of Iowa Student completed a storm drainage study to evaluate Kalona’s system.
9	Complete system improvements (sewer/wastewater)	Flood	1, 2, 5	X	The City is adding new valves to the system; new hydrants have been added; a new lift station along the connection to the lagoon has been added; improvements are ongoing.
10	Conduct community outreach	All hazards	4, 5	X	Outreach is conducted through the Community Rating System program activities and efforts by the Emergency Management Agency. This project is ongoing.
11	Develop/maintain emergency operations plan	All hazards	1, 3, 4, 5	X	The EMA is responsible for the Plan. The City of Kalona may create its own plan.
12	Improve response capabilities	Wildfire, infrastructure failure, terrorism	1, 2, 3, 5	X	This project is ongoing.
13	Install community safe room at one or more critical facilities	Tornado and windstorm	1, 5	X	This would likely be considered for new construction.
14	Floodplain maintenance/regulation	Flood	2, 5	X	This project is ongoing.
15	Complete structural flood mitigation project	Flood	1, 2, 5	X	This project is ongoing.
16	Study/evaluate/maintain current mitigation projects	Flood	2, 5	X	This project is ongoing.
17	Flood-proof infrastructure	Flood	1, 2, 5	X	This project is ongoing.
18	Comply with NFIP	Flood	2, 5	X	CRS Class 9 will be obtained by 2019.
19	Stormwater management ordinance	Flash Flood	2, 5	X	This ordinance has been drafted.

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Table 77: Kalona Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
20	Install permanent generator with automatic backup at water treatment plant or other critical facilities <i>Previously: Backup generators/heat source</i>	Infrastructure Failure; Flash Flood; River Flood; Tornado and Windstorm; Severe Winter Storm; Thunderstorm, Lightning and Hail	1, 2, 3, 5	X	Generators have been installed at City Hall, the Fire Station, and the First Responders building.
21	Create office in new City Hall for the Washington County Sheriff's Department	All hazards	1, 3, 5		
22	Encourage retention ponds in all new developments	Flash Flood, River Flood	1, 2, 3, 5		This project is ongoing.
23	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes	Flash Flood, River Flood	1, 2, 3, 4, 5		

Table 78: Kalona Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Work with U of I Flood Center on mitigation strategy development and implementation	Flash flood, river flood	2, 4, 5	X	This project has been completed.
Smoke detectors	Infrastructure failure	1, 2, 5	X	Smoke detectors have been provided in the past, but there are no future plans to provide more.
Property maintenance/rehabilitation	Infrastructure failure, extreme heat, severe winter storm	1, 2, 5	X	

RIVERSIDE MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Riverside’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. Refer to Table 79 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 79: Riverside Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Install generator at one or more critical facilities	Flash flood; river flood; infrastructure failure; severe winter storm; thunderstorm, lightning, and hail; tornado and windstorm	1, 3, 5	X	Riverside would like to install a generator at City Hall
2	Install safe room in a possible future Community Center	Tornado and windstorm	1, 5	X	Riverside may consider a safe room for a new Community Center or other new critical facility.
3	Security cameras at critical facilities	Terrorism	1, 5	X	
4	Flood buyouts	River flood	1, 2, 5	X	
5	Warning siren installation or update	Thunderstorm, lightning, and hail; tornado and windstorm	1, 4, 5	X	
6	Complete water/waste water improvements	Flash flood	1, 2, 5		
7	Community newsletter	All hazards	1, 4, 5		
8	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	Flash Flood, River Flood	1, 2, 5		

WASHINGTON MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Washington’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. Refer to Table 80 and Table 81 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 80: Washington Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Property acquisitions in flood zone	River flood	1, 2, 5		
2	Public education through mailer and/or website	All hazards	1, 4, 5		
3	Community safe room	Tornado, extreme wind	1, 5	X	Washington would still like to build a community safe room, but they intend to incorporate it into a new building rather than retrofitting an older building.
4	System improvements (water)	Flash flood; river flood; infrastructure failure; drought; human disease; animal, plant, crop disease	1, 2, 3, 5	X	This is an ongoing project. Many system improvements are planned in the next five years, including plant upgrades, water tower rehabilitation, and water main replacements.
5	Interoperability of communications systems	All hazards	1, 2, 3, 5	X	This is an ongoing project that is being addressed on a countywide level.

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Table 80: Washington Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
6	System Improvements (sewer/waste-water)	Flash flood, river flood	1, 2, 3, 5	X	The City would like to have a drainage study conducted to see if there are options for detention/retention/infiltration systems to mitigate flash flooding.
7	Property maintenance/rehabilitation	Infrastructure failure, extreme heat, severe winter storm	1, 2, 3, 5	X	The City has implemented a property maintenance code and a rental inspection program that utilizes the code. It has also hired a 20 hrs./week Code Enforcement Officer. 5 nuisance properties have been demolished in recent years.
8	Smoke detectors	Infrastructure failure	1, 2, 4, 5	X	Washington does not currently have a program to distribute smoke detectors, but rental properties are required to have smoke/CO detectors.

Table 81: Washington Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Road signage	Transportation incident	1, 5	X	High visibility stop and road signs were installed.
Emergency assistance registration	All hazards	1, 4, 5	X	This action is the responsibility of the County.

WELLMAN MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Wellman’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. Refer to Table 82 and Table 83 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 82: Wellman Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
1	Complete utilities infrastructure improvements	Infrastructure Failure	3, 5	Replace and/or expand transmission lines
2	Purchase new dump truck	River Flood	1, 3, 5	A truck snow plow was purchased and that was moved to a Completed item.
3	Purchase and install generator in critical facilities	Severe Winter Storm; Tornado and Windstorm; Infrastructure Failure; Flash Flood; River Flood; Thunderstorm, Lightning, and Hail; Terrorism	1, 3, 4, 5	Priority critical facilities include Parkside Activities Center and Municipal Building
4	Complete water infrastructure improvements	Infrastructure Failure	1, 3, 5	Water main replacements and some new fire hydrants have been installed
5	Complete stormwater infrastructure improvements	Infrastructure Failure, Flash Flood	1, 3, 5	Sewer lining projects throughout the city in phases
6	Complete Emerald Ash Borer remediation	Animal, Plant, Crop Disease	4, 5	This project is underway but not completed.
7	Install security cameras in Parkside Activities Center	Terrorism	1, 5	Cameras have been installed at the Municipal Building and that has been moved to a completed item.
8	Incorporate hazard risk information into city communications	All hazards	1, 2, 3, 4, 5	City website, water bill
9	Acquire and demolish structures in flood hazard areas	River Flood and Flash Flood	1, 2, 5	
10	Construct a tornado safe room in conjunction with critical facilities	Tornado and Windstorm	1, 5	

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Table 82: Wellman Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
11	Install/update warning sirens	Hazardous materials incident; tornado and windstorm; thunderstorm, lightning, and hail	1, 3, 4, 5	
12	Distribute weather radios	Flash flood; river flood; severe winter storm; thunderstorm, lightning, and hail; tornado and windstorm	1, 3, 4, 5	
13	Participate in English River Watershed Management Authority planning and implementation	River Flood and Flash Flood	1, 2, 4, 5	Mayor Ryan Miller is on the Board of Directors for the English River Watershed Management Authority
14	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	River Flood and Flash Flood	1, 2, 5	

Table 83: Wellman Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
Purchase snow plow	Severe Winter Storm	1, 3, 5	A plow has been purchased
Install security cameras at Municipal Building	Terrorism	1, 2, 5	Security cameras have been installed at the Municipal Building

WEST CHESTER MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in West Chester’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. Refer to Table 84 and Table 85 for the City’s mitigation strategy and removed mitigation actions, respectively.

Table 84: West Chester Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
1	Purchase and install backup generators in critical facilities	Infrastructure Failure, Tornado and Windstorm, Thunderstorm, Lightning, and Hail, Severe Winter Storm	1, 2, 3, 5	X	The water plant was wired to allow generator hookup, if needed. A potential project, if grant funding is not available, is wiring the Heritage Building to allow generator hookup.
2	Complete stormwater management improvements	Infrastructure Failure, Flash Flood	1, 2, 3, 5	X	Approximately three miles of tiling have been installed to prevent flooding in the lower level of structures throughout the city. There are three more phases of tiling to be completed throughout the city as the city budget allows.
3	Complete water infrastructure improvements	Infrastructure Failure, Tornado and Windstorm, Thunderstorm, Lightning, and Hail, Severe Winter Storm, Terrorism, Human Disease	1, 2, 3, 5	X	The water plant was wired to allow generator hookup, if needed. Improvements were made to the water plant building to prevent damage and secure the building. Water mains are not large enough to support fire response. A potential project is designing and installing a catch basin pond.

Table 84: West Chester Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
4	Maintain and/or demolish structures with structural and safety issues	Infrastructure Failure, Tornado and Windstorm, Thunderstorm, Lightning, and Hail, Sever Winter Storm	1, 2, 5	X	The city demolished 4 houses and 1 barn that were unsafe with assistance from a local grant. One resident demolished their house at the city's request. One additional house was boarded up by the city. There is a building that a local business may need to address.
5	Community outreach	All hazards	1, 2, 3, 4, 5	X	No progress to report. City staff and officials will join a WENS group to receive important warning and emergency updates to share with residents. The city will coordinate with the local emergency management agency to distribute information to residents, as needed.
6	Community safe room	Tornado and Windstorm, Thunderstorm, Lightning, and Hail	1, 4, 5	X	A safe room would be constructed in conjunction with new city facilities.

Table 85: West Chester Removed Mitigation Strategies

Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Inclusion in Existing Plan	Update/Notes
Emergency operations plan	All	1, 2, 3, 4, 5	X	A countywide plan is maintained by the Washington County EMA
Distribute weather radios	Flash Flood; River Flood; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	4, 5	X	The County completed this project
Smoke detectors	Infrastructure Failure	1, 2, 5	X	There is no longer a fire department in the City.
Emergency assistance registration	All	1, 3, 5	X	The County is responsible for this program.

HIGHLAND COMMUNITY SCHOOL DISTRICT MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Highland 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. Refer to Table 86 for the District’s mitigation strategy.

Table 86: Highland CSD Mitigations Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
1	Purchase and install backup generator	Infrastructure Failure; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 3, 5	
2	Purchase and install security cameras	Terrorism	1, 2, 5	
3	Conduct preparedness drills and exercises	Hazardous Materials Incident; Severe Winter Storm; Thunderstorm, Lightning, and Hail; Tornado and Windstorm	1, 2, 3, 4, 5	This is an ongoing activity that is continually improved.
4	Conduct public education through newsletter/website	All hazards	1, 4, 5	

MID-PRAIRIE COMMUNITY SCHOOL DISTRICT MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Mid-Prairie 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. Refer to Table 87 for the District’s mitigation strategy.

Table 87: Mid-Prairie CSD Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
1	Purchase and install generators	Infrastructure failure; severe winter storm; thunderstorm, lightning, and hail; tornado and windstorm	1, 3, 5	
2	Install tornado safe room	Tornado and windstorm	1, 5	
3	Install cameras	Terrorism	1, 2, 5	
4	Include hazard education notices in newsletter	All hazards	1, 4, 5	

WACO CSD

The WACO CSD mitigation strategies are from the *Henry County, Iowa, Multi-Jurisdictional Pre-Disaster Mitigation Plan 2014*. WACO CSD was consulted for this plan’s development, and no additional strategies were developed for their facility in Washington County. All identified hazards are addressed by at least one mitigation action in WACO 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. Refer to Table 88 for the District’s mitigation strategy.

Table 88: WACO CSD Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
1	Develop and implement natural and technological hazard education and outreach programs to increase awareness among citizens, local, city and regional agencies, and businesses, with a specific focus on education through, but not limited to, the following means: Masters of Disasters, Blood Drives, Public Health Alerts, Senior Health Fairs, Crime Prevention Week, Safe Boating, Fire Safety Awareness Week, Meth Lab Awareness, National Incident Management Systems, Iowa Severe Weather Awareness Week, and EMS Week.	All hazards	1, 4, 5	
2	Educate the public regarding a) proper response to the sirens; b) tornado safe room locations; c) accessing watch and warning information; d) weather advisories and warnings by the National Weather Service; e) any additional relevant information.	Tornado & Windstorm	1, 4, 5	
3	Establish tornado safe room locations.	Tornado & Windstorm	1, 4, 5	
4	Ensure backup generators are available in critical facilities.	Infrastructure failure; severe winter storm; thunderstorm, lightning, and hail; tornado and windstorm	1, 2, 3, 4, 5	

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Table 88: WACO CSD Mitigation Strategy, continued

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
5	Educate the Public regarding a) what precautions to take during hot weather; b) providing sufficient shade and water for animals.	Extreme heat	1, 4, 5	
6	Encourage citizens to check on high-risk or vulnerable individuals during extreme heat conditions.	Extreme heat	1, 4, 5	
7	Educate the Public regarding a) fire safety and proper response to fire events and b) fire prevention.	Extreme heat	1, 2, 4, 5	
8	Encourage best practices for land use and land development with respect to storm water management, including minimizing impervious surfaces and implementing water retention techniques.	Flash flood	1, 2, 3, 4, 5	
9	Educate the Public regarding a) information on precautions to take in the event of severe winter storms; b) dangerous routes and road closings.	Severe winter storm	1, 4, 5	
10	Provide generators for shelter locations in case of energy disruptions due to severe storms.	Severe winter storm	1, 3, 5	
11	Educate public regarding existing diseases and best practices for prevention and care.	Animal, plant, and crop disease	1, 4, 5	
12	Continue disease surveillance and awareness program in collaboration with the Iowa Department of Public Health to alert local doctors, day care centers, and schools of potential warnings and disease characteristics.	Human Disease	1, 4, 5	
13	Educate the Public regarding a) creating a Family Disaster Plan; b) the National Terrorism Advisory System; c) how to respond to a terrorist event; d) where to get vital information.	Terrorism	1, 4, 5	

WASHINGTON COMMUNITY SCHOOL DISTRICT MITIGATION STRATEGY

All identified hazards are addressed by at least one mitigation action in Washington 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. Refer to Table 89 for the District’s mitigation strategy.

Table 89: Washington CSD Mitigation Strategy

ID	Proposed Mitigation Action	Hazard(s) Addressed	Goal(s) Addressed	Update/Notes
1	Install a tornado safe room at a critical facility	Tornado and windstorm	1, 5	Stewart or Lincoln Elementary School would be likely sites for a safe room.
2	Install generator at high school/central food processing kitchen	Infrastructure failure; severe winter storm; thunderstorm, lightning, and hail; tornado and windstorm	1, 3, 5	
3	Include hazard education notice in annual newsletter	All hazards	1, 4, 5	

¹ Iowa Economic Development Authority. Grant: B-13-DS-19-0001 April 1, 2018 thru June 30, 2018 Performance Report. P. 2.

² <http://iowawatershedapproach.iowa.gov/#section2>. Accessed 31 August 2018.

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 Key Considerations 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 90 and Table 91.

Table 90: 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; 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 91: 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 92 is reference for the abbreviations. All other partners and funding sources are explanatory.

Table 92: Potential Partner and Funding Abbreviations

Potential Partner or Funding	Abbreviation
Iowa Homeland Security and Emergency Management Division	IHSEMD
Iowa Department of Agriculture and Land Stewardship	IDALS
Iowa Department of Natural Resources	Iowa DNR
Iowa Department of Transportation	IDOT
Washington County Emergency Management Agency	Washington County EMA
East Central Iowa Council of Governments	ECICOG
Community School District	CSD
Pre-Disaster Mitigation	PDM
Hazard Mitigation Grant Program	HMGP
Flood Mitigation Assistance	FMA
Community Development Block Grant	CDBG
United States Department of Agriculture	USDA

WASHINGTON COUNTY ACTION PLAN

The Washington County planning committee reviewed 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 93 for the County’s action plan.

Table 93: Washington County Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Increase E911 capabilities/implement interoperability of communications	Washington County	911, Communications, and Emergency Management Commissions	High	High	County, locally available grants
1	2	Train response personnel, develop Community Emergency Response Team (CERT)	Washington County EMA	Local jurisdictions	High	Medium	County, IHSEMD grants
1	3	Mass casualty preparation	Washington County EMA	Local jurisdictions	High	Low–Medium	County
1	4	Develop emergency operations plan	Washington County EMA	Local jurisdictions	High	High	County, IHSEMD
1	5	Critical infrastructure protections	County	Local contractors	High	Low–High	County, CDBG, other locally available grants
1	6	Increase safety of culverts and bridges	County Engineer	Engineering consultants	High	High	County, other locally available grants
1	7	Community outreach	Washington County EMA	Local jurisdictions	Medium	Low–Medium	County
1	8	Property maintenance/rehabilitation	Washington County	Local contractors	High	Medium–High	County, CDBG, other locally available grants
1	9	Maintain county roads	County Engineer		High	High	County

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Table 93: Washington County Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	10	Distribute weather radios	County Public Health		High	Low	County, other locally available grants
1	11	Obtain StormReady designation	Washington County EMA	Local jurisdictions; 911 and Communications Commissions	High	Medium	County, other locally available grants
1	12	Build a community safe room at a critical facility	County	IHSEMD	High	High	County, HMGP, PDM
1	13	Conduct hazardous materials response training	Washington County EMA	Muscatine Fire Dept.	High	Medium	County, HMEP, other locally available grants
1	14	Install back-up generators/heat source at critical facilities	County	IHSEMD	High	Medium	County, HMGP, PDM
1	15	Inventory/map early warning system	Washington County EMA	Washington County GIS, local jurisdictions	Medium	Low	County
1	16	Purchase road signage and trailer to designate detour routes around hazard events	County Engineer		High	Medium	County, other locally available grants
1	17	Floodplain maintenance/regulation	County	Iowa DNR	High	Medium	County
1	18	Capital improvements planning—flood related	County	English River Watershed Management Authority	High	Medium–High	County, CDBG, other locally available grants

Table 93: Washington County Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	19	Study/evaluate/maintain current mitigation projects	County	English River Watershed Management Authority	Medium	Medium–High	County, Iowa Watershed Approach funds, other locally available grants
1	20	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	County	English River Watershed Management Authority	Medium	Medium–High	County, Iowa Watershed Approach funds, other locally available grants
2	21	Construct new public administration building	County		Medium	High	County, other locally available grants

AINSWORTH ACTION PLAN

The Ainsworth planning committee reviewed 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 94 for the City’s action plan.

Table 94: Ainsworth Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	2	System improvements (water)	City Maintenance		High	Medium–High	City, CDBG
1	3	System improvements (sewer/waste-water)	City Maintenance		High	Medium–High	City, CDBG
1	4	Property maintenance/rehabilitation	City Maintenance	IHSEMD	High	Medium–High	City, HMGP, PDM, CDBG
1	5	Road signage	City Maintenance		High	Low–Medium	City, other locally available grants
1	6	Emergency Assistance Registration	Fire Department	Washington County EMA	High	Low	City
1	7	Install generators at critical facilities	City Maintenance	IHSEMD	High	Medium	City, HMGP, PDM
1	8	Conduct community outreach/education	City Clerk	Washington County EMA	High	Low	City
2	1	Install community safe room at new or existing critical facilities	City Maintenance	IHSEMD	High	High	HMGP, PDM

BRIGHTON ACTION PLAN

The Brighton planning committee reviewed 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 95 for the City’s action plan.

Table 95: Brighton Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	System improvements (sewer/waste-water)	Brighton Utilities	City	High	Medium–High	City, CDBG, other locally available grants
1	2	Emergency operations plan	City Clerk	City, EMA	High	Medium	City, other locally available grants
1	3	Improve response capabilities	Fire Chief	City, EMA	High	Medium	City, CDBG, other locally available grants
1	6	Storm drainage improvements	Brighton Utilities	City, contractor	High	Medium–High	City, CDBG, other locally available grants
1	8	Stormwater management ordinance	City Council	City	High	Low	City
1	11	Property maintenance/rehabilitation	City Clerk	City	Medium	Medium–High	City, CDBG, other locally available grants
1	13	System improvements (water)	Brighton Utilities	City	High	Medium–High	City, CDBG, other locally available grants
1	14	Install generator at first responder/water plant/warning siren building	City Clerk	City, IHSEMD	High	Medium	City, HMGP, PDM
2	4	Train response personnel	Fire Chief	City	High	Low	City

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Table 95: Brighton Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
2	5	Distribute weather radios	Fire Chief/City Clerk	City	High	Low	City, community organization, other locally available grants
2	9	Community outreach	City Clerk	City, EMA	High	Low	City, other locally available grants
2	10	Emergency assistance registration	Fire Department	City, EMA	Medium	Low	City
2	12	Install community safe room	City Clerk	City, IHSEMD	High	High	City, HMGP, PDM
3	7	Conduct prescribed burning	Fire Department	City	Medium	Low-Medium	City

CRAWFORDSVILLE ACTION PLAN

The Crawfordsville planning committee reviewed 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 96 for the City’s action plan.

Table 96: Crawfordsville Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Conduct community outreach	City Clerk	Washington County EMA	High	Low	City, other locally available grants
1	2	Improve response capabilities	Fire Chief	Washington County EMA	High	Medium	City, other locally available grants
1	3	Complete property maintenance/rehabilitation	City Clerk		Medium–High	Medium	City, CDGB
1	5	Distribute weather radios	City Clerk		High	Low	City, other locally available grants
1	6	Emergency assistance registration	City Clerk	Washington County EMA	High	Low	City
1	7	Provide smoke detectors	Fire Chief		High	Low	City, other locally available grants
1	8	Make storm drainage improvements	City Clerk	Engineering consultant	High	Medium–High	City, CDBG, other locally available grants
2	4	Construct a community safe room in a new facility	City Clerk	IHSEMD	High	High	City, HMGP, PDM
2	9	Basement backflow protection	City Clerk		High	Medium	City

KALONA ACTION PLAN

The Kalona planning committee reviewed 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 97 for the City’s action plan.

Table 97: Kalona Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Create easements/buffers along ditches and other drainage areas	City		Medium	Medium–High	City
1	2	Clean/dredge ditches to increase capacity	City		High	Low–Medium	City
1	3	Acquisitions—at least one property may need to be acquired to implement easements along waterways	City		High	High	City, HMGP, FMA
1	4	Capital improvements planning	City		High	Low	City
1	5	Complete system improvements (water)	City		High	High	City, CDBG
1	6	Increase safety of culverts and bridges	City	IDOT	High	High	City, other locally available grants
1	7	Expand early warning system	City	Washington County EMA	High	Medium–High	City, HMGP, PDM
1	8	Complete storm drainage improvements	City	ERWMA	Medium–High	Medium–High	City, HMGP, PDM, CDBG
1	10	Conduct community outreach	City	Washington County EMA	High	Low–Medium	City, Fire Dept., EMA
1	11	Develop/maintain emergency operations plan	City	Washington County EMA	High	Low	City
1	12	Improve response capabilities	City	Washington County EMA	High	Medium	City
1	14	Floodplain maintenance/regulation	City		High	Low	City

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 97: Kalona Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	15	Complete structural flood mitigation project	City		High	High	City, HMGP, PDM
1	16	Study/evaluate/maintain current mitigation projects	City		Medium	Medium	City
1	17	Flood-proof infrastructure	City		High	Medium–High	City, HMGP, PDM
1	18	Comply with NFIP	City/FEMA		High	Low–Medium	City
1	19	Create stormwater management ordinance	City		High	Medium	City
1	20	Install permanent generator with automatic backup at water treatment plant or other critical facilities	City		High	Medium	City, HMGP, PDM
1	21	Create office in new City Hall for the Washington County Sheriff's Department	City		High	Low	City
1	22	Encourage retention ponds in all new developments	City		Medium–High	Medium	Developers
1	23	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes	City	ERWMA	Medium–High	Medium–High	City, HMGP, PDM
2	9	Complete system improvements (sewer/wastewater)	City		Medium–High	Medium–High	City, HMGP, PDM
2	13	Install community safe room at one or more critical facilities	City		High	High	City, HMGP, PDM

RIVERSIDE ACTION PLAN

The Riverside planning committee reviewed 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 98 for the City’s action plan.

Table 98: Riverside Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Install generator at one or more critical facilities	City	IHSEMD	High	Medium	City, HMGP, PDM
1	3	Security cameras at critical facilities	City		Medium	Low	City, CDBG, other locally available grants
1	4	Flood buyouts	City	IHSEMD	High	High	City, FMA, HMGP, PDM
1	5	Warning siren installation or update	City	IHSEMD	High	Medium	City, HCGP, PDM
1	6	Complete water/waste water improvements	City	Engineering consultant	High	Medium–High	City, CDBG, other locally available grants
1	7	Community newsletter	City Clerk		High	Low	City, other locally available grants
1	8	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	City	IHSEMD	High	Medium–High	City, HMGP, PDM
2	2	Install safe room in a possible future Community Center	City	IHSEMD	High	High	City, HMGP, PDM

WASHINGTON ACTION PLAN

The Washington planning committee reviewed 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 99 for the City’s action plan.

Table 99: Washington Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Property acquisitions in flood zone	City	IHSEMD	High	High	City, HMGP, PDM, FMA, other locally available grants
1	2	Public education through mailer and/or website	City Administrator		Medium	Low	City
1	3	Community safe room	City	IHSEMD	High	High	City, HMGP, PDM
1	4	System improvements (water)	City	Engineering consultant	High	High/medium	City, CDBG, other locally available grants
1	5	Interoperability of communications systems	County/EMA	EMA coordinator	High	High	County
1	6	System improvements (sewer/waste-water)	City	Engineering consultant	High	High/medium	City, CDBG, other locally available grants
1	7	Property maintenance/rehabilitation	City	Local contractors	High	High/medium	City, CDBG, other locally available grants
1	8	Smoke detectors	City building inspector		High	Low	City

WELLMAN ACTION PLAN

The Wellman planning committee reviewed 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 100 for the City’s action plan.

Table 100: Wellman Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Participate in English River Watershed Management Authority planning and implementation	Mayor Ryan Miller or other residents on ERWMA Board	City, ERWMA	High	Low - High	City, ERWMA, HMGP, FMA, PDM
1	2	Identify and implement practices and projects that complement Goal F from the <i>English River Watershed Improvement & Resiliency Plan</i> , i.e. increase water-holding capacity and promote infiltration on both urban and rural landscapes.	City Administrator	ERWMA	High	Low–High	City, ERWMA, Iowa DNR, other locally available grants
1	3	Complete utilities infrastructure improvements	City Administrator	City, utility companies	High	Medium	City, utility companies
1	4	Purchase new dump truck and snow plow	City Administrator	City	High	Medium	City
1	5	Purchase and install generator in critical facilities	City Administrator	City, EMA Coordinator, IHSEMD	High	Medium	City, HMGP, PDM, other locally available grants
1	6	Complete water infrastructure improvements	City Administrator	City, engineering consultant	High	Medium - High	City, CDBG, other locally available grants
1	7	Complete stormwater infrastructure improvements	City Administrator	City, engineering consultant	High	Medium - High	City, CDBG, other locally available grants

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Table 100: Wellman Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	8	Complete Emerald Ash Borer remediation	City Administrator	City	High	Medium - High	City
1	9	Install security cameras in critical facilities	City Administrator	City	Medium	Low	City, CDBG
1	10	Incorporate hazard risk information into city communications	City Administrator	City	Medium	Low	City
1	11	Acquire and demolish structures in flood hazard areas	City Administrator	City, IHSEMD	High	High	City, FMA, HMGP, PDM
1	12	Construct a tornado safe room in conjunction with critical facilities	City Administrator	City, IHSEMD	High	High	City, HMGP, PDM
1	13	Install/update warning sirens	City Administrator	1, 3, 4, 5	High	Medium	City, HMGP, PDM
2	14	Distribute weather radios	City Administrator, community organization	1, 3, 4, 5	High	Low	City, community organization, other locally available grants

WEST CHESTER ACTION PLAN

The West Chester planning committee reviewed 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 101 for the City’s action plan.

Table 101: West Chester Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Purchase and install backup generators in critical facilities	City Clerk	EMA Coordinator	High	Medium	City, PDM, HMGP, other locally available grants
1	2	Complete stormwater management improvements	City Clerk	Engineering consultant	High	High/Medium	City, CDBG, other locally available grants
1	4	Maintain and/or demolish structures with structural and safety issues	City Clerk	Local contractors	High	Medium	City, Iowa DNR Derelict Building Program, other locally available grants
1	5	Community outreach	City Clerk	EMA Coordinator	Medium	Low	City, other locally available grants
2	3	Complete water infrastructure improvements	City Clerk	Engineering consultant	High	High/Medium	City, CDBG, other locally available grants
3	6	Community safe room	City Clerk	Architecture consultant	High	High	City, PDM, HMGP, other locally available grants

HIGHLAND COMMUNITY SCHOOL DISTRICT ACTION PLAN

The Highland CSD planning committee reviewed 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 102 for the District’s action plan.

Table 102: Highland CSD Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Purchase and install backup generator	Building and Grounds Supervisor	IHSEMD	High	Medium	District, HMGP, PDM
1	2	Purchase and install security cameras	Building and Grounds Supervisor		High	Medium	District, other locally available grants
1	3	Conduct preparedness drills and exercises	Superintendent	Washington County EMA	High	Low–Medium	District
1	4	Conduct public education through newsletter/website	District Office		Medium–High	Low	District

MID-PRAIRIE COMMUNITY SCHOOL DISTRICT ACTION PLAN

The Mid-Prairie CSD planning committee reviewed 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 103 for the District’s action plan.

Table 103: Mid-Prairie CSD Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Purchase and install generators	Administrative Office	IHSEMD	High	Medium	District, HMGP, PDM
1	2	Install tornado safe room	Administrative Office	IHSEMD	High	High	District, HMGP, PDM
1	3	Install cameras	Administrative Office		High	Medium	District, other locally available grants
1	4	Include hazard education notices in newsletter	Administrative Office	Washington County Emergency Management Agency	Medium–High	Low	District

WACO CSD

The WACO action plan is from the *Henry County, Iowa, Multi-Jurisdictional Pre-Disaster Mitigation Plan 2014*. WACO CSD was consulted for this plan’s development, and no additional strategies were developed for their facility in Washington County. The mitigation actions in the jurisdiction’s mitigation strategy were evaluated 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 for the District’s action plan.

Table 104: WACO CSD Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Develop and implement natural and technological hazard education and outreach programs to increase awareness among citizens, local, city and regional agencies, and businesses, with a specific focus on education through, but not limited to, the following means: Masters of Disasters, Blood Drives, Public Health Alerts, Senior Health Fairs, Crime Prevention Week, Safe Boating, Fire Safety Awareness Week, Meth Lab Awareness, National Incident Management Systems, Iowa Severe Weather Awareness Week, and EMS Week.	Superintendent	Washington County EMA, other community agencies	High	Low–Medium	District
1	2	Educate the public regarding a) proper response to the sirens; b) tornado safe room locations; c) accessing watch and warning information; d) weather advisories and warnings by the National Weather Service; e) any additional relevant information.	Superintendent	Washington County EMA	High	Low	District
1	3	Establish tornado safe room locations.	Superintendent	IHSEMD	High	High	District, HMGP, PDM

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Table 104: WACO CSD Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	4	Ensure backup generators are available in critical facilities.	Grounds and Building Manager	IHSEMD	High	Medium	District, HMGP, PDM
2	5	Educate the Public regarding a) what precautions to take during hot weather; b) providing sufficient shade and water for animals.	Superintendent	Washington County EMA	High	Low	District
3	6	Encourage citizens to check on high-risk or vulnerable individuals during extreme heat conditions.	Superintendent	Washington County EMA	High	Low	District
3	7	Educate the Public regarding a) fire safety and proper response to fire events and b) fire prevention.	Superintendent	Washington County EMA, local fire department	High	Low	District
3	8	Encourage best practices for land use and land development with respect to storm water management, including minimizing impervious surfaces and implementing water retention techniques.	Superintendent/Building and Grounds Manager		High	Low–Medium	District
3	9	Educate the Public regarding a) information on precautions to take in the event of severe winter storms; b) dangerous routes and road closings.	Superintendent		High	Low	District
1	10	Provide generators for shelter locations in case of energy disruptions due to severe storms.	Building and Grounds Manager		High	Medium	District

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 104: WACO CSD Action Plan, continued

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
3	11	Educate public regarding existing diseases and best practices for prevention and care.	Superintendent	IDALS	Medium	Low	District
3	12	Continue disease surveillance and awareness program in collaboration with the Iowa Department of Public Health to alert local doctors, day care centers, and schools of potential warnings and disease characteristics.	Henry County Public Health	Superintendent	High	Low	District
3	13	Educate the Public regarding a) creating a Family Disaster Plan; b) the National Terrorism Advisory System; c) how to respond to a terrorist event; d) where to get vital information.	Superintendent	Washington County EMA	High	Low	

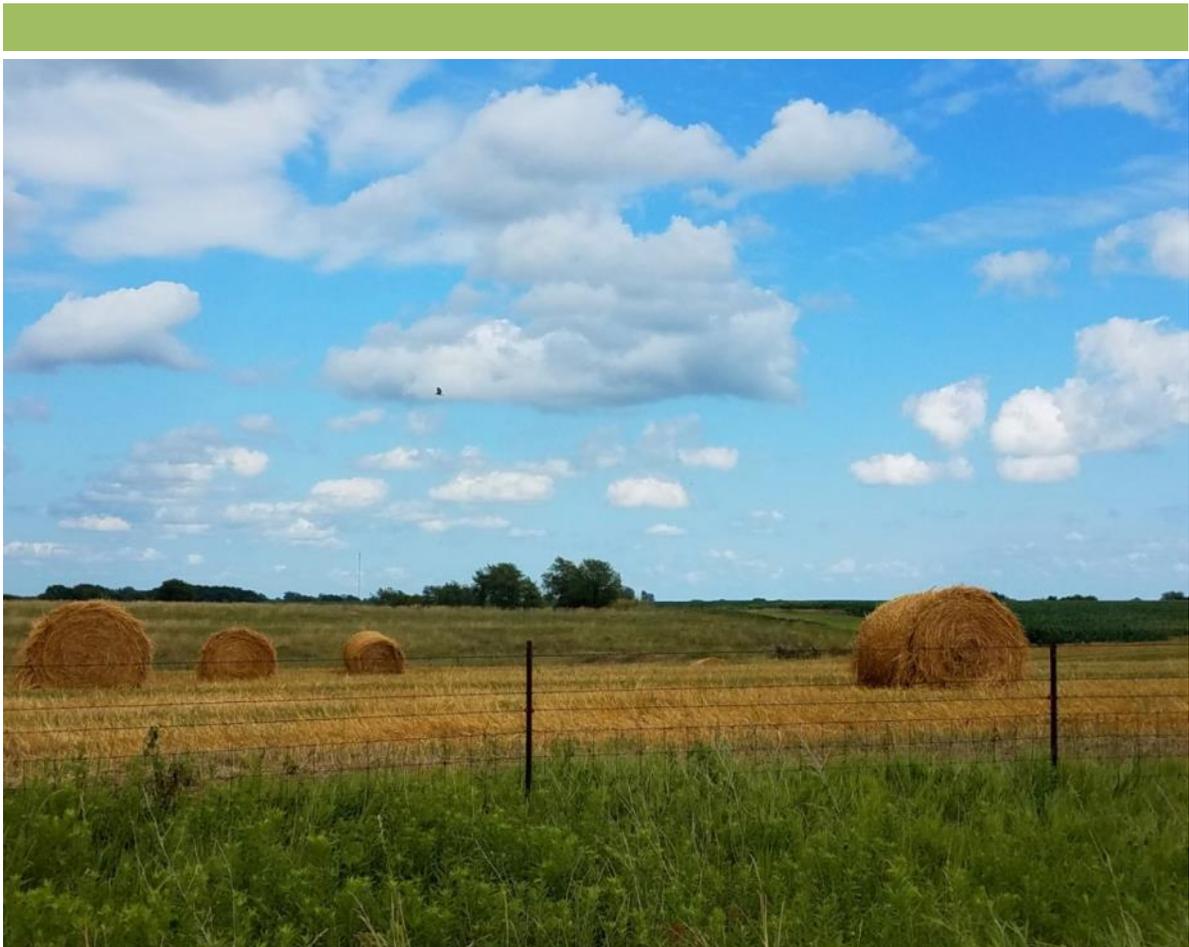
WASHINGTON COMMUNITY SCHOOL DISTRICT ACTION PLAN

The Washington CSD planning committee reviewed 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 105 for the District’s action plan.

Table 105: Washington CSD Action Plan

Priority Level	ID	Proposed Mitigation Action	Lead	Potential Partner(s)	Benefit	Cost	Potential Funding Source(s)
1	1	Install a tornado safe room, possibly in Stewart or Lincoln Elementary School	Administrative Office	IHSEMD	High	High	District, HMGP, PDM
1	2	Install generator at high school/central food processing kitchen	Administrative Office	IHSEMD	High	Medium	District, HMGP, PDM
1	3	Include hazard education notice in annual newsletter	Administrative Office	Washington County Emergency Management Agency	Medium–High	Low	District, Washington County EMA

Plan Incorporation and Maintenance



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 into existing mechanisms, monitor, evaluate, and update the plan. As indicated throughout this plan, jurisdictions in Washington 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.

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 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 the Washington County Emergency Management Agency 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

(IHSEMD). Once the amendment is approved by IHSEMD, 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. Many Washington County jurisdictions' comprehensive plans reference the *Washington County Multi-Jurisdictional Hazard Mitigation Plan*. The City of Kalona, for example, has considered hazards and the environment in a chapter in their 2018 comprehensive plan, refer to Appendix C. Plans and planning mechanisms which may benefit from incorporating or referencing the hazard mitigation plan include, but are not limited to:

- 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.

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.

Since the plan is multi-jurisdictional and the county initiated this particular plan, a complete plan update will be initiated by Washington County approximately three years from plan approval. The Washington County Emergency Management Agency is responsible for completing plan updates. Future plan updates may be funded with Hazard Mitigation Assistance funding and

prepared by a planning consultant that coordinates with Washington County. For the plan maintenance procedure in each participating jurisdiction, refer to Table 106.

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

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.

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 input is required. In addition, a complete plan update will involve one, or more, hazard mitigation planning meeting that is open to the public.

Washington County Multi-Jurisdictional Hazard Mitigation Plan 2019–2024

Table 106: Washington County Plan Incorporation and Maintenance

Jurisdiction	Staff Member	Plan Incorporation	Monitor and Review	Evaluation and Update
Washington County	Marissa Reisen	Formal adoption and the monitor and review process	April annually	To begin approximately three years after approval
Ainsworth	Cheryl Smith		July annually	
Brighton	Chris Davies		January annually	
Crawfordsville	Carolyn Love		April/May annually	
Kalona	Ryan Schlabaugh		April annually	
Riverside	Becky LaRoche/City Council		March annually	
Washington	Greg Goodman		October annually	
Wellman	Ryan Miller/Kelly Litwiller		January annually	
West Chester	Susan Janecek		September annually	
Highland Community School District	Angela Hazlett		June annually	
Mid-Prairie Community School District	Mark Schneider		March annually	
Washington Community School District	Willie Stone		February annually	