Multi-Jurisdictional Hazard Mitigation Plan

Johnson County, Iowa

2025
Maintained By:
Johnson County Emergency Management Agency

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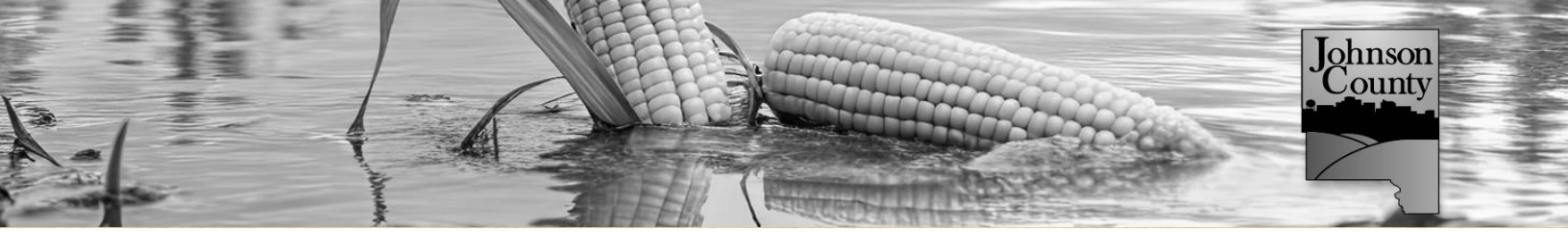
APPROVAL AND ADOPTION



APPROVAL AND ADOPTION

As Chairperson of the Board of Supervisors for Johnson County, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

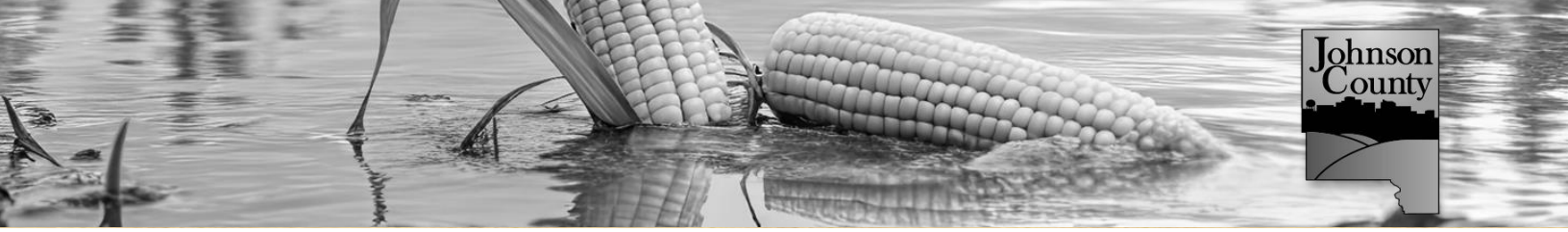
Jon Green Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of Coralville, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Meghann Foster Date Signed



APPROVAL AND ADOPTION

As Mayor of the City of Hills, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

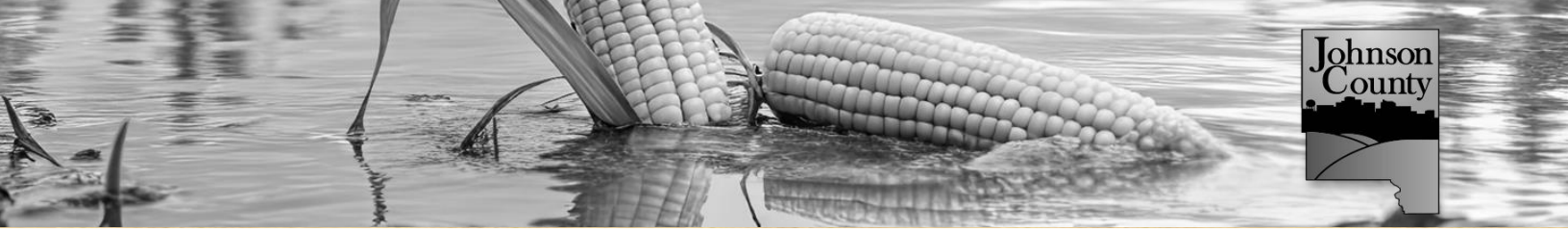
Tim Kemp Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of Iowa City, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Bruce Teague Date Signed



APPROVAL AND ADOPTION

As Mayor of the City of Lone Tree, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

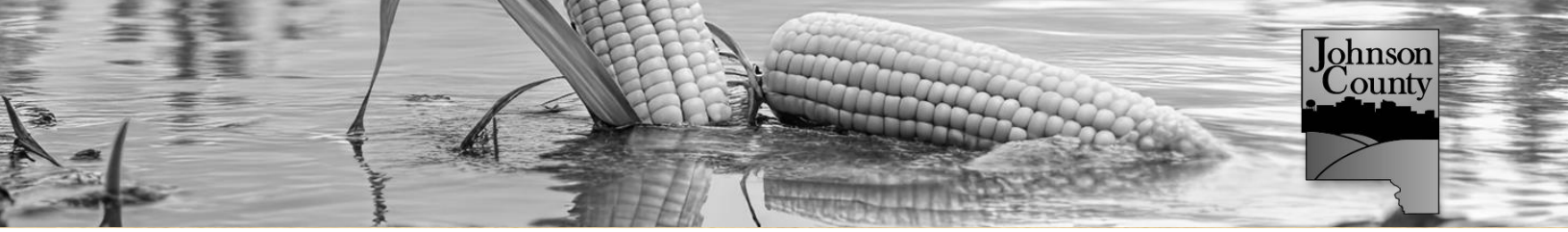
Josh Spilman Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of North Liberty, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Chris Hoffman Date Signed



APPROVAL AND ADOPTION

As Mayor of the City of Oxford, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

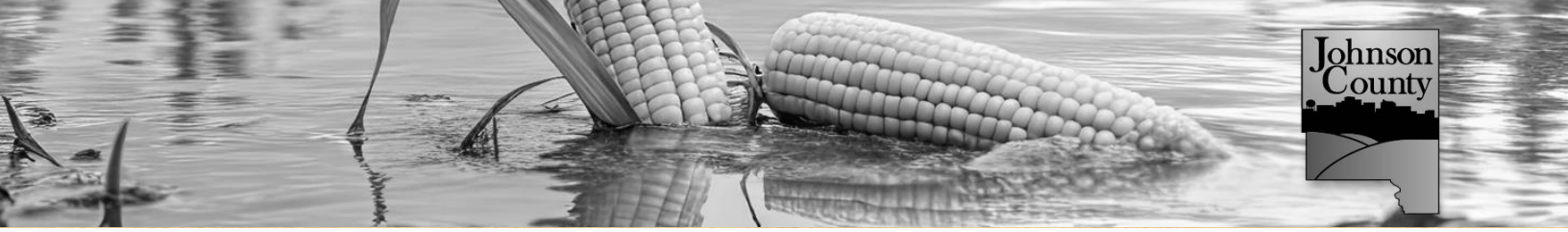
Heather Johnson Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of Shueyville, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Becky Neuhaus Date Signed



APPROVAL AND ADOPTION

As Mayor of the City of Solon, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

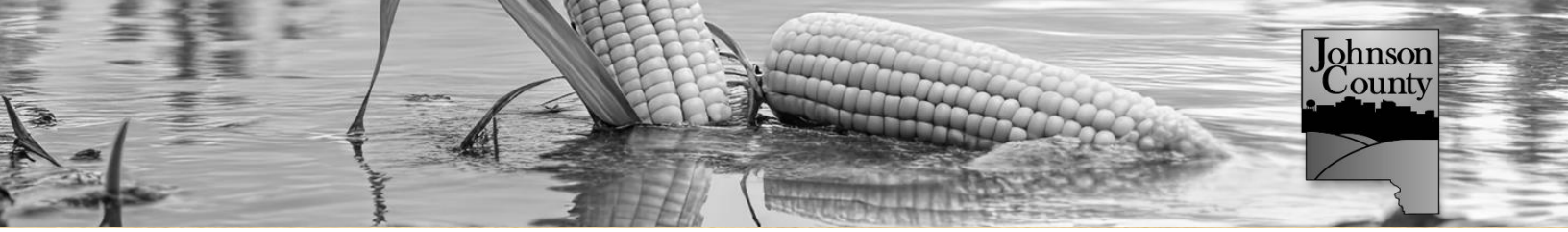
Dan O'Neil Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of Swisher, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Brian Wernimont Date Signed



APPROVAL AND ADOPTION

As Mayor of the City of Tiffin, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

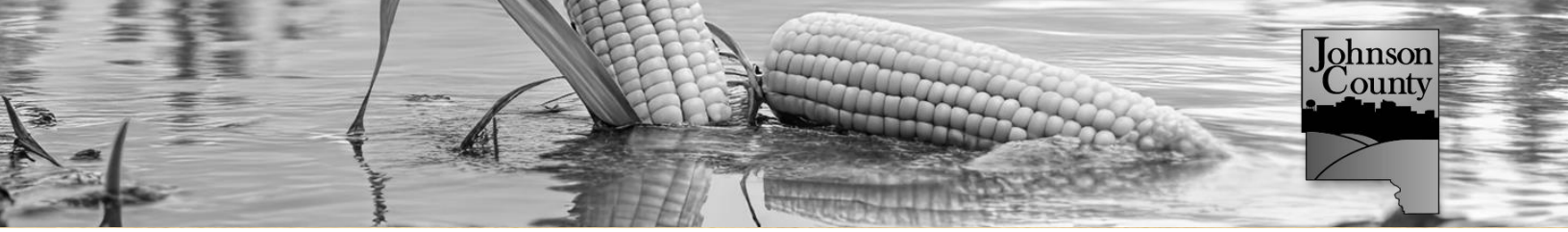
Tim Kasparek Date Signed

APPROVAL AND ADOPTION

As Mayor of the City of University Heights, Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Louise From Date Signed



APPROVAL AND ADOPTION

As Superintendent of Clear Creek Amana Community School District, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

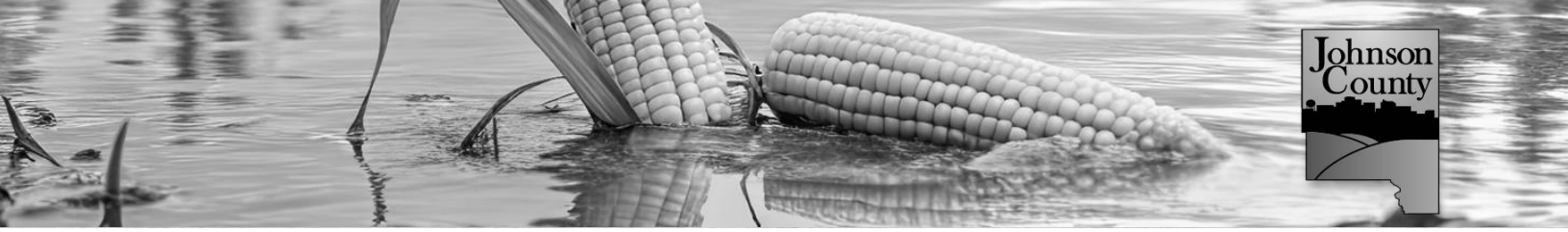
Aaron Davidson Date Signed

APPROVAL AND ADOPTION

As Superintendent of Iowa City Community School District, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Matt Degner Date Signed



APPROVAL AND ADOPTION

As Superintendent of Lone Tree Community School District, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

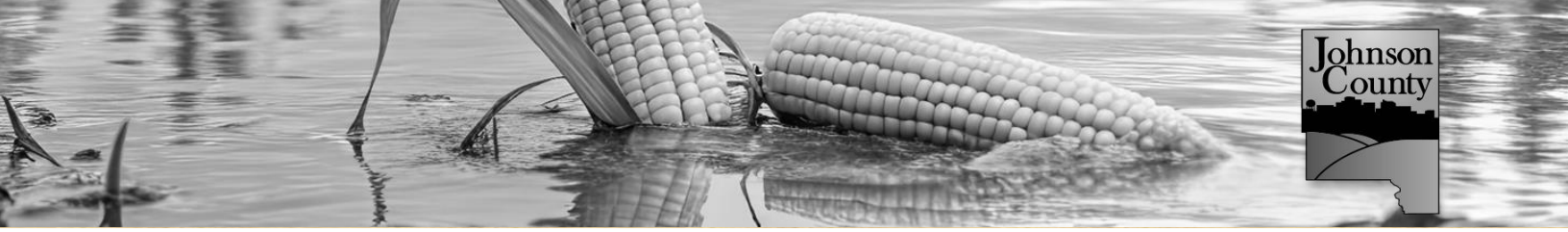
Tyler Hotz Date Signed

APPROVAL AND ADOPTION

As Superintendent of Solon Community School District, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Dr. Davis Eidahl Date Signed



APPROVAL AND ADOPTION

As President of the University of Iowa, I hereby approve and adopt the 2025 update of the Multi-Jurisdictional Hazard Mitigation Plan for Johnson County, Iowa. As needed, further revisions will be submitted to the Johnson County Emergency Management Agency as described in **Section 5: Plan Implementation and Maintenance** of this plan.

Signed

Barbara Wilson Date Signed

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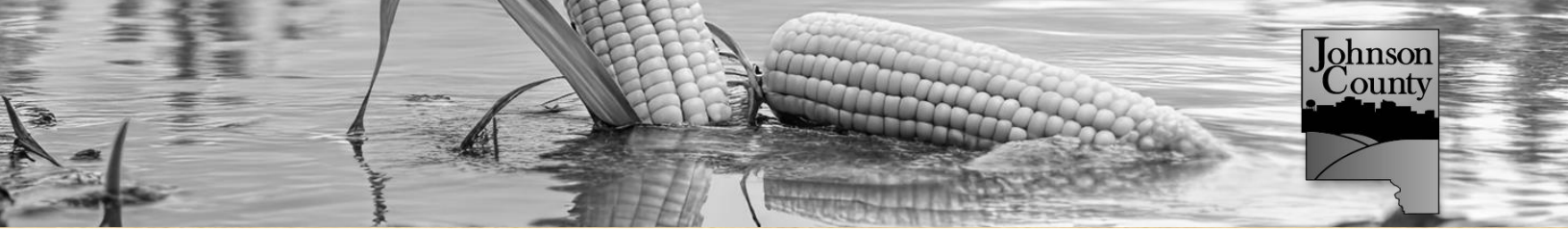
Section 1: Introduction



SECTION 1: INTRODUCTION

1.1 Executive Summary

Johnson County, in cooperation with certain municipalities, schools, and universities within Johnson County, has prepared and adopted this 2025 update of the Johnson County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). The following certain municipalities, schools, and universities are covered in this plan in addition to Johnson County:

- Johnson County
- City of Coralville
- City of Hills
- City of Iowa City
- City of Lone Tree
- City of North Liberty
- City of Oxford
- City of Shueyville
- City of Solon
- City of Swisher
- City of Tiffin
- City of University Heights
- Clear Creek Amana Community School District
- Iowa City Community School District
- Lone Tree Community School District
- Solon Community School District
- University of Iowa

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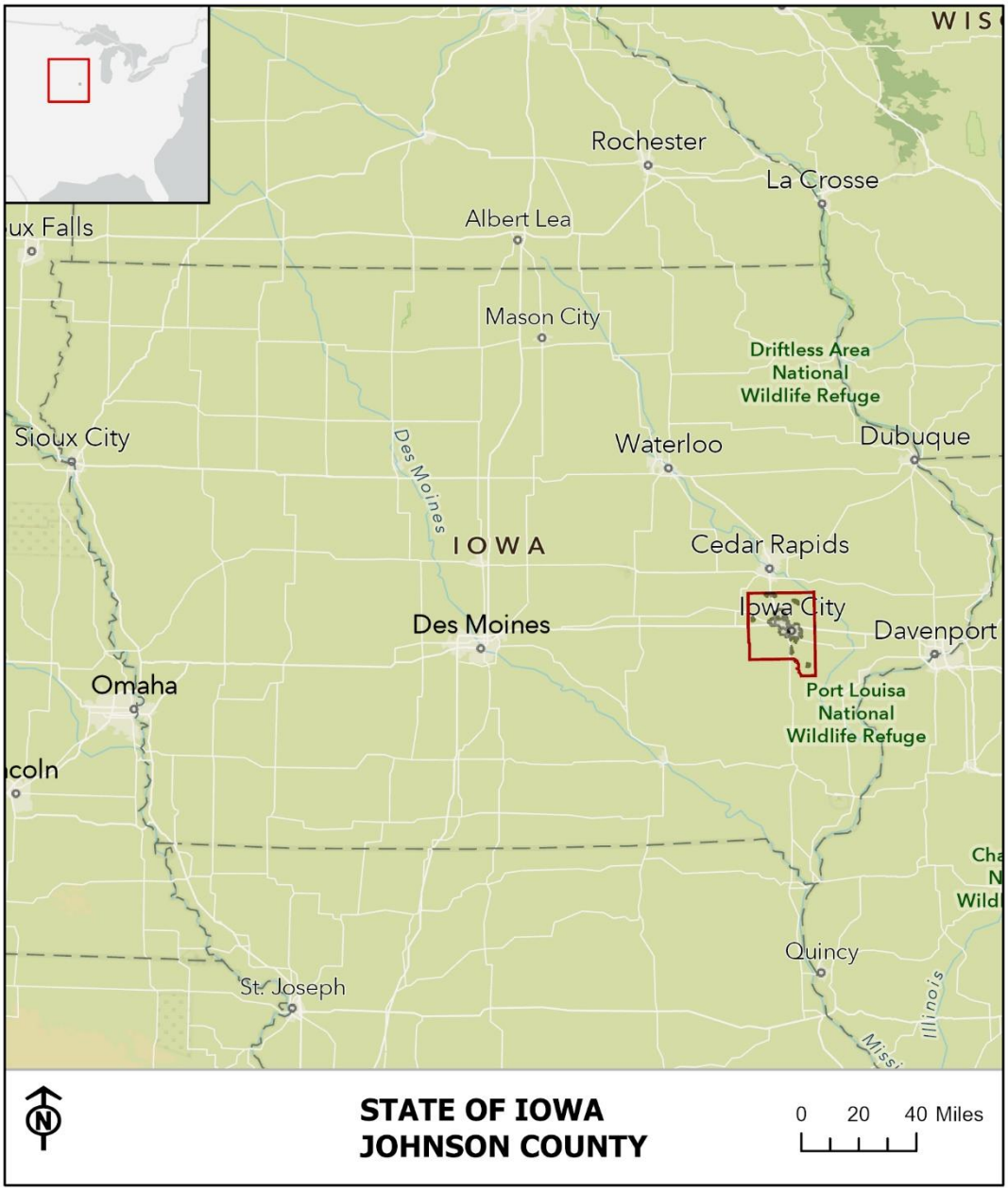
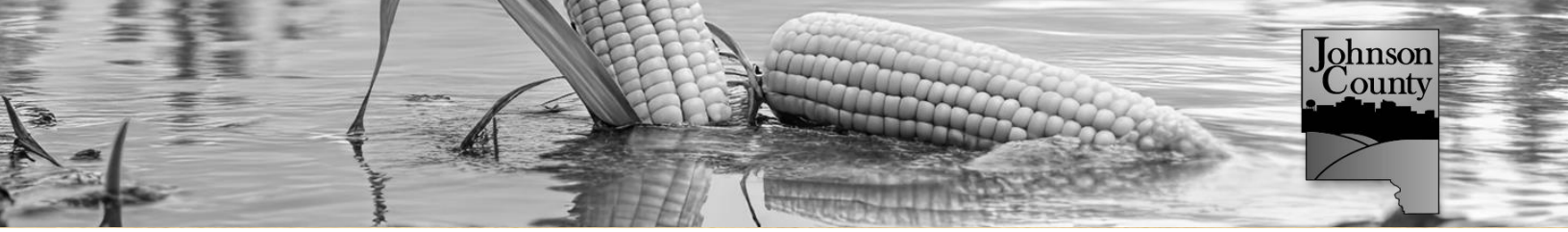


Figure 1-1: State of Iowa Map



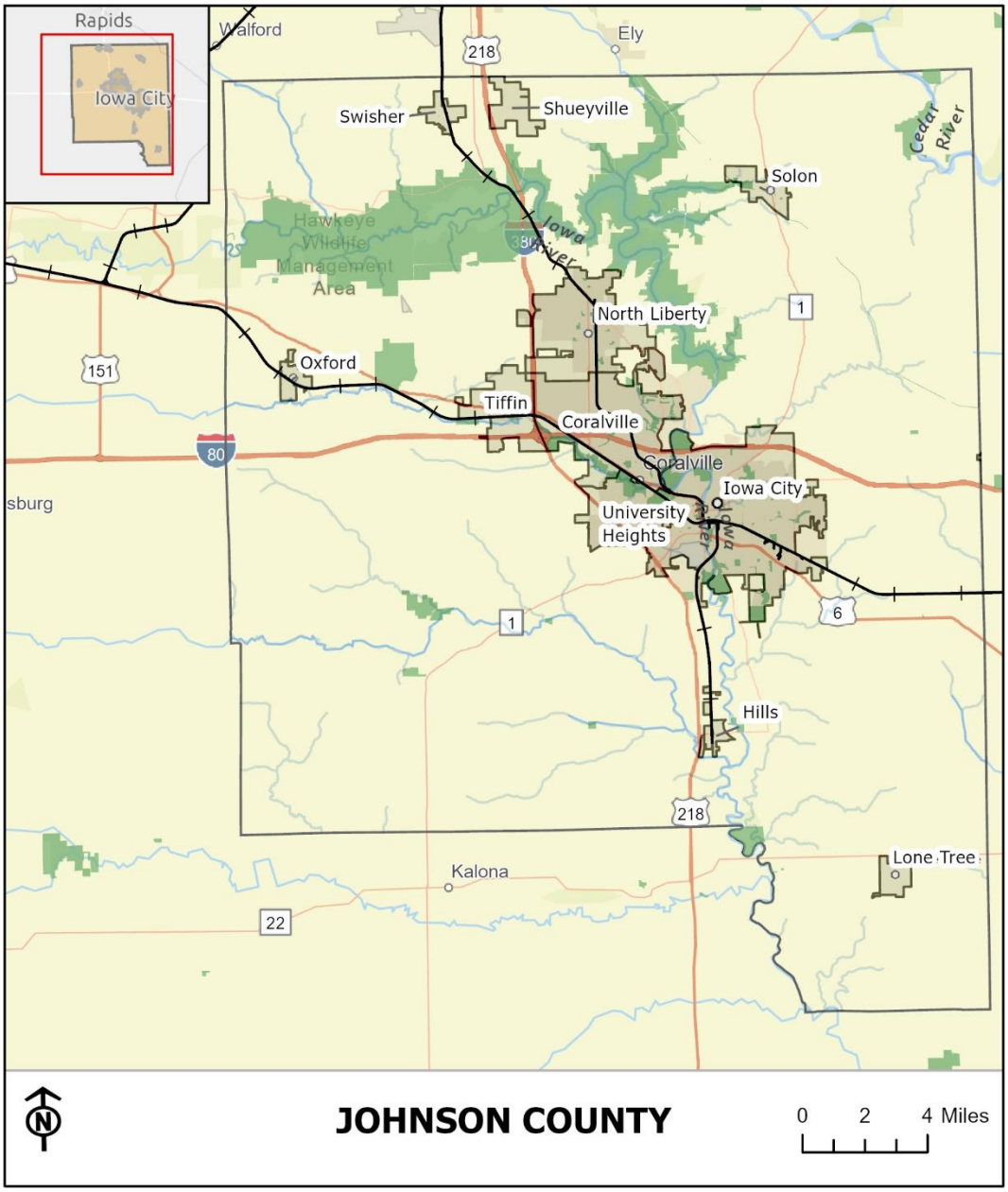


Figure 1-2: Johnson County Jurisdictions Map

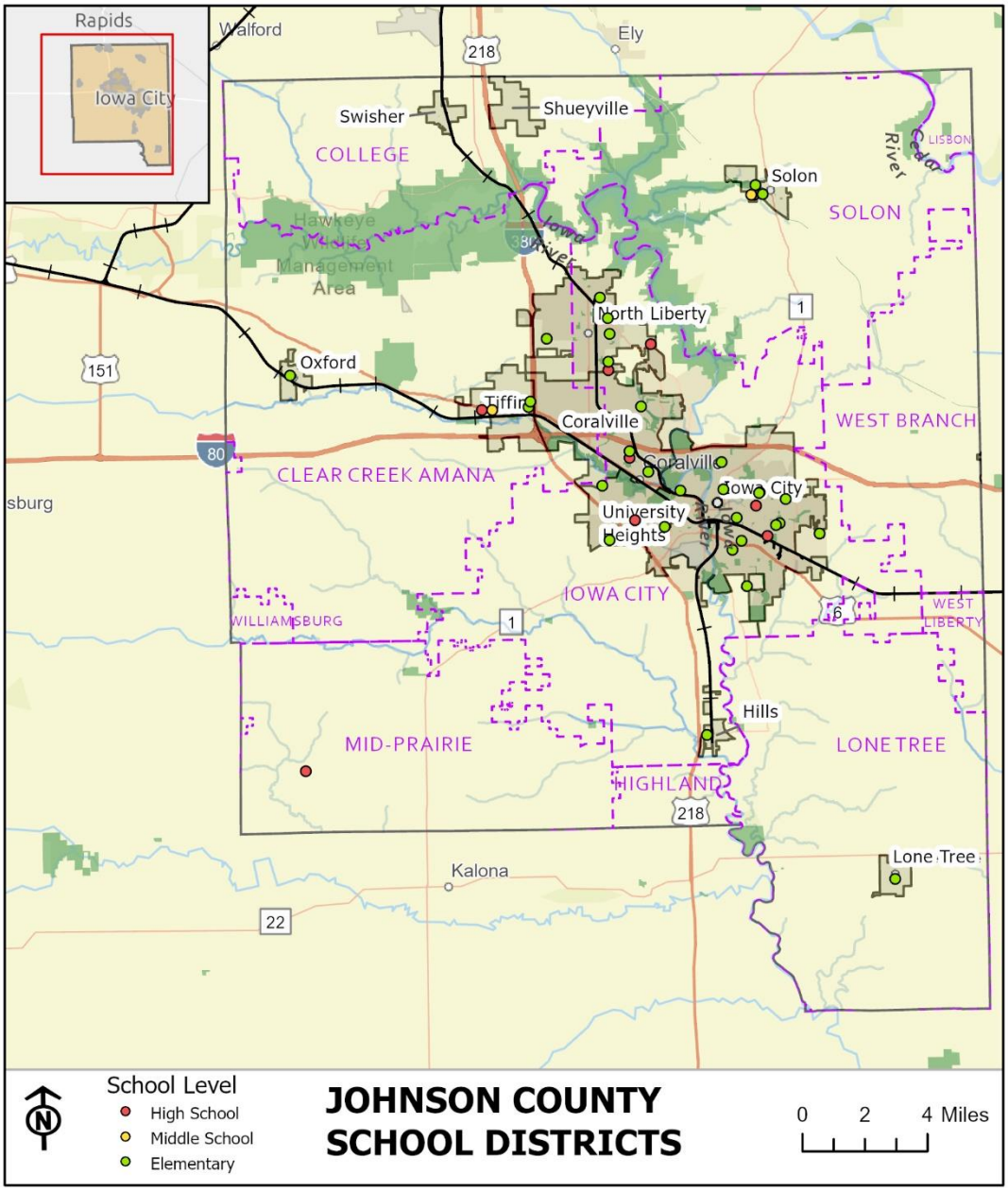
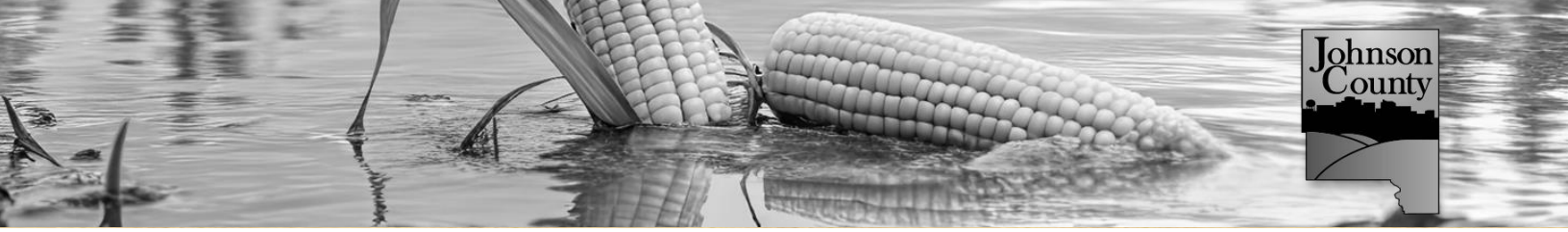


Figure 1-3: Johnson County School Districts Map

Hazard mitigation aims to reduce or eliminate long-term risk to people and property from disasters or hazardous incidents. Studies have found that hazard mitigation is highly cost-effective, with every dollar spent on mitigation saves an average of $6.00 in avoided future losses. The Federal Emergency Management Agency (FEMA) requires that MJHMPs be updated every five years to make the covered jurisdictions eligible for



future FEMA financial assistance. This includes FEMA Hazard Mitigation Assistance (HMA) grants such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC). All sections of the previous mitigation plan for Johnson County were reviewed and updated to address natural and human-caused hazards to save lives and reduce losses from future disasters or hazard incidents.

The 2025 Johnson County Multi-Jurisdictional Hazard Mitigation Plan (also referred to as 'Plan') will serve as a blueprint for coordinating and implementing hazard mitigation policies, programs, and projects throughout the County. It provides a list of mitigation goals and related actions that may assist the participating jurisdictions in reducing risk and preventing loss from future hazard incidents. The impacts of hazards can often be lessened or even avoided if appropriate actions are taken before incidents occur. By reducing exposure to known hazard risks, communities will save lives and property and minimize the social, economic, and environmental disruptions commonly following hazard incidents.

- **Section 1: Introduction** includes this Executive Summary and an in-depth explanation of the purpose of this Plan, its background and scope, the planning process used in its development, the outreach strategy to include the whole community, and the identified planning stakeholders and partners. A broad range of public and private stakeholders, including agencies, local businesses, nonprofits, and other interested parties, were invited to participate. Public input was sought during the planning process, including an online survey and draft plan review.
- **Section 2: Whole Community Profile** describes the planning area, consisting of Johnson County and certain municipality, school, and university assets within Johnson County. Updated information on demographics, social vulnerability, and changes in development are presented, along with an assessment of programs and policies currently in place to reduce hazard impacts or that could be used to implement hazard mitigation activities and identified opportunities to enhance those capabilities.
- **Section 3: Risk Assessment** identifies the hazards of greatest concern to the Plan stakeholders and describes the risk from those hazards. The information generated through the risk assessment helps the stakeholders prioritize and focus their efforts on those hazards of greatest concern and those assets or areas facing the greatest risk(s). For each hazard, the best available information on the impacts of changing weather conditions was considered. The hazards profiled in the 2025 Plan and their assessed significance are summarized in the table below.

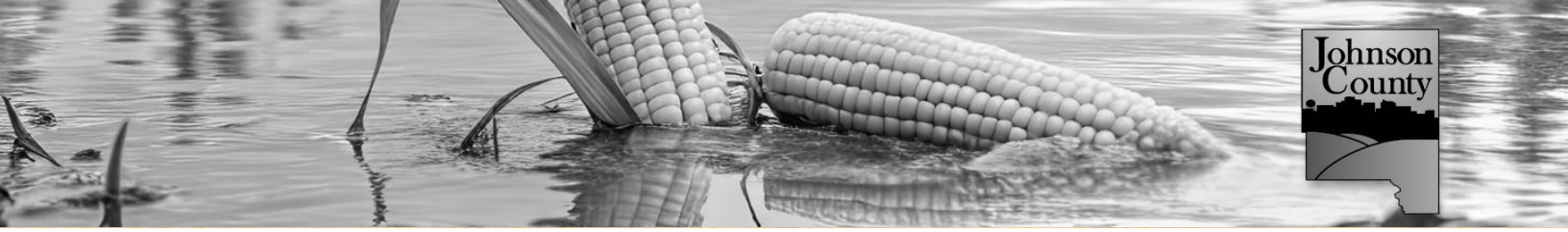
- **Section 4: Mitigation Strategy** describes what the Plan stakeholders will do to reduce their vulnerability to the hazards identified in **Section 3**. It presents the goals and objectives of the mitigation program and details a broad range of targeted mitigation actions to reduce losses from hazard incidents.
- **Section 5: Plan Implementation & Maintenance** details how the Plan stakeholders will implement, monitor, evaluate, and update the Plan, as well as how the mitigation program will be integrated into other planning mechanisms.

HAZARDS	RANKING
Tornadoes	21.09
Severe Thunderstorms	20.67
Severe Winter Storm	19.94
River Flooding	18.93
Flash Flooding	16.66
Social Unrest	16.47
Supply Chain Disruption	16.13
Extreme Temperature	15.59
Cyber Incident	14.52
Drought	14.16
Terrorism & Mass Violence	13.91
Critical Infrastructure Failure	13.17
Communicable Disease Outbreak	12.50
HazMat & Radiological	11.69
Animal/Plant/Crop Disease	7.85
Dam Failure	7.71
Earthquake	7.51
Space Weather	6.00
Wildfire	5.57

1.2 Purpose

The following guiding principles for this Plan process guided the planning team throughout the update:

- To reduce or eliminate the long-term risks to loss of life and property damage in the jurisdictions from the full range of natural and man-made disasters.
- To identify policies, actions, and tolls for long-term implementation to reduce risk and future losses stemming from natural and man-made hazards that are likely to impact the covered municipalities, schools, and universities.
- To create communities whose activities, reflect a comprehensive commitment by government, business, non-profit organizations, and the public to eliminate



or reduce risks and adverse impacts from natural, technological, and human-caused hazards.

Hazard mitigation is defined as a way to alleviate the loss of life, personal injury, and property damage that can result from a disaster through long- and short-term strategies. It involves strategies such as planning, policy changes, programs, projects, and other activities that can mitigate the impacts of hazards. The responsibility for hazard mitigation lies with many, including private property owners; business and industry; and local, state, and federal government.

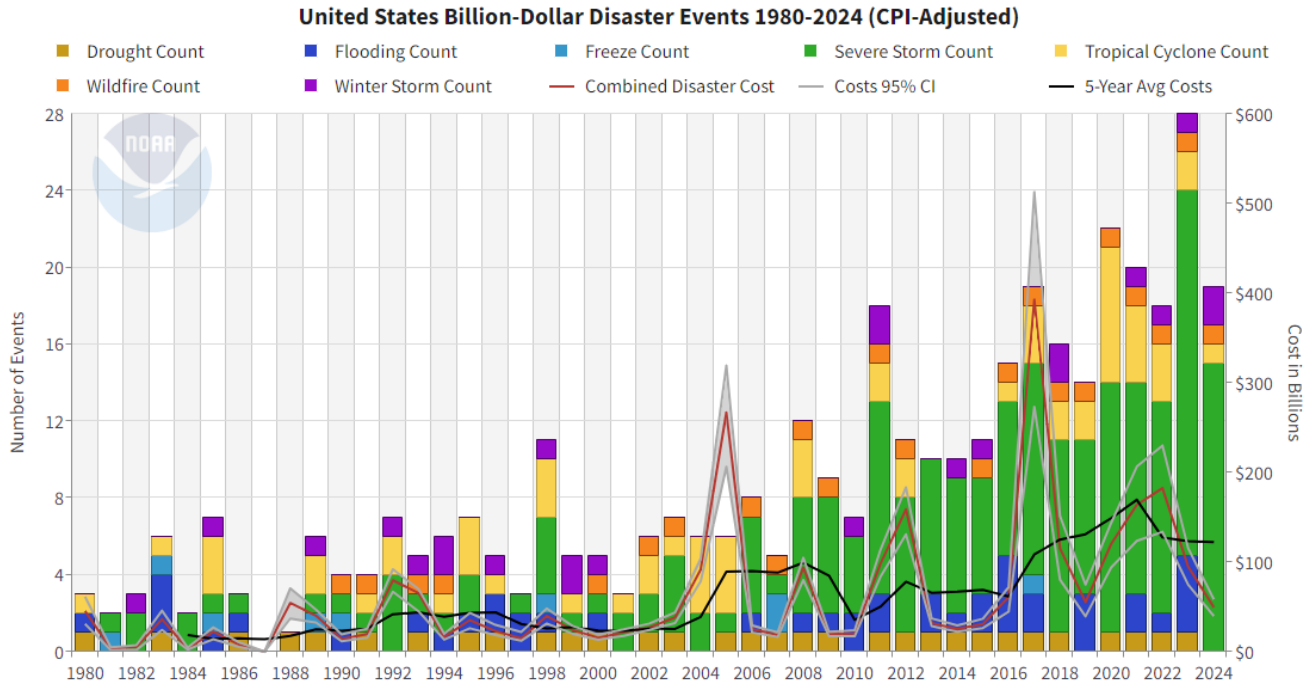
The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) required state and local governments to develop mitigation plans as a condition for federal disaster grant assistance. Prior to 2000, federal disaster funding focused on disaster relief and recovery, with limited funding for hazard mitigation planning. The DMA increased the emphasis on planning for disasters before they occur.

The Plan stakeholders have prepared this mitigation plan to better protect the people and property of Johnson County, certain municipalities, schools, and universities from the effects of hazard incidents. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision-makers direct mitigation activities and resources. The DMA encourages communities to work together on pre-disaster planning. The planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk reduction projects.

The Plan stakeholders are dedicated to implementing the actions and strategies outlined in this updated MJHMP. The Plan will be maintained regularly to address changes in hazards or vulnerabilities and will be updated within the next five years.

1.3 Background and Scope

Each year in the United States, disasters kill or injure thousands of people and do extensive damage to the environment and property. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Additional expenses to insurance companies and non-governmental organizations are not reimbursed by tax dollars, making the costs of disasters several times higher than calculated amounts. The figure below shows the natural disasters in the US that have done more than one billion dollars in damage, showing how the frequency and cost of major disasters have risen over the past several decades.

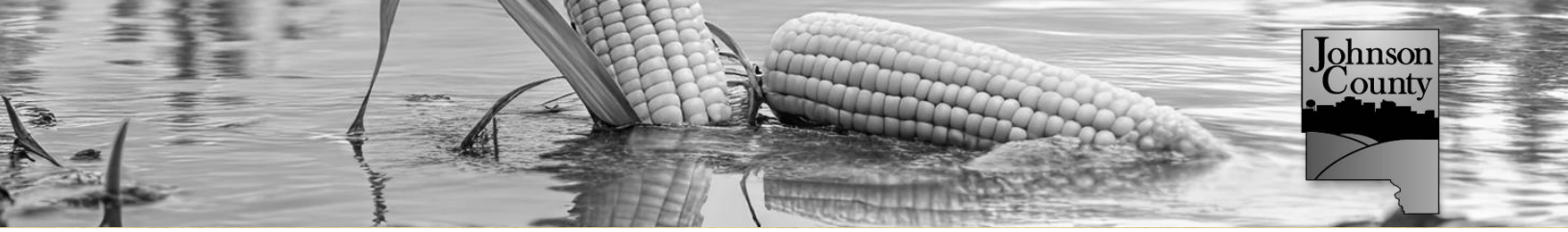


Source: National Oceanic Atmospheric Administration (NOAA)

Figure 1-1: Billion-Dollar Disasters in the US, 1980-2024

However, some types of hazards are predictable, and much of the damage caused by these incidents can be mitigated through the use of various zoning, construction and permitting vehicles, and other preventative actions. Hazard mitigation planning is the process through which communities identify hazards that threaten them, determine likely impacts of those hazards, set mitigation goals, and develop, prioritize, and implement appropriate strategies to lessen impacts. FEMA defines hazard mitigation as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provide evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $6 in avoided future losses in addition to saving lives and preventing injuries, as illustrated in the figure below.

	Adopt Code	Above Code	Building Retrofit	Lifeline Retrofit	Federal Grants
Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost ($ billion)	$1/year	$4/year	$520	$0.6	$27
Benefit ($ billion)	$13/year	$16/year	$2200	$2.5	$160
Riverine Flooding	6:1	5:1	6:1	8:1	7:1
Hurricane Surge	Not Applicable	7:1	Not Applicable	Not Applicable	Not Applicable



Wind	10:1	5:1	6:1	7:1	5:1
Earthquake	12:1	4:1	13:1	3:1	3:1
Wildland-Urban Interface Fire	Not Applicable	4:1	2:1	Not Applicable	3:1

Source: National Institute of Building Sciences, Natural Hazard Mitigation Saves: 2019 Report

This Plan was prepared pursuant to the requirements of FEMA's Local Mitigation Planning Policy Guide 2023 and Title 44 of the Code of Federal Regulations (CFR).

1.4 Planning Process

Element Addressed in Section
Element A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1)), including requirement **A1-a**.

The planning process is how stakeholders, partners, and the public were provided an opportunity to be involved in the identified process and how existing plans, studies, reports, and technical information were reviewed and incorporated into the plan.

Referencing FEMA mitigation planning process requirement **A1-a**. With the assistance of a planning contractor, this Plan takes a phased approach for development.

Phase 1 – Organize Resources (October 2023 – February 2024)

a. Identify stakeholders and partners
b. Review associated planning documents
c. Develop the mitigation planning process
d. Begin the hazard identification and risk assessment process

Phase 2 – Risk Assessment/Plan Development (February 2024 – December 2024)

a. Profile all of the hazards for the jurisdiction
b. Review past incidents
c. Conduct a capability assessment
d. Gather hazard information from the public
e. Develop hazard mitigation actions
f. Develop a plan maintenance strategy

Phase 3 – Plan Finalization (December 2024 – April 2025)

a. Submit the Plan to the state for review
b. Submit the Plan to FEMA for review and approval pending adoption
c. Have all stakeholder jurisdictions adopt the Plan

d. Receive final FEMA approval

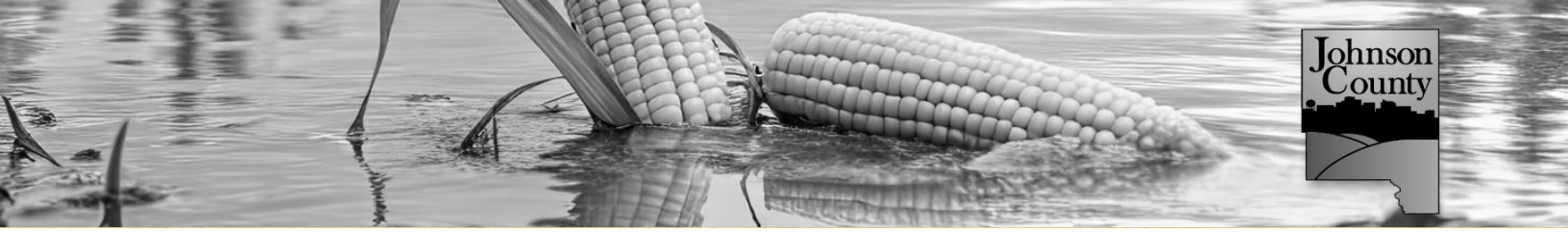
Whereas appropriate, the planning contractor and Johnson County EMA will seek feedback from stakeholders, partners, and the public. The table below provides the Plan's components that are part of the feedback process:

Component	Feedback Type	Audience
Planning Kick-Off Meeting	Virtual Meeting	Stakeholders
Participation Agreement	Document Review	Stakeholders
Hazard Prioritization	Survey/Review and Comment	Stakeholders
Planning Process	Review and Comment	Stakeholders
Public Survey	Survey	Partners and Public
Previous Mitigation Actions	Review and Comment	Stakeholders
Capabilities Assessment	Survey	Stakeholders
Creation of Mitigation Actions	Survey, Review, and Comment	Stakeholders
Draft Plan Review	Document Review and Comment	Stakeholders, Partners, Public

Key Messages

The use of key messages ensures uniformity when discussing the project with stakeholders, partners, and the public. The following terms may be used while describing the project:

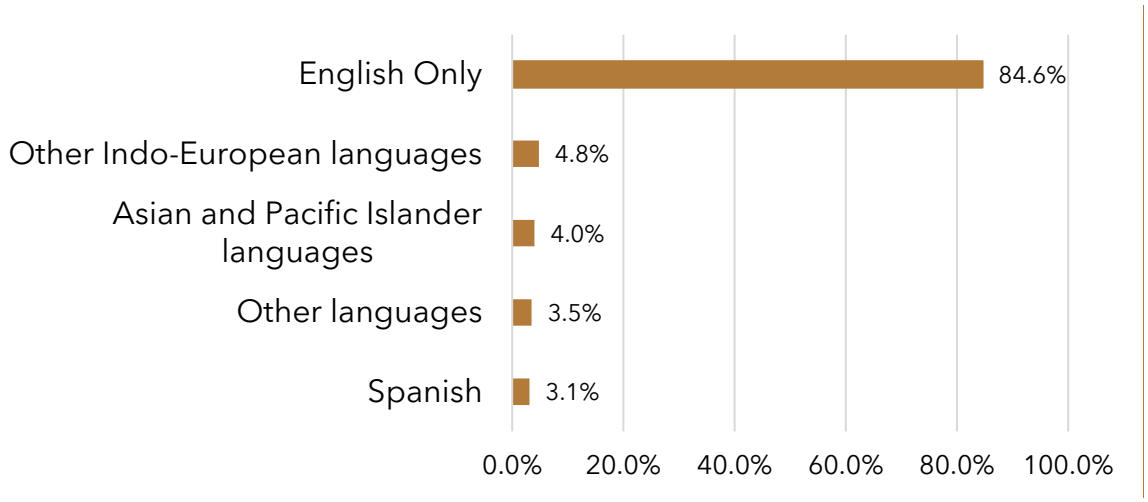
- The Johnson County Emergency Management Agency (EMA) is conducting an update of the local Multi-Jurisdictional Hazard Mitigation Plan.
- Updates to the Plan are required every five (5) years, allowing participating jurisdictions to be eligible for potentially millions of dollars in federal hazard mitigation grants.
- The purpose of the Plan is to strategically guide community action and investments to reduce the local impacts of natural- and human-caused hazards.
- The mitigation plan is only one plan in a series of local emergency and disaster plans maintained by the Emergency Management Agency.



1.5 Public Outreach Strategy

Element Addressed in Section
Element A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1)), including requirement **A3-a**.

Referencing FEMA mitigation planning process requirement **A3-a**. The Johnson County Emergency Management Agency will utilize various methods to conduct outreach and provide engagement material for the public to provide, at a minimum, input during the draft review process before the plan's submission for formal state or FEMA review. This outreach will provide information on the planning process, other applicable details, points of contact for questions, and other potential helpful educational information on hazard mitigation when available. The methods used for public outreach may include, but are not limited to, the Johnson County website, stakeholder social media accounts, virtual meetings, news releases, online surveys, and public in-person meetings. Evidence of various participation opportunities is provided in **Appendix B**. Through the planning stakeholders and demographic information provided by the U.S. Census Bureau, it has been identified that there is not a significant population within the planning area that does not have access to the Internet or communication gaps. The below figures provide a language overview of Johnson County and demonstrates known internet connectivity gaps. Given the low internet connectivity gap, including for those vulnerable and underserved, all feedback is provided digitally/virtually. No targeted outreach was undertaken however, should be considered for the next update.



Source: U.S. Census Bureau, Populations and People Statistics

Population in households lacking fixed broadband availability	Population in households lacking computer or broadband subscription	Population not using the internet	Population not using a PC or tablet computer
6.0%	9.0%	Not Applicable	Not Applicable

Source: U.S. Census Bureau, Digital Equity Act Population Viewer

State of Iowa's figures for population not using the internet is less than 15% and population not using a PC or tablet computer is 25% to 29%.

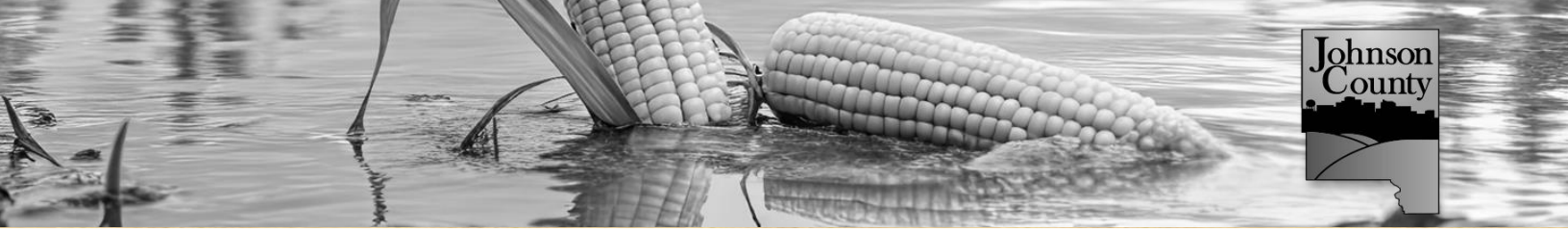
The table below describes the outreach method used for public outreach, what the purpose of the outreach is, the description, and the date of offering.

Outreach Method	Outreach Purpose	Description	Date of Offering
Public Survey	Gather	Public and partner survey assessing the community	02/01/2024 – 03/23/2024
Document Review	Consult	Review of the DRAFT mitigation plan update.	01/06/2025 – 02/04/2025

Any feedback received from the public throughout the planning process was either incorporated into the plan, such as the survey results, or considered for change during the draft review process. During Johnson County's draft review, no feedback was received.

1.6 Existing Document Incorporation

Element Addressed in Section
Element A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3)), including requirement **A4-a**.



Referencing FEMA mitigation planning process requirement **A4-a**. Applicable existing plans, studies, reports, and technical information, as provided by Johnson County were reviewed by the planning contractor. Document review is done by either the responsible stakeholder or the planning contractor on how to incorporate them into the development/update of the plan. The table below provides a list of reviewed documents, who reviewed them, and their disposition related to the plan. Additional information on the applicable jurisdictions are found in the capabilities assessment.

Document	Reviewer	Planning Disposition
State of Iowa Hazard Mitigation Plan (2023)	Contractor	Incorporate hazard data and generalized information
Johnson County, Iowa Multi-Jurisdictional Hazard Mitigation Plan (2020)	Contractor	Incorporate applicable information for 2024
Emergency Operations Plans	Applicable Jurisdictions*	No significant changes to implement since last update.
University of Iowa Campus Master Plan	University of Iowa	No significant changes to implement since last update.
Community School District Facilities Master Plans	Community School Districts	No significant changes to implement since last update.

* - Refer to the capabilities assessment for jurisdictions this applied to.

1.7 Planning Stakeholders and Partners

Element Addressed in Section
Element A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1)), including requirement **A1-b**. **Element A2**. Does the plan document 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 non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2)), including requirements **A2-a**.

For the purposes of this Plan, the following terms are defined as:

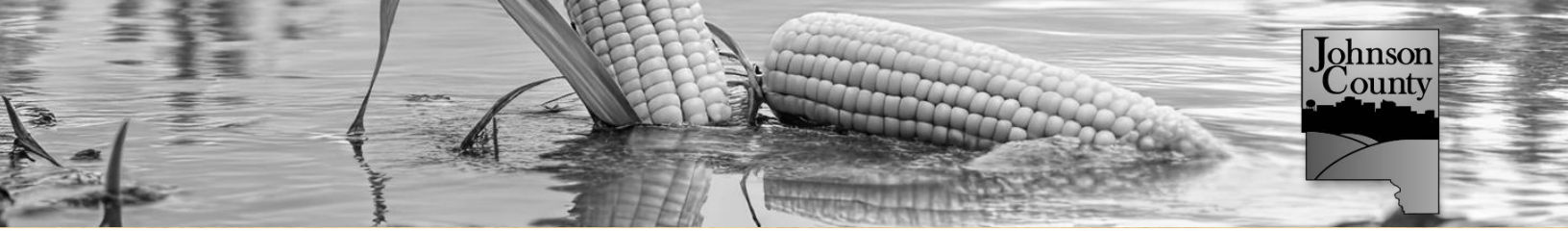
Stakeholders – Those with direct functional roles in the development of the Plan whose jurisdiction is covered by. This may be the unincorporated part of the county, municipalities, school districts, and universities.

Partners—Those who don't have a governing jurisdiction covered by the Plan, however, have a vested interest in its development. These may be neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, businesses, academia, and other private and non-profit interests. The local Emergency Management Agency identifies these partners.

Referencing FEMA mitigation planning process requirement **A1-b**. The planning stakeholders are the primary points of contact during the plan's development. These pre-identified stakeholders serve as the project liaisons to the governing body they represent. Without set frequency, this group participates throughout the plan updating process and is encouraged to provide planning feedback and assist with public outreach and their governing bodies' engagement. Representatives are expected to provide at least two forms of input through participation or feedback. This participation includes but is not limited to virtual meetings, polls or surveys, plan component document reviews, email communication, and phone calls. Various evidence of participation is provided in **Appendix A**. The following is the list of identified stakeholders for this plan update.

The table below outlines which stakeholders were a part of the planning process. Though multiple individuals may be documented as a participant in the planning process, only one response is needed by covered jurisdiction.

Stakeholder	Point of Contact Title
Johnson County	EMA Director
Johnson County	Deputy EMA Director
Johnson County	Emergency Preparedness Planner
Johnson County	Facilities Director
Johnson County	Director
Johnson County	Chairperson
Johnson County	Captain
Johnson County	GIS Analyst
Johnson County	Assistant County Engineer
Johnson County	GIS Director
Coralville	Deputy City Administrator
Coralville	Fire Chief
Hills	Mayor



Stakeholder	Point of Contact Title
Iowa City	Fire Chief
Iowa City	Transportation Planning/Executive Dir
Lone Tree	Councilperson
Lone Tree	Mayor
North Liberty	Assistant City Administrator
North Liberty	City Councilperson
Oxford	Fire Chief
Oxford	Mayor
Shueyville	City Clerk
Solon	City Administrator
Solon	Director of Public Works
Swisher	City Clerk
Tiffin	City Councilperson
Tiffin	City Administrator
Tiffin	Mayor
University Heights	Mayor
Clear Creek Amana CSD	Principal
Iowa City CSD	Director of Student Services
Lone Tree CSD	Superintendent
Solon CSD	Superintendent
University of Iowa	Director, Dept of Emergency Mgmt
University of Iowa	Assistant Director, Facilities Mgmt
University of Iowa	Dir, Emergency Prep & Business Cont.

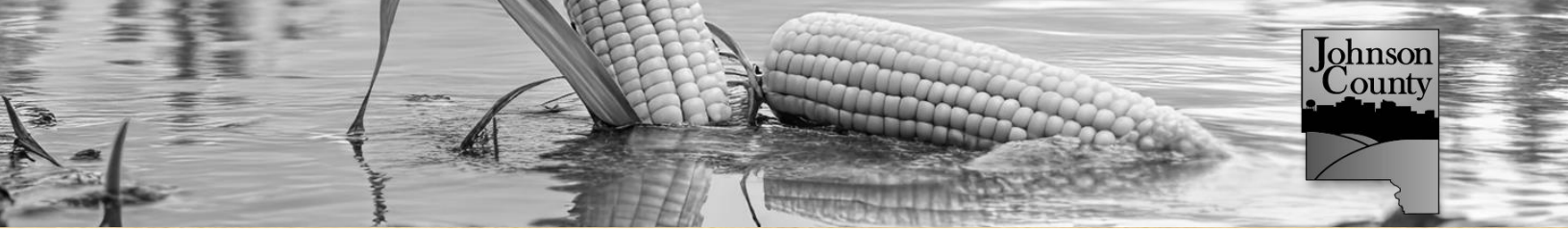
The table below describes the outreach method used for the planning stakeholders, what the purpose of the outreach is, the description, and the date of offering.

Outreach Method	Outreach Purpose	Description	Date of Offering
Presentations to Governing Bodies	Inform	Provided a planning kick-off virtual meeting for plan stakeholders to brief them on the plan update process.	01/11/2024
Individual Outreach	Inform	Sent the recording and slides of the kick-off meeting for additional review if needed.	01/15/2024
Survey	Consult	Whole community hazard ranking assessment	01/15/2024 – 09/30/2024
Document Review	Consult	Review the proposed Planning Process and Outreach Strategy to gather feedback	02/08/2024 – 10/31/2024

Outreach Method	Outreach Purpose	Description	Date of Offering
Content Review	Consult	Stakeholder review of previous mitigation actions and progress.	05/09/2024 – 10/31/2024
Survey	Gather	Assessment of local capabilities, documents, and critical infrastructure	08/04/2024 – 10/31/2024
Individual Outreach	Gather	Gather local data that may be used to fill planning gaps or development of tables and maps.	05/01/2024 – 10/31/2024
Individual Outreach	Consult	Create mitigation actions	11/01/2024 – 12/17/2024
Document Review	Consult	Review of the DRAFT mitigation plan update.	12/09/2024 – 01/20/2025

Referencing FEMA mitigation planning process requirement **A2-a**. The planning partners may provide additional input into the plan. However, in most cases, it gives them an understanding of what this jurisdiction's governing bodies prioritize for local mitigation actions. The specific entities that comprise the planning partners are defined by the Johnson County Emergency Management Agency and are based on the unique characteristics of the county and municipalities. At a minimum, the planning partners can provide plan input during the draft review process. The planning partners are primarily allowed to provide input by documentation review and/or surveys. The table below provides a list of partner categories as defined in the FEMA planning process requirements and the identified entities.

Category	Entities/Entity Type
Local and regional agencies involved in hazard mitigation activities	Johnson County Agricultural Association ENGIE
Agencies that have the authority to regulate development	Cities as provided in the stakeholders list
Neighboring communities	Linn County, Cedar County, Jones County, Benton County, Iowa County
Businesses, Academia, and other private organizations	Iowa City VA Healthcare System IOWA Med Center Downtown
Nonprofit organizations that work directly with and/or provide support to underserved communities and socially vulnerable populations	Schools as provided in the stakeholders list



The table below describes the outreach method used for the planning partners, what the purpose of the outreach is, the description, and the date of offering. These organizations had an opportunity to participate through the online survey and document review, posted in locations such as television news, radio news, Facebook, on websites, or through direct outreach via email.

Outreach Method	Outreach Purpose	Description	Date of Offering
Public Survey	Gather	Public and partner survey assessing the community	02/01/2024 – 03/23/2024
Document Review	Consult	Review of the DRAFT mitigation plan update.	01/06/2025 – 02/04/2025

Feedback gathered throughout this process, if applicable, is brought to the stakeholders for review and potential plan inclusion.

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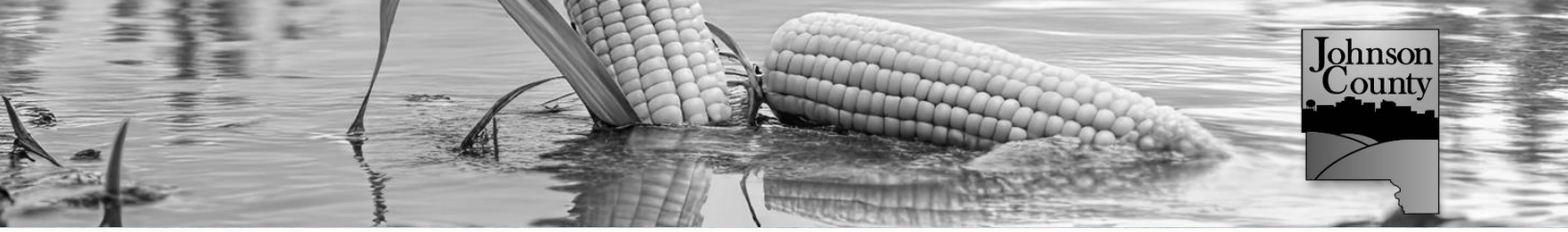
Section 2: Whole Community Profile



SECTION 2: WHOLE COMMUNITY PROFILE

2.1 Brief History

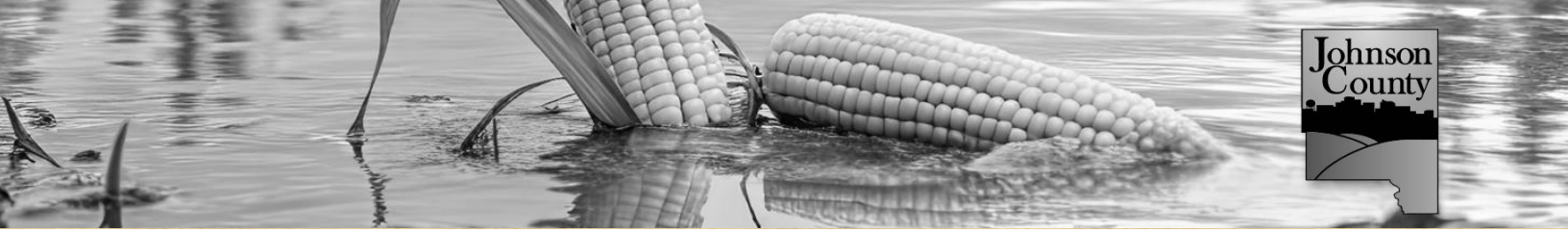
Johnson County, Iowa, officially organized in 1838, carries a history deeply rooted in Iowa's early settlement and development. The county is named after Dr. Lulu Merle Johnson who was born in 1907 in Gravity, Iowa, to a father who was born into slavery, and was originally inhabited by Native American tribes such as the Meskwaki (Fox) and Sauk before European settlers began arriving in the 1830s. Early settlers, largely from the Eastern United States and Northern Europe, were drawn to the county's fertile land, establishing a robust agricultural tradition that remains central to Johnson County's economy and identity.

Iowa City, the county seat, was founded in 1839 and soon after designated as the territorial capital of Iowa, which spurred rapid growth and development. Although the state capital moved to Des Moines in 1857, Iowa City remains a prominent cultural and academic center due to the establishment of the University of Iowa in 1847. The university has become one of Iowa City's defining features, contributing significantly to the local economy and fostering a strong sense of intellectual and cultural identity in the region.

Other towns in the county, such as Coralville, North Liberty, and Tiffin, have grown alongside Iowa City, benefiting from the university's presence and the area's continued development. Coralville, established as a mill town in the 1850s, evolved as a center of trade and industry. The establishment of the Coralville Reservoir in the 1950s created recreational opportunities and helped to control flooding along the Iowa River. North Liberty and Tiffin have grown significantly in recent decades, transforming from small farming communities to thriving suburban areas with rapidly increasing populations.

Throughout the 19th and early 20th centuries, Johnson County's economy was primarily agricultural, with corn, soybeans, and livestock production playing central roles. The arrival of railroads in the late 19th century facilitated trade and bolstered Iowa City and surrounding communities as economic hubs. Today, while agriculture remains important, Johnson County's economy has diversified, with education, healthcare, and technology sectors growing significantly, particularly in and around Iowa City.

In addition to its academic and agricultural significance, Johnson County is home to numerous parks and recreational areas, including Lake Macbride State Park and the Coralville Reservoir, which attract residents and visitors alike for hiking, fishing, and water



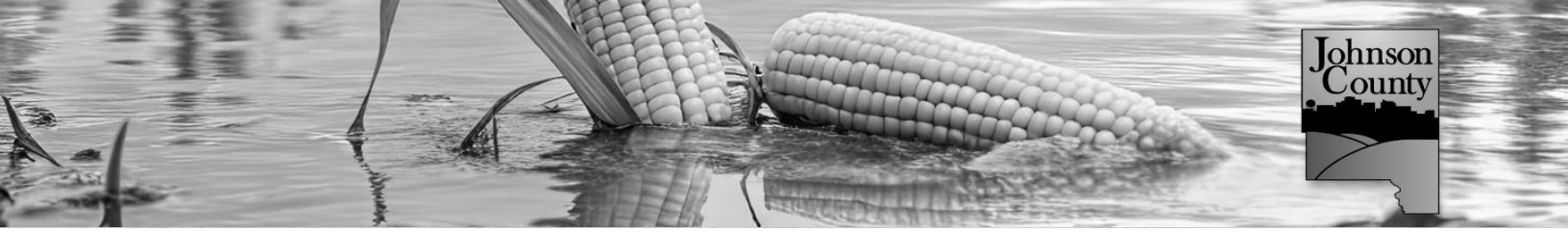
activities. Cultural events, such as Iowa City's Summer of the Arts festival series and the North Liberty Blues & BBQ festival, underscore the county's vibrant community spirit. Historic sites like the Old Capitol Museum and Plum Grove Historic Home reflect Johnson County's rich heritage, while newer developments continue to enhance its economic and cultural landscape. Although Johnson County has modernized considerably, it retains a strong connection to its historical roots and agricultural heritage, making it a unique and integral part of Iowa's dynamic landscape.

2.2 Resources

2.2.1 Historical and Cultural

Johnson County, Iowa, is rich in historical and cultural resources that showcase its unique contributions to regional and national heritage. Key historical and cultural sites and resources within the county include:

- Old Capitol Museum: Located in Iowa City, the Old Capitol is a historic building that served as the seat of the Iowa government before the capital moved to Des Moines in 1857. Now part of the University of Iowa, it operates as a museum, preserving artifacts and exhibits on Iowa's early statehood and government.
- University of Iowa Cultural Attractions: The university hosts numerous cultural institutions, including the University of Iowa Museum of Art, which houses an extensive collection of works from around the world, and the Iowa Writers' Workshop, an internationally recognized graduate-level creative writing program that has influenced American literature since 1936.
- Coralville Historic District: The Coralville Historic District highlights the area's 19th-century milling industry and features remnants of the historic mills and structures that were essential to the early economy. Nearby, the Coralville Old Town Hall and Schoolhouse Museum preserves artifacts and displays related to local history.
- Plum Grove Historic Home: Once the home of Iowa's first territorial governor, Robert Lucas, Plum Grove provides a glimpse into 19th-century life in Iowa. The historic site offers tours and displays that explore the social and political history of early Iowa.
- Johnson County Historical Society Museum: This museum, located in Coralville, preserves and interprets the history of Johnson County, showcasing exhibits on local industry, early settlers, and the impact of significant events like floods on the community.
- Amana Colonies: Although just outside Johnson County, the Amana Colonies influence the cultural landscape with their history as a communal society founded by German Pietists in the mid-1800s. The area is known for its historic architecture,



unique crafts, and annual cultural events, drawing many visitors from Johnson County.

- Historic Downtown Districts: Iowa City's downtown includes a mix of preserved architecture and newer cultural hubs, reflecting both the city's historical roots and its contemporary growth. The Pedestrian Mall and surrounding area serve as cultural centers, hosting festivals, farmers' markets, and events that celebrate the arts and community life.
- Cemeteries and Churches: Historic cemeteries and churches, including Oakland Cemetery in Iowa City, which dates back to the 1800s, provide insight into the religious and social history of Johnson County. The Black Angel, a notable monument in Oakland Cemetery, is part of local folklore.
- Coralville Reservoir and Devonian Fossil Gorge: This unique natural and historical site reveals fossils dating back over 375 million years. The gorge was exposed after flooding in 1993 and offers educational opportunities about Iowa's ancient geological history.
- Johnson County Historic Poor Farm: Established in 1855, the Poor Farm provided housing and work opportunities for the poor and indigent. It is one of the few remaining county poor farms in the United States and stands as a testament to social welfare history. The site is now being preserved and repurposed as a community-centered space with agricultural, historical, and educational initiatives.

These sites highlight Johnson County's rich historical and cultural legacy, including its contributions to government, education, arts, and natural history.

It should be noted that, as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and potentially eligible for the National Register. Therefore, if a property is altered due to a major federal action, it must be evaluated under NEPA guidelines. Structural mitigation projects are considered alterations for the purpose of this regulation.

2.2.2 Natural

Johnson County, Iowa, is home to diverse natural resources that support its economy, recreational activities, and environmental sustainability initiatives. The following is an overview of Johnson County's key natural resources:

Soils and Farmland

- Agricultural Land: Johnson County's fertile soils, especially its rich prairie soils, are among its most valuable resources. The soil composition is ideal for growing

crops like corn and soybeans, making agriculture a foundational part of the county's economy.

- Topsoil Conservation: Given the county's strong agricultural base, conservation efforts focus on preventing soil erosion and promoting sustainable farming. Programs led by the USDA and local conservation districts support topsoil preservation and water runoff management to protect this vital resource.

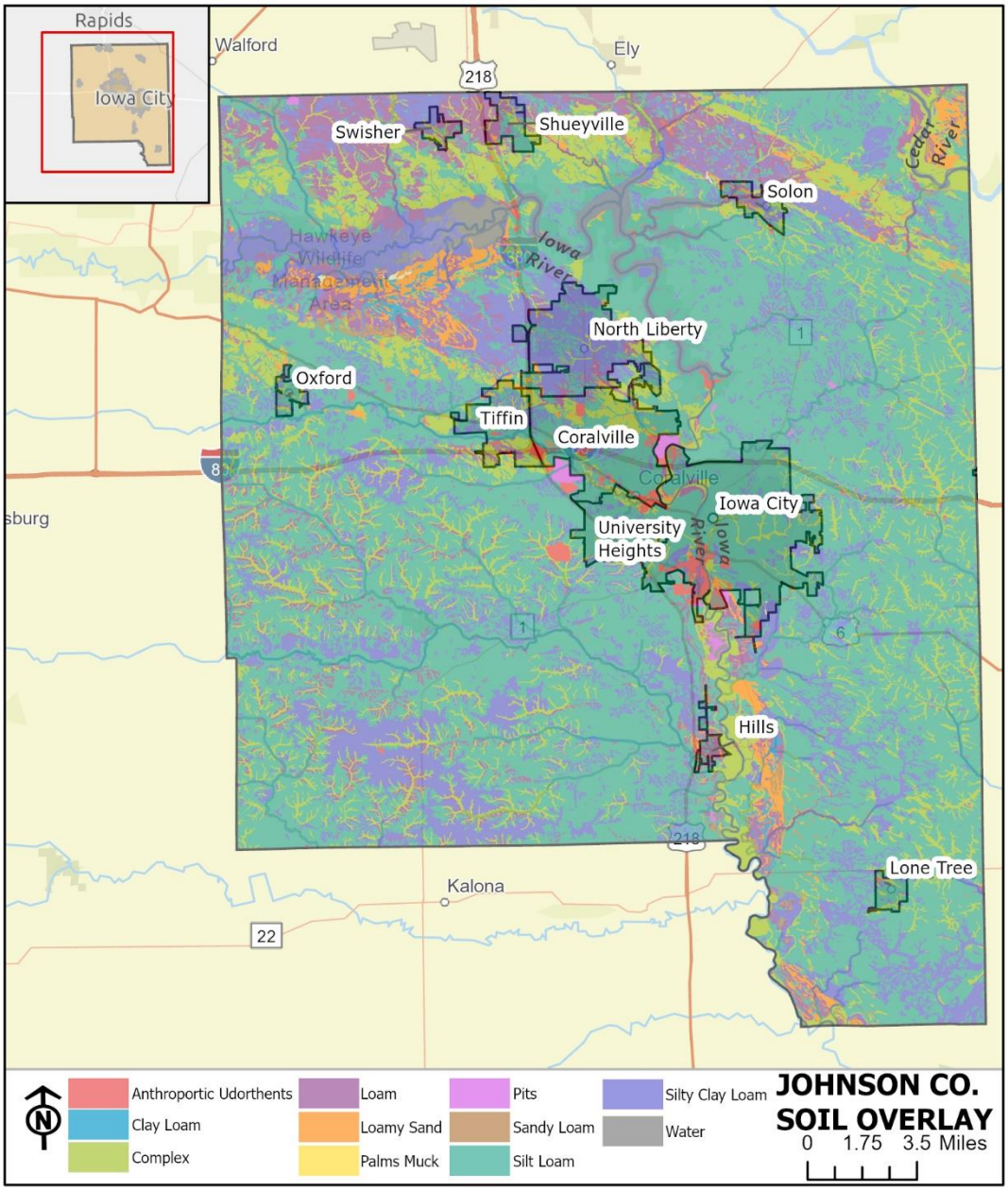
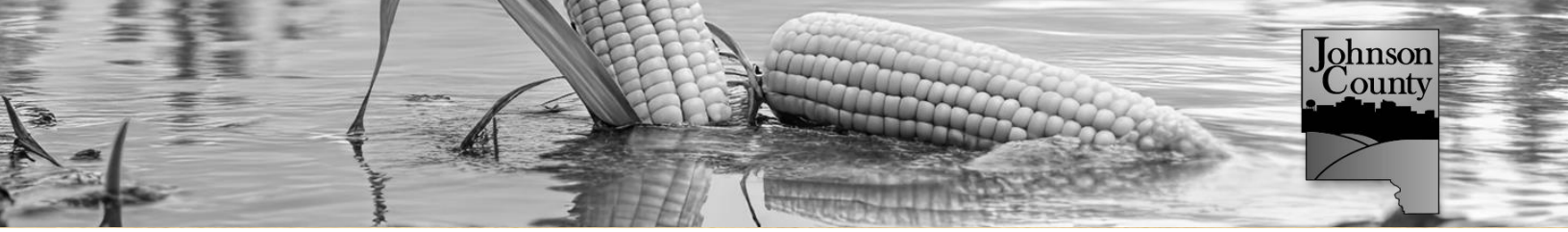


Figure 2-1: Johnson County Soil Overlay Map



Water Resources

- Rivers and Streams: Johnson County is traversed by the Iowa River, which plays an essential role in the county's ecosystem. The river and its tributaries provide irrigation for agriculture, support local wildlife, and offer recreational spaces for fishing, kayaking, and other water activities.
- Aquifers and Groundwater: Johnson County relies on underground aquifers for its water supply, crucial for both agricultural and municipal uses. Protecting groundwater resources is a top priority to maintain clean drinking water and ensure continued agricultural productivity.
- Floodplains: Floodplains along the Iowa River and other water bodies are critical for flood management and ecological health. Conservation efforts often target these areas to preserve wetlands, manage water flow, and reduce flood risks.

Forests and Woodlands

- Forested Areas: Johnson County has forested lands, particularly along river valleys, which contribute to the local ecosystem by providing habitats for wildlife. These wooded areas are popular spots for recreational activities like hiking, bird-watching, and camping.
- Hardwood Trees: Native hardwoods such as oak, hickory, and maple are prominent in the county's forests. These trees support biodiversity and contribute to Johnson County's natural beauty and environmental balance.

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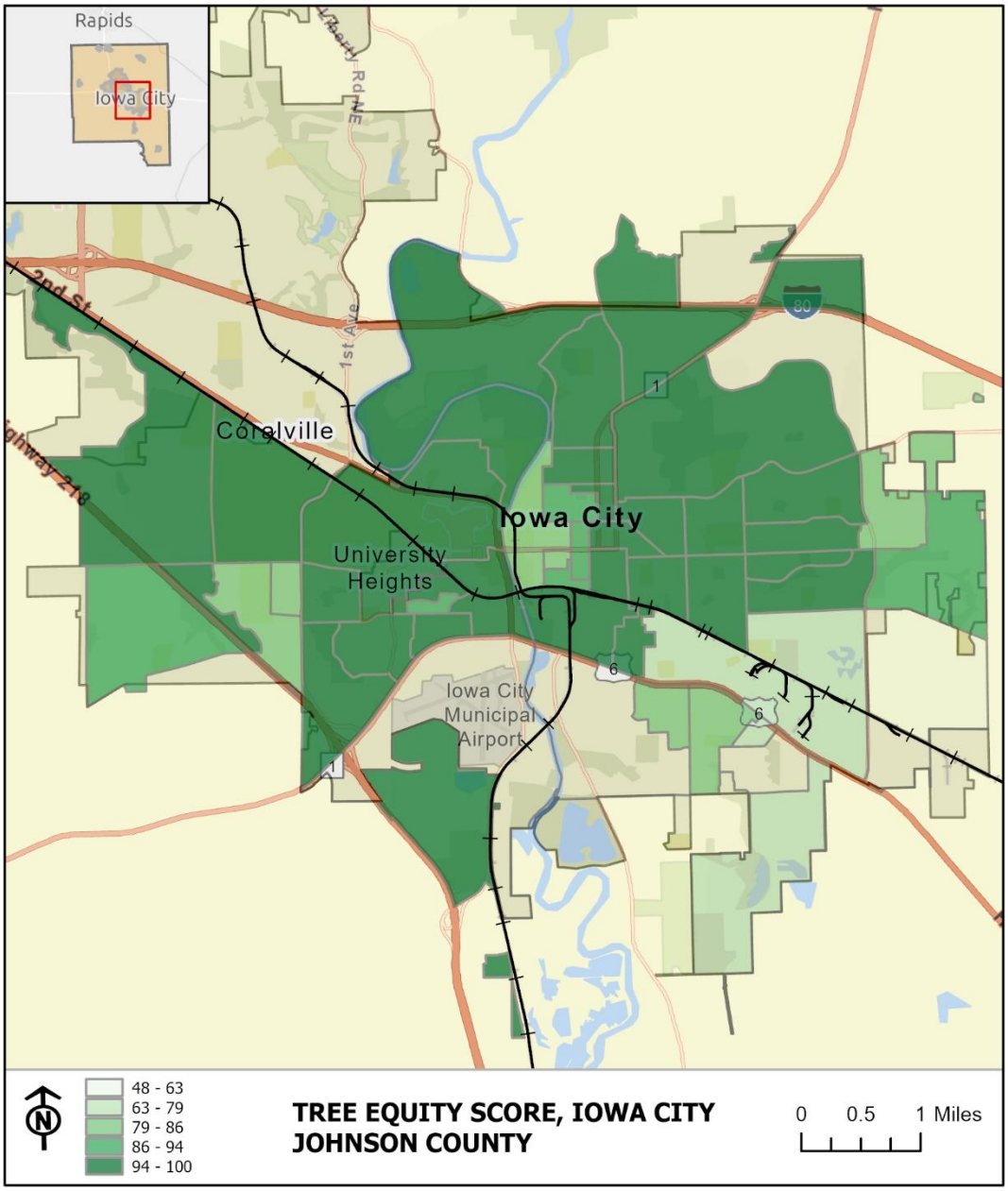
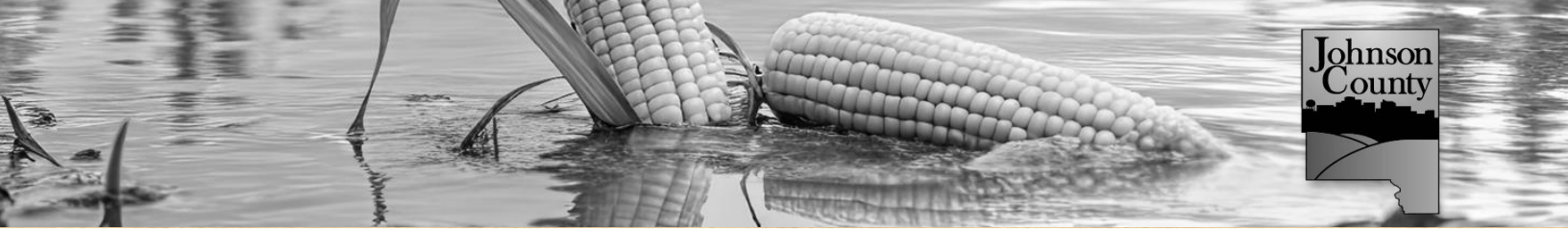


Figure 2-2: Iowa City Tree Equity Score Map

Mineral Resources

- Sand and Gravel: Johnson County contains deposits of sand and gravel, essential for construction and infrastructure development. These resources are extracted



through regulated operations that support the local economy while ensuring environmental safeguards.

Wetlands and Conservation Areas

- Wetlands: Wetlands in Johnson County are crucial for water quality, wildlife habitat, and flood management. Protected areas around rivers and streams help maintain these valuable ecosystems and support biodiversity.
- Conservation Efforts: Organizations like the Johnson County Conservation Board work to preserve natural habitats, promote sustainable land use, and manage parks, trails, and nature reserves for public enjoyment and environmental health.

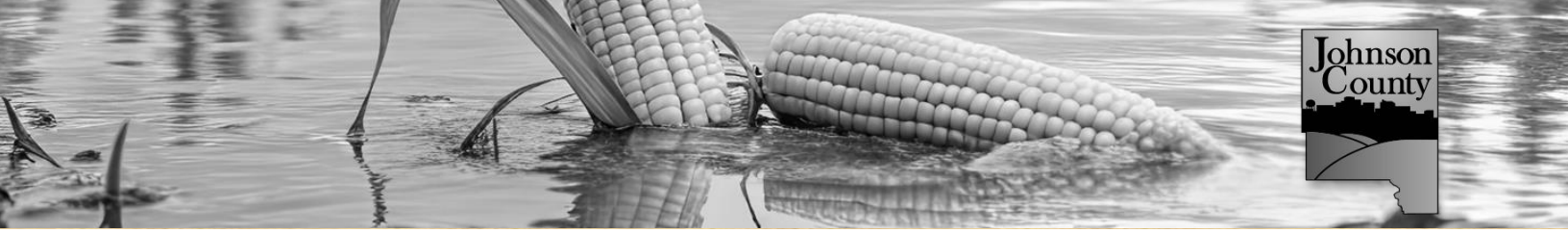
Recreational Natural Resources

- Lake Macbride State Park: This popular state park offers scenic views, forested areas, and Lake Macbride itself, where residents and visitors enjoy camping, boating, fishing, and nature observation.
- Coralville Reservoir and Devonian Fossil Gorge: The Coralville Reservoir provides recreational opportunities and is known for the Devonian Fossil Gorge, where exposed fossils from over 375 million years ago create a unique educational site. This area supports fishing, boating, hiking, and picnicking.
- F.W. Kent Park and Other Reserves: Johnson County includes multiple natural preserves, like F.W. Kent Park, which provides hiking, fishing, and camping opportunities while protecting local habitats and promoting conservation.

Johnson County's natural resources, including fertile soils, rivers, forests, and recreational areas, support its agricultural economy and quality of life. Conservation programs aim to protect these assets, ensuring sustainability for the environment and the community.

2.2.3 Endangered Species and Threatened Species

In Johnson County, Iowa, several species are classified as endangered or threatened, facing risks due to habitat loss, environmental changes, and human activity. These species are protected under the Endangered Species Act (ESA), and various conservation efforts are underway to help preserve their populations. Below is an overview of some notable endangered and threatened species in the area:



Endangered Species

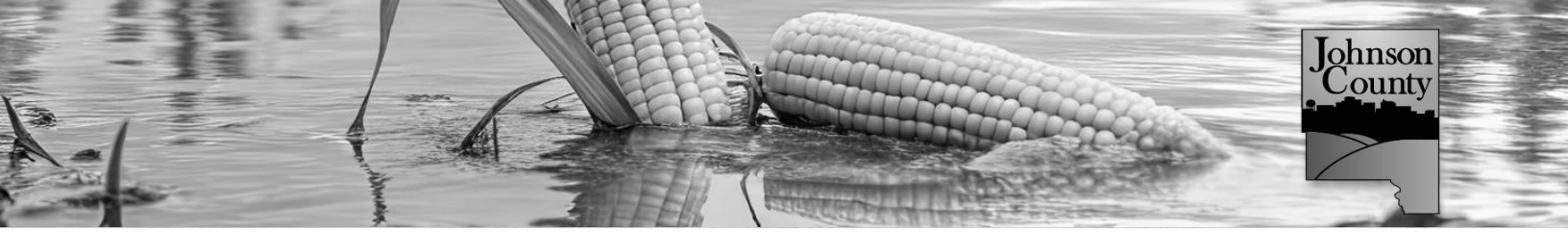
- Higgins' Eye Pearly Mussel (Lampsilis higginsii): A thick-shelled freshwater mussel found in the Iowa River, requiring clean, fast-flowing waters; endangered by sediment buildup and water pollution.
- Northern Long-eared Bat (Myotis septentrionalis): A small bat with long ears that roosts in Johnson County's forests and caves, threatened by white-nose syndrome and habitat disturbances.
- Eastern Massasauga (Sistrurus catenatus): A small rattlesnake residing in marshes and wetlands; endangered due to habitat loss and occasional conflicts with humans.
- Eastern Prairie Fringed Orchid (Platanthera leucophaea): A delicate white-flowered orchid found in prairie remnants and wet meadows, endangered by habitat loss from agricultural expansion.
- Fat Pocketbook Mussel (Potamilus capax): A rounded mussel inhabiting clean riverbeds, facing risks from pollution and sedimentation impacting Johnson County's rivers.

Threatened Species

- Orangethroat Darter (Etheostoma spectabile): A small, colorful fish inhabiting clear, fast-flowing streams with gravel or sandy bottoms; threatened by water pollution and habitat degradation.
- Purple Wartyback (Cyclonaias tuberculata): A freshwater mussel with a thick, warty shell, residing in medium to large rivers with clean, stable substrates; faces threats from sedimentation and water quality decline.
- Northern Long-eared Bat (Myotis septentrionalis): A medium-sized bat with long ears, roosting in forests and caves; populations are declining due to white-nose syndrome and habitat loss.
- Byssus Skipper (Problema byssus): A butterfly species that prefers wet prairies and marshes; its numbers are decreasing because of habitat destruction and fragmentation.
- Pinesap (Monotropa hypopithys): A non-photosynthetic plant found in shaded, mature forests; threatened by deforestation and changes in forest composition.

Conservation Efforts

Johnson County, Iowa, actively engages in conservation initiatives to protect endangered and threatened species within its jurisdiction. In November 2024, voters approved a $30 million conservation bond to fund projects over the next 20 years,



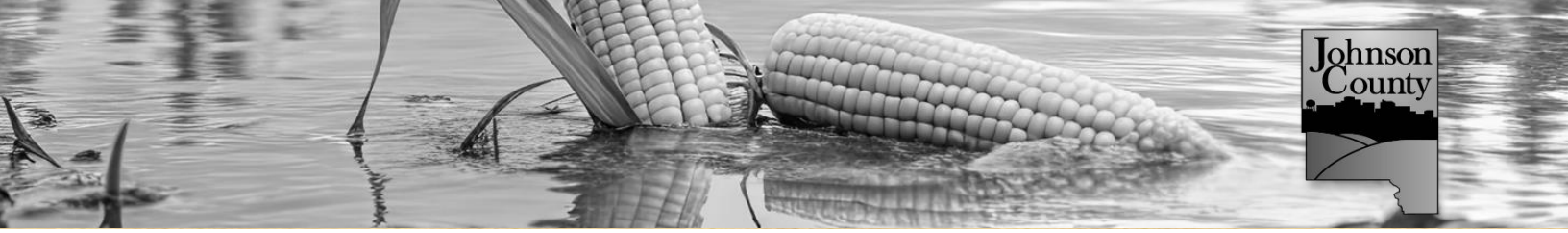
focusing on protecting water quality, preserving natural areas, and enhancing public access to parks and trails. This builds upon a previous $20 million bond from 2008 that supported flood mitigation, park expansion, and trail development. The Johnson County Conservation Department manages over 18 sites, including natural areas, parks, preserves, and trails, with efforts directed at restoring native habitats such as prairies and wetlands, which are crucial for species survival. Projects like the Malinda Reif Reilly Fen and Prairie focus on preserving rare plant species and maintaining ecological balance.

The county also prioritizes conservation education through programs and events to raise awareness about local wildlife and habitat preservation. Community engagement initiatives, such as the annual BioBlitz, encourage residents to document biodiversity, strengthening the connection between residents and their environment. In addition, Johnson County collaborates with organizations like The Nature Conservancy and the Iowa Department of Natural Resources to implement conservation strategies, leveraging shared resources and expertise to enhance the impact of these efforts. Land acquisition funded by conservation bonds and grants is another significant aspect of Johnson County's strategy, allowing the county to secure critical habitats and protect them from development. These comprehensive efforts underscore Johnson County's commitment to preserving its natural heritage and safeguarding the diverse species that call the region home.

2.3 Built Environment

2.3.1 General Property

Understanding property values is crucial to disaster preparedness and mitigation because it helps Johnson County's local government and emergency planners assess potential economic impacts and allocate resources effectively. Knowing the total value of properties in Johnson County allows officials to prioritize areas for disaster prevention measures, especially high-value commercial or residential zones vulnerable to significant financial loss. Additionally, property value assessments support financial planning for disaster recovery by providing estimates of potential damage costs, aiding in securing insurance coverage, setting aside reserve funds, and applying for federal assistance. Property values also guide the targeting of mitigation investments, ensuring that critical infrastructure or economically important areas receive necessary protection. In the event of a disaster, responders can prioritize high-value areas to minimize overall economic loss. Data gathered from reports like the Abstract of Values from the Johnson County Assessor ensures that both preparedness and response efforts are aligned with the county's economic landscape, ultimately helping reduce financial and structural damage during disasters.



The following chart provides an overview of property values related to agriculture:

City/County	Agricultural Realty	Residential Dwellings on Agricultural Realty
Johnson County	$51,596,700	1,710
Coralville	$1,321,500	3
Hills	$301,200	2
Iowa City	$1,664,680	7
Lone Tree	$614,600	0
North Liberty	$3,629,200	5
Oxford	$467,100	0
Shueyville	$799,100	2
Solon	$105,000	0
Swisher	$505,100	2
Tiffin	$675,100	8
University Heights	$0	0

The following chart provides an overview of residential, commercial, and industrial property values:

City/County	Residential Realty	Residential 3+ Dwellings Realty	Commercial Realty	Industrial Realty
Johnson County	$2,773,840,037	$33,828,651	$160,005,664	$11,344,100
Coralville	$2,280,691,811	$204,203,674	$1,031,534,733	$42,105,600
Hills	$84,458,540	$2,768,753	$34,781,212	$0
Iowa City	$6,435,753,040		$1,248,387,848	$88,393,670
Lone Tree	$97,280,649	$3,482,986	$7,787,880	$0
North Liberty	$2,122,146,711	$82,690,717	$380,191,585	$19,844,700
Oxford	$57,921,701	$871,673	$3,943,940	$0
Shueyville	$134,830,500	$0	$4,552,500	$0
Solon	$368,403,530	$12,859,858	$42,570,425	$954,000
Swisher	$90,123,100	$1,272,139	$3,458,300	$0
Tiffin	$748,279,400	$33,412,168	$112,195,935	$0
University Heights	$210,529,372	$0	$16,349,875	$0

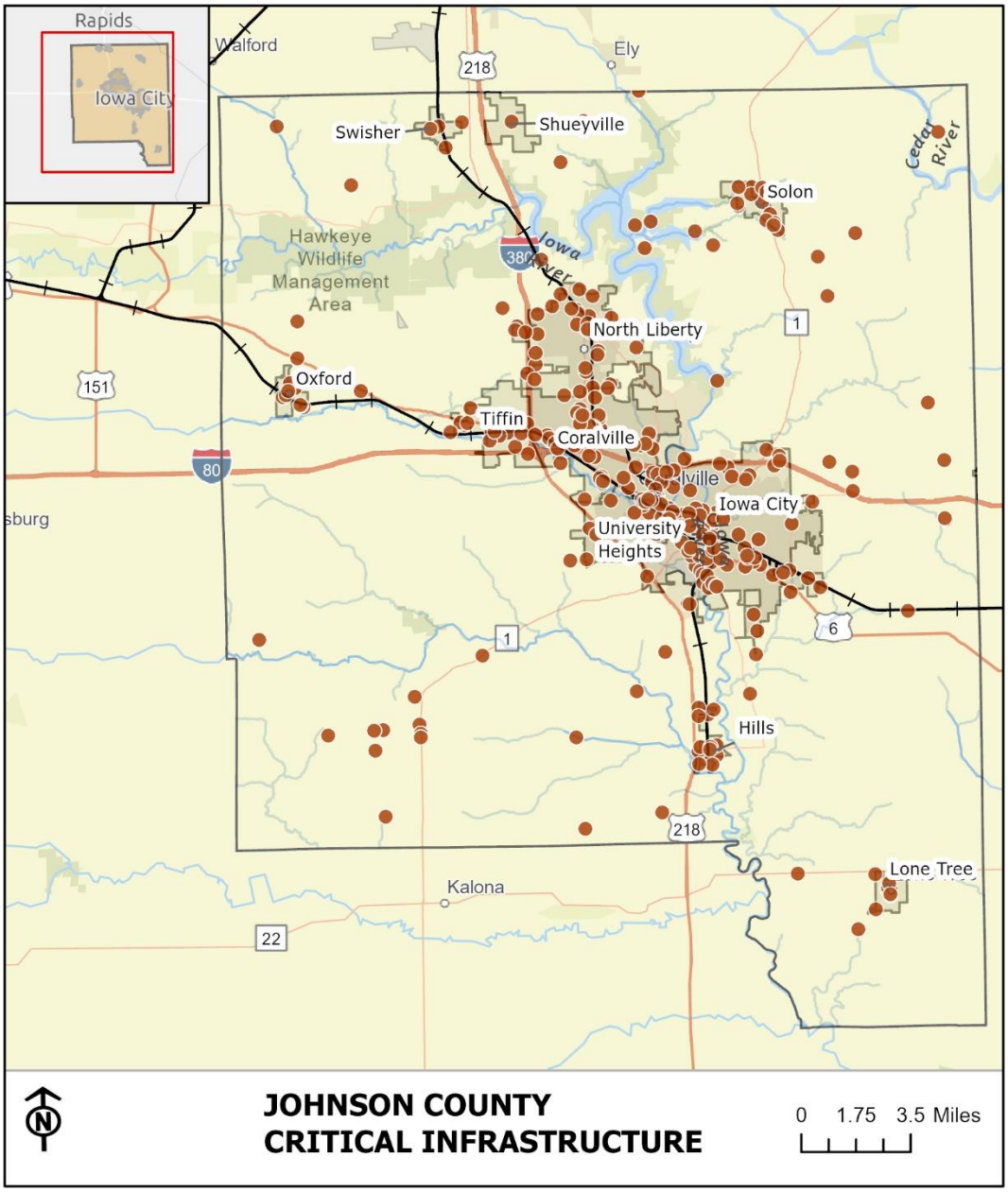


Figure 2-3: Johnson County Critical Infrastructure Map

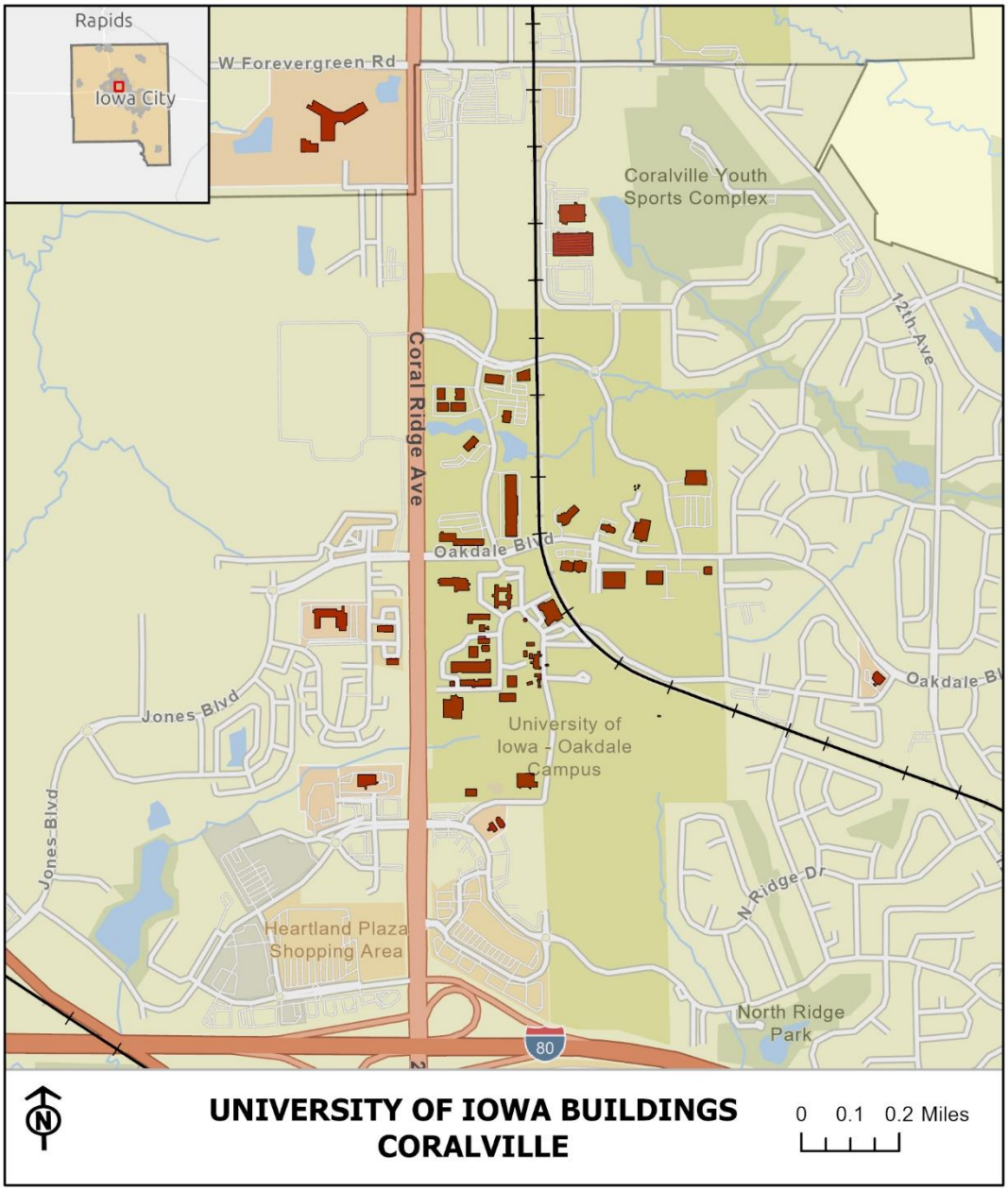


Figure 2-4: University of Iowa Buildings - Coralville

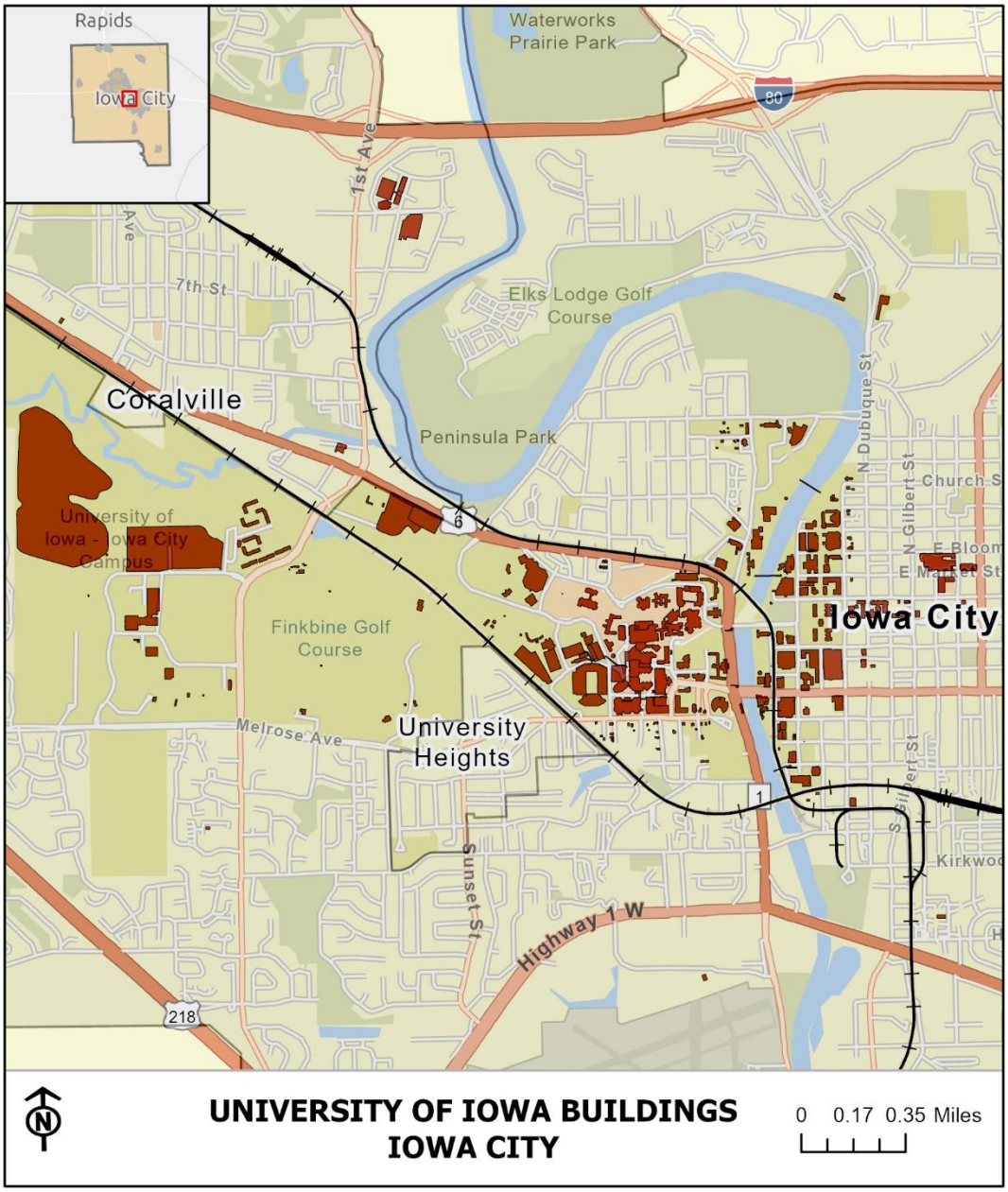


Figure 2-5: University of Iowa Buildings – Iowa City

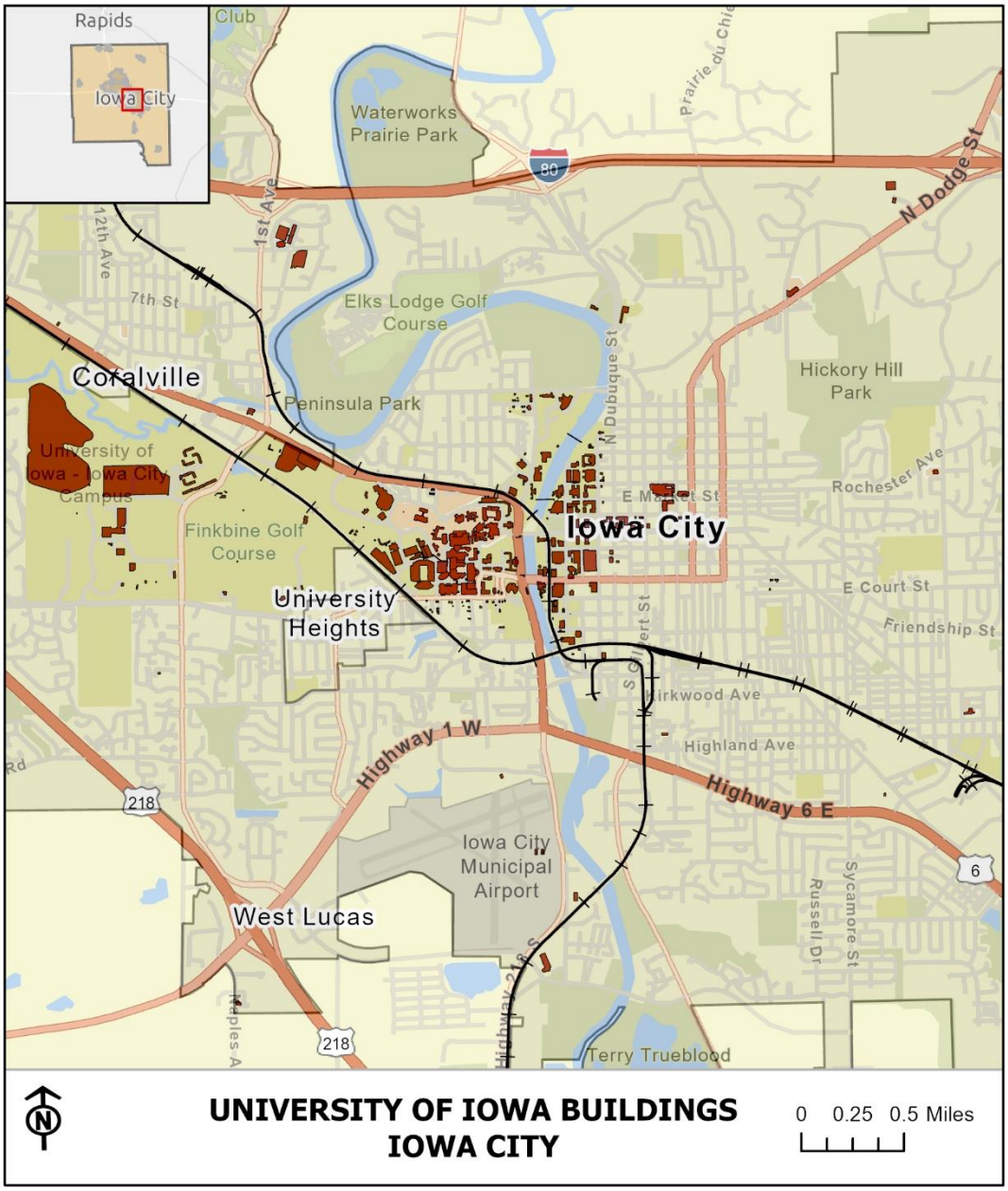


Figure 2-6: University of Iowa Buildings – Iowa City 2

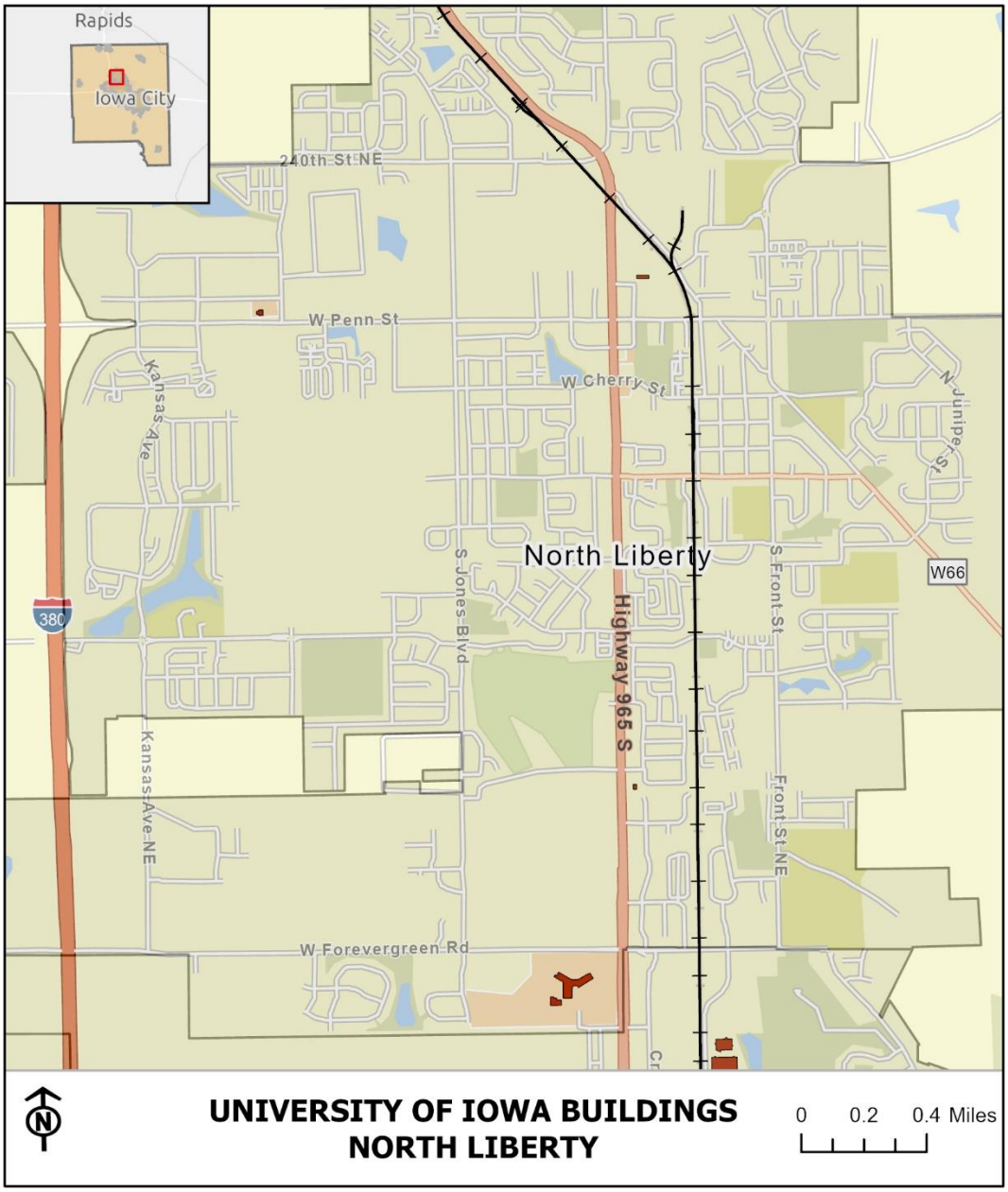
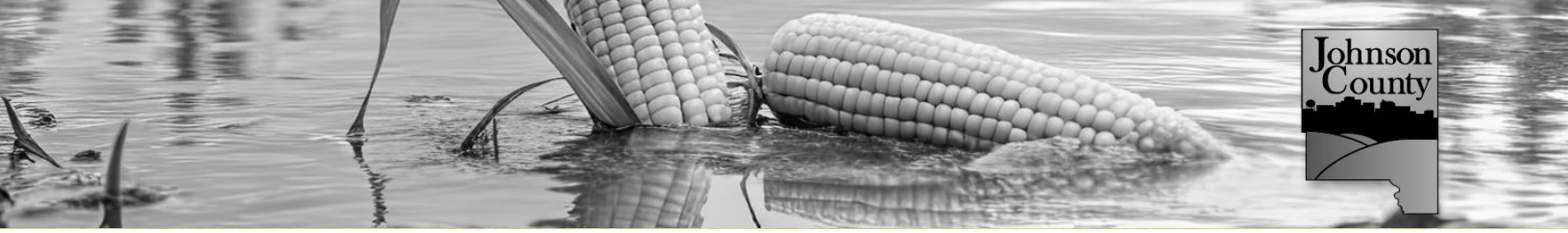


Figure 2-7: University of Iowa Buildings – North Liberty



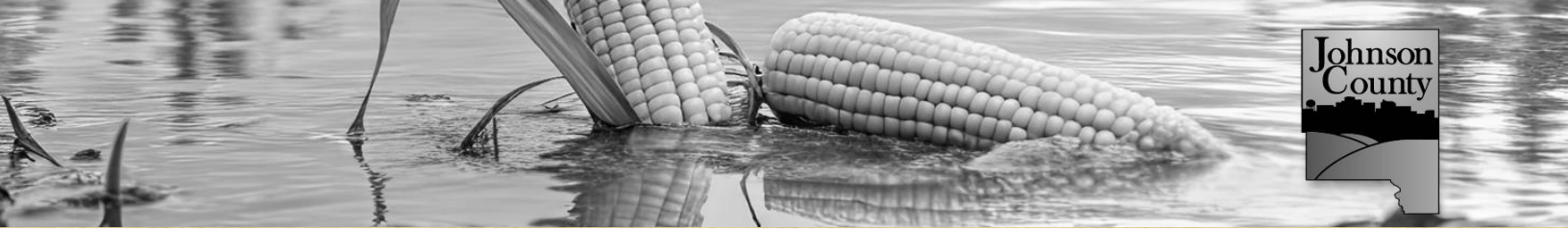
2.3.2 Repetitive Loss Properties

Element Addressed in Section
Element B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii)), including requirement **B2-c.**

Properties covered under the National Flood Insurance Program (NFIP) that have experienced multiple flood-related insurance claims, specifically distinguishing between repetitive loss (RL) and severe repetitive loss (SRL) properties. RL properties are those that have filed two or more flood claims of at least $1,000 each within a 10-year period, signaling locations with frequent flooding issues that may warrant intervention or mitigation. In contrast, SRL properties have experienced either four or more flood claims exceeding $5,000 each (totaling over $20,000 cumulatively) or two claims totaling the building's value, indicating a higher degree of risk and recurrent loss. By capturing both the count of claims and indicators of mitigation or insurance status, this dataset enables an assessment of areas within a county where flood-related losses are most concentrated, thus informing floodplain management and risk mitigation strategies. The following information is provided for the planning area from FEMA:

- Repetitive Loss Properties: 14 properties
- Severe Repetitive Loss Properties: 1 property
- Total Repetitive Loss Properties: 23 properties have been identified as repetitive loss properties.
- Total Loss Claims: There have been a total of 62 claims filed across these properties.
- Average Loss Claims per Property: Approximately 2.70 claims per property.
- Types of Properties:
    - Single-family homes (code 1.0): 14 properties
    - Multifamily units (code 4.0): 6 properties
    - Mobile homes (code 2.0): 0 properties
    - Commercial or other non-residential (code 6.0): 1 property
- Primary Residences: 10 properties are identified as primary residences.
- Mitigated Properties: 6 properties have undergone mitigation efforts.
- Insured Properties: 8 properties currently hold active insurance.

The Iowa DNR lists the following repetitive losses and severe repetitive losses by jurisdiction:



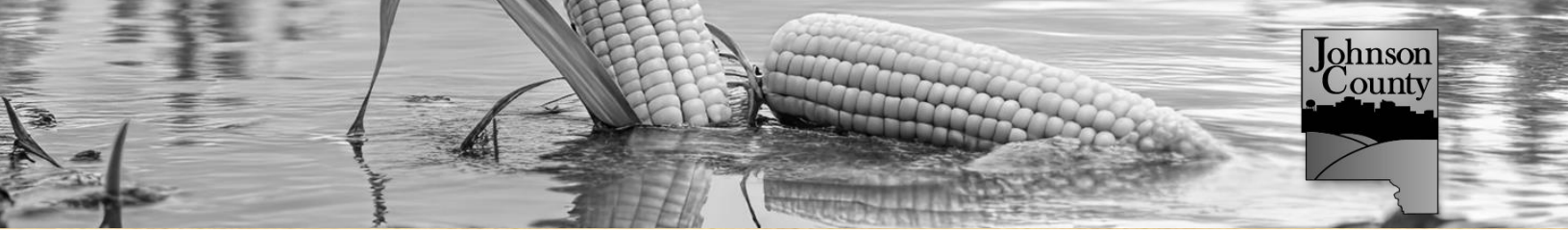
Jurisdiction	# of RL Properties	# of Single Family	# of Other-Non Residential	# of 2-4 Family	# of Business
Johnson County	6	6			
Coralville	4		3		1
Iowa City	1	1			
North Liberty	1	1			
Swisher	1			1	

Jurisdiction	# of SRL Properties	# of Single Family	# of Other-Non Residential	# of 2-4 Family	# of Business
Johnson County	1	1			
Coralville	2	1			1
Iowa City	1	1			

2.4 Geography and Climate

Johnson County, Iowa, is located in the southeastern part of the state, encompassing approximately 623 square miles that blend urban and rural landscapes, including significant agricultural areas as well as the urban center of Iowa City. The terrain consists of gently rolling hills, river valleys, and plains, with the Iowa River flowing through the heart of the county. This river not only supports agriculture and local ecosystems but also provides recreational opportunities, with Coralville Lake and Lake Macbride State Park nearby, which offer hiking, fishing, and boating activities. Johnson County's soil is primarily composed of loess and alluvial deposits, ideal for the cultivation of crops like corn and soybeans that contribute to both the local economy and the agricultural industry.

Johnson County experiences a humid continental climate with four distinct seasons. Summers are typically warm and humid, with average highs in July reaching the mid-80s°F, while winters are cold, with January lows around 15°F. The county receives an average of 36 inches of annual precipitation, most of which falls between April and September, supporting the agricultural growing season. Snowfall in winter averages about 27 inches, with potential for heavy snow events. Severe weather, including thunderstorms, hail, and occasional tornadoes, is common in spring and early summer. The Iowa River and other waterways can experience flooding, particularly following heavy rainfall or snowmelt, making flood risk a notable concern for the county.



2.4.1 Land Use

Johnson County, Iowa, has a diverse land use mix that balances agriculture, urban areas, and recreational spaces, reflecting its blend of rural and metropolitan characteristics. While agricultural land, primarily growing corn and soybeans, remains a significant part of the landscape, urban development centered around Iowa City and Coralville influences land use with residential, commercial, and institutional zones, particularly near the University of Iowa.

The cities and towns within Johnson County each have distinct land use patterns. Iowa City (25.28 square miles) features a vibrant downtown core with commercial, cultural, and academic areas centered around the University of Iowa, surrounded by residential neighborhoods, parks, and open green spaces along the Iowa River. Coralville (12.1 square miles) has a mix of residential, retail, and commercial spaces along major thoroughfares like the Coral Ridge Mall area, with recreational zones near Coralville Lake.

North Liberty (8.15 square miles), a rapidly growing suburb, has expanded residential neighborhoods, retail centers, and parks, along with recreational areas around Lake Macbride. Tiffin (2.45 square miles) has seen increased residential development along with small commercial areas, supporting its suburban growth. Solon (2.38 square miles) is mainly residential with small businesses concentrated around its central square and agricultural lands surrounding the town, reflecting its rural roots. Hills (0.19 square miles) is largely residential, with smaller agricultural fields and grasslands surrounding it, maintaining a more rural character.

Smaller communities like Shueyville (1.22 square miles) have residential areas interspersed with agricultural land and some wooded areas, while Lone Tree (0.6 square miles) consists of residential zones and small commercial establishments, with farmland and pastures surrounding it. Oxford (1.02 square miles) has residential neighborhoods, a small commercial district, and extensive agricultural fields, retaining its rural feel.

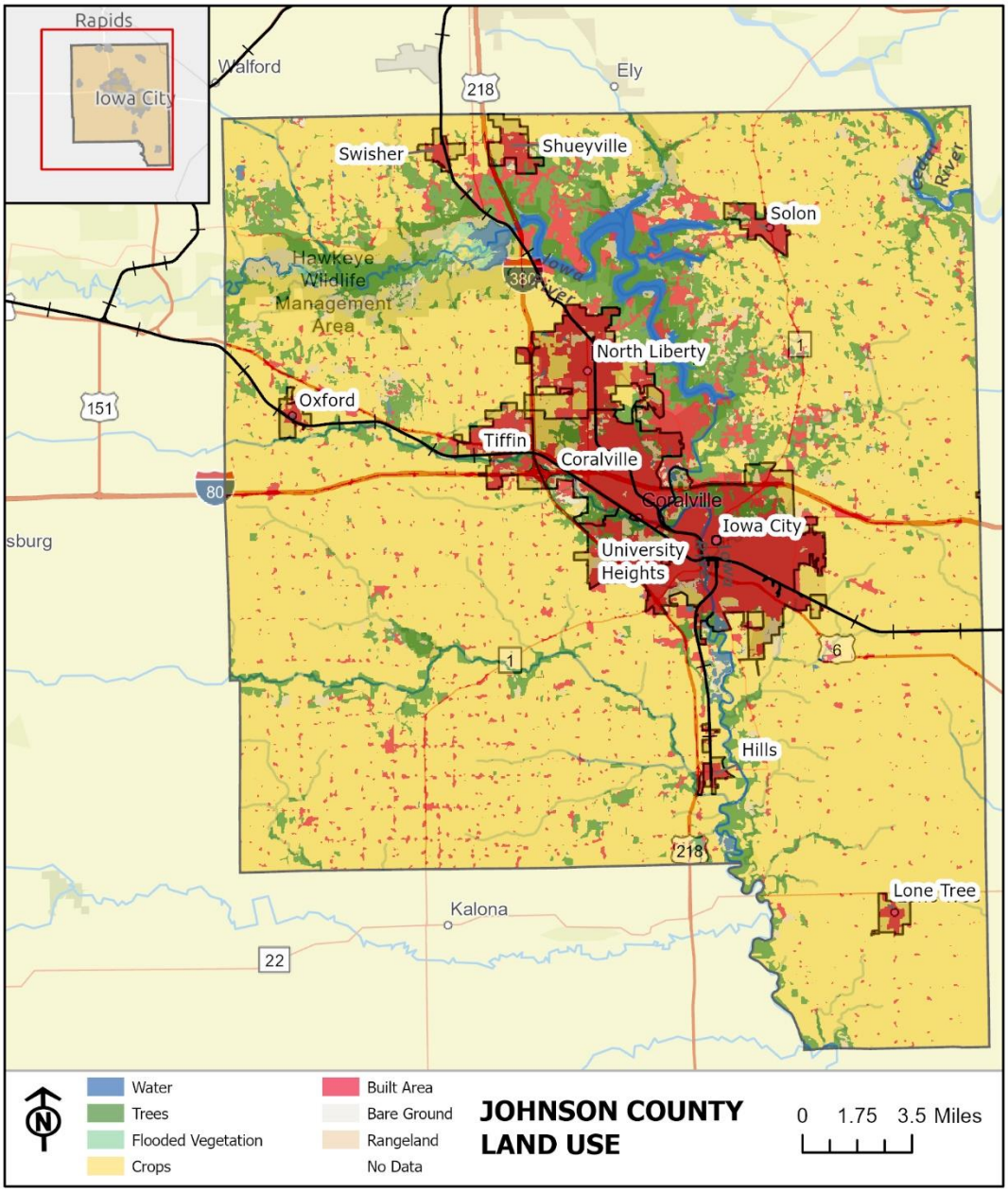


Figure 2-8: Johnson County Land Use Map

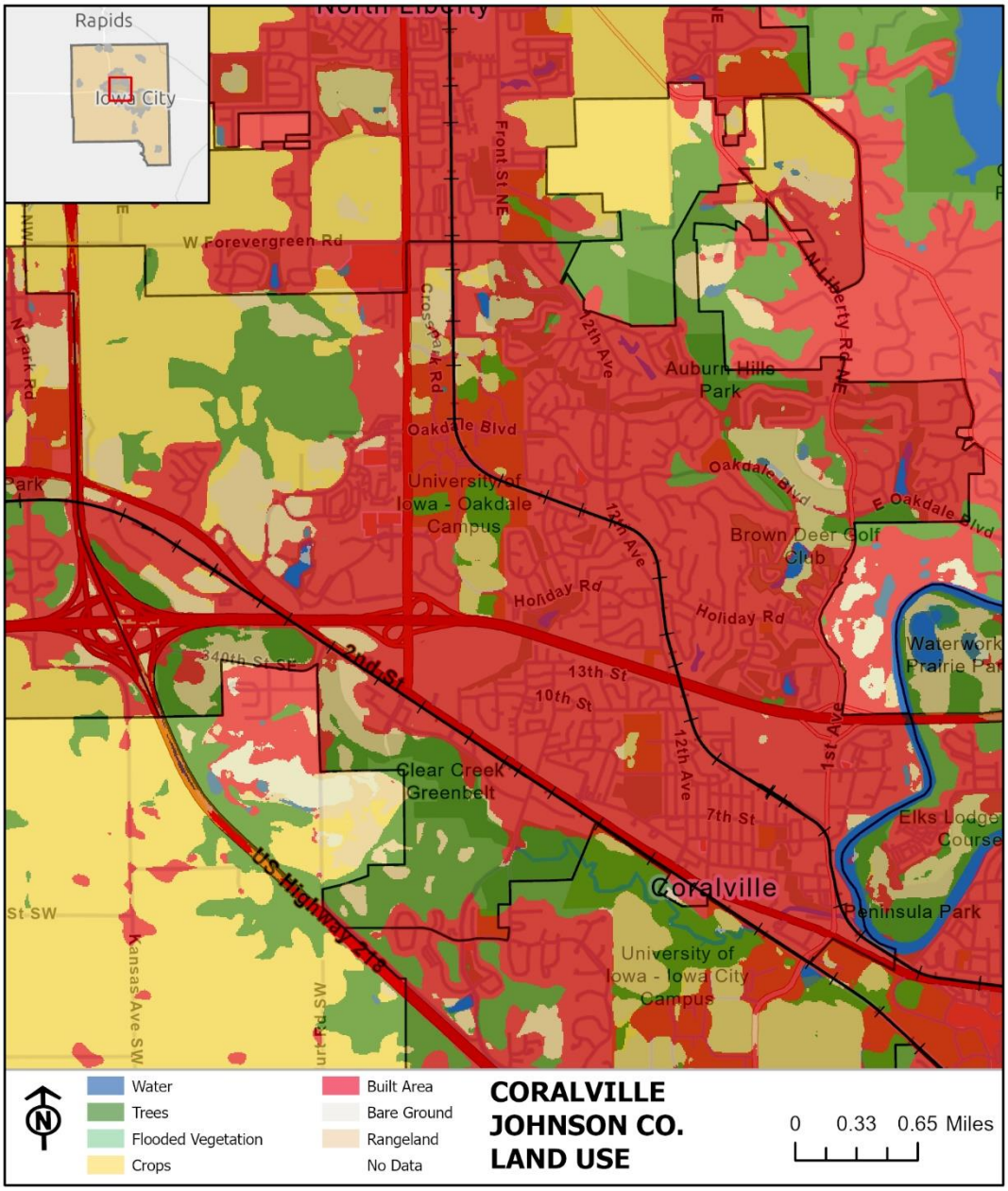


Figure 2-9: Coralville Land Use Map

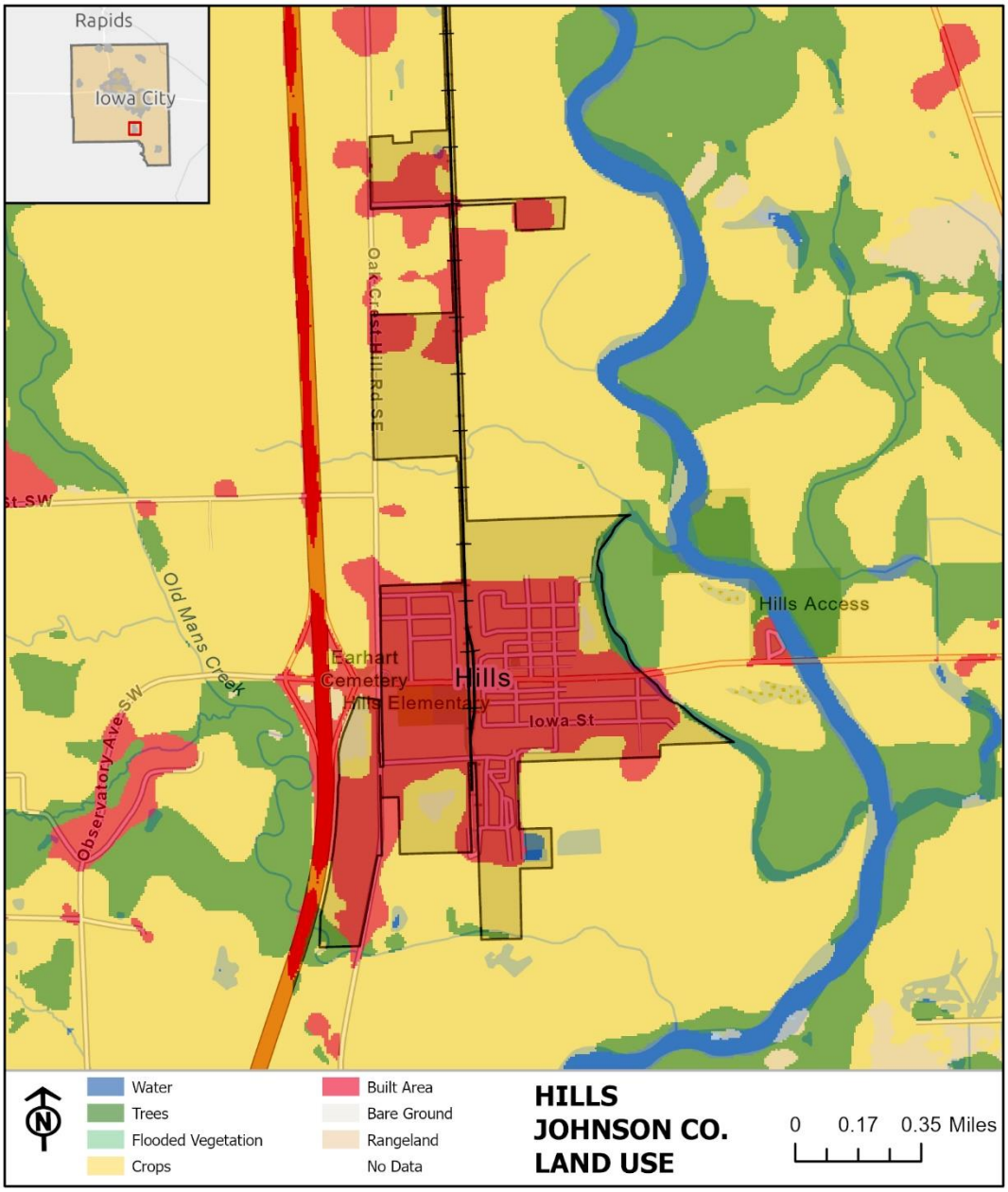


Figure 2-10: Hills Land Use Map

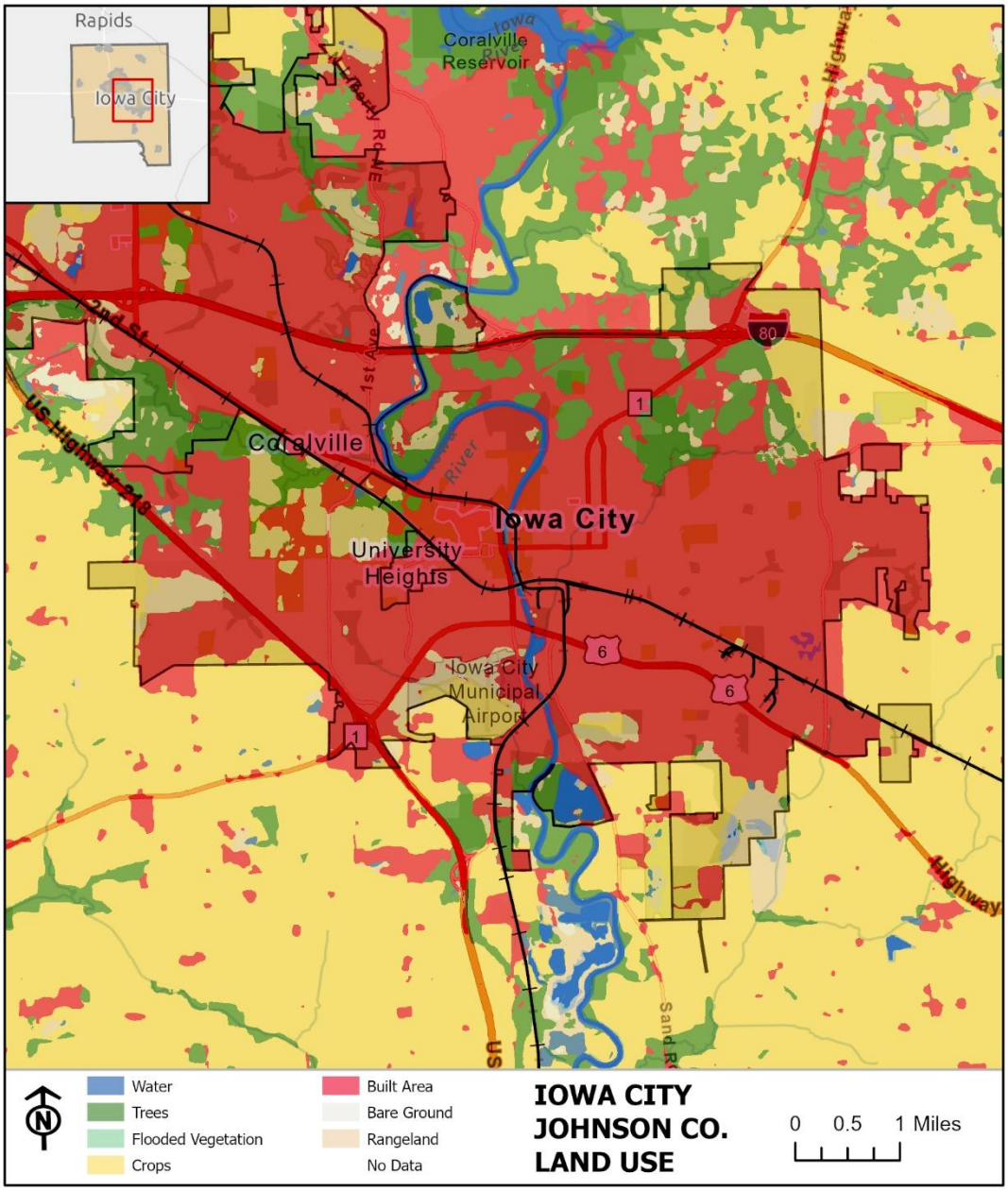


Figure 2-11: Iowa City Land Use Map

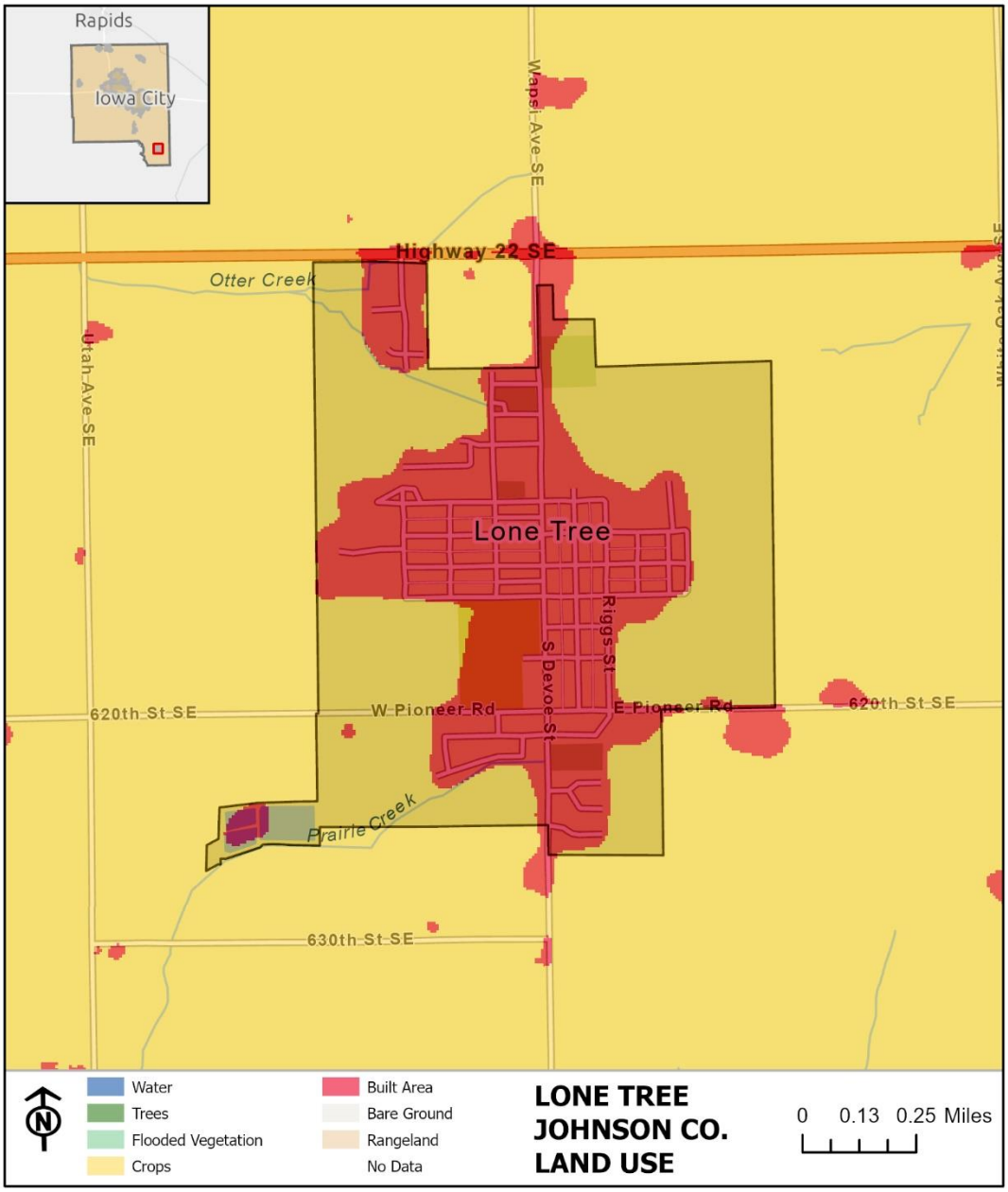


Figure 2-12: Lone Tree Land Use Map

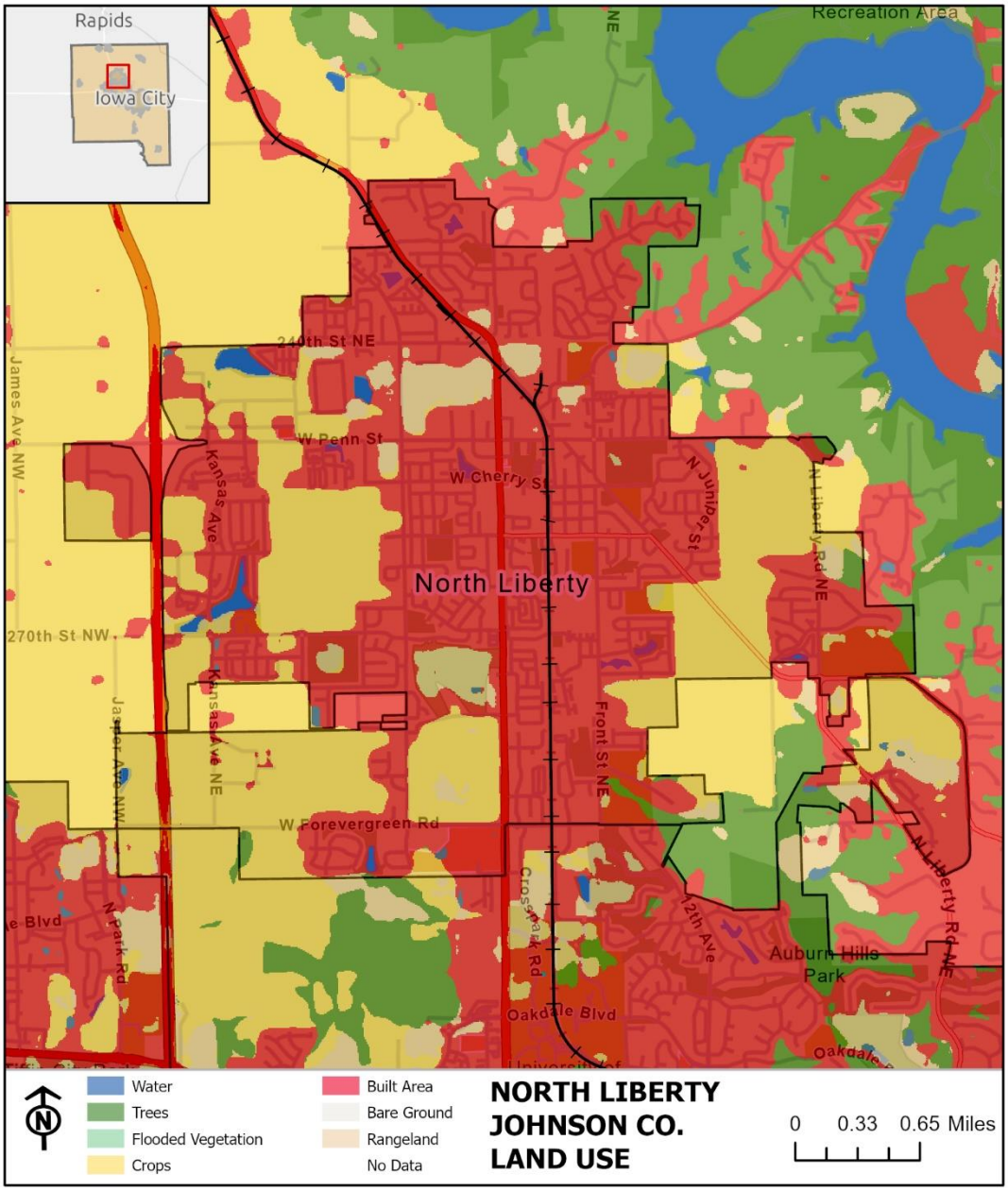


Figure 2-13: North Liberty Land Use Map

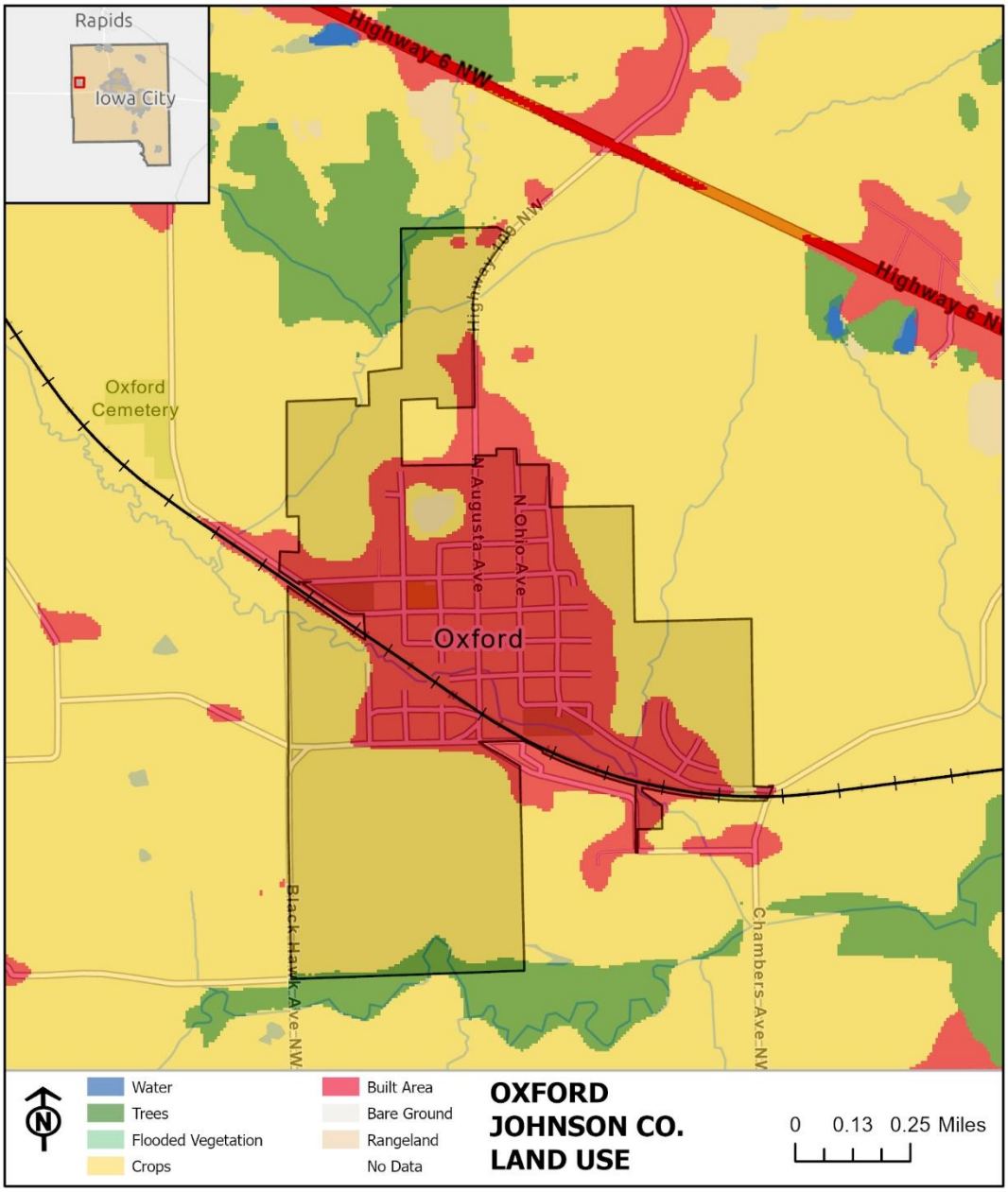


Figure 2-14: Oxford Land Use Map

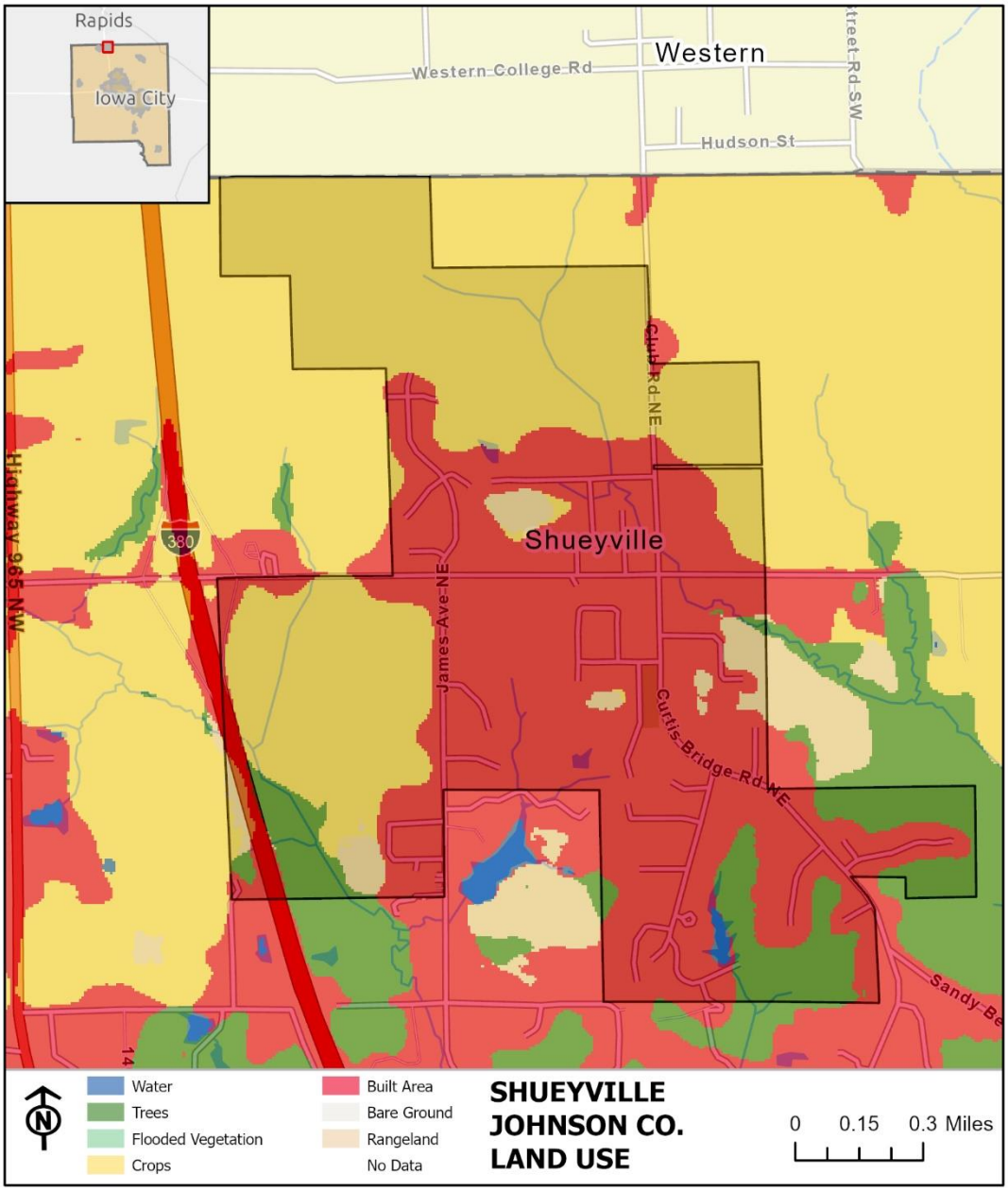


Figure 2-15: Shueyville Land Use Map

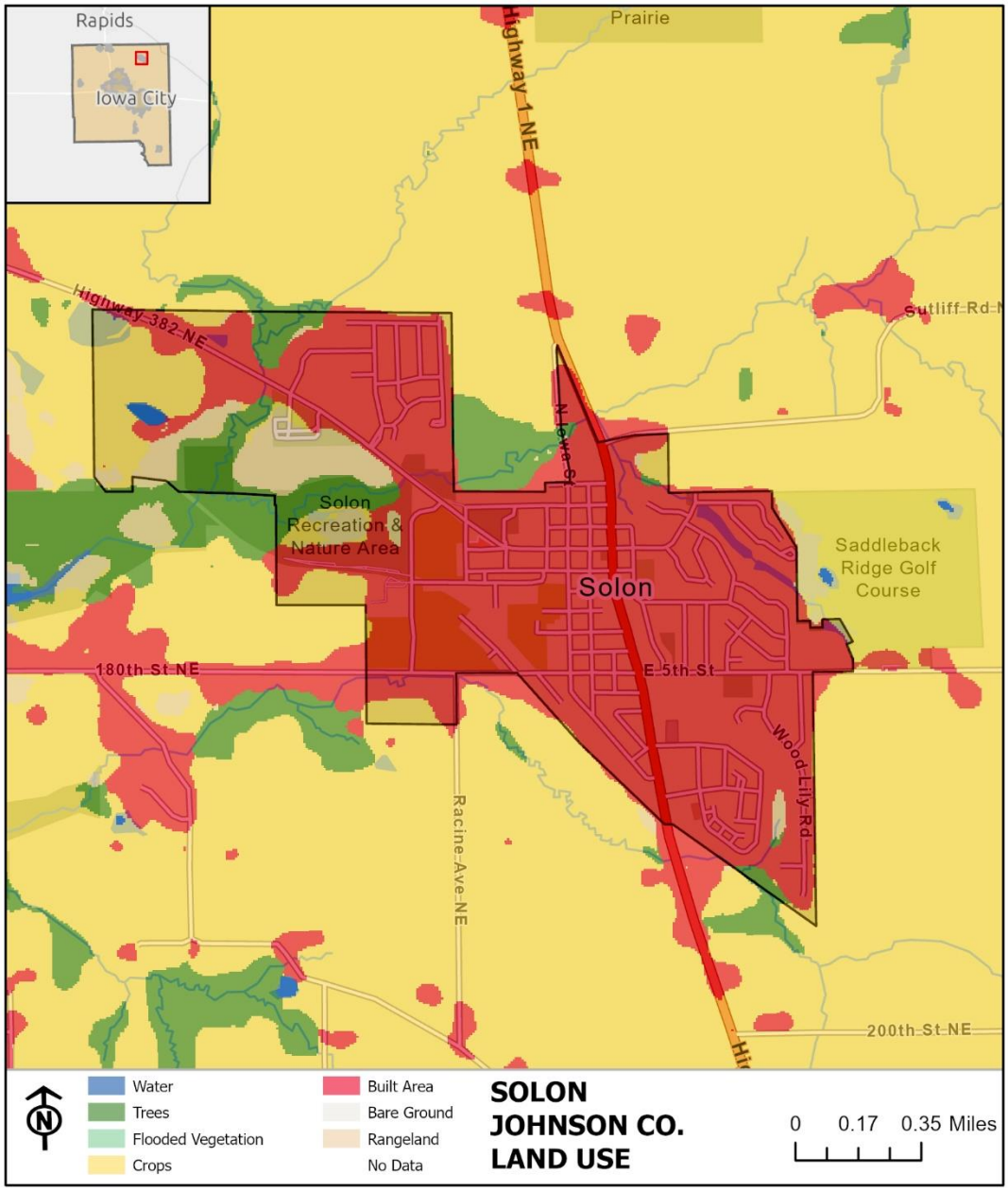


Figure 2-16: Solon Land Use Map

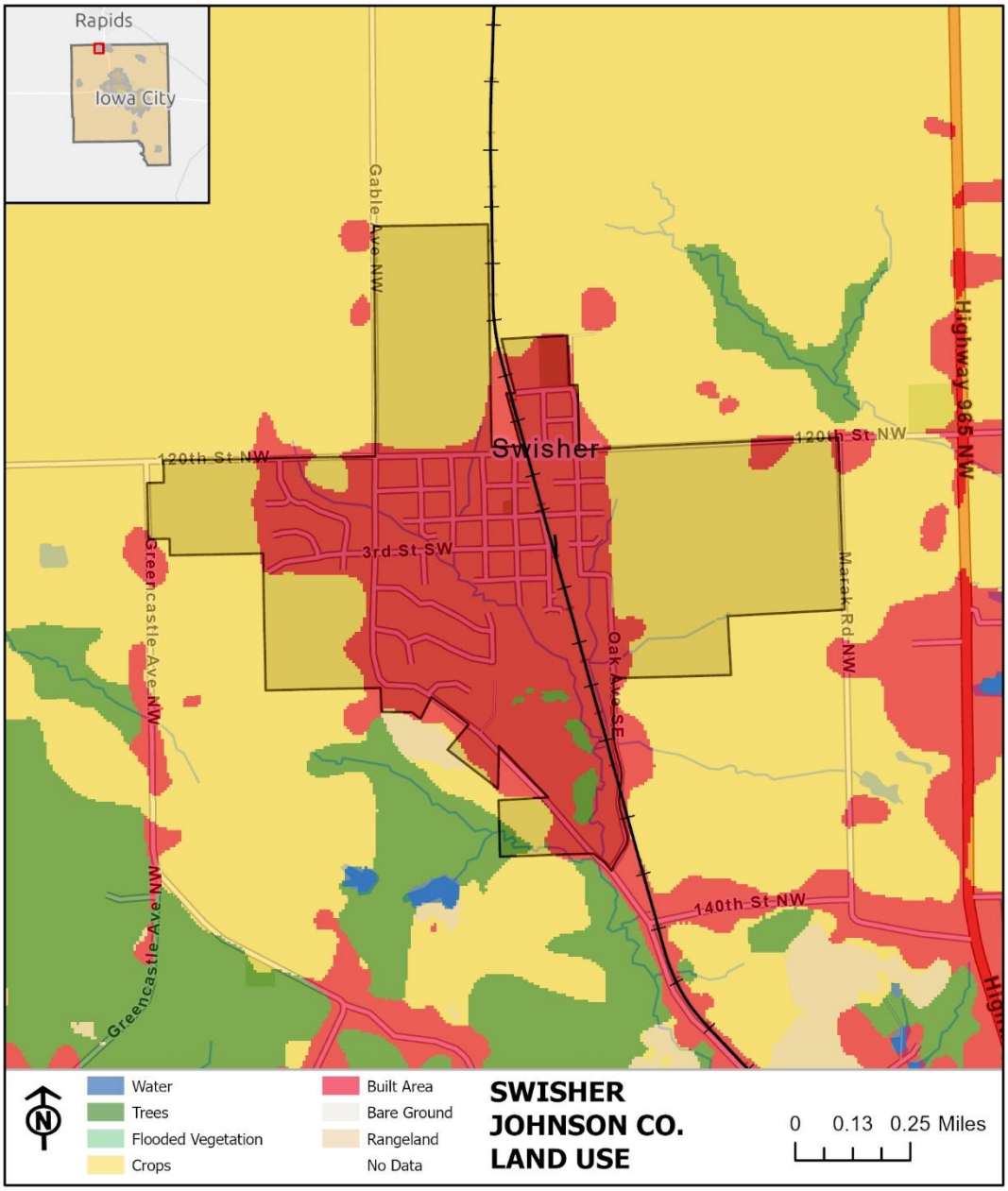


Figure 2-17: Swisher Land Use Map

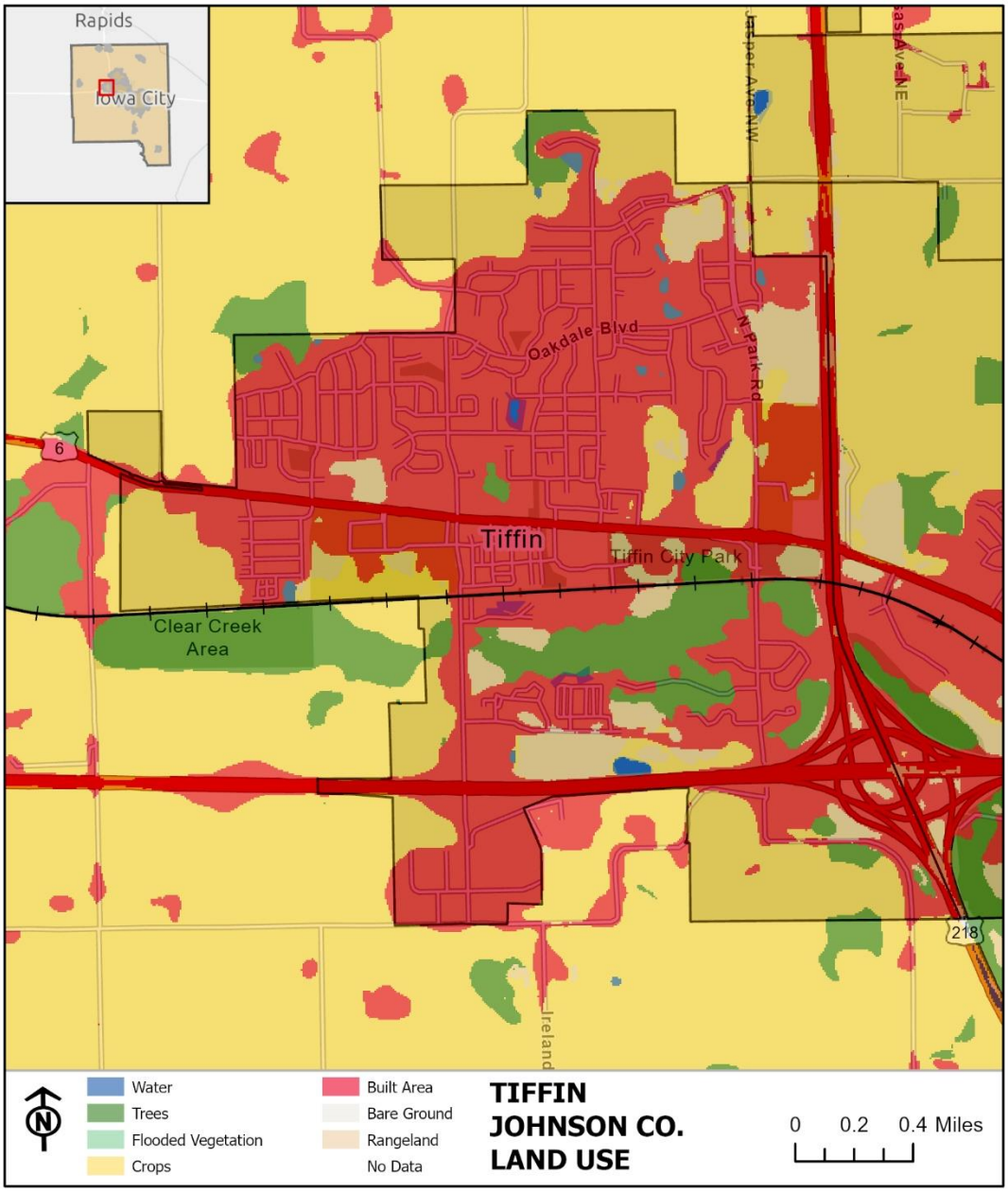


Figure 2-18: Tiffin Land Use Map

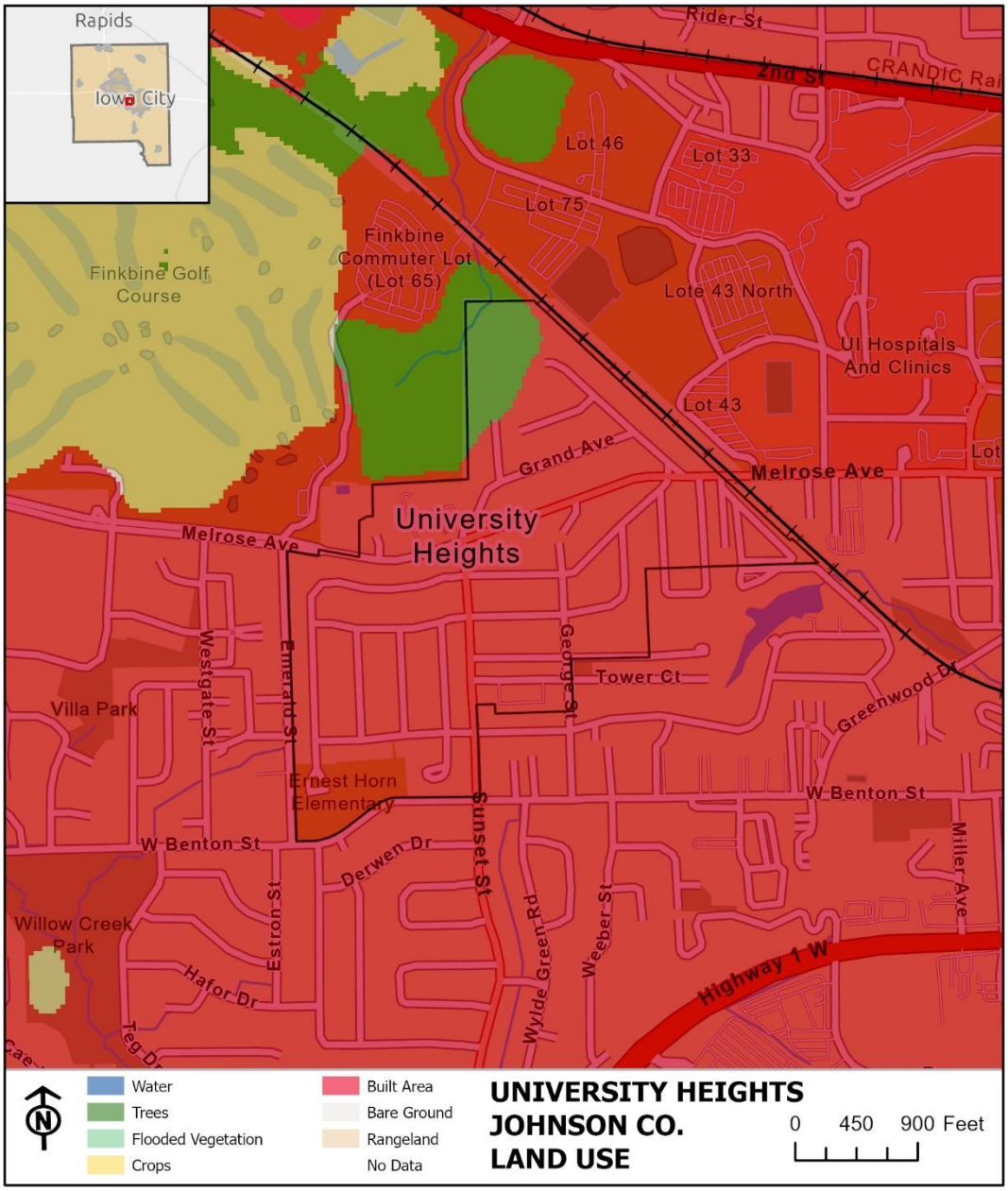
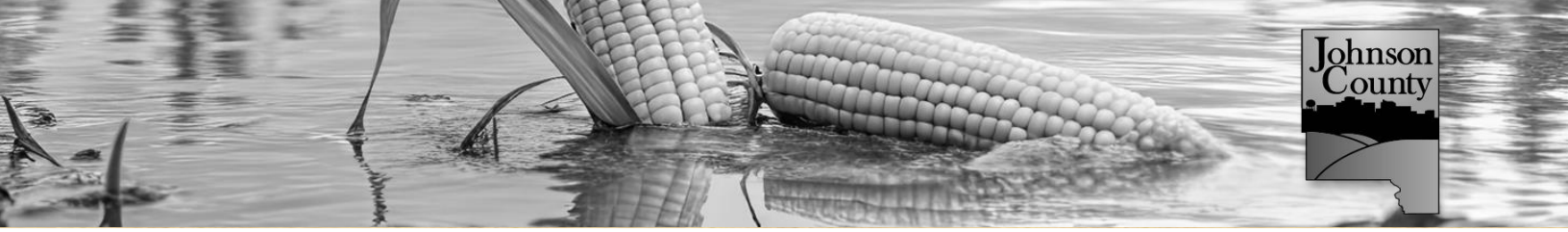


Figure 2-19: University Heights Land Use Map

2.4.2 Elevation

Johnson County, Iowa, features a varied elevation profile, shaped by river valleys, gentle hills, and the Iowa River basin. The county's lowest points, around 630 feet above sea level, are located in the Iowa River valley near the southeastern edge of the county. The



highest elevations, approximately 860 feet, are found in the northwestern portions of the county, where the landscape transitions into rolling hills.

Iowa City has elevation variations from about 640 feet near the Iowa River to 750 feet in higher residential areas on the west side. Coralville ranges from 650 feet near the river and lake areas to approximately 780 feet in the residential zones on the northern side. North Liberty sits at slightly higher elevations, generally between 720 and 780 feet, with gentle slopes throughout the town.

In Tiffin, elevations range from 710 feet near Clear Creek to around 760 feet in the northern residential areas. Solon is positioned on a gradual incline, with elevations between 730 and 780 feet. Smaller towns like Lone Tree average around 670 feet, consistent with the lowlands near the Iowa River. Hills is at an elevation of approximately 660 feet, also near the Iowa River floodplain, contributing to its relatively flat terrain.

Oxford and Shueyville are slightly higher, with elevations ranging from 720 to 780 feet, featuring rolling hills that add subtle topographic variation. Overall, Johnson County's elevation differences are modest but contribute to a mix of floodplain areas, fertile valleys, and gently rolling hills that define its landscape.

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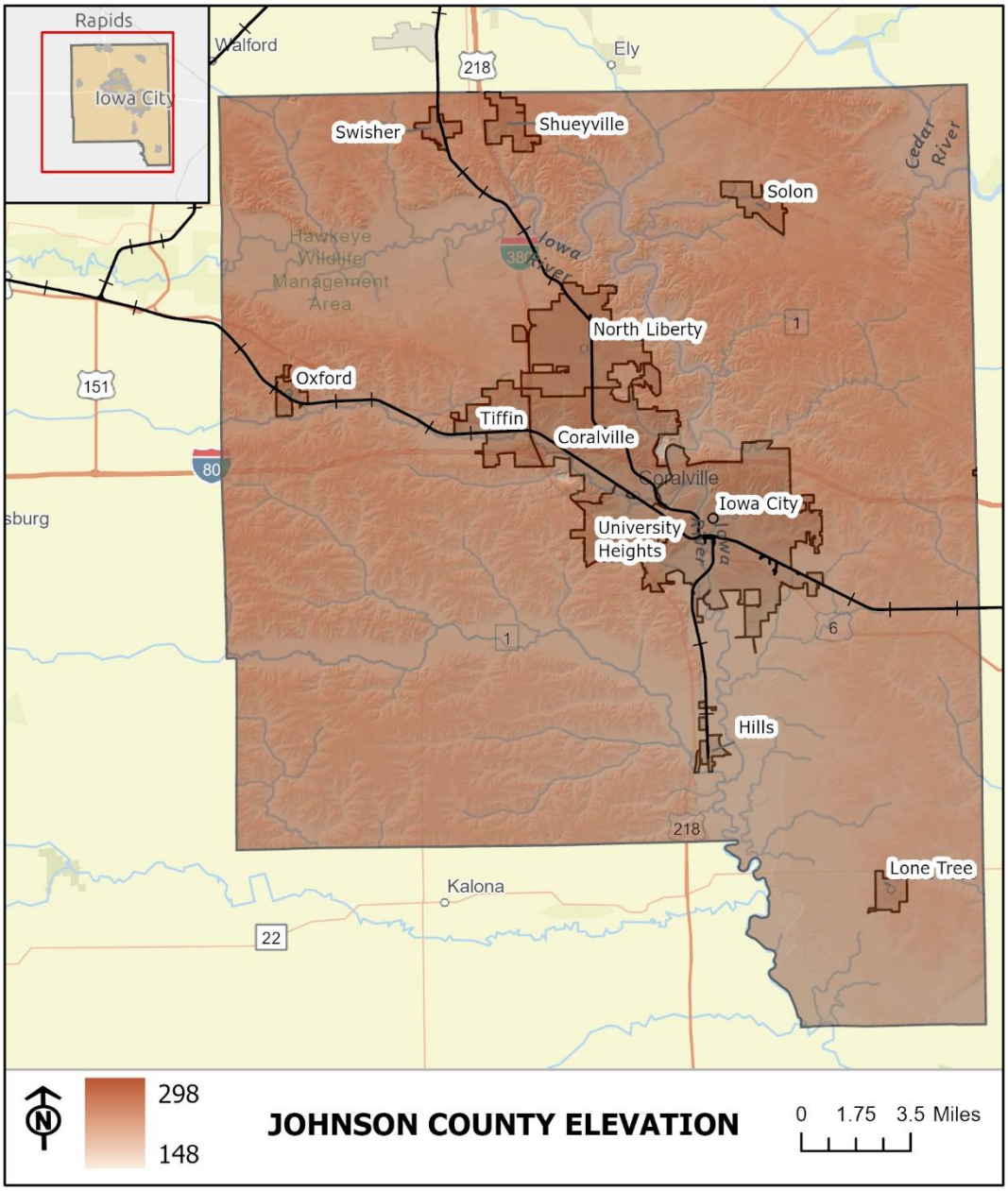
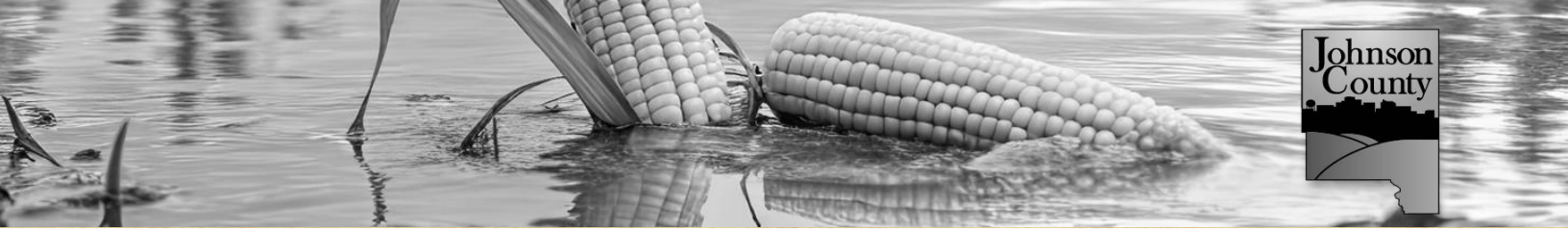


Figure 2-20: Johnson County Elevation Map

2.4.3 Rivers and Streams

Johnson County, Iowa, contains several prominent rivers and streams, with the Iowa River as the most significant waterway. Flowing through the county from northwest to southeast, the Iowa River runs through Iowa City and Coralville, providing essential water



resources, recreational opportunities, and scenic landscapes. The river stretches over 320 miles, eventually joining the Mississippi River. The Coralville Dam creates Coralville Lake, a popular recreation area that also serves as a flood control measure for the Iowa River and surrounding communities.

Several creeks also contribute to Johnson County's water system. Clear Creek flows west to east, passing near Tiffin and North Liberty before joining the Iowa River. It plays a role in local drainage and offers habitats for wildlife. Ralston Creek, a smaller tributary, runs through eastern Iowa City and drains into the Iowa River, impacting urban stormwater management.

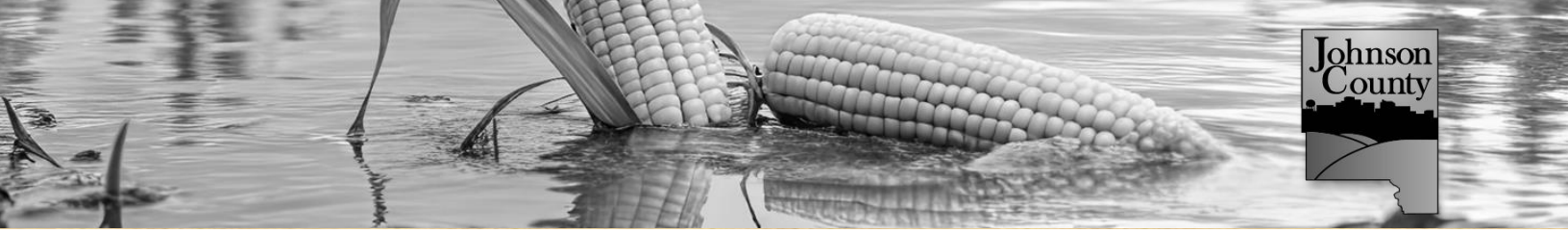
Other smaller streams, such as Rapid Creek and Deer Creek near Solon, and Old Man's Creek near Lone Tree, add to the county's natural waterways and provide drainage for the rural areas. While towns like Hills and Shueyville lack major rivers, they are bordered by streams and small creeks that support local drainage and agricultural needs. Collectively, Johnson County's rivers and streams play a crucial role in the area's ecology, water management, and recreational offerings.

2.4.4 Watersheds

Johnson County, Iowa, is part of several major HUC-10 watersheds, with much of the county falling within the Iowa River watershed. The county's southeastern areas also belong to the Lower Cedar River watershed, while the northwestern corner is part of the Upper Iowa River watershed. Within these larger watersheds, Johnson County contains approximately 35 HUC-12 sub-watersheds, influenced by the region's network of creeks and streams.

Iowa City and Coralville lie within the Iowa River watershed, with sub-watersheds like Clear Creek, Ralston Creek, and Muddy Creek contributing to the area's drainage and stormwater management. North Liberty is located entirely within the Clear Creek watershed, which is part of the broader Iowa River watershed. Tiffin sits in the Clear Creek sub-watershed as well, adding to its importance in managing water flow toward the Iowa River.

In the southeastern part of the county, Lone Tree and Hills fall within the Lower Cedar River watershed, with tributaries such as Old Man's Creek feeding into it. Solon is positioned between the Iowa River and Cedar River watersheds, with Rapid Creek contributing to its drainage system. Smaller communities like Oxford and Shueyville lie within various sub-watersheds connected to the Iowa River, primarily contributing to local agricultural and urban runoff management.



Johnson County's diverse watershed system, marked by a combination of major rivers and smaller streams, plays a critical role in regional water management, stormwater drainage, and ecological conservation, supporting both urban and rural needs.

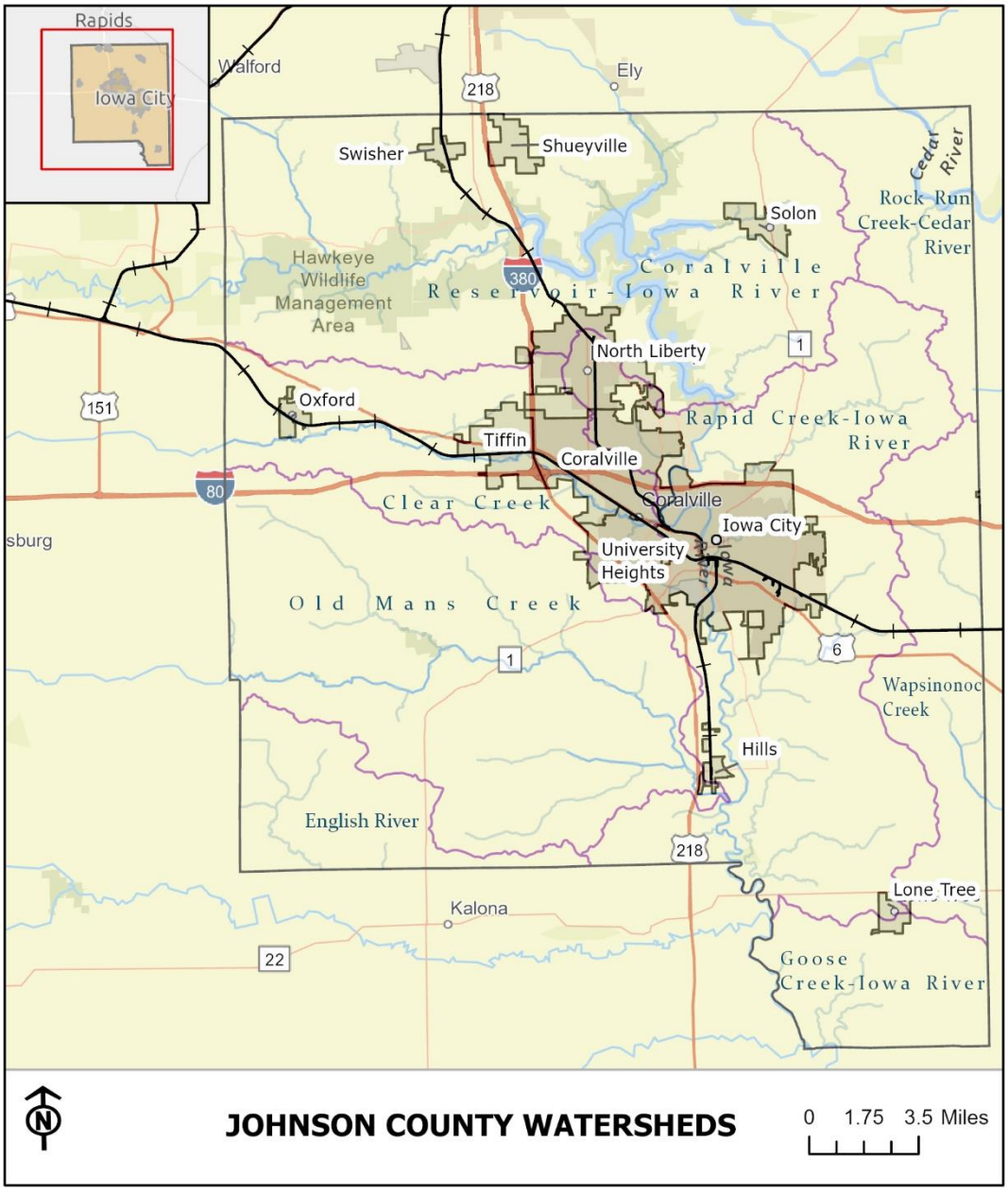


Figure 2-21: Johnson County Watersheds Map

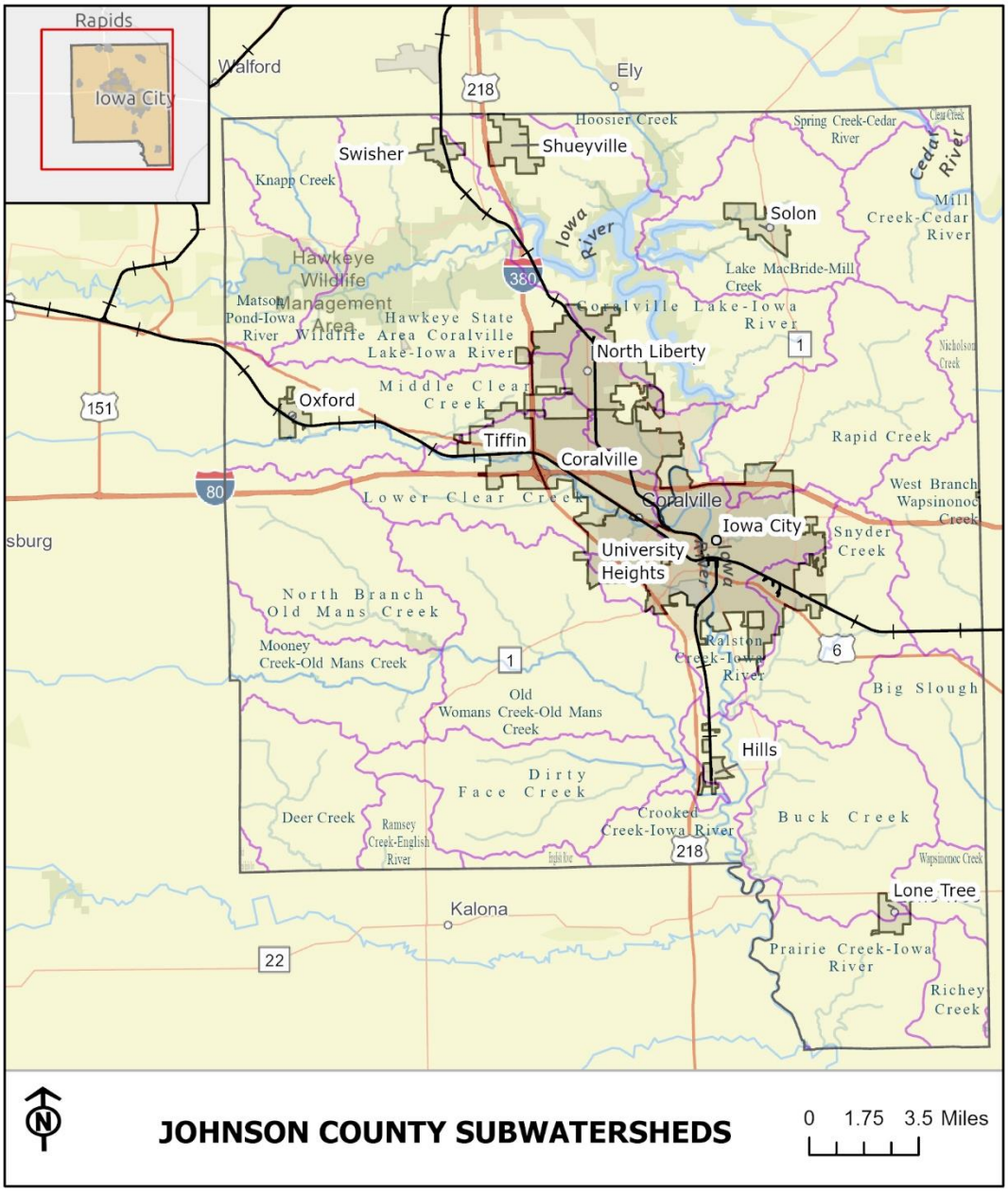
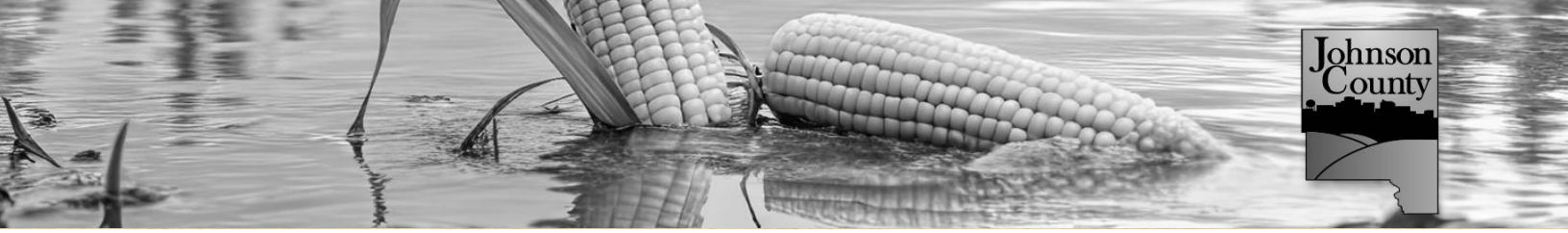


Figure 2-22: Johnson County Subwatersheds Map

2.4.5 Flooding

Johnson County, Iowa, faces considerable flood risks due to its proximity to major rivers and extensive network of creeks and streams. The primary flood-prone areas are along the Iowa River, particularly affecting Iowa City and Coralville. These cities experience



frequent flooding, especially in low-lying areas near the Iowa River and its tributaries. Flooding is especially common around Coralville Lake, which is managed to reduce downstream flood risk but can still lead to inundation during significant rainfall events or snowmelt. The 2008 flood, which significantly impacted Iowa City and Coralville, highlighted the vulnerability of the region to riverine flooding.

North Liberty and Tiffin, located near Clear Creek and other tributaries of the Iowa River, also face flood risks, with Clear Creek posing a notable flash flood hazard during heavy rains. Smaller towns such as Hills and Lone Tree, positioned near Old Man's Creek and other Cedar River tributaries, experience occasional flooding in low-lying areas, particularly during prolonged rainfall or rapid snowmelt. Solon, near Rapid Creek, has localized flood risks, mainly from stormwater pooling and smaller stream overflow.

Johnson County's flood insurance maps were last updated in 2019 to provide more accurate risk assessments, with FEMA's updated Flood Insurance Rate Maps (FIRMs) and detailed Flood Insurance Study (FIS) guiding floodplain management and insurance requirements. The county also employs advanced two-dimensional flood risk modeling to better predict and manage both fluvial (river) and pluvial (rainwater) flood risks across urban and rural areas. These tools, combined with local planning efforts, aim to mitigate flood risks and enhance resilience throughout Johnson County.

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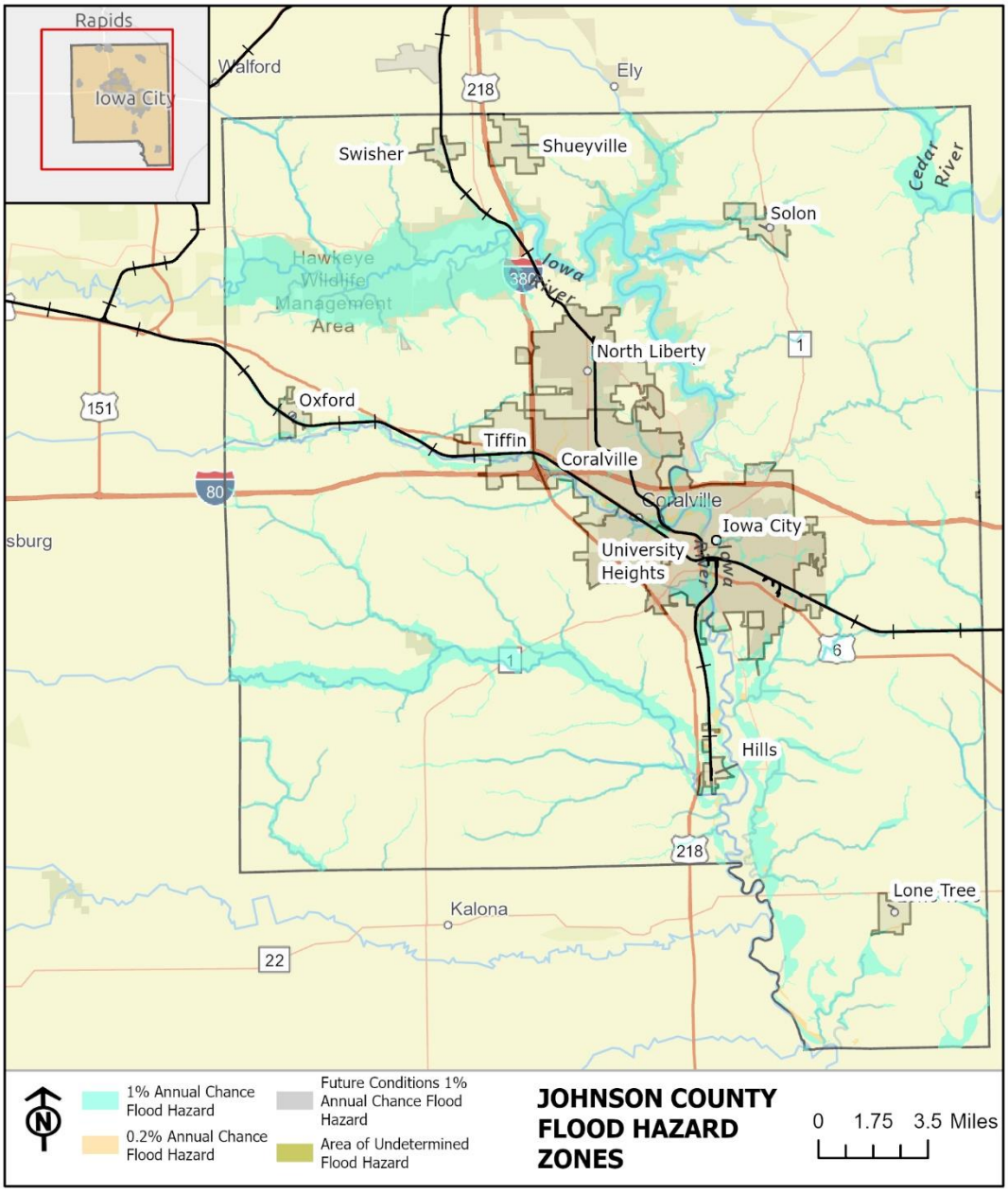


Figure 2-23: Johnson County Flood Zones Map

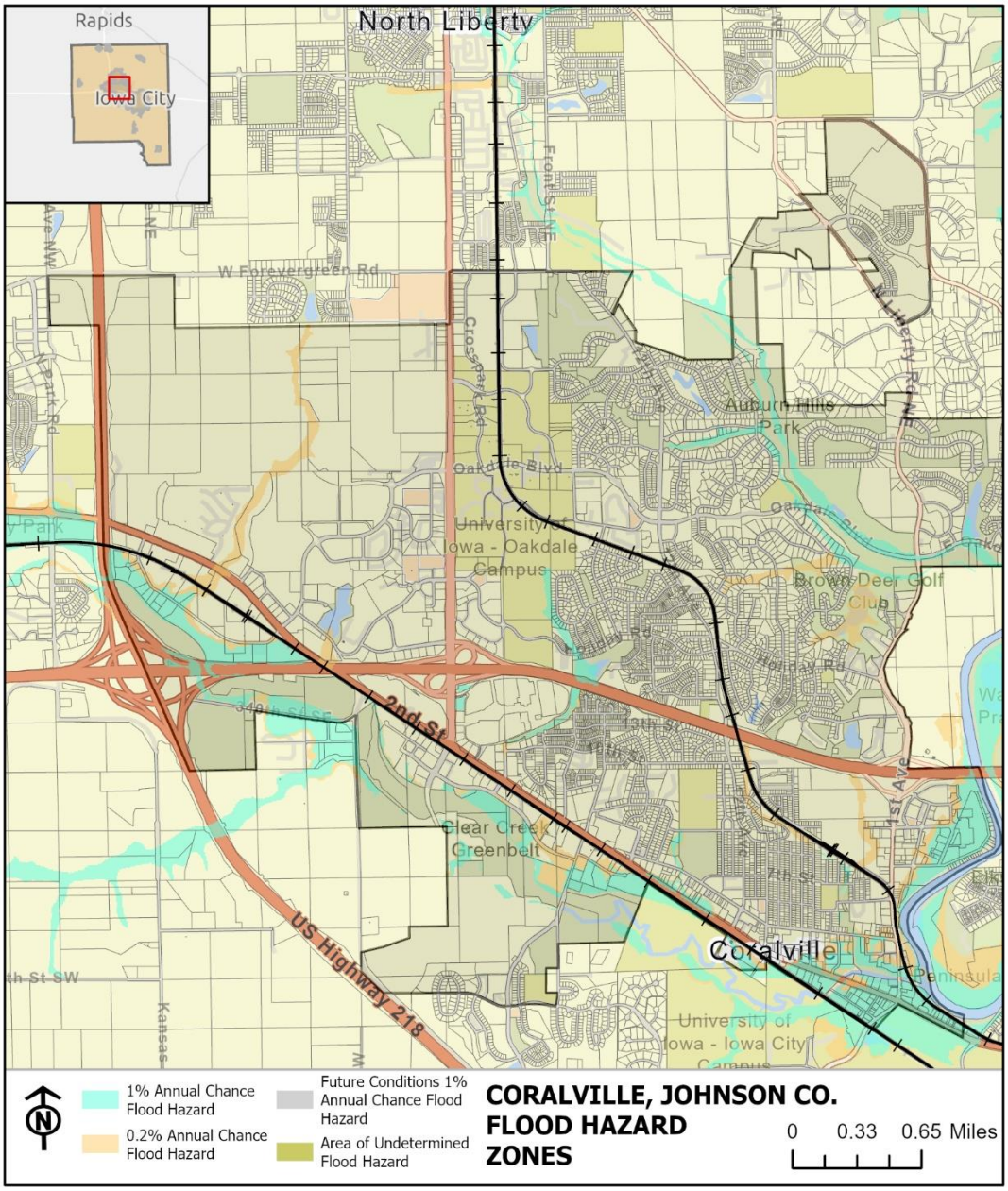


Figure 2-24: Coralville Flood Zone Map

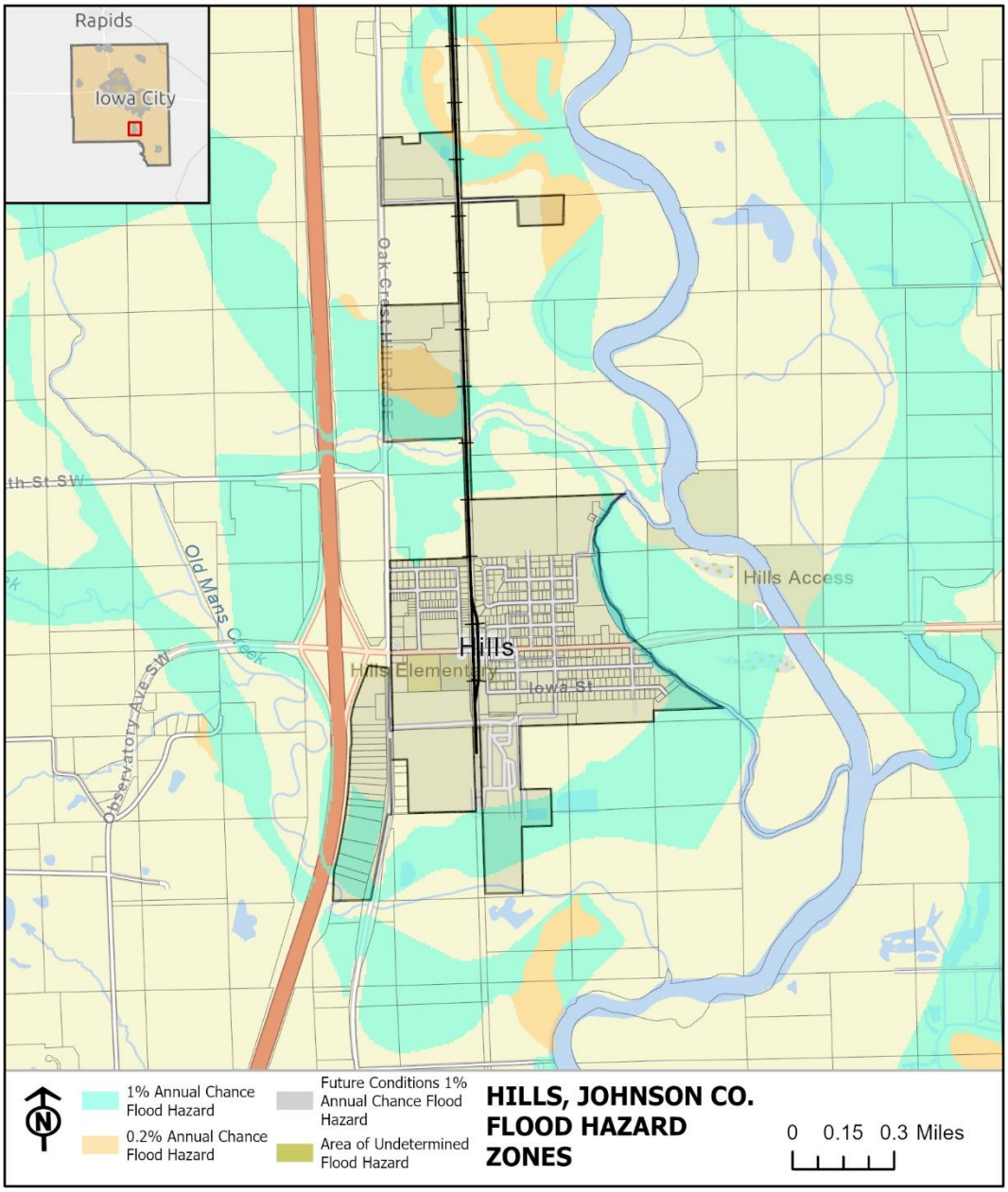


Figure 2-25: Hills Flood Zone Map

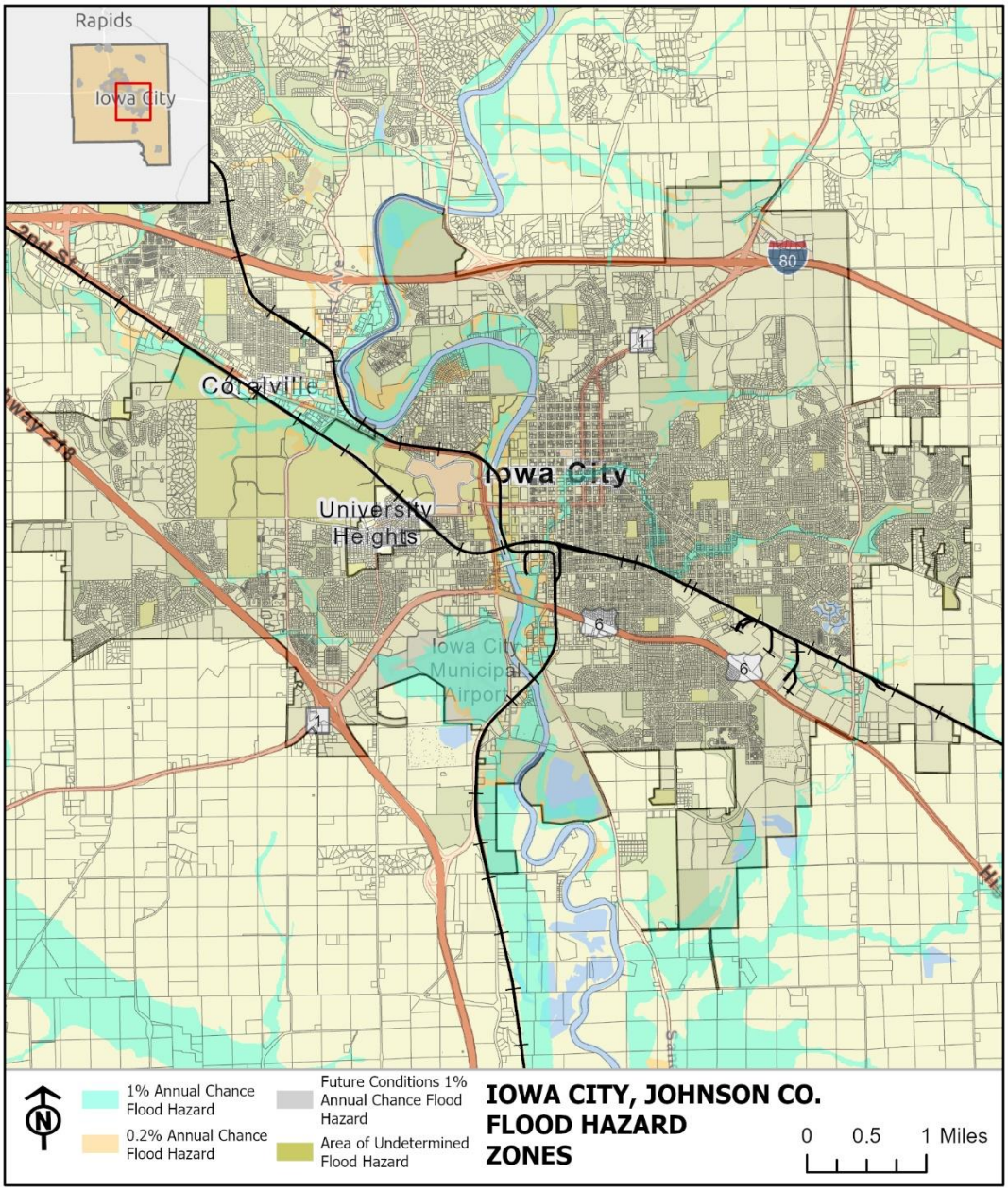


Figure 2-26: Iowa City Flood Zone Map

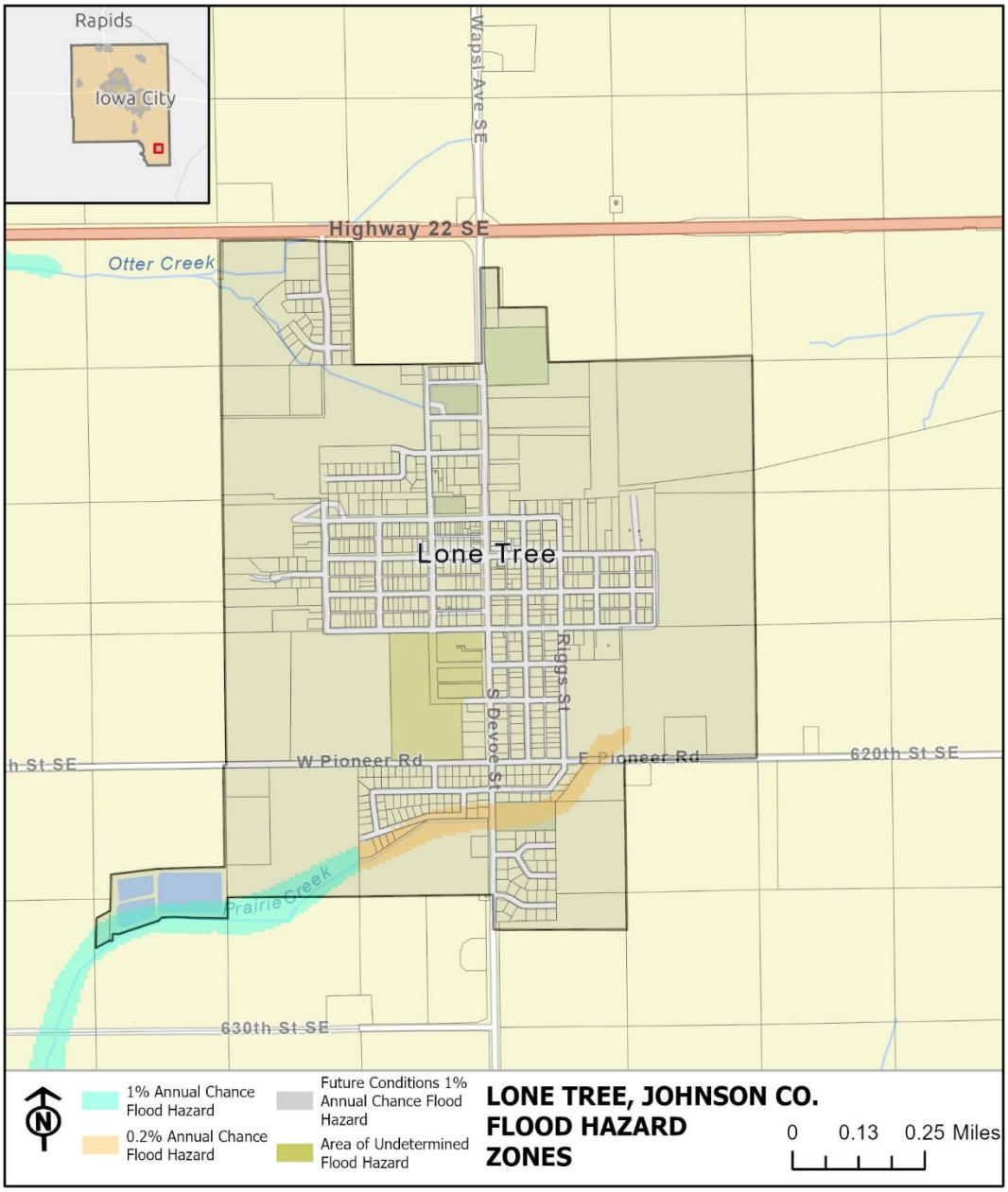


Figure 2-27: Lone Tree Flood Zone Map

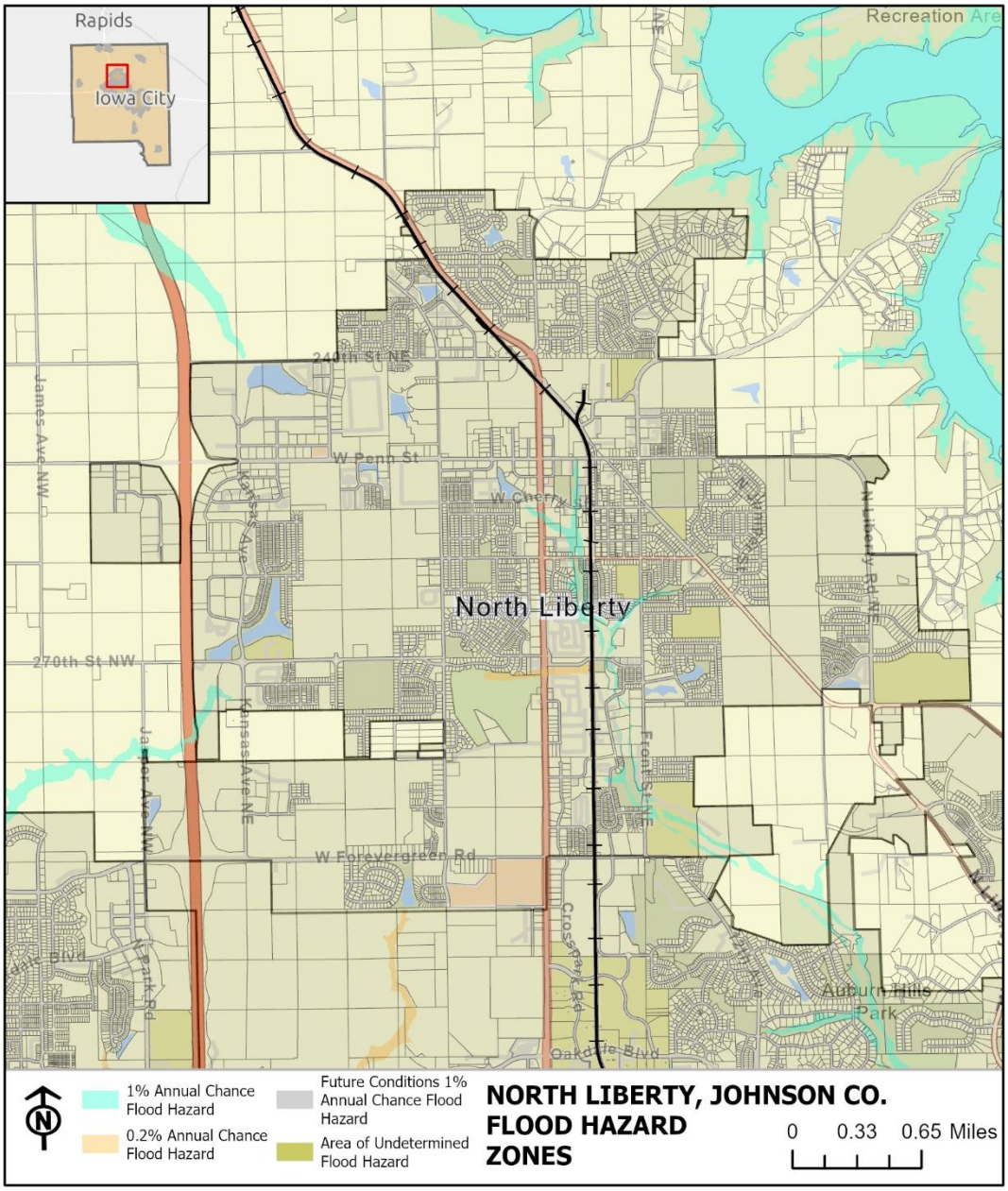


Figure 2-28: North Liberty Flood Zone Map

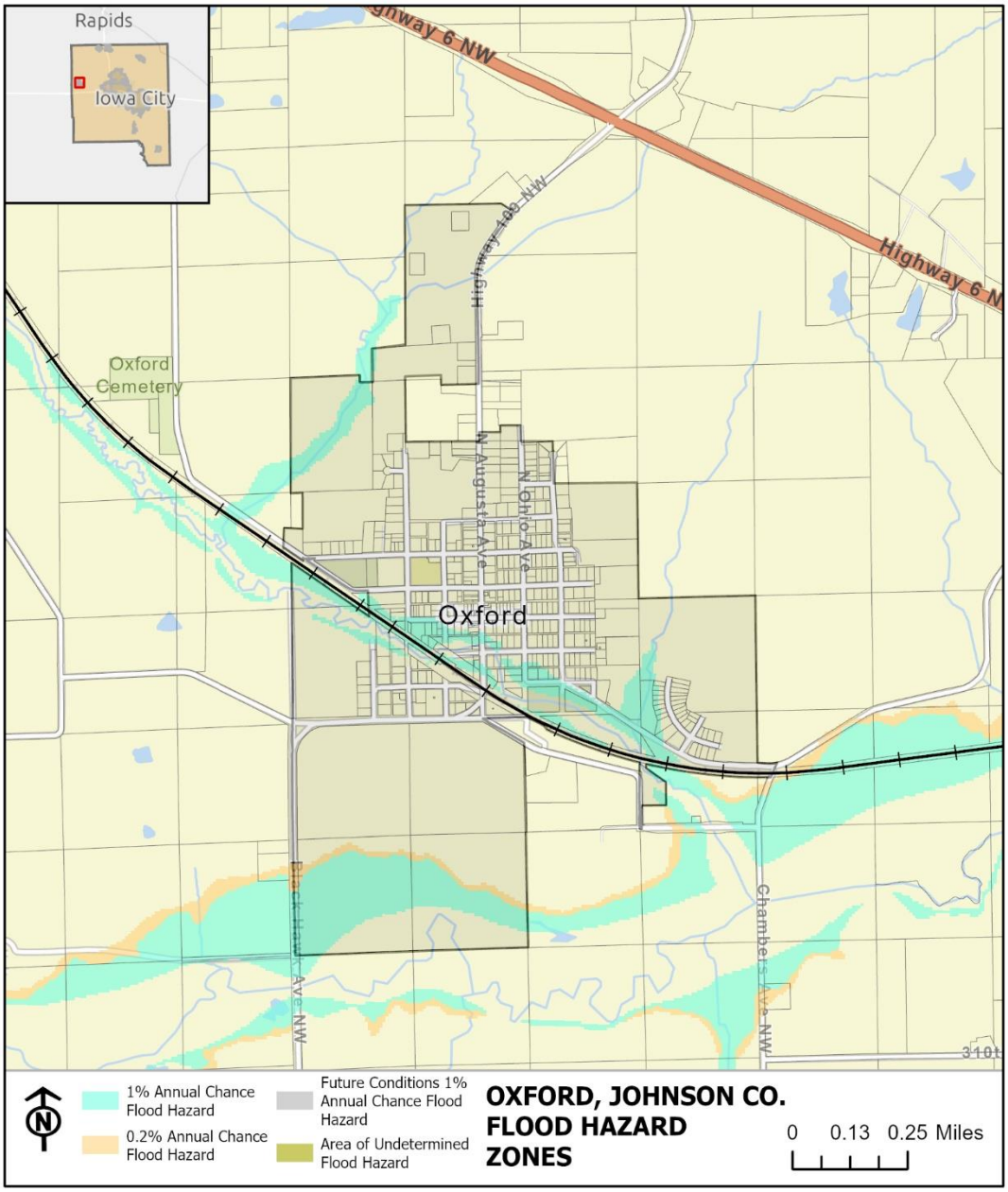


Figure 2-29: Oxford Flood Zone Map

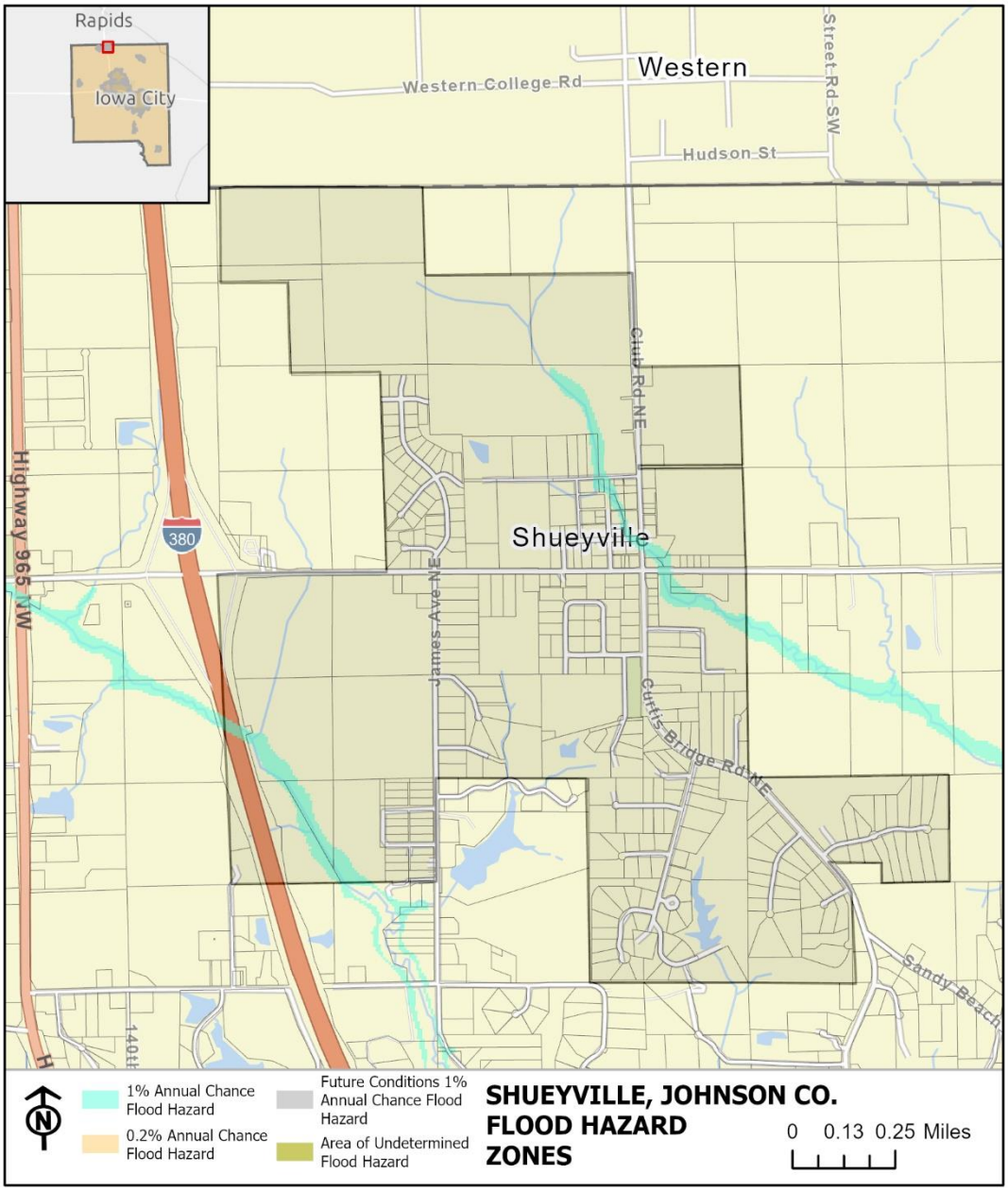


Figure 2-30: Shueyville Flood Zone Map

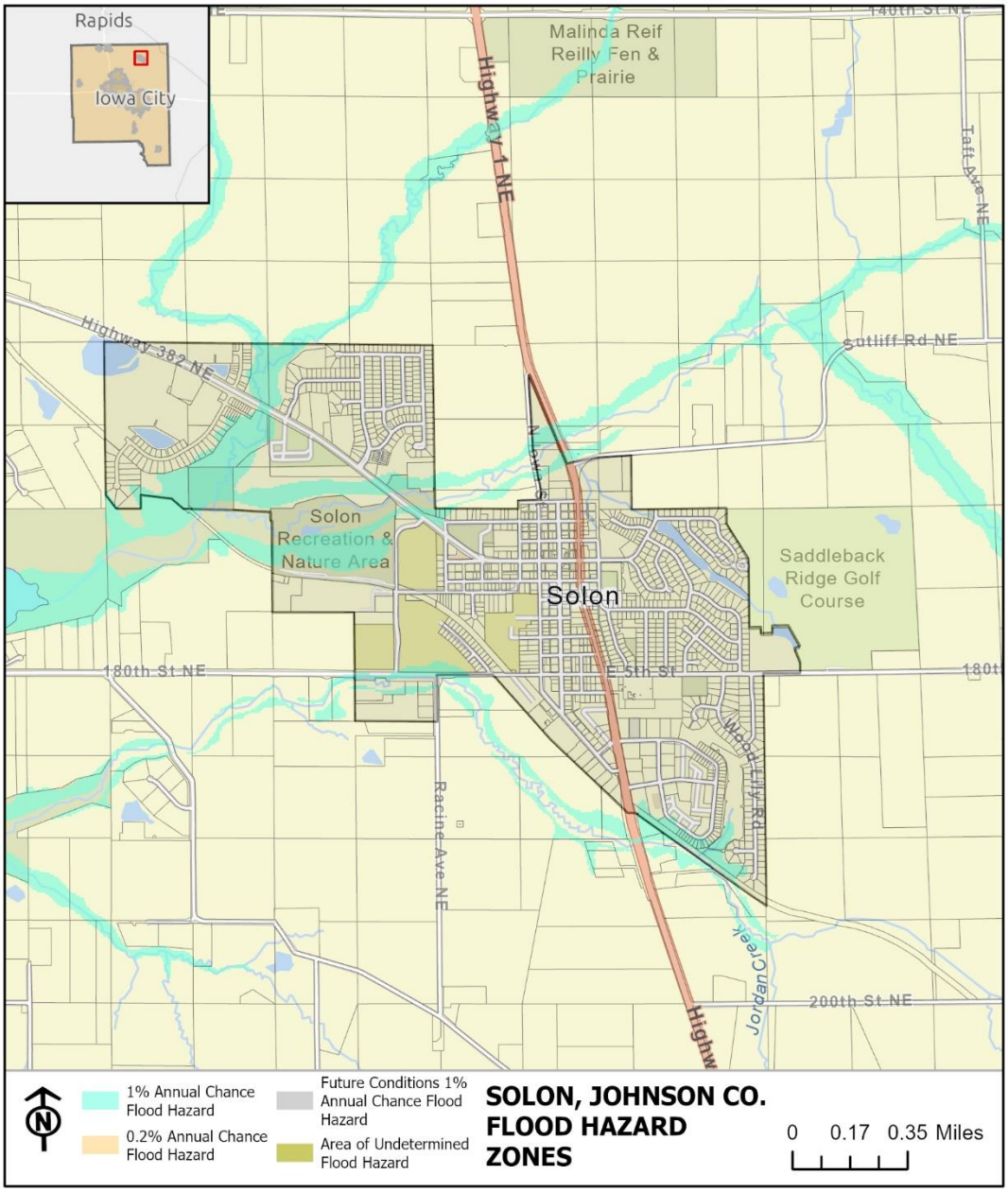


Figure 2-31: Solon Flood Zone Map

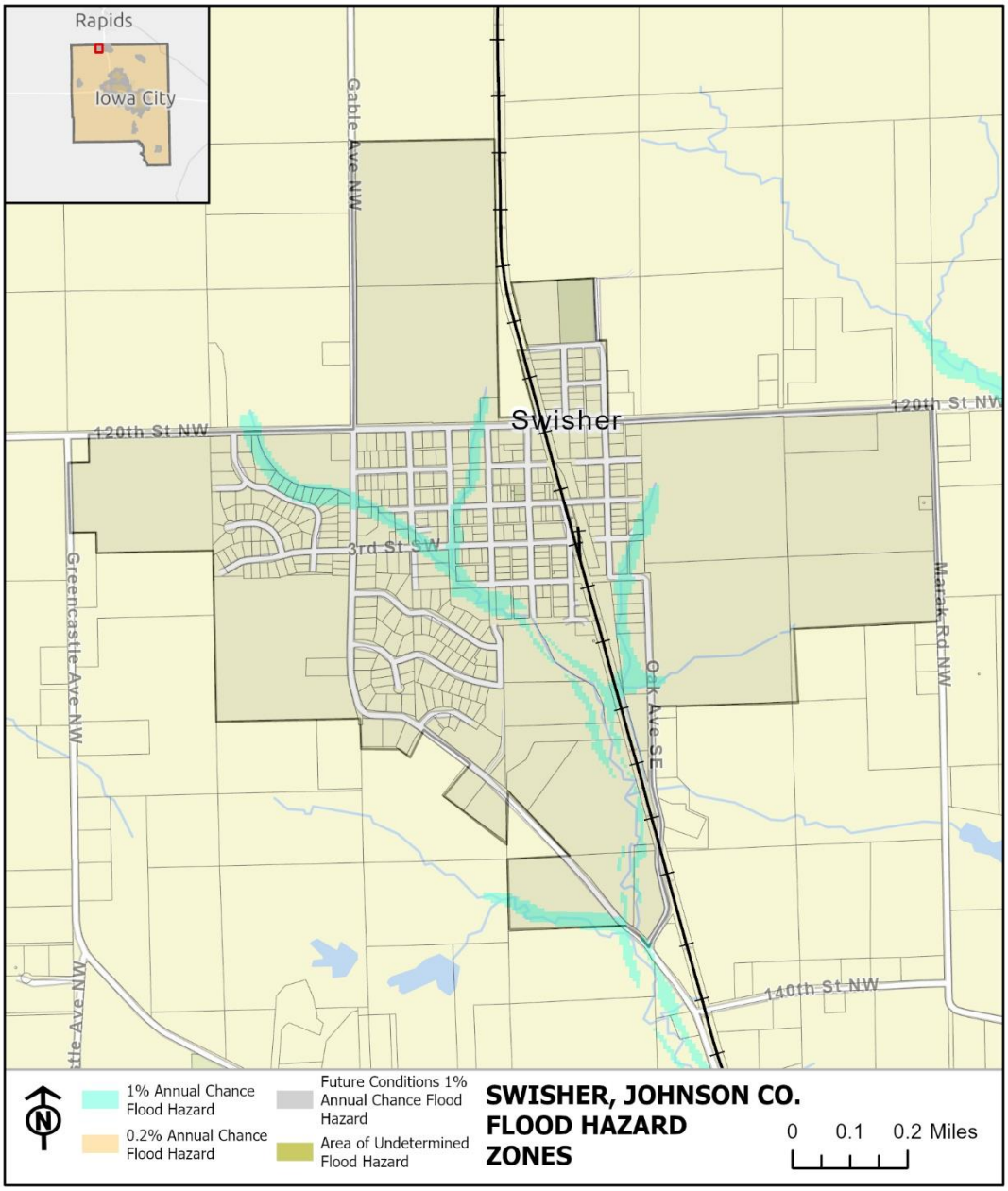


Figure 2-32: Swisher Flood Zone Map

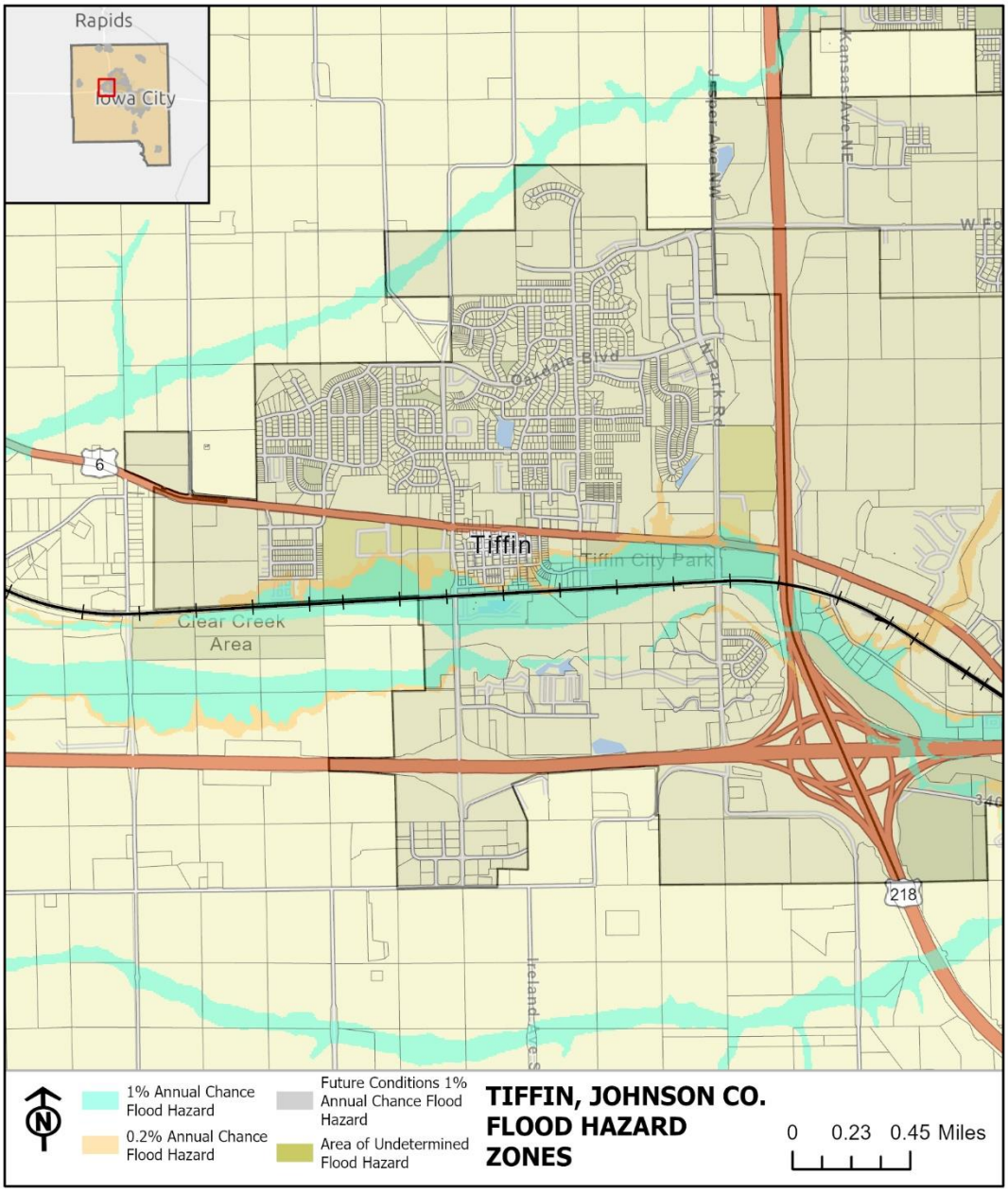


Figure 2-33: Tiffin Flood Zone Map

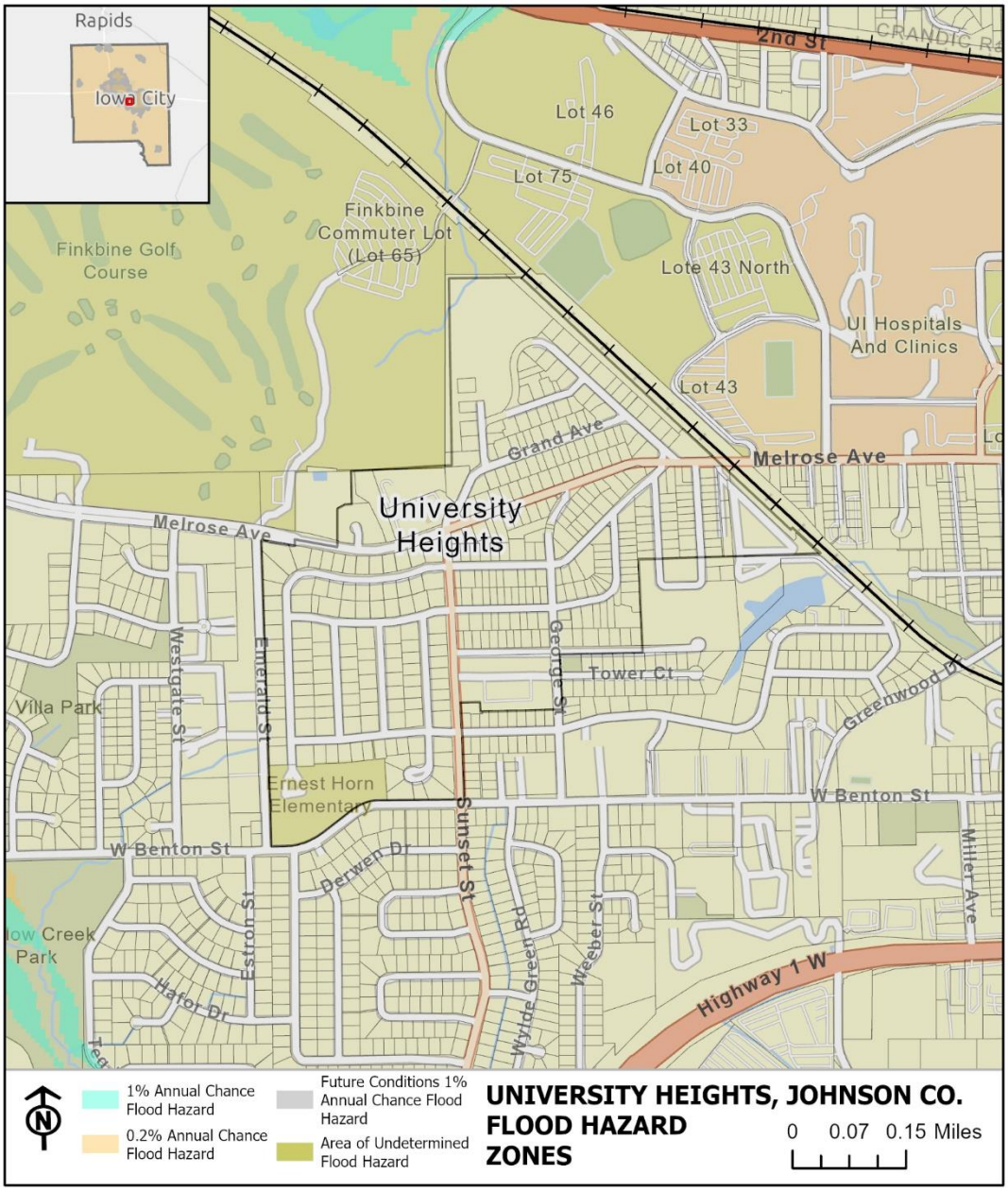
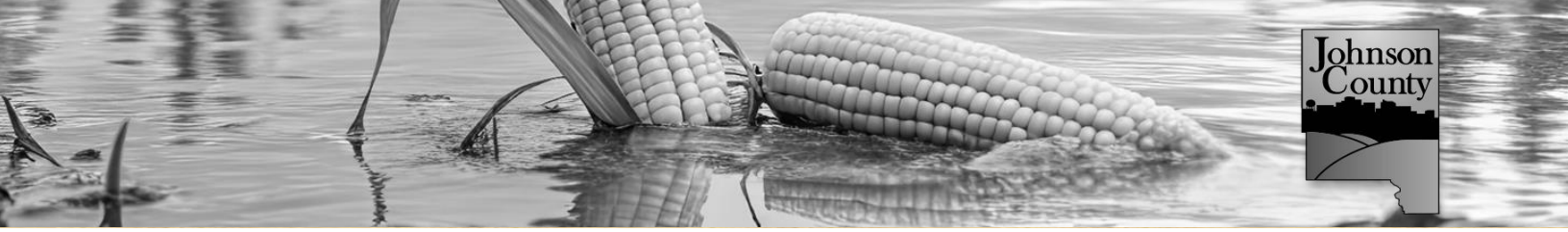


Figure 2-34: University Heights Flood Zone Map



2.5 Transportation Infrastructure

3.5.1 City Streets

Johnson County, Iowa, includes a blend of urban and rural street networks that reflect its mix of small towns and larger cities. Iowa City and Coralville feature urban streetscapes with a combination of historic and contemporary architecture, particularly near downtown areas. Streets are well-maintained and lined with a variety of local businesses, restaurants, and shops, creating a bustling atmosphere. Residential neighborhoods in these cities are tree-lined with sidewalks, fostering walkability and a community-oriented feel. Major city streets are designed to accommodate higher traffic volumes, with ample parking options in commercial zones and structured parking in denser areas.

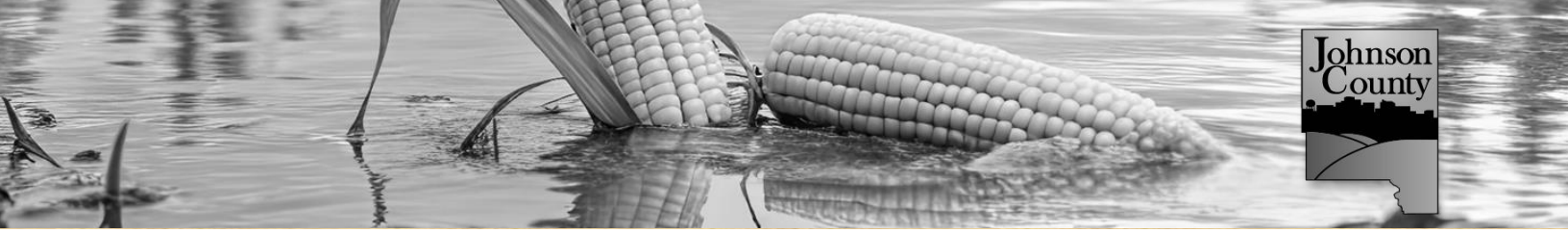
North Liberty and Tiffin showcase a suburban street layout, with broader streets connecting residential developments to local businesses and parks. Streets here are modern, well-maintained, and quieter than in Iowa City, reflecting a suburban lifestyle. In Solon and smaller towns like Lone Tree and Hills, streets have a small-town charm, with a mix of historic and new structures, narrower roadways, and light traffic. Local streets are often adjacent to grassy areas, creating a rural-urban transition.

Rural roads outside the city and town limits frequently transition to gravel or dirt, especially near agricultural areas and remote farms. These roads vary in condition and may be dusty in dry weather or muddy after rain. Paved county highways, such as Highway 1 and Highway 6, connect the larger communities, offering smooth travel and scenic views of Johnson County's landscape. Traffic in rural areas is generally minimal, contributing to a stress-free commute. However, winter snow and ice can impact rural roads, though main roads and highways are typically cleared efficiently to ensure safe travel.

3.5.2 Highways

Johnson County, Iowa, benefits from a network of major highways, including an interstate that supports transportation, commerce, and regional connectivity. Interstate 80 runs east-west through the central part of the county, linking Iowa City, Coralville, and North Liberty with Des Moines to the west and the Quad Cities to the east. This major route is essential for commercial transport, daily commuting, and tourism, supporting significant traffic flow through the area.

US Highway 218 is a north-south corridor that connects Johnson County with Cedar Rapids to the north and Washington, Iowa, to the south. It merges with Interstate 380



near Coralville, forming the Avenue of the Saints, a vital route for both local and long-distance travel. US Highway 6 runs parallel to Interstate 80, serving as a local east-west route that connects Iowa City and Coralville with surrounding rural areas.

Several state highways also contribute to Johnson County's connectivity. Iowa Highway 1 runs north-south through the county, connecting Iowa City with rural communities like Solon and Mount Vernon and further south toward Washington. Iowa Highway 22 travels east-west across the southern part of the county, linking Lone Tree with Riverside and Nichols, supporting access to agricultural areas and smaller towns.

This comprehensive highway network ensures that all communities in Johnson County have access to regional travel routes, making transportation efficient and supporting economic activity across both urban and rural parts of the county.

3.5.3 Bridges

Johnson County, Iowa, features a critical network of bridges that connect urban and rural areas, facilitating the movement of people, goods, and services across the region. These bridges vary widely in their condition, with some in excellent structural health and others showing significant signs of wear and requiring maintenance or repair. A number of bridges are in fair condition, suggesting they are functional but may need proactive upkeep to prevent long-term degradation. A smaller proportion of the bridges are in poor condition, indicating that they have reached a critical stage where repairs or replacements are necessary to ensure safety and usability. Additionally, a few bridges are currently closed, likely due to structural deficiencies that pose safety risks.

The county's bridges are essential for supporting local and regional transportation, especially in and around key areas like Iowa City, Coralville, and North Liberty, where they are heavily used by commuters and freight traffic. In rural areas, while the traffic volume may be lower, these bridges are equally important for ensuring access to farmlands, emergency services, and smaller communities. The traffic volume varies widely, with bridges near major highways and urban centers experiencing significantly higher usage compared to those in more remote locations.

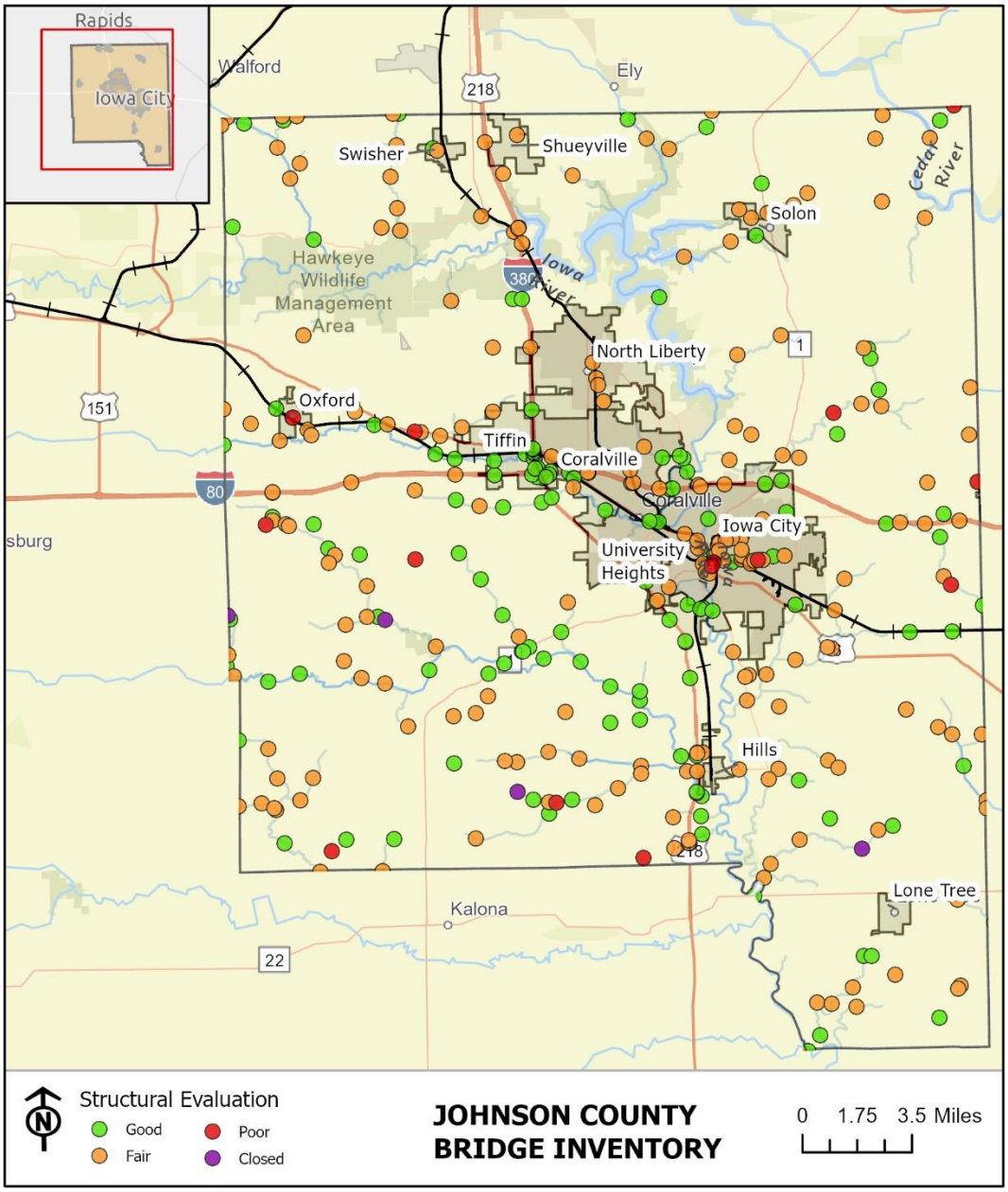
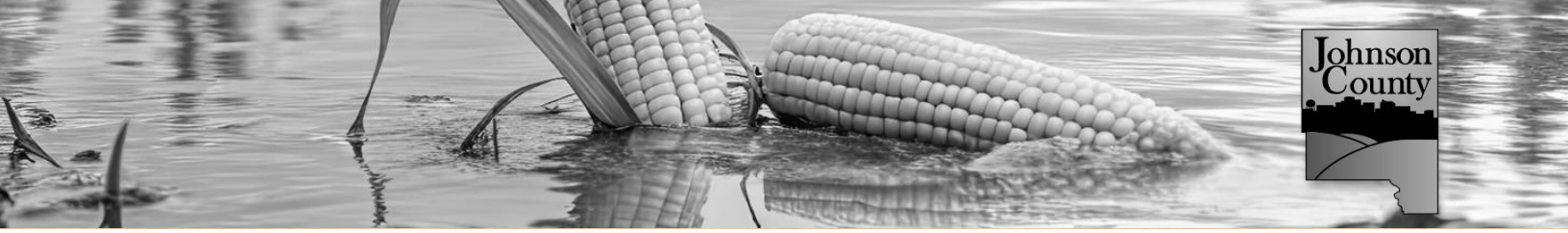


Figure 2-35: Johnson County Bridges Map

3.5.4 Accessibility

Johnson County, Iowa, offers more extensive mass transit options than many rural areas, largely due to the presence of Iowa City and Coralville. Iowa City Transit and Coralville Transit provide fixed-route bus services throughout Iowa City, Coralville, and University



Heights, connecting residents to key destinations such as the University of Iowa, downtown districts, and medical facilities. Additionally, the University of Iowa's CAMBUS offers free shuttle service for students, faculty, and staff, covering multiple campus and off-campus locations.

In rural areas of Johnson County, the East Central Iowa Council of Governments (ECICOG) operates SEATS, a demand-response service providing transportation for elderly and disabled residents across the county. While urban centers have bus transit, there are no county-wide shared micromobility services like bike or scooter rentals. Instead, Iowa City has implemented bike-share stations available through a local bike-share program, which provides some micromobility options in urban areas.

Johnson County's transportation infrastructure is primarily vehicle-oriented in rural regions, while urban areas benefit from robust bus systems. For current information on schedules and service areas, local government or transit authority resources are recommended.

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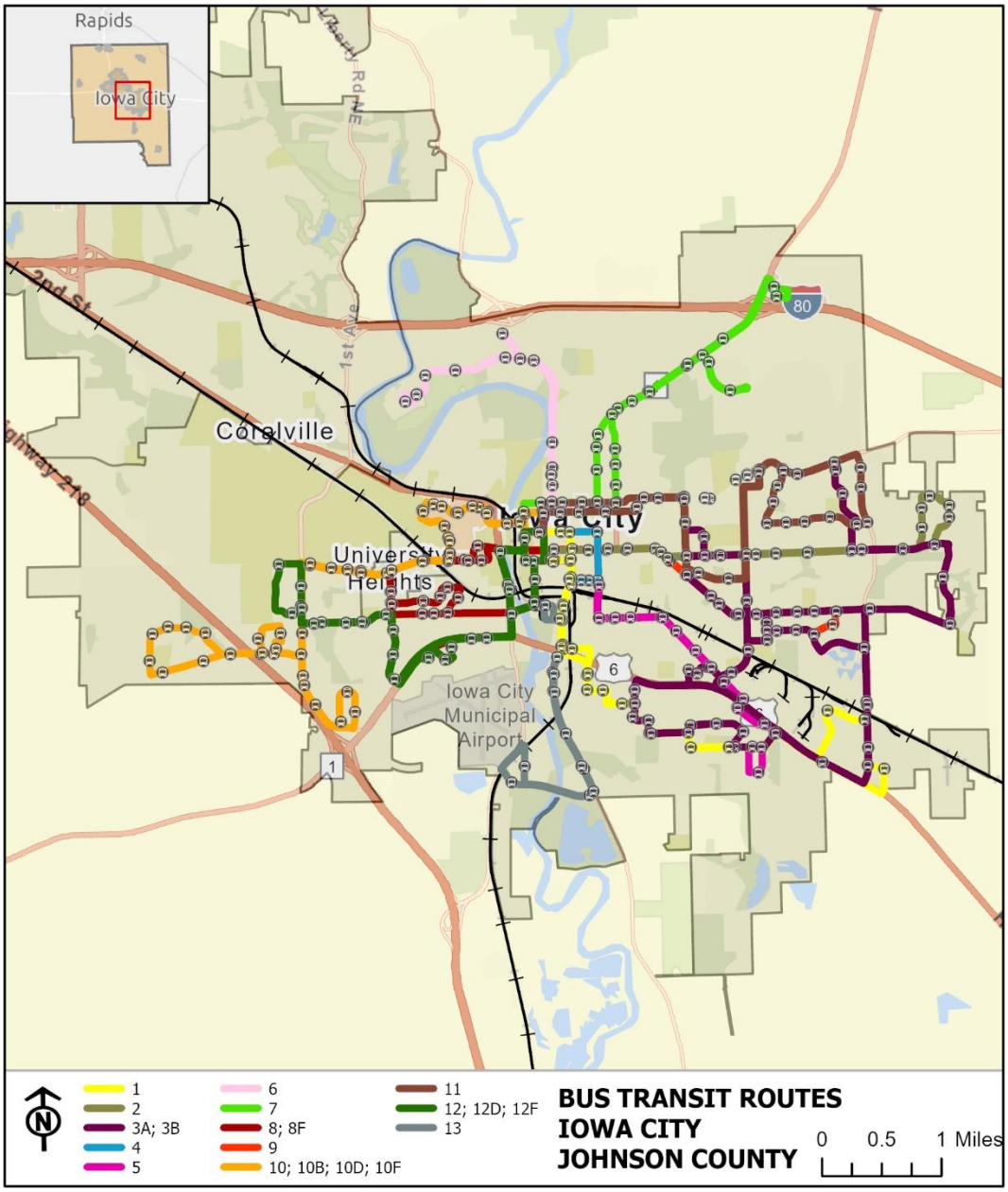
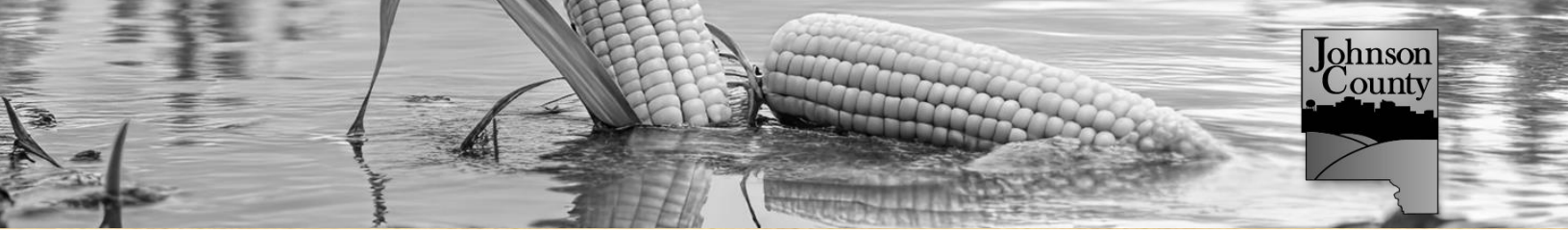


Figure 2-36: Iowa City Bus Transit Route Map

3.5.5 Airports

Johnson County has limited airport facilities, with Iowa City Municipal Airport as its primary public airport, located on the south side of Iowa City. This airport primarily serves general aviation and business travel, offering services like charter flights, flight



training, and aircraft maintenance. The Iowa City Municipal Airport is a crucial facility for the area, supporting general aviation needs and emergency response operations.

In addition to the municipal airport, University of Iowa Hospitals and Clinics (UIHC) operates a heliport, facilitating medical air transport for critical care patients. This heliport is essential for rapid medical response, given UIHC's status as a major regional medical center.

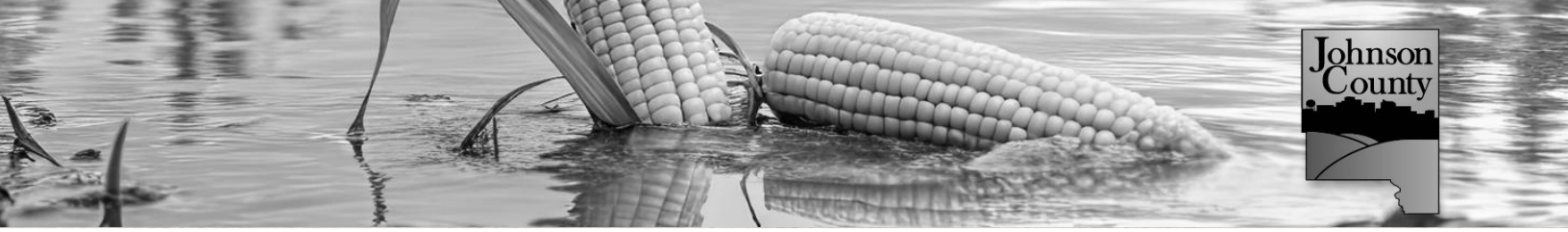
For commercial air travel, Johnson County residents rely on the nearby Eastern Iowa Airport in Cedar Rapids, approximately 20 miles north of Iowa City, which provides passenger services with multiple major carriers and offers direct flights to key destinations. This combination of a local public airport, a medical heliport, and easy access to a regional commercial airport in Cedar Rapids ensures that Johnson County residents have access to both general and commercial aviation services for a variety of needs.

3.5.6 Railroad

Johnson County, Iowa, has a modest but essential railroad infrastructure that supports freight transport and connects the county to regional and national rail networks. The primary rail service is provided by the Iowa Interstate Railroad (IAIS), which runs through Iowa City, connecting it to Des Moines in the west and the Quad Cities in the east, and ultimately linking with national lines. This rail line is primarily used for transporting agricultural products, industrial goods, and other freight, supporting the region's economic activity. In addition to IAIS, Canadian Pacific Railway operates a line in the northern part of the county, primarily serving industrial freight needs and offering connections to larger hubs in Cedar Rapids and Chicago. While Johnson County does not currently have passenger rail service, residents can access Amtrak stations in nearby cities like Mount Pleasant and Osceola. This rail infrastructure plays a vital role in supporting the county's commerce and providing a reliable transportation option for local industries.

3.5.7 Utilities

Johnson County, Iowa, benefits from a diverse array of utility providers that ensure consistent access to essential services across urban and rural areas. MidAmerican Energy and Alliant Energy are the primary electric providers in the urban areas, while several cooperatives, including the Linn County Rural Electric Cooperative (REC), Farmers Electric Cooperative, Eastern Iowa Power Cooperative, and T.I.P. Rural Electric Cooperative, provide electricity to rural regions, ensuring reliable power distribution



countywide. Natural gas services are primarily supplied by MidAmerican Energy, delivering essential heating resources for homes and businesses.

Water and sewer services are managed locally by municipal utilities in Iowa City, Coralville, North Liberty, and other communities, guaranteeing access to clean water and efficient wastewater management. Broadband and telecommunications are provided by various companies, including Mediacom, CenturyLink, and South Slope Cooperative Communications, which offer high-speed internet and digital connectivity vital for remote work, education, and access to digital resources.

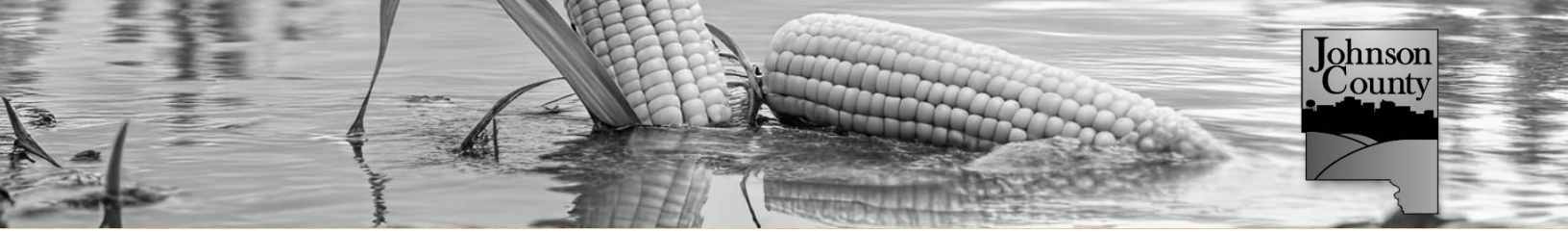
This well-rounded network of utility providers supports the quality of life and economic vitality in Johnson County, accommodating the needs of both densely populated urban centers and outlying rural communities.

2.6 Demographics

According to the 2020 Census Bureau data, the planning area has an official population of 152,854. Unofficial population reports from World Population Review have reported the 2024 population to be 158,141, a 3.46% increase. While most data is provided from 2020 and 2022, the following tables will analyze the past growth at a minimum of five (5) years from data gathered between 2020 and 2023.

Johnson County	Prior	2020-23	% Change
Population	146,547	152,854	+4.30%
Median Age	30.6 years	30.6 years	0%
Total Housing Units	61,335	69,454	+13.2%
Housing Occupancy Rate	94.2%	92.8%	-1.5%
Median Home Value	$217,100	$277,800	+27.9%
Unemployment Rate	2.1%	2.0%	-4.8%
Mean Travel Time to Work (Minutes)	18.4	19.7	+7.1%
Median Household Income	$61,640	$72,977	+18.4%
Individuals Below Poverty Level	15.0%	16.9%	+12.7%
Without Health Insurance	3.8%	3.5%	-7.9%
Average Household Size	2.38	2.4	+0.8%
High School Diploma or Higher (Age 25+)	94.8%	96.1%	+1.4%
Bachelor's Degree or Higher (Age 25+)	50.0%	54.1%	+8.2%
Individuals with Disabilities	7.0%	7.1%	+1.4%
Speak English Less Than "Very Well"	4.5%	4.4%	-2.2%

The following compares the demographics between Johnson County, the State of Iowa, and the United States.



Demographics	County	Iowa	US
Population	152,854	3,190,369	331,449,281
Median Age	30.6 years	38.9 years	38.5 years
Total Housing Units	65,916	1,412,789	140,498,736
Occupied Housing Units	61,335	1,330,995	126,817,580
% of Housing Units with No Vehicles Available	6.1%	5.7%	8.5%
Median Home Value	$277,800	$158,900	$244,900
Unemployment Rate	2.5%	3.1%	3.7%
Mean Travel Time to Work (Minutes)	19.7	19.1	26.9
Median Household Income	$72,977	$65,600	$67,521
% of Individuals Below Poverty Level	15.3%	11.0%	12.6%
% Without Health Insurance	5.0%	4.5%	8.0%
Average Household Size	2.38	2.41	2.60
% of Population Over 25 with High School Diploma or Higher	96.0%	92.1%	88.5%
% of Population Over 25 with Bachelor's Degree or Higher	54.1%	29.3%	32.1%
% with Disability	6.5%	10.9%	12.6%
% Speak English Less Than "Very Well"	4.5%	3.6%	8.2%

The following is a breakdown of the population by born sexual orientation and by race.

Johnson County	Population	%
Total Population	152,854	100%
White, Not Hispanic	114,491	74.9%
Black or African American	12,643	8.3%
Hispanic or Latino	10,198	6.7%
Asian	8,555	5.6%
American Indian and Alaska Native	768	0.5%
Native Hawaiian and Other Pacific Islander	N/A	N/A
Some Other Race	N/A	N/A
Two or More Races	6,199	4.1%

Johnson County	Population	%
Total Population	156,420	100%
Male	76,466	48.9%
Female	79,954	51.1%

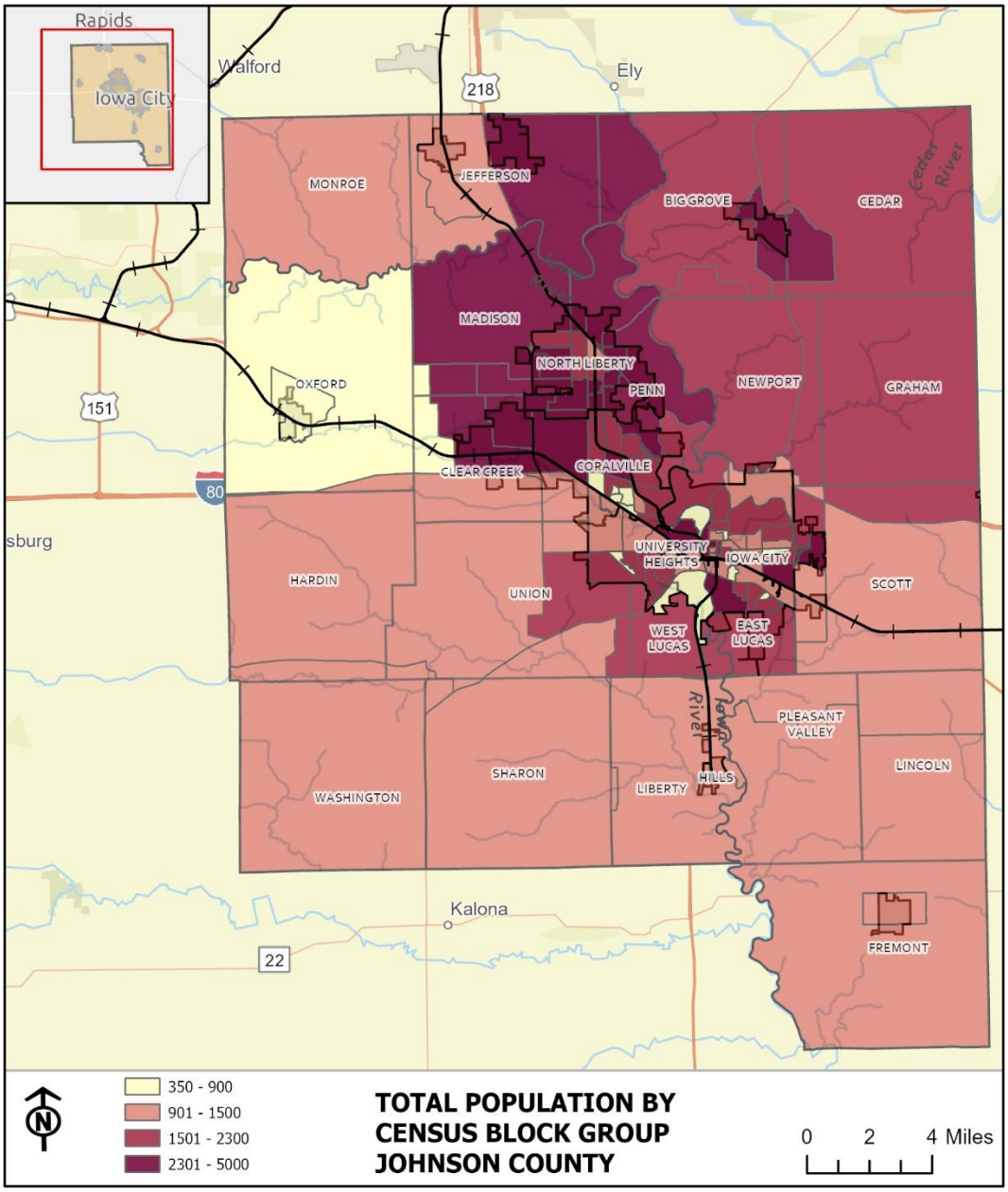
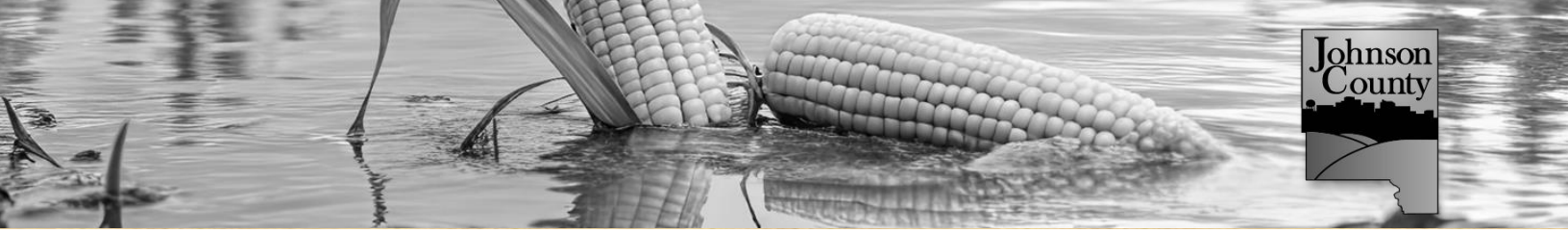


Figure 2-37: Johnson County Population by Census Block Map

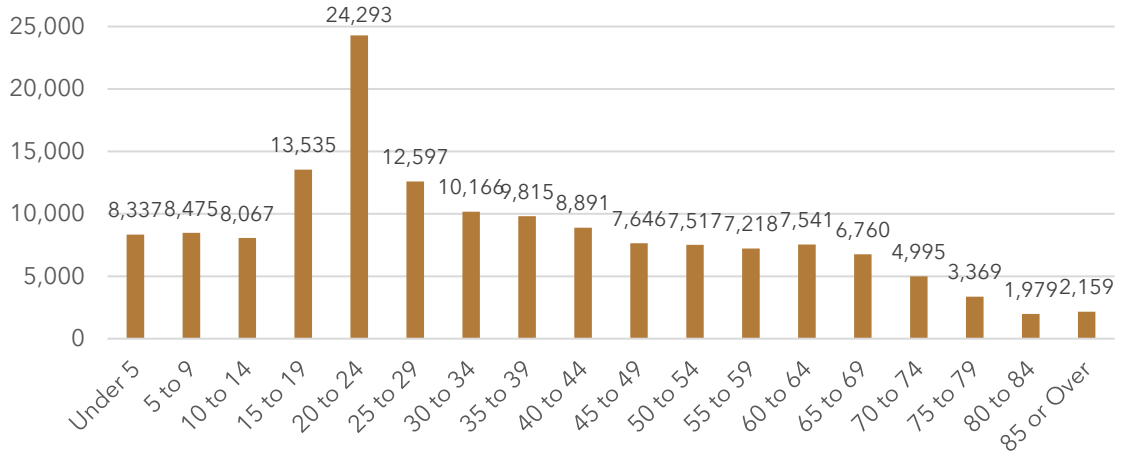
Type of Housing Units	Total	%
Occupied Total Housing Units	8,062	100%
1-Unit Detached	6,626	82.19%
1-Unit Attached	218	2.70%
2 Units	187	2.32%
3 or 4 Units	184	2.29%

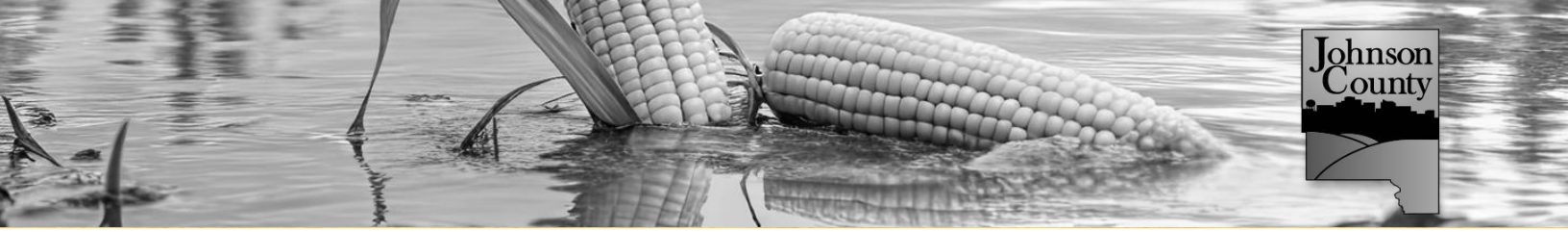


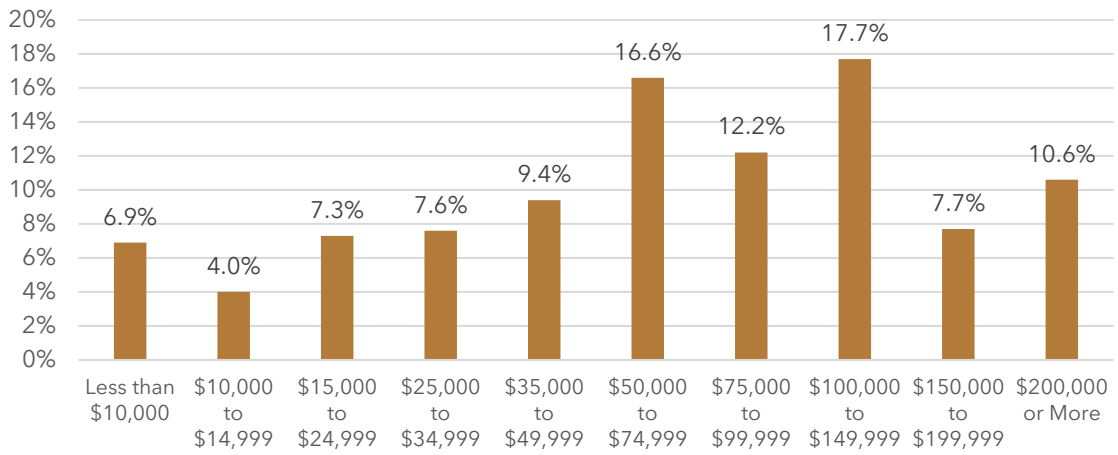
Type of Housing Units	Total	%
5 to 9 Units	131	1.62%
10 or More Units	302	3.75%
Mobile Home or Other	414	5.14%

Johnson County, Iowa, has a diverse demographic breakdown by age and household income. In terms of age, the largest group consists of individuals aged 20 to 24 years (24,293 people), reflecting the county's vibrant young adult population. This is followed by those aged 25 to 29 years (12,597) and individuals aged 15 to 19 years (13,535), with notable representation in the 30 to 34 age bracket (10,166). The county also has a significant population of seniors, with 6,760 residents aged 65 to 69 years, 4,995 aged 70 to 74 years, and 3,369 aged 75 to 79 years.

Regarding household income, the median household income in the county varies by age. Households led by individuals aged 45 to 64 report the highest median income at $97,979, followed closely by those aged 25 to 44 at $80,052. Younger households, particularly those under 25, have the lowest median income at $24,201, while those led by individuals 65 and older report a median income of $77,165.







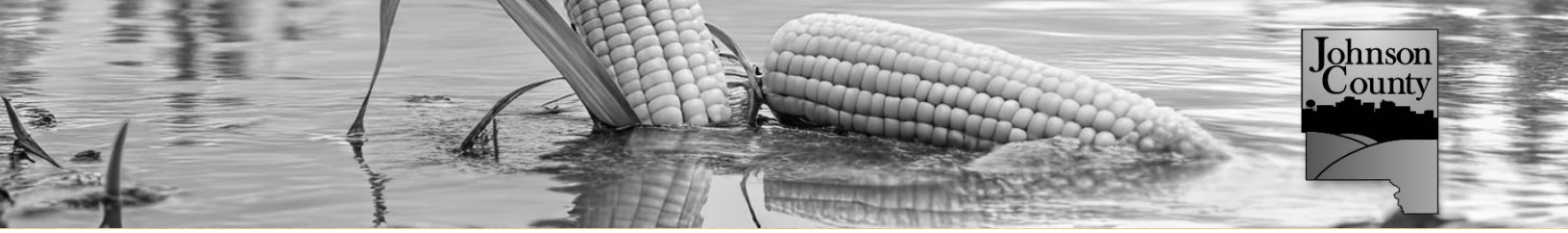
2.7 Social Vulnerability

Local vulnerability to disasters is shaped by more than just geographic exposure to hazards; social and economic factors like race, age, income, renter status, or institutionalized living play a crucial role in a community's ability to prepare for, respond to, and recover from disasters. The concept of social vulnerability explains why different communities can experience the same physical impacts from a hazard event, yet recover at different rates. This disparity arises from the community's access to resources and services, not from individual deficiencies.

It is essential to use the term vulnerability to describe communities at risk from specific hazards, such as high vulnerability to wildfires or floods, rather than applying it directly to individuals. Labeling people as "vulnerable" risks framing them through a deficit lens, implying a lack of personal responsibility. In reality, vulnerability results when a system fails to ensure equitable access to resources or services needed to cope with disasters. Barriers amplified by social and economic factors, like those mentioned above, are what hinder individuals and communities from adequately preparing for and recovering from disasters.

Incorporating social vulnerability assessments into local disaster risk strategies allows for more targeted mitigation actions. By identifying areas with heightened vulnerability, communities can ensure that the needs of all members, particularly the most sensitive groups, are considered during hazard prioritization and emergency management efforts. This approach fosters more equitable and inclusive resilience planning.

For this plan, the National Risk Index's social vulnerability values are used. This is determined by analyzing 16 socioeconomic variables from the Centers for Disease



Control/Agency for Toxic Substances and Disease Registry (CDC/ATSDR). The following are the factors that determine the social vulnerability score:

- Below 150% Poverty
- Unemployed
- Housing Cost Burden
- No High School Diploma
- No Health Insurance
- Aged 65 & Older
- Aged 17 & Younger
- Civilian with a Disability
- Racial & Ethnic Minority Status
- Multi-Unit Structures
- Mobile Homes
- Crowding
- No Vehicle
- Group Quarters
- Single-Parent Households
- English Language Proficiency

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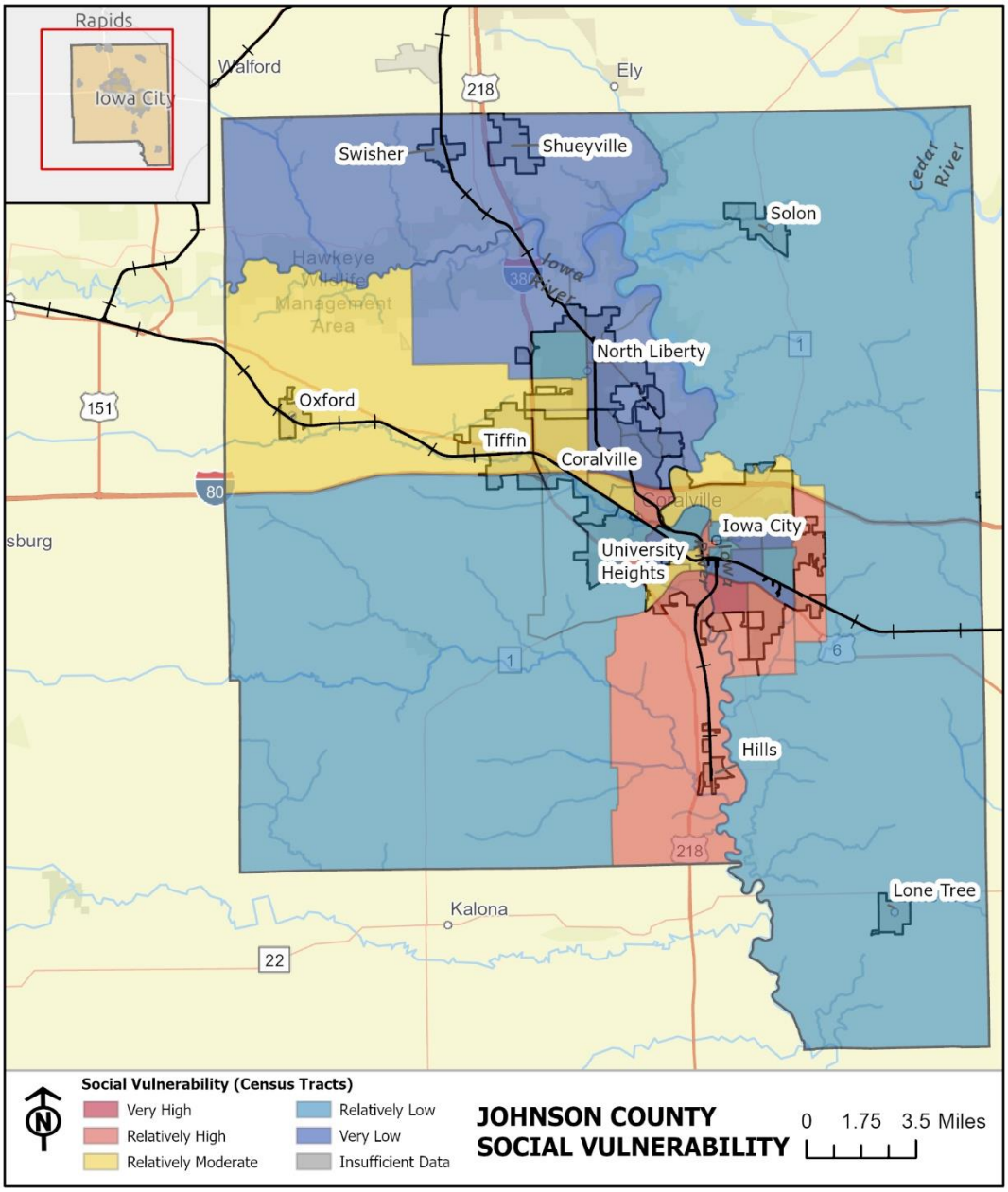


Figure 2-38: Johnson County Social Vulnerability Map

Overall, Johnson County received a score of 35.11 for a relatively low social vulnerability; 64.89% of the U.S. counties have a higher score.

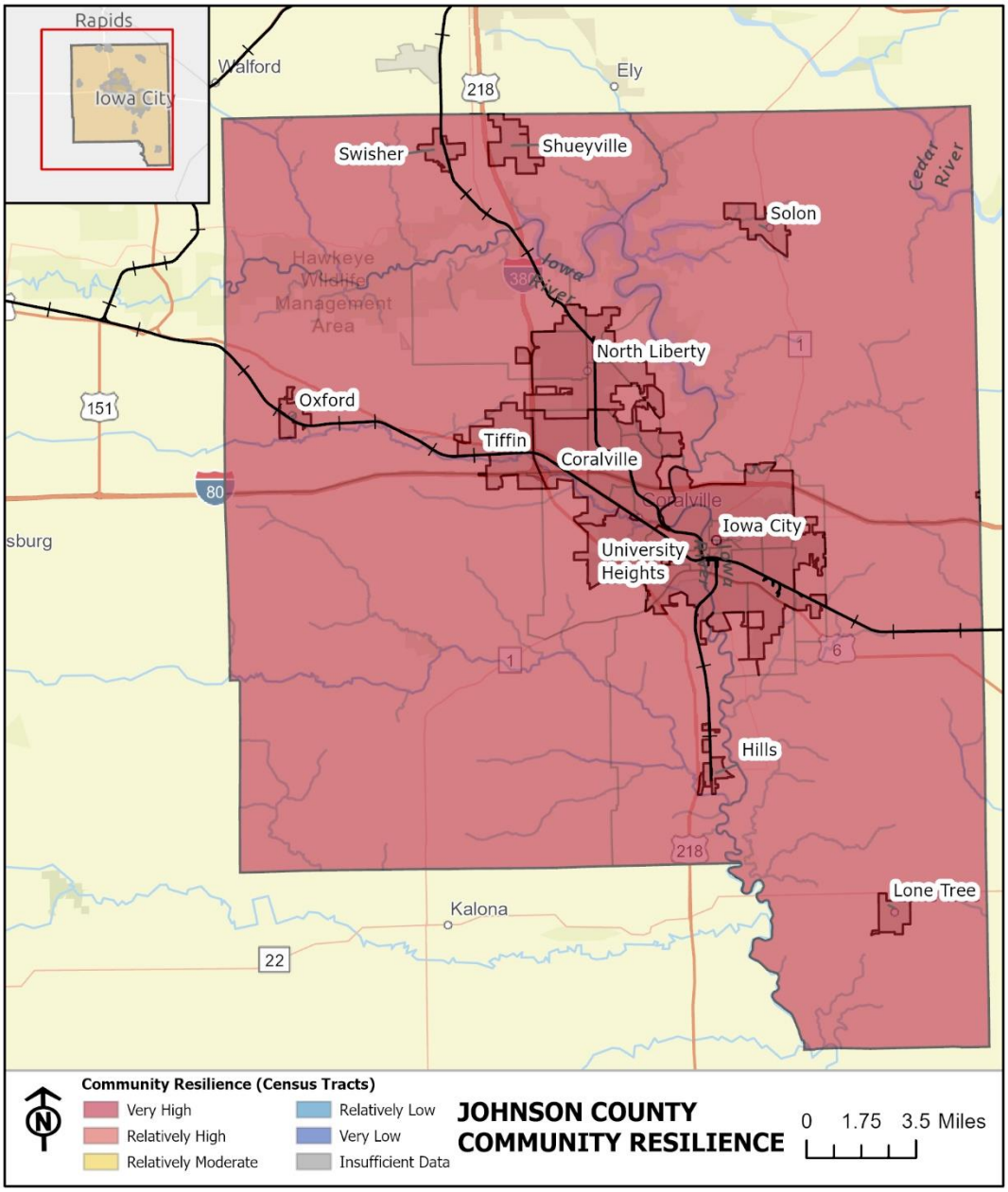
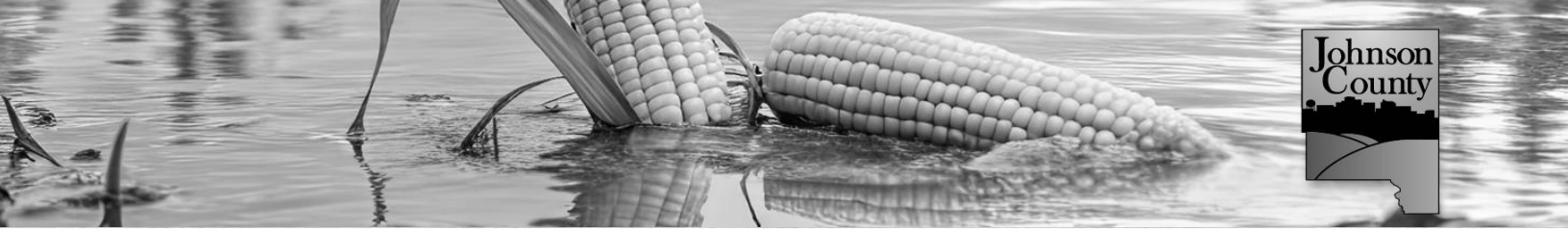


Figure 2-39: Johnson County Community Resilience Map

2.8 Economy

Johnson County, Iowa, has a diversified economy that blends agricultural, educational, healthcare, and service sectors, reflecting its mix of rural and urban characteristics. Agriculture remains important, with corn and soybean farming prominent throughout



the rural areas of the county, as well as livestock production, including cattle and hogs. Local agribusinesses support the agricultural sector with services such as grain storage and processing.

However, Johnson County's economy is notably bolstered by the University of Iowa, a major employer and economic driver, which stimulates growth in healthcare, research, and education sectors. The University of Iowa Hospitals and Clinics (UIHC) is among the state's largest employers and provides specialized healthcare services, attracting patients from across the region. Additionally, the university fosters a robust service sector around its campus in Iowa City, supporting retail, hospitality, and entertainment industries.

Manufacturing in Johnson County is less concentrated than in purely industrial regions but includes small to mid-sized firms involved in producing food products, metal goods, and machinery. These businesses contribute to the county's economy and supply chain and benefit from the county's proximity to the Cedar Rapids metropolitan area, allowing access to larger markets.

Tourism also supports the economy, driven by cultural, historical, and recreational attractions. Iowa City is recognized for its literary history as a UNESCO City of Literature, and Coralville Lake and other natural areas attract visitors interested in outdoor activities.

Overall, Johnson County's economy is resilient and balanced, blending higher education, healthcare, agriculture, and service-based employment to create a stable and diverse economic landscape.

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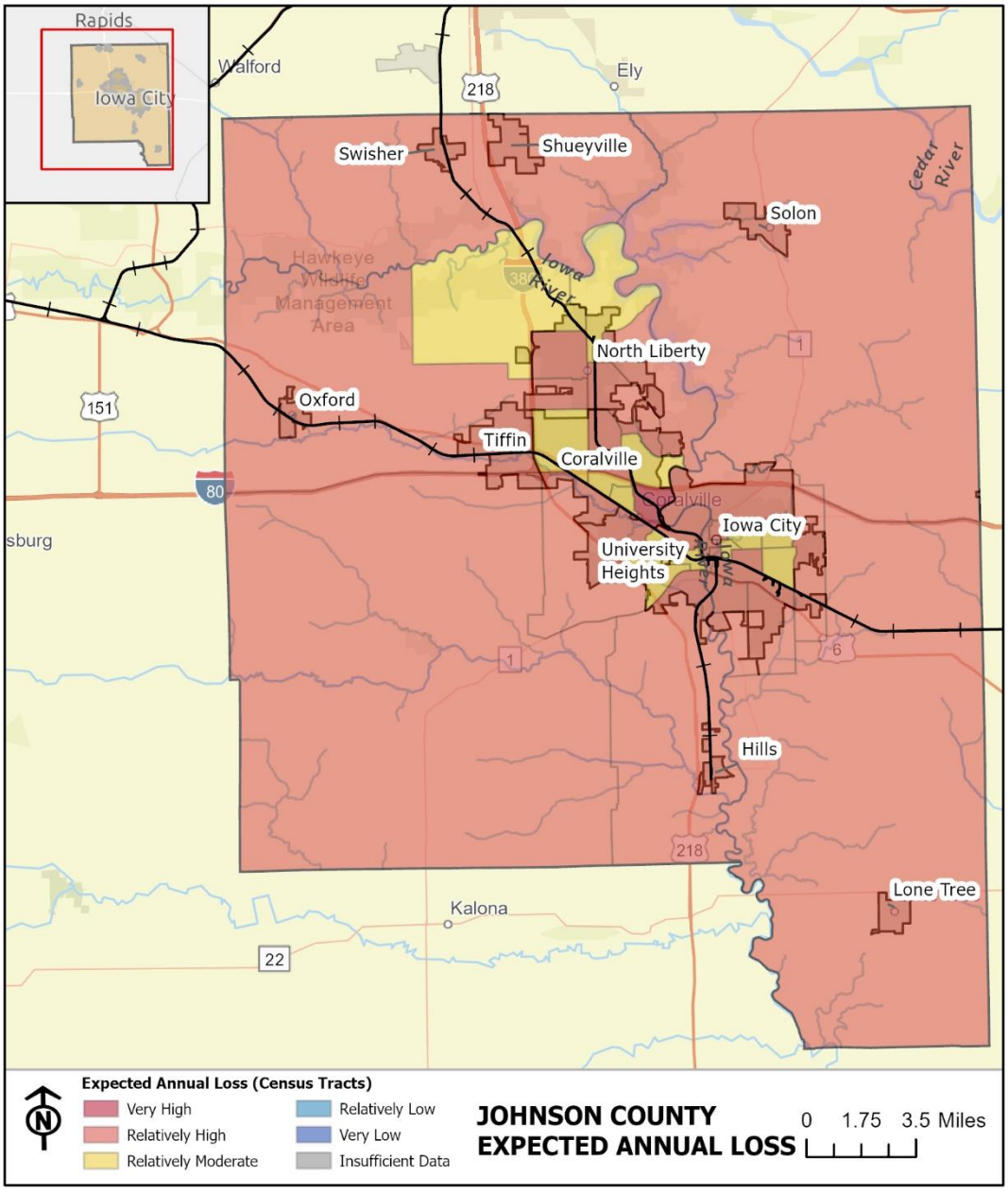
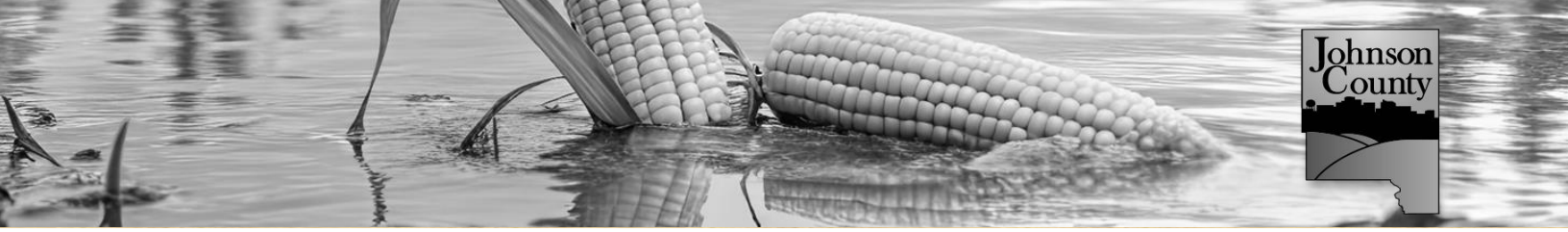


Figure 2-40: Johnson County Expected Annual Loss Map

2.8.1 Income

Johnson County, Iowa, has a median household income of approximately $74,000, which is higher than the state median, reflecting its more urbanized and economically diverse setting. The income distribution within the county varies widely due to the



presence of major employers like the University of Iowa, healthcare institutions, and a substantial service sector centered around Iowa City. Households with members working in higher-paying sectors, such as education, healthcare, and specialized manufacturing, tend to earn above the median. However, some areas, especially those with a greater reliance on retail or lower-wage service jobs, fall below the median income level.

Around 11% of Johnson County residents live below the poverty line, a rate that is close to the national average but below many other counties in Iowa. The per capita income in Johnson County is approximately $37,000, reflecting contributions from various income sources. Many households have diverse income streams, including wages, self-employment, especially in professional services, and retirement benefits. In addition to traditional employment, some residents benefit from university-related programs and economic activity stemming from university events, research, and tourism.

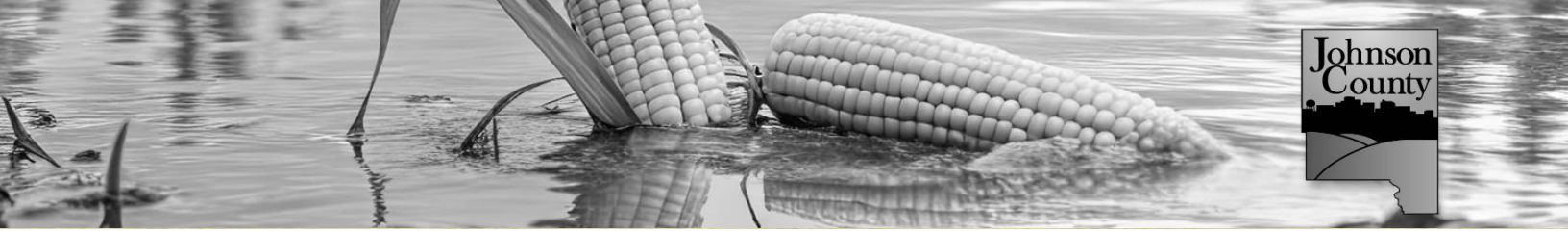
Overall, income in Johnson County is characteristic of a mixed urban-rural economy, with substantial opportunities in education and healthcare sectors that drive higher incomes, balanced by blue-collar and service-based employment that supports the local economy and provides a range of income levels across the county.

2.8.2 Occupations and Industries

In Johnson County, Iowa, the workforce is concentrated in education, healthcare, and service sectors, with the University of Iowa as a central economic driver. The education sector is the largest employer, with the university and local schools providing numerous jobs in teaching, research, administration, and support roles. The healthcare and social assistance sector follows closely, driven by the presence of the University of Iowa Hospitals and Clinics (UIHC), which offers a range of occupations in nursing, specialized medical care, administration, and research. This sector attracts both local residents and professionals from surrounding areas, contributing to the county's economic stability.

While Johnson County has less agricultural employment compared to rural counties, agriculture remains relevant in its rural areas, with a focus on crop production, livestock farming, and agribusiness services. Manufacturing also plays a role in the local economy, primarily through small to mid-sized firms producing food products, machinery, and metal goods, contributing to regional supply chains.

Retail trade and food services are major employers, particularly in Iowa City, where restaurants, retail stores, and service-oriented businesses thrive due to the high student population and university-affiliated events. Professional, scientific, and technical services are growing sectors, with many residents employed in fields such as consulting,



engineering, and technology, often in connection with university research or small business entrepreneurship. Additionally, tourism-related jobs are supported by the county's cultural attractions, including the UNESCO City of Literature designation and Coralville Lake.

Johnson County's occupational landscape is characterized by a strong emphasis on education, healthcare, and service-oriented industries, with a mix of professional and blue-collar opportunities that support diverse skill levels and economic resilience.

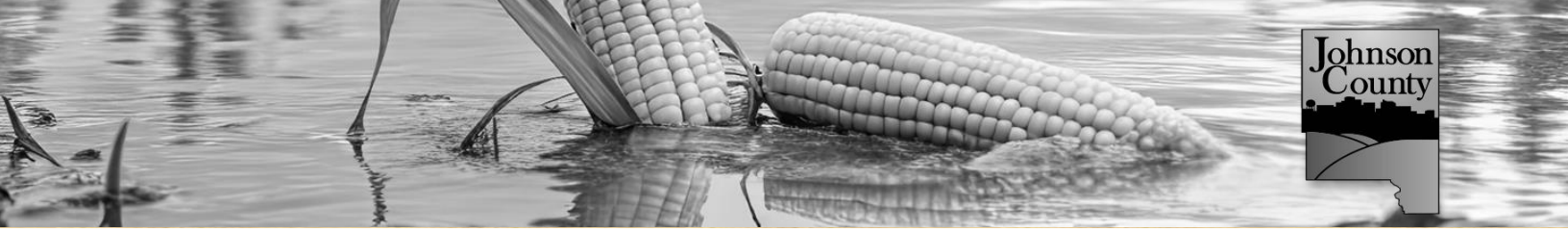
2.8.3 Future Population Growth and Development Trends

Johnson County, Iowa, is projected to experience steady population growth, driven by its urban appeal, employment opportunities, and the presence of the University of Iowa. The county, with a population exceeding 150,000, is growing at a rate above the state average, largely due to the influx of students, professionals, and families attracted by the amenities and employment options in Iowa City and Coralville. This growth is fueling significant residential development, particularly around urban centers where new housing projects are underway to accommodate both students and long-term residents.

The population in Johnson County is also becoming increasingly diverse, with a mix of younger residents attending the university and professionals employed in healthcare, education, and technology sectors. While much of the county's growth is centered around Iowa City, nearby communities like North Liberty and Coralville are also expanding, spurring the development of additional housing, retail, and recreational facilities to meet rising demand.

Land use in Johnson County reflects a balance between urban expansion and the preservation of rural landscapes, particularly agricultural areas in the county's outer regions. Efforts to integrate sustainable land use practices are growing as the county seeks to support both farmland preservation and residential needs. Infrastructure investments, including improvements to roads, public transit, and utilities, are essential to support this growth, especially in densely populated areas near major highways and the University of Iowa.

Johnson County's development trends indicate a shift toward a more urbanized, diverse population while maintaining strong agricultural roots, positioning the county to meet future housing, employment, and infrastructure demands as it continues to grow.

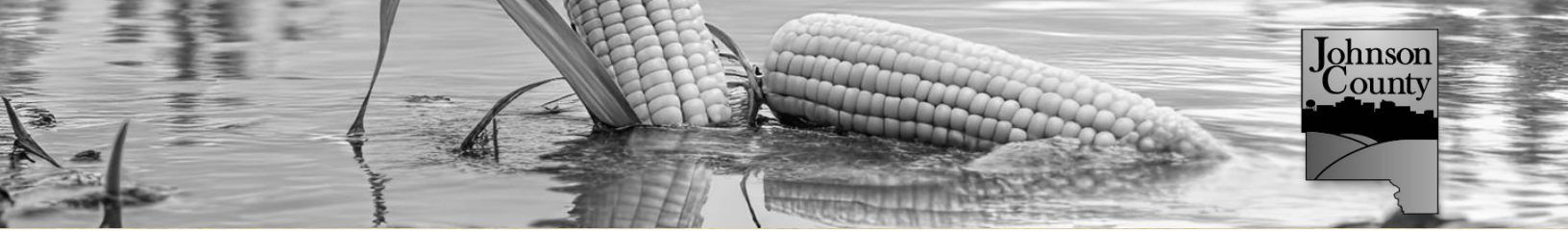


2.9 Capability Assessment

Element Addressed in Section
Element C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3)), including requirement **C1-a and C1-b.** **Element C2.** Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii)), including requirement **C2-a.**

A comprehensive capability assessment was conducted to evaluate the planning resources, policies, staffing, and regulatory tools available among stakeholders within the planning area. This assessment, facilitated through a detailed survey, aimed to identify existing strengths, gaps, and opportunities for enhancing hazard mitigation and community resilience. The survey analyzed the presence and implementation of critical plans, such as Capital Improvement Plans, Climate Change Adaptation Plans, Community Wildfire Protection Plans, and Comprehensive or Master Plans, which are essential for guiding community growth, safety, and long-term risk reduction. Additionally, it examined the availability of codes and ordinances governing building practices, land use, floodplain management, and hazard-specific regulations, as well as the roles of key personnel, including Chief Building Officials, Civil Engineers, and Floodplain Administrators.

The assessment highlights that these existing capabilities are well-positioned to support the mitigation strategy through the effective alignment and integration of resources, programs, and expertise across participating jurisdictions. Policies such as zoning ordinances, building codes, and hazard-specific regulations provide a solid framework to guide mitigation actions. Operational systems, including emergency response plans and interagency agreements, ensure resources can be coordinated and mobilized efficiently. Financial capabilities, including dedicated funding streams, grants, and local general fund budgets, enable the implementation of prioritized mitigation projects. Furthermore, trained personnel and subject matter expertise allow jurisdictions to apply best practices, innovative solutions, and data-driven strategies to address risks effectively. By leveraging these existing capabilities, stakeholders can build a stronger foundation for resilience, ensuring a coordinated and cost-effective approach to mitigating current and future hazards.



2.9.1 Plans

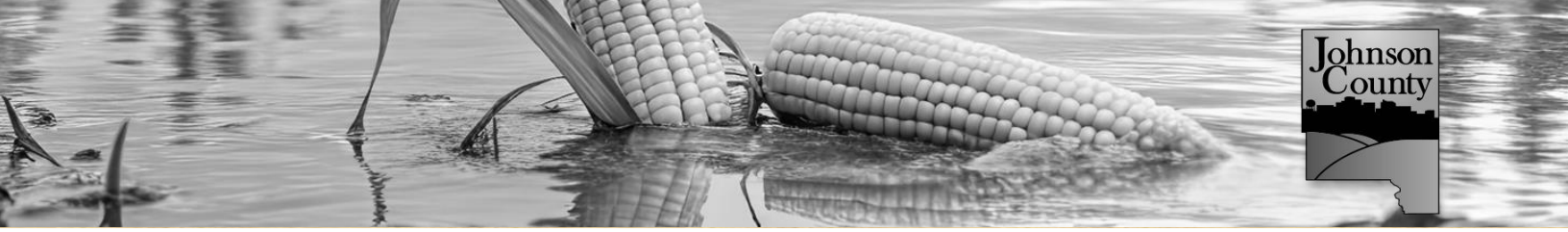
Capital Improvements Plan (CIP)

Capital Improvement Plans (CIPs) are long-term planning tools that outline a government or organization's projected investments in significant physical assets and infrastructure. Typically covering a 5- to 10-year period, these plans include major projects like road repairs, water system upgrades, building renovations, new facilities, and other infrastructure improvements that require substantial financial resources and strategic prioritization. CIPs help ensure that essential infrastructure is maintained, replaced, or expanded as needed to support community needs, enhance safety, and improve quality of life.

In the context of mitigation, CIPs are crucial because they incorporate infrastructure projects that can reduce a community's vulnerability to hazards and increase resilience to disasters. For example, CIPs may include flood control and stormwater management projects, such as installing stormwater systems, building levees, or upgrading drainage infrastructure to manage heavy rainfall and reduce flooding risks. This proactive investment helps mitigate flood hazards, protecting properties and lowering recovery costs after storms. In areas prone to earthquakes, a CIP might allocate funds for seismic retrofitting of public buildings, bridges, or critical infrastructure, reducing the risk of collapse and ensuring community safety. For wildfire-prone areas, CIPs may fund projects like creating firebreaks, installing fire-resistant roofing on public buildings, or establishing water storage facilities to support firefighting efforts.

Transportation infrastructure is also commonly included in CIPs, with a focus on maintaining and strengthening roads and bridges, which are vital for evacuation routes and emergency response. Well-maintained roads and bridges can support quicker, safer evacuation and ensure that emergency services can access impacted areas during a disaster. Utility upgrades are another key aspect, where CIPs may prioritize modernizing water, electricity, and gas utilities, such as burying power lines to reduce outage risks from storms or enhancing water and sewer systems to handle extreme weather events, helping to prevent contamination or service disruptions.

By including mitigation-focused projects, CIPs enable communities to strategically reduce future disaster impacts, protect critical infrastructure, and improve recovery capabilities. A well-integrated CIP ensures that communities not only maintain their infrastructure but also adapt and prepare it to withstand local hazards, ultimately saving lives, protecting property, and reducing long-term recovery costs.



Most jurisdictions and school districts within Johnson County, Iowa, lack a formal Capital Improvements Plan (CIP). However, Johnson County maintains a countywide CIP, which is updated annually to prioritize infrastructure projects, including those that address mitigation needs. The county's CIP supports community growth and hazard resilience by including projects such as transportation improvements, stormwater management systems, and utility upgrades.

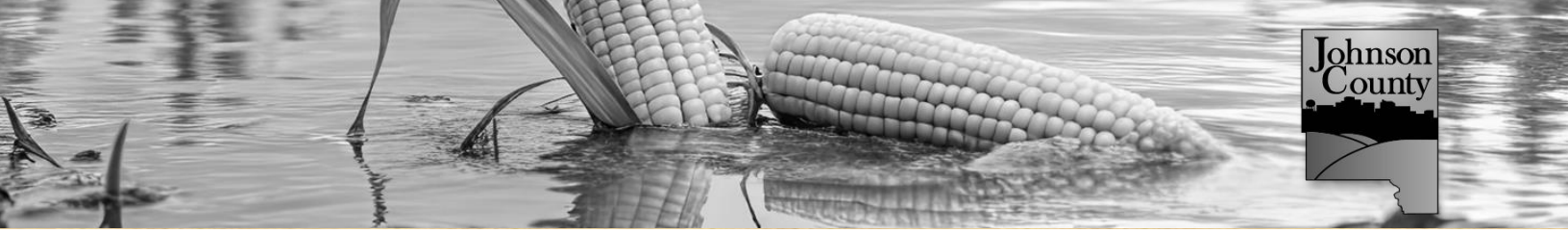
Based on survey responses, North Liberty has a CIP in place, authored by city staff and implemented on May 14, 2024. Although it does not specifically address hazards, it can be used to implement mitigation actions and is updated and adopted annually with the budget. Iowa City's CIP, managed by the Finance Department and implemented on July 1, 2024, includes multiple projects aimed at mitigating hazards and is updated annually. Coralville's CIP, maintained by city staff and implemented on August 22, 2024, addresses hazards when funding permits; however, project demands often exceed available resources. Tiffin's CIP, authored by Doug Boldt and initiated on December 1, 2019, lacks specific hazard mitigation measures but was last updated in 2023.

The University of Iowa has a CIP overseen by Campus Planning and Development, established on August 26, 2019, which may address hazards as applicable and is updated annually. Solon's CIP, managed by the City of Solon and implemented on January 1, 2024, does not address hazards. In University Heights, the city council, city engineer, and city staff maintain a CIP that was implemented on March 8, 2024. This plan addresses hazards and is updated as needed to support mitigation actions. Finally, the Iowa City Community School District has a CIP, managed by Jeff Barnes, that was put in place on September 29, 2019. This plan addresses hazards and supports mitigation actions, with the last update occurring in December 2023.

The lack of CIPs in other surveyed jurisdictions highlights a potential area for improvement in Johnson County, especially in terms of long-term infrastructure planning and hazard mitigation. Expanding the use of CIPs and aligning them with hazard mitigation strategies across jurisdictions could strengthen community resilience and enhance disaster preparedness.

Climate Change Adaptation Plan

Climate Change Adaptation Plans are strategic frameworks that guide communities, organizations, and governments in adjusting to the current and anticipated impacts of climate change. These plans identify vulnerabilities to climate-related hazards—such as increased frequency of extreme weather events, rising temperatures, prolonged droughts, and shifting ecosystems—and propose actions to reduce these risks.



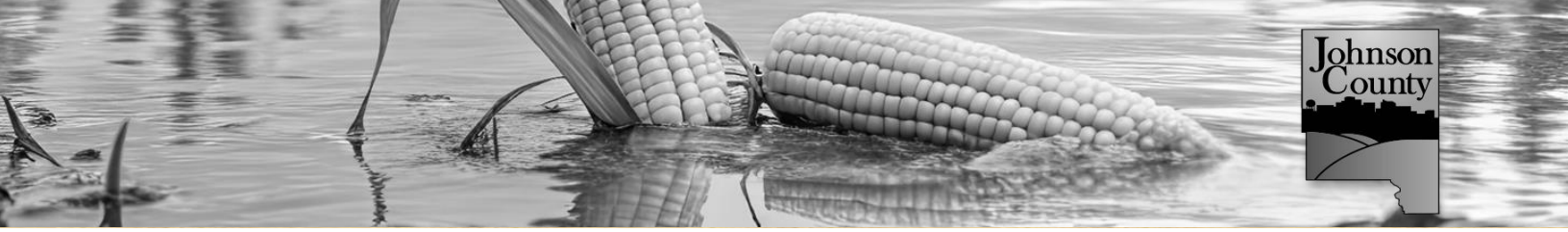
Adaptation measures often include modifying infrastructure, updating land-use policies, preserving natural buffers, and enhancing water management systems to withstand future climate conditions. Unlike mitigation, which aims to reduce greenhouse gas emissions and limit the extent of climate change, adaptation focuses on preparing for and managing the impacts of climate change that are already occurring or projected to occur.

Adaptation plans are closely related to mitigation because they often include measures that enhance resilience to natural hazards, thereby reducing the severity of disaster impacts. For instance, building seawalls or restoring wetlands as a buffer against sea-level rise can protect coastal communities from flooding while also preserving ecosystems that absorb carbon. Similarly, upgrading infrastructure to withstand higher temperatures or intense storms helps ensure that roads, bridges, and utilities remain functional during extreme weather events, thereby reducing recovery costs and minimizing disruption. Integrating climate change adaptation with traditional hazard mitigation strategies ensures that communities are prepared not only for current risks but also for evolving hazards due to climate change, resulting in more sustainable and resilient communities in the long term.

Most jurisdictions and school districts within Johnson County, Iowa, currently lack a formal Climate Change Adaptation Plan. However, Johnson County is actively working to adopt a Climate Change Adaptation Plan, which aims to identify vulnerabilities and implement strategies to address climate-related risks across the county. This effort demonstrates a commitment to enhancing resilience against climate impacts and aligns with the county's long-term planning goals.

According to survey responses, Iowa City has a Climate Change Adaptation Plan, developed by climate action staff, which was implemented on September 1, 2019. This plan addresses hazards and is updated annually with a report. The Iowa City Community School District also has a plan, authored by Ben Grimm and put in place on August 29, 2019. This plan addresses hazards and can be used to support mitigation actions, with the last update in December 2023.

The absence of climate adaptation planning in other surveyed jurisdictions highlights an area where increased focus on climate resilience and adaptation strategies could be beneficial, especially given the growing risks associated with climate change. Johnson County's ongoing effort to adopt a Climate Change Adaptation Plan sets a model for other jurisdictions and could serve as a framework to encourage broader adoption of climate adaptation measures across the region.



Community Wildfire Protection Plan (CWPP)

Community Wildfire Protection Plans (CWPPs) are collaborative documents that outline strategies for reducing wildfire risks in areas prone to wildland fires. Developed through partnerships between local governments, fire departments, state and federal agencies, and community stakeholders, CWPPs assess wildfire hazards in specific communities, identify vulnerable areas, and prioritize actions to enhance fire resilience. These plans typically include recommendations for fuel reduction, such as clearing flammable vegetation near homes, creating defensible spaces, and managing forests to reduce fire intensity. They also focus on improving emergency response, strengthening building codes to make structures more fire-resistant, and raising public awareness about wildfire risks and preparedness.

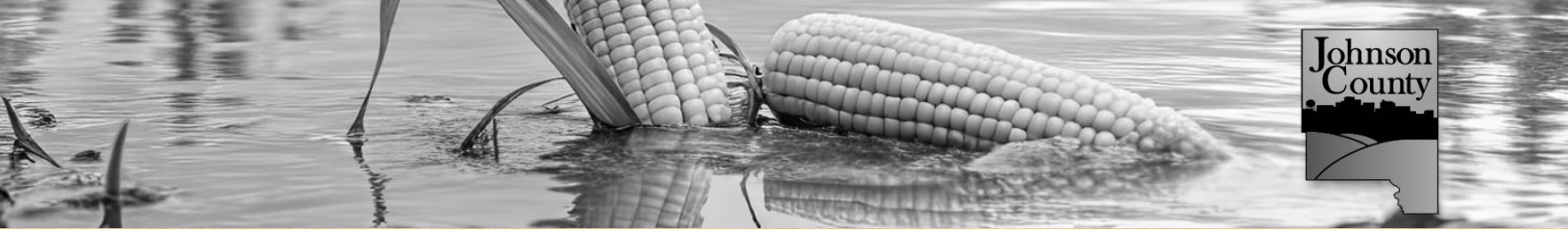
CWPPs play a crucial role in mitigation by proactively addressing factors that increase wildfire vulnerability and aiming to reduce the severity of future wildfires. By identifying and implementing fire-prevention measures, these plans help protect lives, property, and natural resources. Moreover, CWPPs can qualify communities for funding and technical assistance from federal and state wildfire mitigation programs, enhancing their ability to implement effective prevention projects. In the broader scope of hazard mitigation, CWPPs contribute to community resilience by reducing potential fire-related losses and preparing residents for a more effective response, ultimately supporting safer, more sustainable communities in wildfire-prone areas.

Most jurisdictions and school districts in Johnson County, Iowa, do not currently have a formal Community Wildfire Protection Plan (CWPP). According to survey responses, no CWPPs are in place for North Liberty, Coralville, Tiffin, Swisher, Lone Tree, Solon, Shueyville, the Iowa City Community School District, Johnson County, and the Clear Creek Amana Community School District. Certain jurisdictions, including Iowa City, the University of Iowa, Hills, University Heights, and Oxford, marked CWPP applicability as "N/A," indicating that wildfire risk may not be a primary concern for these areas.

The lack of CWPPs across these jurisdictions highlights an opportunity for Johnson County stakeholders to consider wildfire resilience and preparedness measures, which could improve local safety and align with broader hazard mitigation goals.

Comprehensive or Master Plans

Comprehensive or master plans are strategic, long-term planning documents used by cities, towns, and counties to guide growth and development in a structured and sustainable way. These plans typically cover a wide range of community aspects,



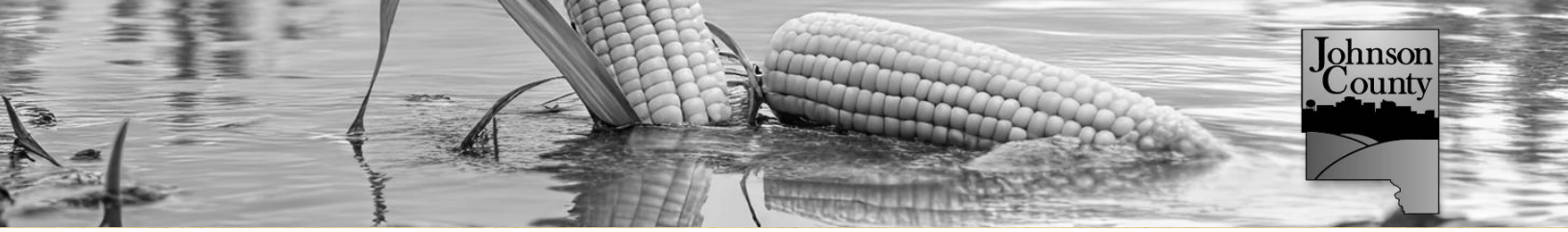
including land use, housing, transportation, economic development, public facilities, and environmental protection. By setting a vision for the community's future, comprehensive plans provide a roadmap for decision-making over a 10- to 20-year period, ensuring that growth aligns with the community's goals and values. Developed with input from residents, businesses, and local government stakeholders, these plans help shape policies, zoning regulations, and development practices to foster orderly and balanced development.

In the context of mitigation, comprehensive plans play an essential role by incorporating strategies to reduce risks from natural and human-made hazards. By addressing areas like flood-prone zones, wildfire-prone areas, and critical infrastructure locations, these plans can guide development away from high-risk areas, enhance building codes, and encourage resilient infrastructure design. Many comprehensive plans also promote sustainability practices, such as green infrastructure and climate adaptation, which help communities prepare for and adapt to long-term environmental changes. Ultimately, by embedding mitigation principles into comprehensive plans, communities build a safer and more resilient future, reducing potential losses from disasters and supporting sustainable growth.

Most jurisdictions and school districts in Johnson County, Iowa, have a Comprehensive or Master Plan in place, though the focus and incorporation of hazard mitigation vary across these plans. North Liberty has a plan authored by RDG Planning & Design, last updated in February 2023, which does not address hazards directly but may support mitigation actions. Iowa City's plan, developed by Urban Planning Staff, was last adopted in 2013 with a revision underway; it addresses hazards. Coralville's plan, collaboratively developed by city staff, residents, and stakeholders with a consultant, was last updated on August 22, 2019. This plan specifically addresses flood hazards and supports mitigation decision-making, with strategies to manage significant flood impacts.

Tiffin's plan, created by the East Central Iowa Council of Governments (ECICOG) and updated in April 2018, does not address hazards or mitigation actions. Swisher also has a plan by ECICOG, last updated in November 2023, which does not include hazard mitigation. The University of Iowa has a Strategic Plan, implemented on July 1, 2022, which serves as an equivalent to a Comprehensive Plan but does not align directly with typical jurisdictional planning. Solon's plan, authored by MSA Professionals and last updated on September 1, 2019, does not address hazards.

Other jurisdictions with Comprehensive Plans include Hills, updated in 2022, and University Heights, which addresses hazards in new developments and can support mitigation actions. The Iowa City Community School District, with a plan by Jeff Barnes



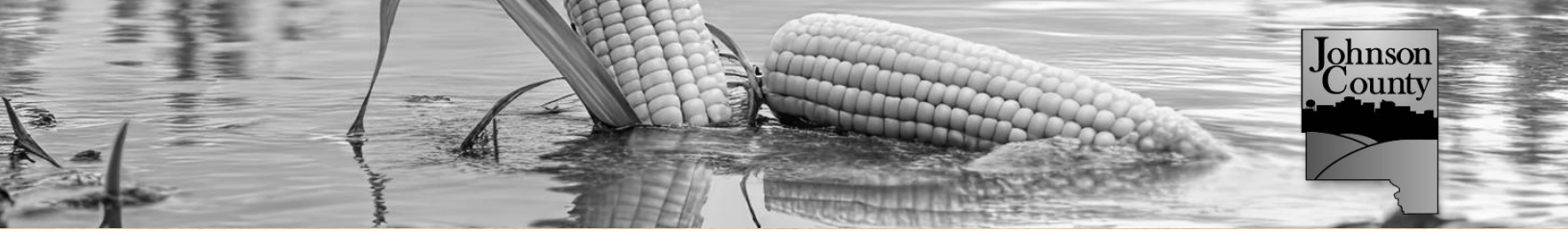
updated on November 2, 2021, includes hazard considerations, with an additional update in August 2024. Johnson County also has a Comprehensive Plan, implemented on January 1, 2020, which includes a Land Use Plan as a key component. While the Comprehensive Plan provides broad guidance for growth and development, the Land Use Plan offers specific direction on zoning, land management, and the sustainable use of resources. However, hazard information is not explicitly specified within these plans. Oxford's plans, both created by ECICOG and last updated in August 2024, do not address hazards.

Overall, while many jurisdictions in Johnson County have Comprehensive or Master Plans, there is variation in the extent to which these plans address hazard mitigation. This suggests an opportunity to enhance the integration of hazard resilience measures across the county's planning efforts to support long-term community safety and sustainable development.

Continuity of Operations Plan

Continuity of Operations Plans (COOP) are essential strategies developed by organizations, including government agencies, businesses, and essential service providers, to ensure that critical functions and services can continue or be quickly restored following a disruption. These disruptions can stem from natural disasters, cyber incidents, equipment failures, or other emergencies that threaten to halt normal operations. A COOP typically outlines procedures for maintaining essential functions, identifying alternate facilities, designating leadership roles, and establishing communication protocols in the event of an incident. By planning for staff reassignments, technology backups, and essential resource requirements, COOPs ensure that organizations can minimize downtime and swiftly recover from unexpected interruptions.

In terms of mitigation, COOPs are crucial because they proactively address potential operational vulnerabilities before an incident occurs. By identifying critical functions and dependencies in advance, organizations can implement safeguards, such as redundancies in technology and supply chains, to reduce the risk of a total shutdown. This approach not only protects the organization's operations but also helps protect the broader community that relies on these services—whether it's emergency response, healthcare, utilities, or other essential functions. Ultimately, COOPs enhance resilience by equipping organizations to handle disruptions more effectively, minimizing the cascading effects that could exacerbate a crisis, and supporting faster recovery and continuity of services in the face of disasters.



Most jurisdictions and school districts in Johnson County, Iowa, do not currently have a Continuity of Operations Plan (COOP) in place. However, several key jurisdictions do have COOPs. Iowa City has a COOP developed by Finance Department staff, last recorded on August 21, 2024, though the actual adoption date is unknown. This plan does not support mitigation actions. The University of Iowa also has COOPs that vary by units or departments (Emergency Support Functions or ESFs), with the earliest available date recorded as August 26, 2019. These plans may address hazards as applicable and may support mitigation actions, with updates generally conducted annually.

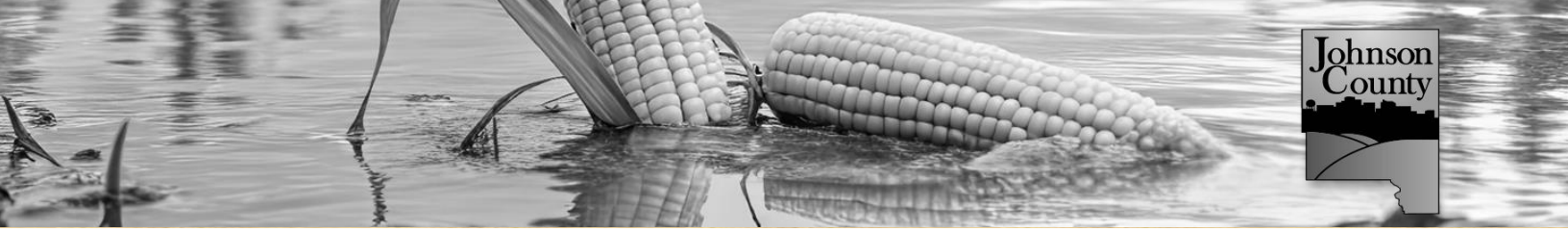
Solon's COOP, authored by the City of Solon and implemented on April 1, 2020, does not address hazards. The Iowa City Community School District has a COOP created by Josh Reynolds, implemented on February 23, 2022, which addresses hazards and can support mitigation actions, with the next update scheduled for February 2024. Johnson County also maintains a COOP, established on January 1, 2020, and is planning an update within the next 6 months to a year.

The absence of COOPs across other jurisdictions highlights an opportunity to develop continuity planning across Johnson County. Implementing COOPs in these jurisdictions would strengthen operational resilience during disruptions and enhance the capacity for swift recovery and continuity of essential services.

Economic Development Plan

Economic Development Plans are strategic frameworks created by local governments, regional agencies, or economic development organizations to promote economic growth, job creation, and improved quality of life within a community. These plans often focus on attracting new businesses, supporting existing industries, improving infrastructure, enhancing workforce skills, and diversifying the local economy. Economic Development Plans usually include an analysis of local economic strengths and weaknesses, target industries, and specific actions to achieve sustainable economic growth. They aim to create a resilient, vibrant economy that can adapt to changing market conditions, attract investments, and improve living standards for residents.

In terms of mitigation, Economic Development Plans play a crucial role by promoting diversified and resilient economic structures that are less vulnerable to disasters and disruptions. A well-rounded local economy with diverse industries is better equipped to absorb the impacts of hazards, such as natural disasters or economic downturns, because it doesn't rely too heavily on a single sector. Furthermore, these plans often encourage investments in resilient infrastructure, like improved transportation networks and utility systems, which enhance the community's ability to withstand and recover from



disruptive events. By aligning economic growth with hazard mitigation goals, Economic Development Plans help create sustainable, disaster-resilient communities that can rebound more effectively after adverse events, ultimately supporting long-term stability and prosperity.

Several jurisdictions in Johnson County, Iowa, have an Economic Development Plan in place, although the plans' focus on hazard mitigation varies. North Liberty has a plan authored by city staff, adopted on April 10, 2012, with the latest version put in place on August 20, 2019. However, this plan does not address hazards and cannot be used to implement mitigation actions. Iowa City's plan, managed by Economic Development Staff, was recorded on August 21, 2024, but it is currently undergoing updates and does not address hazards.

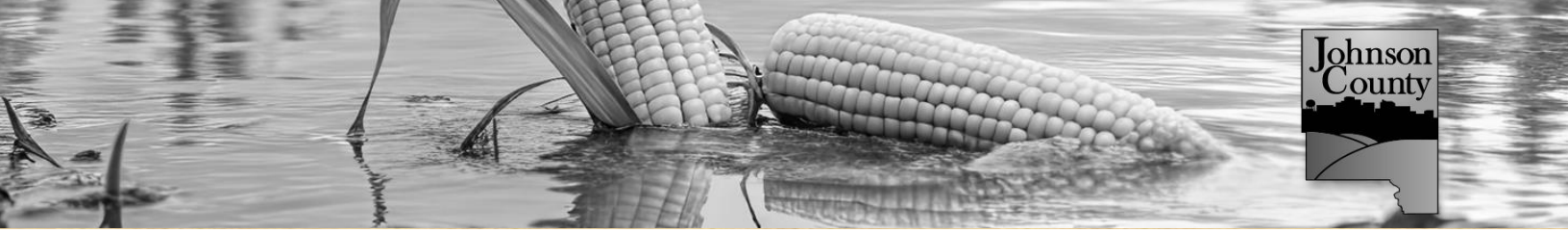
Tiffin has an Economic Development Plan authored by the Tiffin City Council, initially updated in 2015, and last recorded as implemented on September 15, 2019. This plan does not address hazards or mitigation actions. Swisher's plan, created by The Bill Menner Group and recorded on January 13, 2022, similarly lacks hazard and mitigation considerations. The University of Iowa has a plan led by the Office of Innovation, put in place on July 1, 2023, which does not address hazards and is updated annually.

Johnson County also has an Economic Development Plan, created by the Cities of Johnson County and implemented on January 1, 2020. However, it does not include hazard considerations.

The absence of hazard mitigation components in these Economic Development Plans across Johnson County jurisdictions highlights an opportunity to enhance economic resilience. By integrating mitigation goals, these plans could better support sustainable growth and help create a more disaster-resilient local economy, which would benefit community stability and prosperity in the long term.

Land Use Plan

Land Use Plans are strategic documents that outline how land within a community should be developed and used, guiding decisions on zoning, housing, transportation, green spaces, commercial areas, and industrial zones. Created by local or regional planning agencies, these plans are based on an assessment of current land use, projected growth, environmental considerations, and community needs. They typically aim to balance development with environmental preservation, ensuring that land resources are managed sustainably for future generations. By organizing land use in a



coherent and forward-thinking manner, these plans help communities develop in ways that support economic vitality, environmental health, and quality of life.

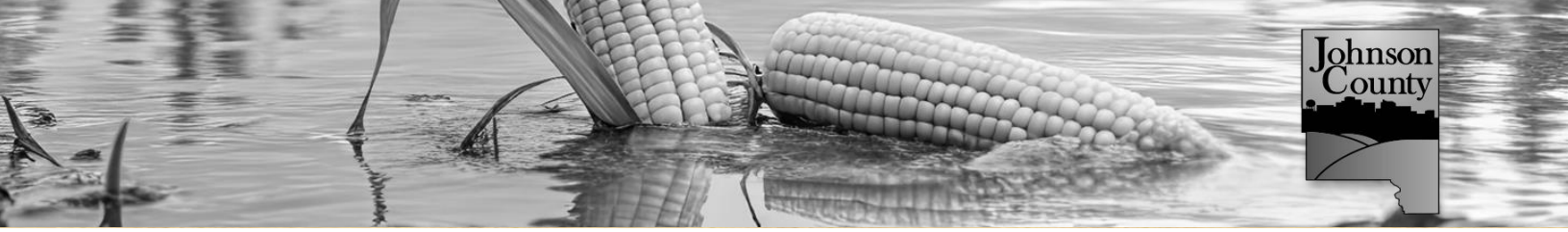
In the context of hazard mitigation, Land Use Plans are essential tools for reducing risk and enhancing resilience. By directing development away from hazard-prone areas, such as floodplains, erosion-prone zones, and wildfire-prone regions, these plans help minimize the community's exposure to potential disasters. Land Use Plans can also incorporate green infrastructure, like wetlands and parks, which not only improve quality of life but also serve as natural buffers against floods, heat, and other hazards. By thoughtfully planning where and how growth occurs, Land Use Plans reduce vulnerabilities to natural hazards, helping communities prevent or lessen the impact of disasters.

Several jurisdictions in Johnson County, Iowa, have established Land Use Plans, though the plans' focus on hazard mitigation varies. North Liberty has a Land Use Plan developed by RDG Planning & Design, implemented on February 1, 2023, which does not address hazards or support mitigation actions. Iowa City's Land Use Plan, managed by Urban Planning Staff, was last adopted with the Comprehensive Plan and updated in 2013, with a revision forthcoming; it includes hazard considerations.

Coralville's plan, part of the 2014 comprehensive/community plan and developed with input from city staff, stakeholders, residents, and consultant Houseal Lavigne, includes mitigation actions and undergoes map amendments as needed, with the last amendment in July 2023. Swisher's plan, authored by ECICOG and implemented on November 27, 2023, does not address hazards or support mitigation actions. The University of Iowa has a plan managed by the Finance and Operations Business Office, put in place on August 26, 2019, and updated annually; it may address hazards and support mitigation actions as applicable.

Solon's plan, created by V&K Engineering and implemented on February 1, 2023, does not address hazards. Shueyville also has a plan by ECICOG, last updated on April 8, 2008. The Iowa City Community School District has a plan authored by Jeff Barnes, implemented on August 29, 2019, which includes hazard considerations and was last updated in August 2024.

Johnson County has a Land Use Plan developed by PDS, put in place on January 1, 2020, though it does not focus on specific hazard analysis (Not JHA). Oxford has two plans, both likely created by ECICOG and implemented on September 13, 1994, with potential amendments made afterward; these plans do not address hazards or mitigation.



The lack of comprehensive hazard considerations in some Land Use Plans in Johnson County underscores an opportunity for integrating resilience measures to guide development away from hazard-prone areas and strengthen the community's ability to withstand natural hazards.

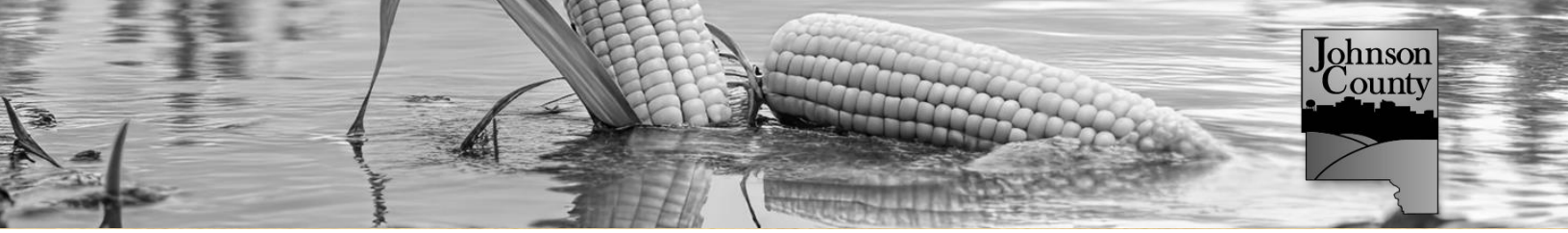
Emergency Operations Plan

Emergency Operations Plans (EOPs) are comprehensive frameworks designed to guide the actions and coordination of various agencies, organizations, and community stakeholders during emergency incidents. An EOP outlines responsibilities, resources, and procedures for responding to a range of potential emergencies, from natural disasters to human-caused incidents. Typically structured with sections that cover preparedness, response, recovery, and mitigation, an EOP provides clear protocols for activities such as evacuations, sheltering, communications, resource allocation, and mutual aid. This plan is often developed in coordination with local emergency services, public health departments, government agencies, and community organizations, ensuring a unified response to incidents.

In the context of hazard mitigation, EOPs play a crucial role by incorporating mitigation measures into preparedness and response strategies. Through hazard identification, risk analysis, and pre-incident planning, EOPs identify potential vulnerabilities within a community and outline actions to reduce or eliminate these risks. For instance, they may include guidelines for reinforcing infrastructure, establishing early warning systems, or designating safe zones. By embedding mitigation principles into emergency procedures, EOPs help communities not only respond more effectively to emergencies but also build resilience against future events, reducing the severity of impacts and enhancing recovery capabilities.

Several jurisdictions in Johnson County, Iowa, have Local Emergency Operations Plans (EOPs) in place, although the scope and focus of these plans vary. Iowa City has an EOP developed by Fire Chief Rocca, originally implemented in 2008 and last recorded on August 21, 2024, with an update currently in progress. This plan addresses hazards. The University of Iowa also has an EOP, managed by Emergency Management and implemented on July 1, 2021, which addresses hazards and can be used to support mitigation actions; it is updated annually.

Solon's EOP, authored by the City of Solon and implemented on August 27, 2019, addresses hazards, with an update in progress. The Iowa City Community School District has an EOP developed by Kate Callahan, implemented on August 29, 2019, which



includes hazard mitigation measures and is set for its next update in August 2024. Johnson County has an EOP created by the county and first implemented in 2006, with the latest update on June 1, 2023, addressing hazards and supporting mitigation actions.

Oxford's EOP, managed by Johnson County Emergency Management, was last updated on September 3, 2024, and is confirmed to address hazards, although some details remain uncertain.

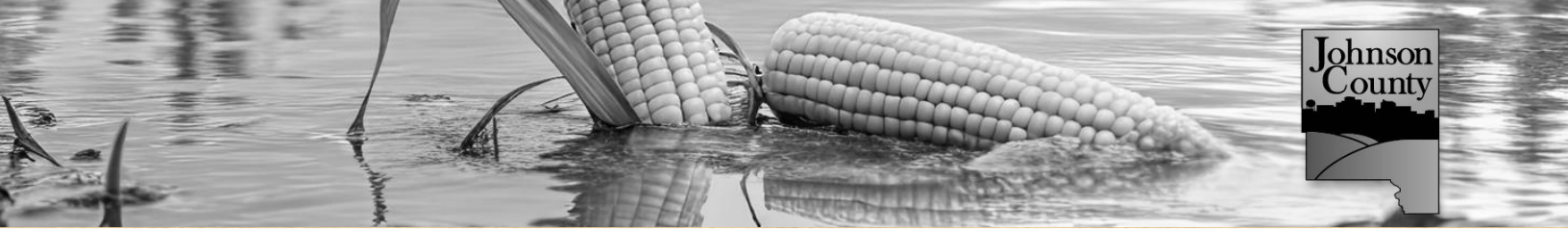
The absence of EOPs in other jurisdictions presents an opportunity to expand emergency preparedness across Johnson County. Implementing or updating EOPs in these areas would enhance the county's overall emergency response capabilities and resilience to various hazards, ensuring consistent preparedness for incidents across all communities.

Stormwater Management Plan

Stormwater Management Plans are strategic documents developed by municipalities or regions to manage rainwater runoff in urban and suburban areas. These plans outline methods to collect, treat, and divert stormwater in ways that prevent flooding, reduce erosion, protect water quality, and minimize property damage. By integrating systems like retention basins, green infrastructure, permeable surfaces, and drainage networks, Stormwater Management Plans aim to handle large volumes of stormwater effectively, particularly during heavy rainfall events. These plans also address regulatory requirements, such as those set by the Clean Water Act, and often involve public education on minimizing pollution from runoff.

In terms of mitigation, Stormwater Management Plans are essential because they directly reduce the risk of flooding and water damage, especially as urban areas expand and impermeable surfaces increase. By controlling stormwater runoff, these plans help communities mitigate the impacts of heavy rainfall, protect critical infrastructure, and preserve natural waterways. Additionally, stormwater management contributes to climate adaptation by preparing communities for more intense rainfall patterns associated with climate change. Ultimately, Stormwater Management Plans not only protect property and infrastructure but also enhance community resilience, reducing the long-term costs and impacts associated with flood-related disasters.

Several jurisdictions in Johnson County, Iowa, have Stormwater Management Plans, although the level of detail and focus on hazard mitigation vary. North Liberty has a plan, part of the City Code of Ordinances, authored by city staff and implemented on August



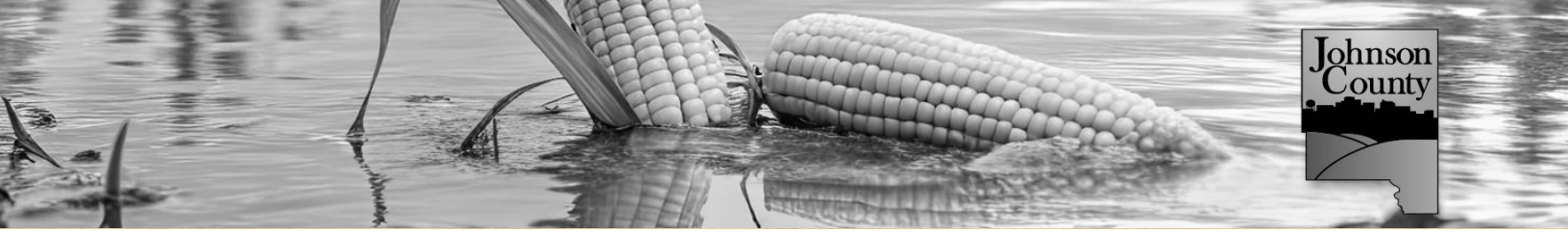
20, 2019. It is updated regularly, though it does not specifically address hazards. However, it could support mitigation actions, with the last update occurring in 2023. Iowa City's plan, managed by Engineering Staff, was recorded on August 21, 2024, and addresses stormwater mitigation, with an update currently underway. Tiffin also has a plan, developed by the City Engineer and implemented on August 23, 2019, which does not address hazards or mitigation actions. The University of Iowa's plan, managed by Facilities Management-Environmental Compliance and implemented on August 26, 2019, addresses hazards and supports mitigation actions, with updates conducted annually.

University Heights has a plan authored by the City Engineer under a DNR MS4 permit, put in place on April 10, 2020. This plan addresses hazards and can be used for mitigation actions, with the MS4 permit covering 2020–2025. The Iowa City Community School District has a plan managed by Ben Grimm, implemented on August 29, 2019, which addresses hazards and supports mitigation, with the next update scheduled for December 2023. Johnson County itself has robust Storm Water Management Regulations for new construction, ensuring that developments adhere to best practices in stormwater control. These regulations include requirements for detention and retention systems, minimizing runoff, and protecting water quality, all of which significantly reduce flood risks and enhance resilience to heavy rainfall events.

The absence of formal Stormwater Management Plans in other jurisdictions presents an opportunity to enhance stormwater resilience across the county. By implementing or updating these plans, communities can better manage stormwater runoff, reduce flood risks, and protect water quality, ultimately enhancing local resilience to climate-related impacts.

Transportation Plan

Transportation Plans are strategic documents that guide the development, maintenance, and improvement of a community's transportation infrastructure, including roads, bridges, public transit, pedestrian pathways, and bike lanes. Created by local or regional transportation agencies, these plans are typically based on assessments of current transportation needs, projected population growth, economic development goals, and environmental considerations. A Transportation Plan outlines priorities for new projects, upgrades, and repairs, often spanning a long-term period of 10 to 20 years. By addressing accessibility, safety, and sustainability, these plans aim to create efficient and resilient transportation networks that support community mobility and economic vitality.



In terms of mitigation, Transportation Plans are essential because they enhance community resilience by reducing vulnerabilities in critical infrastructure. For instance, these plans may include strategies for reinforcing bridges, improving road drainage systems to prevent flooding, and designing evacuation routes that can withstand extreme weather. Transportation Plans can also incorporate alternative routes and public transit options, which are vital for emergency response and evacuation during disasters. By addressing potential hazards in infrastructure design and planning, Transportation Plans help communities prepare for and mitigate the impacts of natural and human-made events, ensuring that transportation networks remain safe, functional, and accessible even in times of crisis.

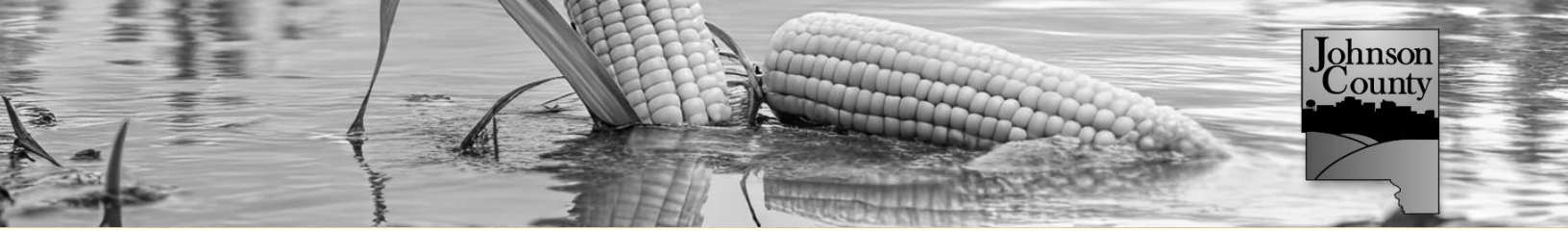
Several jurisdictions in Johnson County, Iowa, have established Transportation Plans. Iowa City has a Transportation Plan developed by the Metropolitan Planning Organization of Johnson County (MPOJC), implemented on May 1, 2022. This plan addresses hazards and discusses ways to minimize their effects, with the latest update in 2022. Coralville's Transportation Plan, also authored by MPOJC, was put in place on May 25, 2022. Known as the "MPOJC Future Forward 2050 Long Range Transportation Plan," it was last updated on July 12, 2023.

The Iowa City Community School District has a Transportation Plan authored by Esme Davis, implemented on August 29, 2019. This plan addresses hazards and is scheduled for its next update in August 2024. Johnson County also has a Transportation Plan, created by the cities within the county and recorded on January 1, 2020. However, it does not specifically mention hazard analysis (Not JHA).

The lack of Transportation Plans in other jurisdictions presents an opportunity to enhance resilience within Johnson County. By developing or updating Transportation Plans, communities can ensure that critical infrastructure is safeguarded against potential hazards, supporting safe, functional, and accessible transportation networks in times of crisis.

Substantial Damage Plan

Substantial Damage Plans are focused strategies developed by communities to assess, manage, and mitigate severe damage to buildings and infrastructure following a disaster. Typically, these plans outline procedures to evaluate the extent of damage, particularly after events like floods, hurricanes, or earthquakes, where structures may be compromised. Under the National Flood Insurance Program (NFIP), "substantial damage" is defined as damage to a building where the repair cost equals or exceeds 50% of its pre-disaster market value. Substantial Damage Plans ensure that communities



can quickly identify and inspect affected properties, determine if they require significant repairs or upgrades, and enforce rebuilding standards that make these properties safer and more resilient to future events.

In the context of mitigation, Substantial Damage Plans are crucial because they prevent repetitive loss and enhance community safety by promoting resilient rebuilding. By enforcing updated building codes and requiring elevation or retrofitting in flood-prone areas, these plans reduce the likelihood of future damage. They also enable communities to qualify for federal and state recovery funds and ensure that rebuilding efforts meet hazard-resistant standards. Through proactive damage assessment and mitigation-focused rebuilding, Substantial Damage Plans help communities break the cycle of damage and repair, ultimately reducing long-term recovery costs and strengthening community resilience against future disasters.

Most jurisdictions in Johnson County, Iowa, do not currently have a Substantial Damage Plan in place. Coralville has a plan, outlined in Chapter 160.02(26) of its City Code, which mandates that any structure with damage restoration costs equal to or exceeding 50% of its pre-damage market value must comply with current floodplain development standards. This code effectively reduces hazards by requiring that flood-prone or repetitive loss properties are either demolished or elevated at least one foot above the base flood elevation. Coralville's plan also incorporates Chapter 160.02(27), which applies similar requirements to substantial improvements.

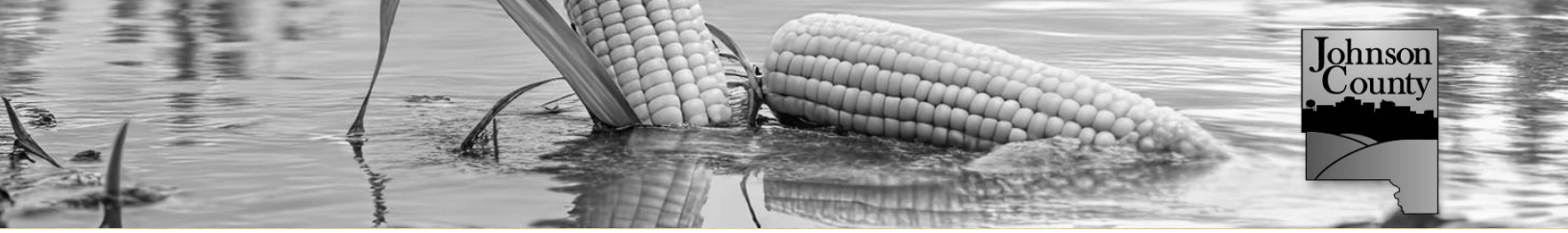
The University of Iowa uses design standards rather than an ordinance for mitigation, which are enforced and aid in reducing hazard impacts. The Iowa City Community School District also has measures in place for substantial damage assessment, ensuring compliance and enforcement.

The absence of Substantial Damage Plans in other jurisdictions highlights an opportunity to enhance community resilience in Johnson County. Developing and enforcing such plans would ensure that rebuilding efforts after disasters meet hazard-resistant standards, ultimately reducing repetitive loss and supporting efficient recovery across the county.

2.9.2 Codes and Ordinances

Acquisition of Flood-Prone Properties

Having a code or ordinance for the acquisition of flood-prone properties is a powerful tool for community mitigation efforts. Such codes allow communities to proactively



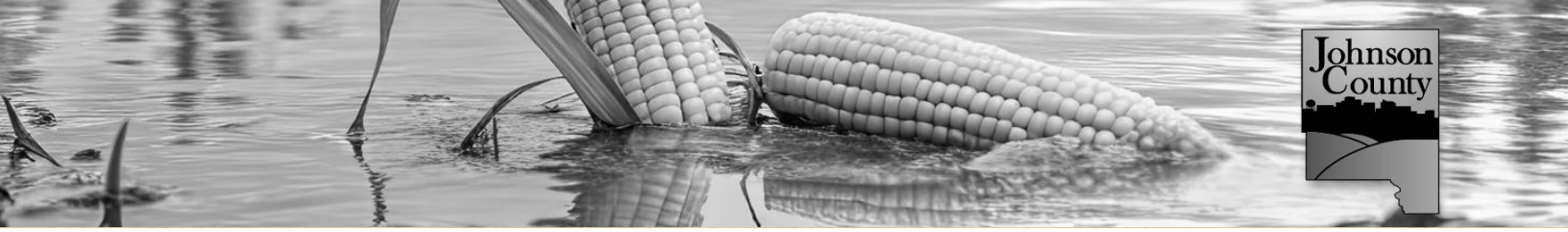
purchase properties located in high-risk flood areas, removing or relocating structures that are vulnerable to frequent flooding. By acquiring and often demolishing these properties, the community reduces the number of homes and businesses at risk of flood damage, thereby lowering potential future losses and minimizing the need for costly emergency response and recovery efforts. These ordinances often allow communities to convert the acquired land into open space, wetlands, or parks, which act as natural buffers that absorb floodwaters, reduce runoff, and improve water quality.

From a mitigation perspective, these codes help break the cycle of repetitive loss, where properties in flood-prone areas are continuously repaired or rebuilt only to be damaged again by future floods. Additionally, having a clear ordinance facilitates eligibility for state and federal funding, such as FEMA's Hazard Mitigation Assistance programs, which provide financial support for flood-prone property acquisitions. By setting up a structured, legal pathway for acquiring and managing flood-prone lands, communities can enhance resilience, protect residents, and create green spaces that further support flood mitigation and environmental sustainability.

Several jurisdictions in Johnson County, Iowa, have ordinances or plans in place to acquire land for open space and public recreation, which indirectly supports flood mitigation by reducing hazard impacts. Iowa City has an ordinance allowing land acquisition for these purposes, which is effectively administered and enforced. Coralville has a similar ordinance, which allows the city to acquire land for greenways, trails, ecological preservation, and park expansion. This ordinance has been particularly effective in mitigating flood risks by converting high-risk areas into open spaces that serve as natural buffers.

Tiffin and Hills also have ordinances in place, both effectively administered and enforced, that support land acquisition for open space, contributing to hazard reduction. The Iowa City Community School District and Oxford have similar provisions. Oxford's subdivision code requires parks and open spaces, which is effectively administered.

The lack of such ordinances in other jurisdictions presents an opportunity for these areas to enhance flood mitigation by adopting similar measures. By establishing ordinances for acquiring flood-prone properties, these jurisdictions can further support flood resilience, reduce repetitive loss, and create green spaces that contribute to environmental sustainability and community safety.



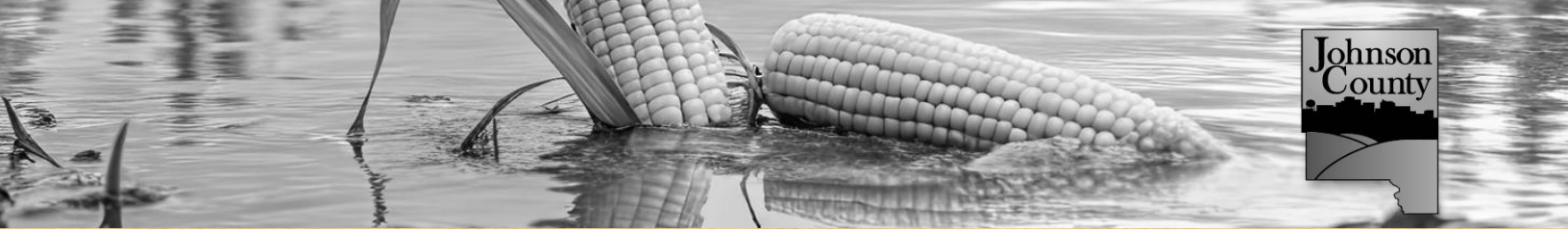
Residential Building Code

A residential building code is essential for community mitigation because it sets minimum standards for construction that ensure homes are built to withstand local hazards, such as high winds, earthquakes, floods, or wildfires. By implementing and administering building codes, communities reduce the vulnerability of residential structures to damage from disasters, which helps protect lives, reduces property losses, and lowers recovery costs after an event. Building codes typically include requirements for structural strength, fire resistance, moisture protection, and energy efficiency, all of which contribute to safer, more resilient homes.

For instance, in flood-prone areas, building codes may require homes to be elevated above flood levels, while in regions susceptible to high winds, they may mandate reinforced roofing and secure window installations. These standards ensure that residential buildings are better equipped to handle extreme conditions, preventing damage that could otherwise lead to costly repairs or reconstruction. Residential building codes also allow communities to qualify for better insurance ratings, which can lead to reduced insurance premiums for homeowners. Ultimately, by implementing and administering residential building codes, communities can build a safer housing stock that contributes to long-term resilience and sustainability.

In Johnson County, Iowa, residential and commercial building codes are enforced to ensure compliance with safety standards. The county also administers zoning code enforcement but only for unincorporated areas. Johnson County is contracted to perform building inspections for Swisher, Oxford, Shueyville, and Lone Tree. While the county administers building codes in these cities, it does not "enforce" them in the traditional sense, as cities retain the discretion to approve non-code-compliant buildings. Johnson County does not currently enforce zoning codes for any city. This distinction reflects a unique approach to administering building codes while respecting the autonomy of individual municipalities.

Most jurisdictions in Johnson County have adopted and effectively administer residential building codes, contributing to hazard mitigation. North Liberty enforces a residential building code, and Iowa City adopts the International Building Code, administered and enforced effectively. Coralville follows the 2021 International Residential Code (IRC), which includes hazard-resistant provisions for flood and wind risks. Coralville's code is enforced by the Community Development Department, which has dedicated staff for plan reviews and inspections.

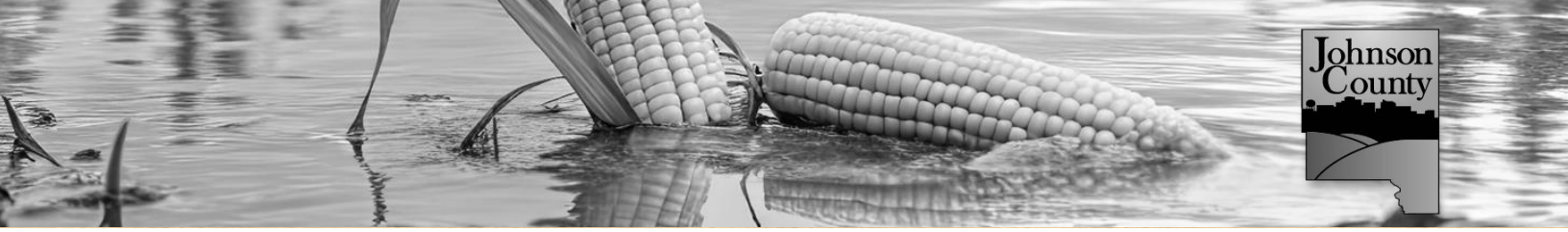


Tiffin, Solon, Hills, and University Heights have effective residential building codes that are actively enforced. University Heights, in particular, emphasizes the code as a significant measure for hazard mitigation. Swisher, Lone Tree, and Shueyville align with Johnson County's building inspection and code administration. Oxford enforces the International Residential Code through a 28E agreement with the Johnson County Building Inspection Division.

The University of Iowa Community School District does not have building codes.

The presence of residential building codes across most jurisdictions in Johnson County strengthens the county's overall resilience to hazards by ensuring that homes are built to withstand local risks. These building standards enhance community safety, reduce potential property losses, and support long-term sustainability. Johnson County's role in administering building codes and inspections, while allowing cities flexibility, further supports the region's commitment to resilience and safety.
The following is a summary of adopted building codes for the planning area as provided by the National Building Code Adoption Tracking Portal:

Jurisdiction	Adopted Building Code
Johnson County	2021 IBC/IRC
Coralville	2021 IBC/IRC
Hills	2015 IBC/IRC
Iowa City	2021 IBC/IRC
Lone Tree	2021 IBC/IRC
North Liberty	2021 IBC/IRC
Oxford	2021 IBC/IRC
Shueyville	2021 IBC/IRC
Solon	2015 IBC/IRC
Swisher	2021 IBC/IRC
Tiffin	2018 IBC/IRC
University Heights	2015 IBC/IRC
Clear Creek Amana CSD	None
Iowa City CSD	None
Lone Tree CSD	None
Solon CSD	None
University of Iowa	None



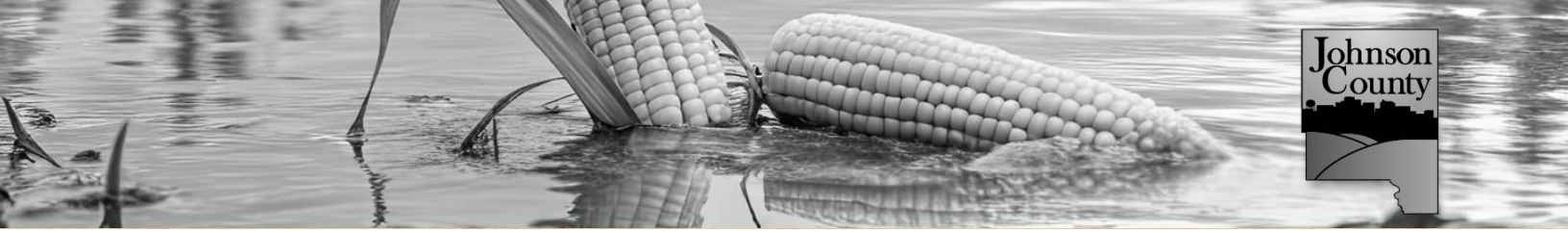
Commercial Building Code

A commercial building code is a critical tool for community mitigation because it establishes minimum safety and resilience standards for non-residential structures, such as offices, retail spaces, warehouses, and industrial facilities. These codes ensure that commercial buildings are designed and constructed to endure local hazards, including earthquakes, hurricanes, floods, and fires. By mandating specific structural, electrical, plumbing, and fire safety requirements, commercial building codes help protect occupants, reduce property damage, and maintain business continuity during and after a disaster.

In high-wind areas, for example, commercial building codes may require reinforced walls and roofs to prevent collapse, while in earthquake-prone regions, they may necessitate structural features to withstand seismic activity. For flood-prone areas, codes often require the elevation of buildings or the use of flood-resistant materials. Adhering to these codes ensures that businesses and essential facilities, such as hospitals and schools, are better equipped to remain functional or recover quickly following an emergency, reducing economic disruption in the community. Commercial building codes also lower insurance risks, which can lead to more affordable premiums for businesses. Overall, commercial building codes are integral to a community's resilience, as they safeguard economic stability, protect lives, and support faster recovery, ultimately contributing to a stronger and more disaster-resilient community.

In Johnson County, Iowa, commercial building codes are administered and enforced by the county to ensure compliance in unincorporated areas. The county also conducts building inspections for Swisher, Oxford, Shueyville, and Lone Tree through contractual agreements. While Johnson County administers commercial building codes for these cities, it does not "enforce" them in the traditional sense, as cities retain discretion to allow non-code-compliant structures. This administrative role reflects Johnson County's effort to support smaller jurisdictions in managing code compliance effectively. The county does not, however, perform zoning code enforcement for any city.

Most jurisdictions in Johnson County have adopted commercial building codes, which are effectively administered and enforced, contributing to community resilience. North Liberty enforces a commercial building code, while Iowa City has adopted the International Building Code (IBC) and administers it effectively. Coralville has also adopted the 2021 IBC, which includes hazard-resistant provisions for flood, wind, and other risks. Coralville's code is enforced by the Community Development Department, with full-time staff dedicated to plan review and building inspections.



Tiffin, Solon, Hills, and University Heights all have effective commercial building codes that are enforced, with University Heights noting that the code significantly reduces hazard impacts. Swisher, Lone Tree, and Oxford rely on Johnson County for building inspections and code administration, with Oxford enforcing the IBC through a 28E agreement with Johnson County's Building Inspection Division.

The University of Iowa, the Iowa City Community School District, and Shueyville do not have an adopted commercial building code, and Clear Creek Amana Community School District also lacks a building code.

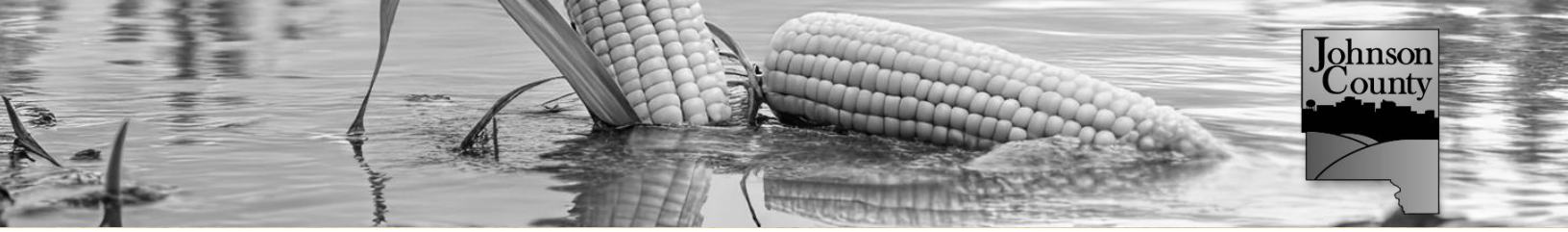
The widespread adoption of commercial building codes across most jurisdictions in Johnson County enhances the county's resilience to hazards by ensuring that commercial structures are built to withstand local risks. This adherence to building standards protects lives, supports economic stability, and facilitates quicker recovery in the event of disasters. Johnson County's dual role in administering codes and inspections while respecting city autonomy strengthens the region's commitment to safety and resilience.

Use of Flood Insurance Maps

Flood insurance maps, often created and maintained by agencies like FEMA, are essential to a community's mitigation strategy because they provide accurate, up-to-date information about flood risks across different areas. These maps identify high-risk flood zones, moderate-to-low risk areas, and special flood hazard areas, helping communities understand where flooding is most likely to occur. By using flood insurance maps, local planners, developers, and homeowners can make informed decisions that reduce the vulnerability of structures and infrastructure to flood damage.

For communities, flood maps play a key role in guiding land-use planning and zoning. They help ensure that high-risk areas are preserved for open space, parks, or natural flood buffers, while critical facilities, such as hospitals, schools, and emergency response centers, are kept outside of flood-prone zones whenever possible. Additionally, building codes and elevation requirements are often based on flood map data, ensuring that new construction and major renovations in flood zones are designed to minimize flood risks.

Flood insurance maps also inform flood insurance requirements, ensuring that property owners in high-risk areas carry appropriate coverage to help manage recovery costs after a flood. By leveraging flood insurance maps in planning and development, communities can reduce potential flood damage, lower long-term recovery costs, and create a more resilient and prepared environment for residents and businesses alike.



A few jurisdictions in Johnson County, Iowa, have documented processes for using flood insurance rate maps, which are essential tools for understanding and mitigating flood risks. Coralville has a documented process that utilizes both paper and GIS maps accessible to city staff and the public. Floodplain management data is available at a county-wide level and online through resources like the Iowa Flood Center, FEMA, and the Department of Natural Resources. Coralville's process, outlined in Chapter 160 of the City Code, provides guidelines for permits and applications for development in the floodplain and is enforced by the Community Development Director, who also serves as the city's floodplain coordinator and participates in annual floodplain management training.

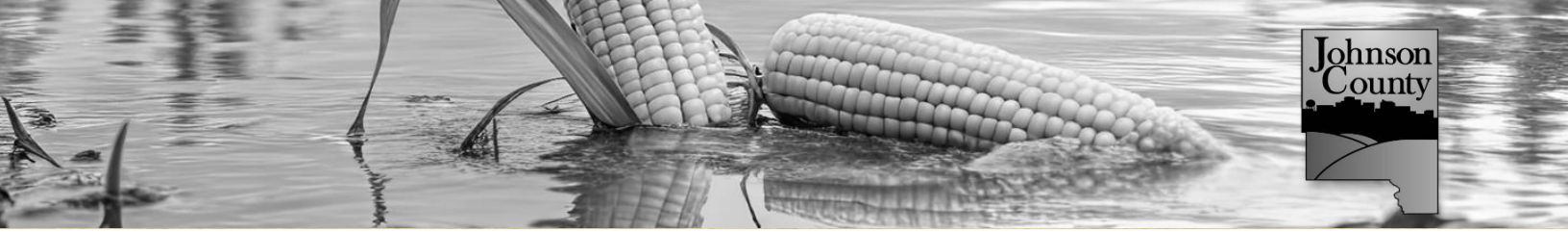
Swisher also has a process in place for using flood insurance maps, which is effective in reducing hazard impacts and is adequately administered and enforced. The Iowa City Community School District and Johnson County are documented as having processes for using flood insurance maps, although specific details on the administration were not provided.

The absence of such processes in other jurisdictions highlights an opportunity to strengthen flood resilience across Johnson County. Adopting and enforcing a standardized approach for utilizing flood insurance rate maps would help these communities make informed land-use and development decisions, ultimately reducing flood risk and enhancing preparedness.

Floodplain Ordinance

A floodplain ordinance is a vital tool for community mitigation as it establishes regulations for development within flood-prone areas, helping to reduce the risk of flood damage and protect public safety. These ordinances typically restrict or regulate construction, renovation, and land-use practices in designated floodplains, requiring measures such as elevated building foundations, flood-resistant materials, and setbacks from waterways. By enforcing these standards, communities can prevent or minimize the impact of flooding on homes, businesses, and critical infrastructure, reducing potential property losses and protecting lives.

Floodplain ordinances also support sustainable land-use practices by discouraging dense development in high-risk areas and promoting the preservation of natural flood buffers, like wetlands and open spaces, which absorb excess water and help manage flood levels. Additionally, having a floodplain ordinance enables communities to participate in the National Flood Insurance Program (NFIP), making flood insurance more



accessible and affordable for residents and providing access to federal disaster assistance. Ultimately, floodplain ordinances are an essential part of a comprehensive mitigation strategy, helping communities manage growth responsibly, protect residents, and build resilience against future flood events.

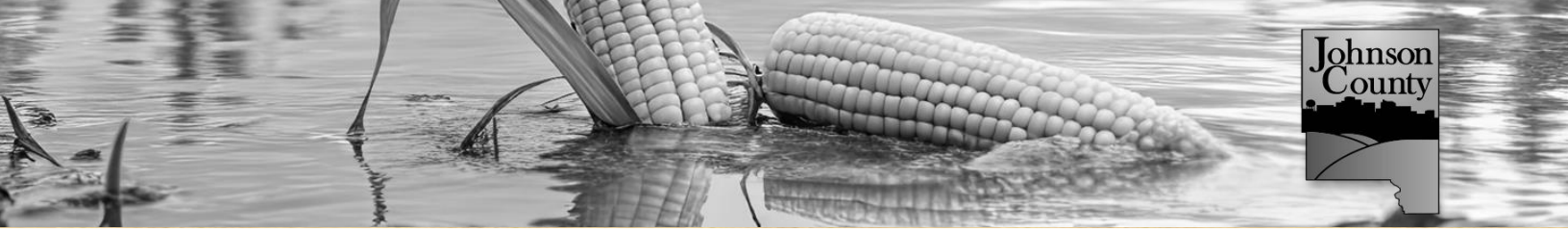
Johnson County has strong floodplain development regulations and actively enforces them, ensuring that construction and development within flood-prone areas adhere to strict standards. These regulations are key to minimizing flood-related risks, protecting both property and public safety. Johnson County's enforcement efforts contribute significantly to the overall flood resilience of the region by coordinating closely with state and federal agencies, such as the Iowa Department of Natural Resources (DNR) and the NFIP.

Most jurisdictions in Johnson County, Iowa, have floodplain ordinances in place, which are effectively administered and enforced to reduce flood risk and support community resilience. North Liberty and Iowa City both have effective floodplain ordinances, with Iowa City being one of the first in the state to adopt the 500-year flood as the base elevation, a proactive measure for flood mitigation. Coralville's ordinance, detailed in Chapter 160 of the City Code, includes requirements for development permits and elevation certificates. This ordinance is reviewed regularly in conjunction with the Iowa DNR and is enforced by the Community Development Director, who also coordinates floodplain management and participates in annual training.

Tiffin, Solon, Shueyville, and Oxford also enforce floodplain ordinances, with Shueyville recently updating its ordinance to align with Iowa DNR and NFIP standards. Johnson County provides strong floodplain management support, including education and enforcement, further enhancing the region's capacity to mitigate flood hazards. The Iowa City Community School District also confirms having effective floodplain management practices.

Some jurisdictions, such as Lone Tree and Hills, do not have a floodplain ordinance, while others, including the University of Iowa and University Heights, do not participate directly due to their unique status or focus areas.

The widespread use of floodplain ordinances among Johnson County jurisdictions, combined with Johnson County's robust floodplain regulations and enforcement, helps manage development in flood-prone areas, reducing hazard impacts and supporting sustainable growth. However, the absence of such ordinances in a few jurisdictions presents an opportunity to further strengthen flood mitigation efforts across the county.



Hazard-Specific Ordinance(s)

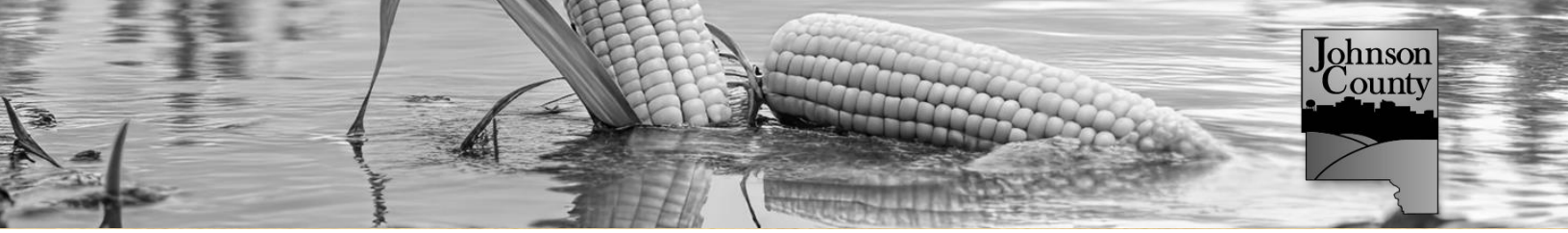
Hazard-specific ordinances are targeted regulations designed to address specific local hazards, such as earthquakes, wildfires, hurricanes, or landslides. These ordinances are an essential component of a community's mitigation strategy, setting guidelines for building design, land use, and safety practices tailored to the unique risks posed by each hazard. For example, a wildfire ordinance might require defensible space around homes and the use of fire-resistant materials, while an earthquake ordinance could mandate structural reinforcements to improve building stability during seismic events.

By implementing hazard-specific ordinances, communities can reduce vulnerability, protect lives, and minimize property damage. These ordinances empower local governments to regulate building codes, zoning, and infrastructure development in high-risk areas, helping to prevent construction practices that could exacerbate disaster impacts. They also promote responsible growth by guiding development away from hazard-prone locations, preserving natural buffers, and requiring mitigation measures for new and existing structures. Additionally, these ordinances can enhance eligibility for federal and state funding for disaster preparedness and resilience projects. Overall, hazard-specific ordinances provide a proactive approach to building resilience, protecting public safety, and reducing long-term recovery costs by addressing risks before disasters occur.

In Johnson County, Iowa, hazard-specific ordinances vary among jurisdictions, with some communities implementing targeted regulations to mitigate local hazards. Both Johnson County and Iowa City have adopted and enforce a Sensitive Areas Ordinance, which is a critical tool for protecting environmentally vulnerable areas, such as steep slopes, floodplains, and woodlands. This ordinance helps reduce hazard impacts by restricting development in sensitive areas, preserving natural buffers, and maintaining the ecological integrity of high-risk zones.

Solon has a stormwater ordinance that contributes to flood mitigation efforts by regulating stormwater management within its jurisdiction. The Iowa City Community School District also adheres to hazard-specific regulations that effectively reduce risks through compliance and enforcement measures.

Other jurisdictions, including North Liberty, Coralville, Tiffin, Swisher, Lone Tree, Shueyville, Hills, Oxford, and the Clear Creek Amana Community School District, currently lack hazard-specific ordinances. The University of Iowa and University Heights also do not have ordinances addressing specific natural hazards, reflecting their unique institutional roles and priorities.



The presence of a Sensitive Areas Ordinance in Johnson County and Iowa City demonstrates a strong commitment to hazard mitigation and sustainable land-use practices. However, the absence of hazard-specific ordinances in many other jurisdictions highlights an opportunity to strengthen resilience across the county. By adopting targeted regulations to address risks such as flooding, severe weather, or other local hazards, these communities can further reduce vulnerability and promote safer, more sustainable growth.

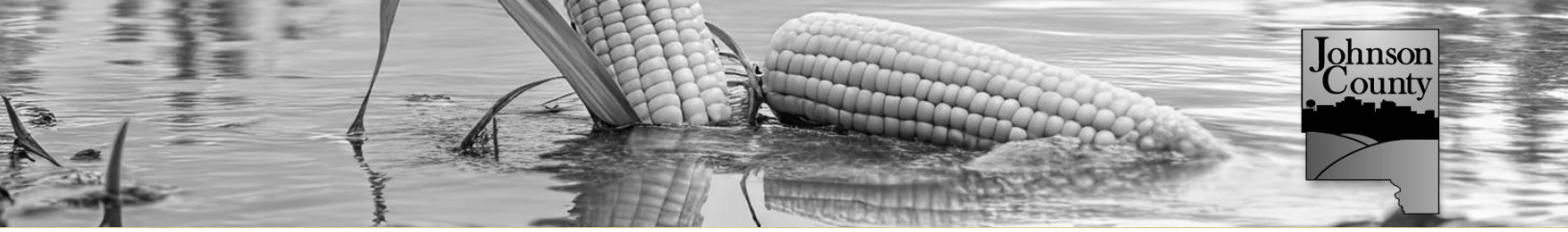
Subdivision Ordinance

A subdivision ordinance is a regulation that governs how land can be divided into lots for development, establishing standards for infrastructure, roadways, drainage, utilities, and public spaces within new developments. This ordinance is crucial for community mitigation as it ensures subdivisions are planned and built with hazard resilience in mind, reducing the risk of future property damage and enhancing public safety. Subdivision ordinances typically include requirements for grading and drainage to manage stormwater, restrictions on building in flood-prone or erosion-sensitive areas, and specifications for road width and access to facilitate emergency response and evacuation.

By enforcing a subdivision ordinance, communities can guide growth responsibly, preventing new developments from increasing hazard exposure. For example, such ordinances may require developers to include flood mitigation measures, such as retention basins, or designate open spaces in areas vulnerable to natural hazards to act as protective buffers. Subdivision ordinances also promote consistent infrastructure standards, ensuring that new developments have resilient roads, utilities, and drainage systems that reduce vulnerability to disasters.

Johnson County has a Subdivision Ordinance that plays a key role in guiding responsible development while ensuring compliance with infrastructure and land-use standards. The ordinance supports hazard resilience by incorporating provisions for grading, drainage, and stormwater management, helping to minimize risks from flooding and erosion. Johnson County administers and enforces its ordinance effectively, contributing to the county's overall hazard mitigation efforts.

Across the county, multiple jurisdictions have subdivision ordinances in place, each providing varying levels of hazard mitigation. North Liberty enforces a subdivision ordinance that effectively manages growth while reducing hazard impacts. Iowa City’s subdivision ordinance is particularly robust, as it integrates provisions from the Sensitive



Areas Ordinance, protecting vulnerable environments and ensuring developments adhere to resilient practices. Coralville's subdivision ordinance, detailed in Chapter 170 of the City Code, requires construction plans for public improvements—such as storm sewers, water mains, sanitary sewers, stormwater management, and grading plans—to be reviewed and approved by the city. The ordinance is administered by the Community Development and Engineering Departments, ensuring effective stormwater management and flood mitigation.

Tiffin, Solon, Shueyville, and Hills report effective subdivision ordinances that are well administered and enforced, supporting hazard resilience across these areas. Swisher also enforces its subdivision ordinance adequately, though it is not explicitly focused on hazard mitigation. University Heights applies its subdivision ordinance effectively, reducing hazard impacts and supporting sustainable development. Oxford's subdivision ordinance is administered through agreements with Johnson County, ensuring compliance and promoting hazard resilience through coordinated enforcement.

Clear Creek Amana Community School District does not have a subdivision ordinance, which presents an opportunity for the development of land-use regulations to support hazard mitigation in school district planning.

This comprehensive overview of Johnson County's subdivision ordinances underscores the importance of consistent land development standards in mitigating hazards. The inclusion of measures for flood and stormwater management within these ordinances strengthens community resilience and provides a foundation for safer, more sustainable growth across the county.

Zoning Ordinance

A zoning ordinance is a regulation that divides a community into zones or districts, specifying the types of land uses permitted in each area, such as residential, commercial, industrial, and recreational. This ordinance is fundamental for community mitigation as it guides development in ways that minimize exposure to hazards and promote safer, more resilient growth. Zoning ordinances can restrict high-density or critical infrastructure development in hazard-prone areas—such as floodplains, steep slopes, or wildfire-prone zones—and instead encourage these activities in safer locations. By directing land use, zoning ordinances help prevent placing homes, businesses, and essential services in areas vulnerable to natural hazards.

For mitigation purposes, zoning ordinances often include overlay zones with additional regulations for specific hazards, such as requiring elevated construction in flood-prone

areas or limiting vegetation near structures in wildfire-prone zones. These targeted regulations enhance public safety and reduce the potential for property damage. Additionally, zoning ordinances may require open space in hazard-prone areas, preserving natural buffers that manage floodwaters or reduce wildfire spread.

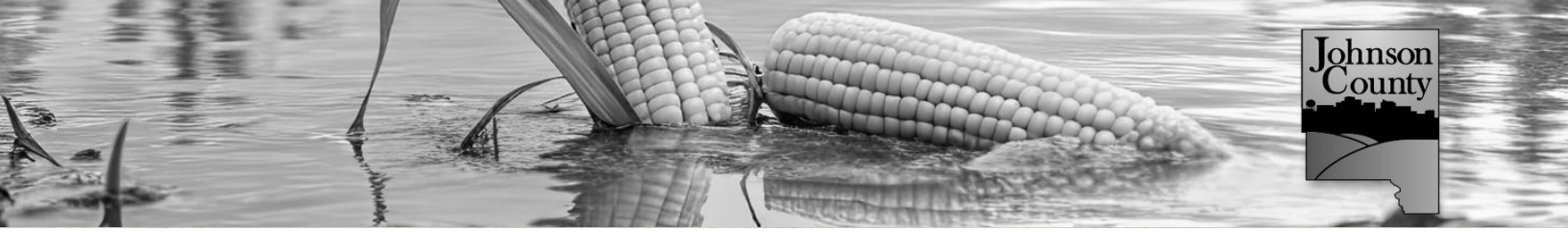
Zoning ordinances support sustainable growth and resilience by aligning development with hazard mitigation goals. They help communities proactively address risks, protect residents and infrastructure, and create safer, more adaptable environments. Overall, zoning ordinances play a critical role in hazard mitigation by shaping land use in ways that reduce vulnerability, enhance preparedness, and support long-term community resilience.

Johnson County has a robust zoning ordinance that is effectively administered and plays a significant role in guiding safe and sustainable development. The ordinance incorporates provisions to protect flood-prone and environmentally sensitive areas, supporting hazard mitigation efforts. However, Johnson County does not perform code enforcement for Lone Tree, as each city manages its own zoning enforcement unless explicitly contracted otherwise.

Several jurisdictions within Johnson County have zoning ordinances tailored to their specific needs. North Liberty enforces its zoning ordinance effectively, with potential to reduce hazard impacts. Iowa City also has a well-administered zoning ordinance that includes provisions to address hazard mitigation and support resilient growth.

Coralville's zoning ordinance, outlined in Chapter 165 of the Coralville Code of Ordinances, is particularly effective for flood hazard mitigation. The ordinance requires development site plans in floodplain areas to delineate floodplain boundaries and include detailed elevation and grade information for review. It also mandates compliance with zoning and floodplain development standards when property improvements or damages exceed 50% of the property's value or floor area. This ordinance is implemented by the Community Development Director, ensuring consistent application.

Tiffin and Solon both have effective zoning ordinances that support hazard mitigation and are consistently enforced. Swisher has a zoning ordinance that contributes to hazard resilience but may benefit from additional hazard-specific provisions. University Heights enforces its zoning ordinance effectively, which has been noted as a key measure for reducing hazard impacts.



Shueyville and Hills also have zoning ordinances in place, both of which are well-administered and contribute to hazard mitigation. Oxford's zoning ordinance is administered through agreements with Johnson County, ensuring compliance and hazard impact reduction through coordinated enforcement.

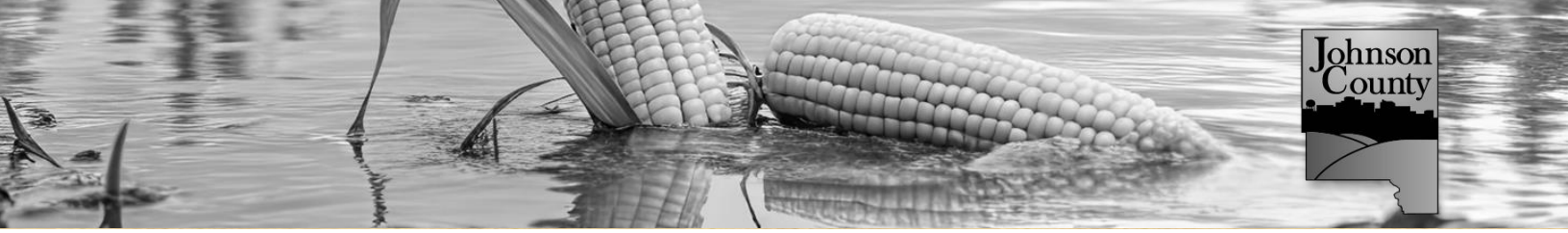
The Clear Creek Amana Community School District does not have a zoning ordinance in place, highlighting an opportunity to incorporate zoning guidance into land-use planning for school district properties.

This comprehensive overview of zoning ordinances in Johnson County highlights their critical role in guiding safe development and reducing hazard risks. Johnson County's strong zoning ordinance, combined with consistent enforcement across most jurisdictions, ensures that land-use practices align with hazard mitigation goals, enhancing resilience and promoting sustainable growth across the region.

2.9.3 Expansion and Improvement of Plans, Codes, and Ordinances

The assessment reveals that several jurisdictions and school districts in Johnson County, Iowa, have identified areas for expanding and improving local plans, codes, and ordinances to enhance risk management. North Liberty and Iowa City emphasize the importance of keeping plans current, while Coralville is actively updating its stormwater management and emergency operations plans, expecting these revisions to further reduce risk. Coralville also notes the need to correct adoption dates within its land use and community plans due to limitations in the current data entry program. Tiffin highlights a need for additional staffing to support the planning process, and Swisher identifies training as a priority for capability improvement. The University of Iowa focuses on continual evaluation and partnerships with experts to meet or exceed industry standards, while Solon points to the importance of regularly reviewing policies and ordinances to minimize hazards and ensure continuity as the city grows. Shueyville echoes this sentiment, endorsing periodic reviews to identify potential improvements.

Other jurisdictions expressed their needs in varied ways. Hills suggests possible improvements but is tentative in specifics, while University Heights indicates no immediate need for changes but is open to future adjustments if necessary to reduce risks. The Iowa City Community School District identifies collaboration with community partners and additional funding as essential for enhancing its capabilities. Oxford reflects the challenges faced by small towns where limited development means codes and ordinances are rarely reviewed unless triggered by new projects. Oxford suggests establishing a regular review schedule, though the town acknowledges constraints due to limited time, funds, and volunteer availability for council and board roles. Clear Creek



Amana Community School District defers to the county for guidance, indicating a reliance on broader county-level support for regulatory updates and risk reduction. This assessment underscores a shared county-wide interest in continuous evaluation and resource allocation to improve risk management frameworks, adapted to each jurisdiction's unique capabilities and constraints.

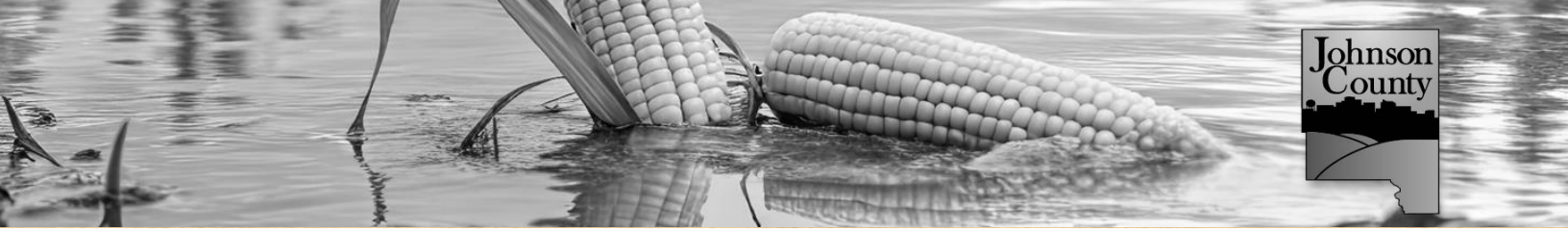
2.9.4 Key Staff

The assessment of key staffing roles in Johnson County, Iowa, reveals that the county is well-positioned for hazard mitigation and resilience efforts, as it has all the key staff roles found in the major cities. This consistency ensures a strong foundation for implementing and coordinating mitigation strategies across jurisdictions.

Chief Building Officials, who are essential for enforcing building codes and reducing structural vulnerabilities, are present in Johnson County as well as in major cities such as North Liberty, Iowa City, and Coralville. Johnson County's Chief Building Official ensures compliance with resilience standards, much like Coralville's Community Development Department, which emphasizes effective coordination and enforcement. North Liberty and Iowa City report adequate staffing and training for hazard mitigation, while Tiffin has noted a lack of clarity on hazard training. In Swisher, the Mayor serves as the Zoning Administrator without formal hazard training, indicating potential gaps in specialized enforcement.

Civil Engineers, vital for designing and maintaining resilient infrastructure, are also a part of Johnson County's staffing, ensuring the county can manage infrastructure resilience effectively. Cities such as Iowa City and Coralville report sufficient civil engineering staff, with Coralville emphasizing training on hazard mitigation. While North Liberty lacks a dedicated Civil Engineer, Johnson County's engineering staff can provide additional support to address infrastructure resilience across the region. Tiffin and Swisher affirm adequate civil engineering capabilities, enhancing infrastructure resilience in their jurisdictions.

Community Planners, crucial for managing sustainable growth and hazard mitigation, are staffed within Johnson County, complementing the roles in North Liberty, Iowa City, and Coralville. Johnson County's planning efforts align closely with those in Coralville, where the Community Development Director also oversees floodplain regulations, enhancing integrated planning. Tiffin and Swisher, however, lack dedicated community planners, which may limit their capacity for coordinated hazard mitigation.



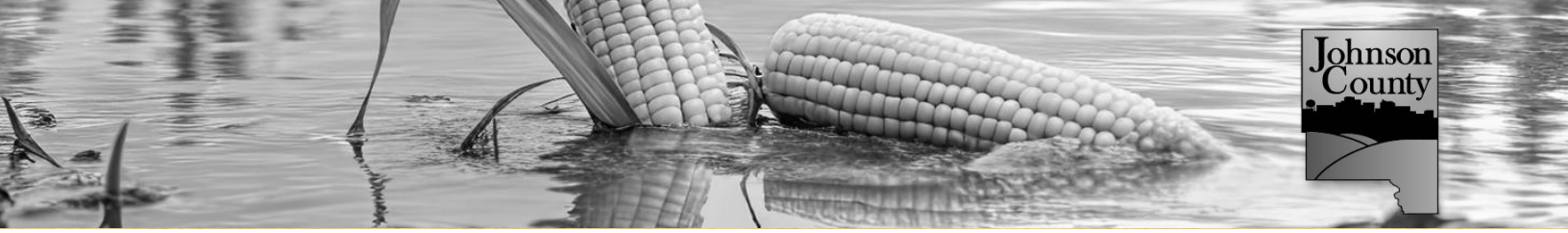
Emergency Managers are present in Johnson County, addressing a critical gap that many smaller jurisdictions experience. While most cities lack dedicated emergency management staff, Johnson County's Emergency Management Program provides comprehensive support for disaster preparedness, mitigation, and response. This ensures a cohesive approach to emergency management across the county.

In Johnson County, floodplain administrators are responsible for enforcing floodplain regulations established by the National Flood Insurance Program (NFIP), the Iowa Department of Natural Resources (DNR), and local ordinances. Iowa City, Coralville, and Unincorporated Johnson County each employ designated floodplain administrators who utilize DNR-issued floodplain maps to evaluate development proposals and ensure new construction meets elevation requirements—typically requiring structures within Special Flood Hazard Areas (SFHAs) to be built at least one foot above the Base Flood Elevation (BFE). Permit applications in these jurisdictions are reviewed during the building permit process to verify compliance with floodplain regulations. In municipalities without a formally trained floodplain administrator, such as Tiffin, applicants may choose to go through the Johnson County floodplain administrator or submit their plans directly to the Iowa DNR for review. This decentralized yet coordinated approach allows for localized management of floodplain development while supporting adherence to state and federal standards.

Jurisdiction	Floodplain Administrator
Johnson County	Yes
Coralville	Yes
Hills	No
Iowa City	Yes
North Liberty	Yes
Oxford	No
Shueyville	No
Solon	No
Swisher	No
Tiffin	No
University Heights	No

Note: Those with no designated floodplain administrator rely on assistance from Johnson County or the Iowa DNR.

GIS Coordinators, critical for hazard mapping and spatial analysis, are part of Johnson County's staffing resources, enhancing the county's ability to perform hazard assessments and resource allocation. Iowa City and Coralville also maintain GIS expertise, with Coralville employing a dedicated GIS Specialist. While Tiffin uses contracted GIS services without clarity on hazard training, and North Liberty and Swisher



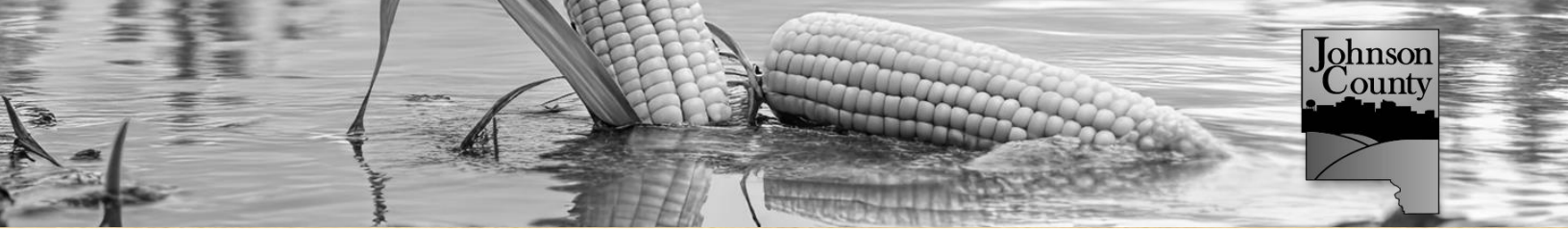
lack GIS Coordinators, Johnson County's GIS capabilities can fill these gaps and strengthen countywide hazard response.

Overall, Johnson County's robust staffing structure, mirroring that of major cities, ensures the expertise needed to enforce regulations, plan for resilience, and manage hazards effectively. The county's comprehensive approach to staffing enables it to provide critical support to smaller jurisdictions, fostering coordinated hazard mitigation and resilience efforts across the region.

2.9.5 Commissions

Based on the updated assessment of Johnson County, Iowa, several jurisdictions have established planning commissions or similar bodies to manage planning and zoning activities, though the structure and effectiveness vary across the county. North Liberty operates with a volunteer-based Planning Commission, indicating community engagement but potentially limited capacity for consistent enforcement. Iowa City and Coralville have well-established Planning Commissions. Coralville's commission is appointed by the City Council and supported by the Community Development Director, with specialized training in stormwater and floodplain issues. This commission actively participates in hazard mitigation planning and collaborates with local and county officials, reflecting a strong alignment with resilience efforts. Tiffin and Swisher also have Planning Commissions in place, though Tiffin reports inadequate staffing for enforcement, while Swisher confirms adequate staffing and effective interagency coordination but lacks hazard-specific training.

In other areas, the University of Iowa, Solon, and University Heights have effective planning bodies. The University Heights Planning and Zoning Commission is assisted by city staff trained in hazards and mitigation, ensuring effective coordination and enforcement. Solon's Planning and Zoning Commission is led by the City Administrator, suggesting a streamlined approach. Shueyville's Planning Commission is adequately staffed but lacks specific training on hazards and mitigation. Johnson County itself maintains a well-staffed Planning Commission with effective enforcement and coordination capabilities, while Oxford also reports an effective commission. However, other jurisdictions, such as Lone Tree, Hills, and Clear Creek Amana Community School District, do not have dedicated planning bodies, highlighting an opportunity to develop or enhance local planning functions to better support zoning, hazard mitigation, and resilience initiatives across the county.



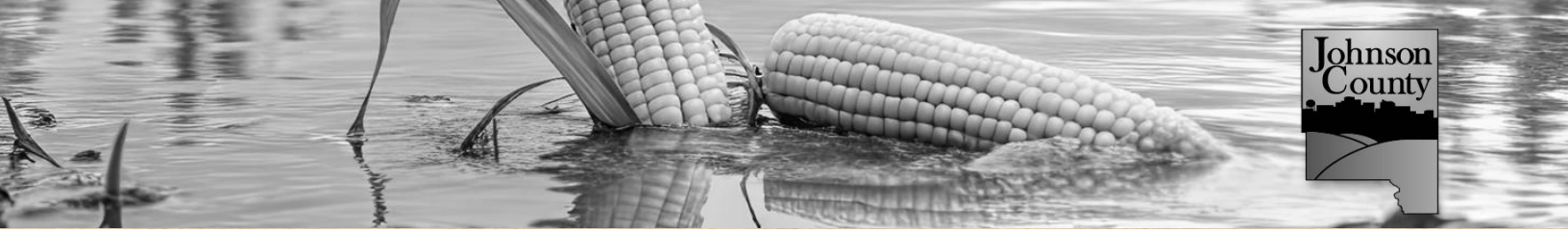
2.9.6 Data

The updated assessment of Johnson County, Iowa, highlights a range of capabilities and access to hazard data and GIS analysis across jurisdictions, impacting local efforts in risk assessment and mitigation planning. North Liberty and Iowa City both have hazard data readily available and have utilized it in the past for risk mitigation. Coralville has extensive hazard mitigation data accessible through GIS, along with specific resources such as floodplain information and data from the Johnson County Multi-Jurisdictional Hazard Mitigation Plan, which identifies regional and community-specific risks and strategies for mitigation. Coralville maintains GIS data for various attributes, including waterways, topography, aerial imagery, and special flood hazard areas, enabling comprehensive planning and risk mitigation. Tiffin and Swisher, however, lack both hazard data and GIS analysis resources, which limits their capacity for proactive risk assessment and management.

Several jurisdictions, including the University of Iowa, Solon, and Johnson County, actively use GIS analysis for spatial planning, hazard mapping, and risk assessment. This tool aids in understanding hazard exposure, resource allocation, and informed community planning. On the other hand, jurisdictions such as Lone Tree, Shueyville, and Hills do not utilize GIS analysis data, and their access to hazard data remains limited. The Iowa City Community School District has hazard data available but does not engage in GIS analysis, while Oxford assumes the fire department has access to some hazard data but does not confirm direct use of GIS capabilities. Expanding access to both hazard data and GIS tools across all jurisdictions in Johnson County would allow for a more evidence-based approach to risk management, enabling effective prioritization of resources and potentially strengthening applications for state and federal funding for resilience projects. This expansion would ultimately enhance community resilience and preparedness countywide.

2.9.7 Agreements

The updated assessment of Johnson County, Iowa, reveals that mutual aid agreements are actively used by many jurisdictions, providing essential support during emergencies and enabling effective resource-sharing and collaboration. North Liberty, Iowa City, Coralville, Tiffin, and Swisher all utilize mutual aid agreements, with records indicating that these capabilities have been leveraged successfully in past risk mitigation efforts. The University of Iowa also participates in mutual aid, although it did not provide specifics on its application for risk mitigation. Lone Tree confirmed the existence of mutual aid agreements, but they have not been used for mitigation efforts as far as local officials are aware. Solon reported active use of these agreements, while Shueyville



participates in mutual aid but has not yet utilized it for risk mitigation. Hills confirmed its involvement in mutual aid but is uncertain about its past use for assessing or mitigating risks.

University Heights noted that while it currently does not engage mutual aid for mitigation, it would participate if needed. The Iowa City Community School District and Clear Creek Amana Community School District did not report details on mutual aid. Johnson County and Oxford both confirmed that mutual aid agreements are in place and have been used effectively in the past to address and mitigate risks. These agreements are crucial for strengthening emergency management capabilities across the county, as they enable jurisdictions to collaborate and access external resources during large-scale incidents. Expanding mutual aid to include additional jurisdictions or formalizing agreements further could enhance Johnson County's overall resilience, ensuring that each community has robust support and resources to mitigate risks and respond effectively to emergencies.

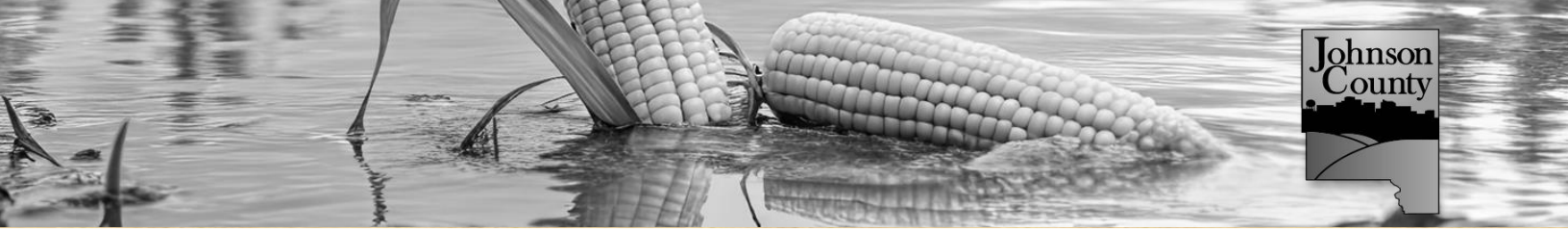
2.9.8 Expansion and Improvement of Staff, Commissions, Data, and Agreements

The assessment highlights varied perspectives across jurisdictions in Johnson County, Iowa, on how to improve local capabilities related to staffing, commissions, data, and mutual aid agreements to reduce risk.

The City of North Liberty is currently uncertain about specific improvements to enhance risk reduction. Iowa City emphasizes maintaining appropriate staff credentials and education to strengthen capabilities. Coralville is open to considering additional mutual aid agreements as appropriate and available. The City of Tiffin suggests that increased coordination between local entities would improve their risk management, while Swisher simply indicates a readiness to enhance capabilities.

The University of Iowa proposes continual evaluation and building upon capabilities through partnerships and ongoing evaluations. Solon highlights the importance of shared resources and communication with local and county agencies. Shueyville indicates a need for further information to determine the necessary level of capability expansion, while Hills expresses tentative interest in improvements.

University Heights is unsure of specific steps to expand capabilities but remains open to seeking assistance from local and state agencies to reduce risk. The Iowa City Community School District points to funding and collaboration with community partners as key areas for improvement. Johnson County identifies a need for better organization and understanding of existing mutual aid agreements, and the City of Oxford



underscores financial support as a priority for capability enhancement. Clear Creek Amana Community School District remains uncertain about specific improvements.

Overall, the findings reveal a collective awareness in Johnson County of areas needing growth, whether through additional staffing, enhanced funding, formalized commissions or committees, improved access to data, or stronger mutual aid agreements. Strengthening these aspects across Johnson County could bolster the region's risk mitigation and response capabilities, fostering a more resilient community.

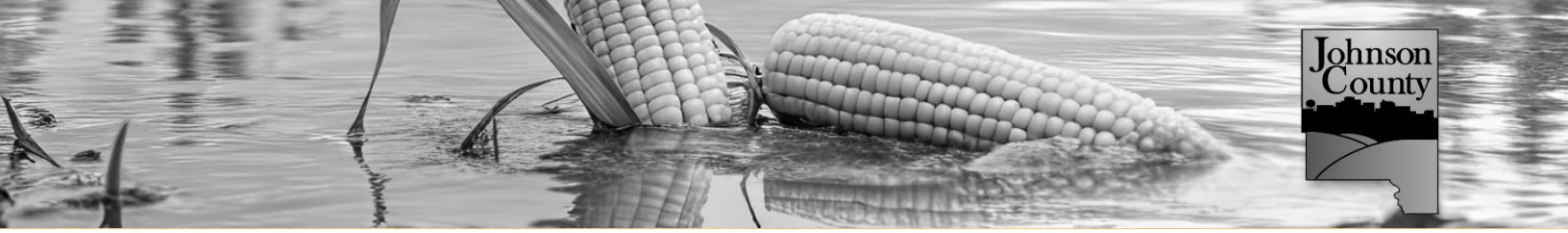
2.9.9 Funding

The assessment of funding resources and grant-writing capabilities across Johnson County, Iowa, reveals varied abilities among local jurisdictions to support hazard mitigation and resilience-building initiatives. Iowa City and Coralville have established funding channels primarily for infrastructure and quality-of-life improvements. Cities like Tiffin and Solon utilize capital improvement funds, though these are mostly directed toward infrastructure, with limited allocation for future mitigation projects. Expanding grant-writing skills across all jurisdictions could empower more communities to secure funding for essential resilience projects, thus enhancing preparedness and community safety.

Capital improvements funding is widely accessible in Johnson County and used across jurisdictions for infrastructure and unexpected needs. For example, Coralville primarily allocates it for street repairs, while North Liberty is open to exploring its application for future mitigation. This resource holds potential for broader use in risk reduction activities countywide. Additionally, Community Development Block Grant (CDBG) funds are available to several cities, including Iowa City and Tiffin, though use varies based on eligibility. Expanding the application of CDBG funds for mitigation could further support hazard resilience in the county.

Federal funding sources, excluding FEMA, have been accessed by cities like Iowa City and Coralville for emergency management and infrastructure projects. Expanding awareness of federal funding resources and strategically applying them to mitigation efforts could further enhance preparedness across Johnson County. Fees for water, sewer, gas, or electric services provide limited support for operational expenses and infrastructure upgrades in jurisdictions like Iowa City and Solon but may not be sufficient for large-scale mitigation initiatives.

State funding programs are used by various cities, such as North Liberty and Swisher, to support safety, conservation, and infrastructure improvements. However, some



jurisdictions are uncertain about these programs or have limited access, highlighting an opportunity to increase awareness and streamline access to state resources for hazard mitigation. Stormwater utility fees, available in multiple jurisdictions, are utilized for stormwater infrastructure improvements, though expanding this funding countywide could better address stormwater management needs.

Overall, enhancing funding access, grant-writing capabilities, and strategic resource utilization across Johnson County can strengthen the collective capacity to implement effective hazard mitigation and build resilience against future risks.

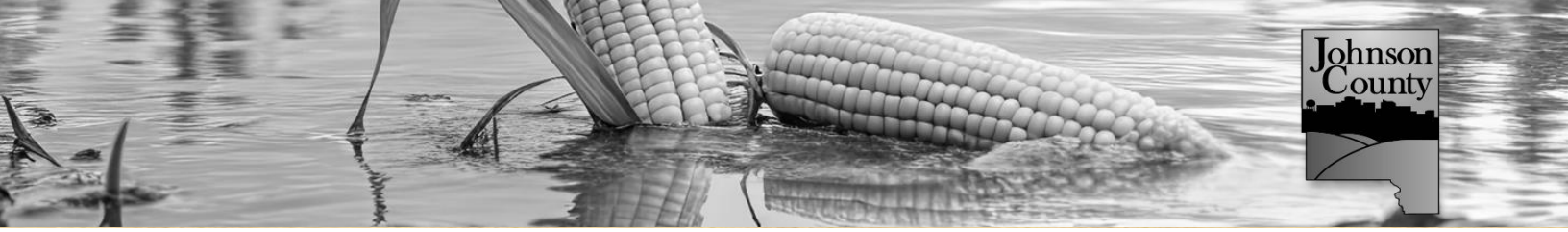
2.9.10 Expansion and Improvement of Funding

The assessment of funding capabilities across Johnson County, Iowa, reveals varied strategies and needs among local jurisdictions for improving risk mitigation through additional financial resources. Iowa City maintains a proactive approach to planning and accessing funds as needed to support resilience efforts. Coralville emphasizes the application of existing resources to their fullest potential, constrained only by staffing and available resources. Tiffin suggests that with more available funds, it could allocate resources more widely for risk mitigation.

Solon identifies a need for streamlined access to county, state, and federal funding for local hazards, highlighting the administrative challenges smaller jurisdictions face when handling complex funding processes. Shueyville notes the necessity of a comprehensive plan to prioritize projects, while Hills remains uncertain about potential funding expansions.

University Heights indicates a willingness to explore local and state funding programs based on risk assessments, demonstrating an adaptable approach to mitigation. The Iowa City Community School District sees value in securing funding through collaboration with community partners, which could bolster its resilience efforts. Johnson County itself aims to gain a better understanding of available funding streams, suggesting a need for a diversified financial strategy to support various risk reduction initiatives. Clear Creek Amana Community School District and Oxford are unsure of specific strategies for funding expansion, indicating potential areas for growth in financial planning.

These findings suggest that while some jurisdictions have defined approaches to securing mitigation funding, others could benefit from increased financial resources or targeted funding strategies to address their specific needs. Enhancing access to diverse



funding streams and reducing administrative burdens could help improve resilience and reduce vulnerabilities across Johnson County.

2.9.11 Public Outreach

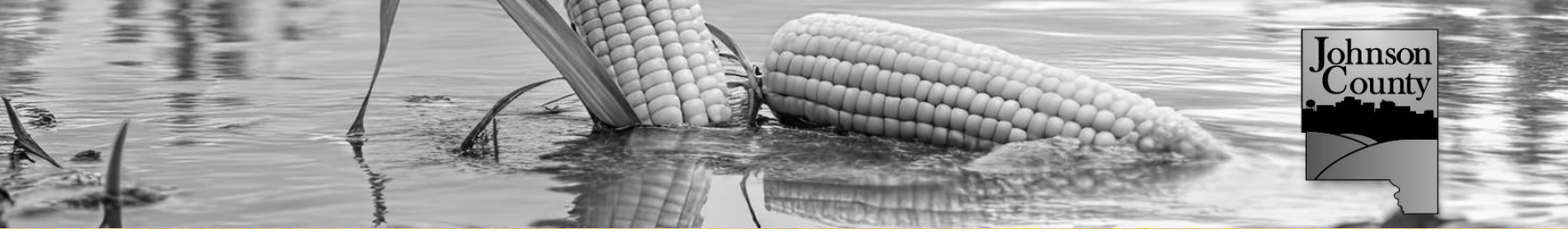
The assessment of public outreach tools for mitigation across Johnson County, Iowa, reveals a varied use of communication platforms to engage residents, disseminate hazard information, and support underserved communities. Many jurisdictions, including Iowa City, Coralville, and the University of Iowa, utilize community newsletters with widespread reach, ensuring regular updates for residents. For instance, Coralville distributes a quarterly magazine to nearly 13,000 addresses and an e-newsletter to over 1,400 subscribers, with additional engagement through social media platforms. Smaller cities like North Liberty and Swisher rely on subscription-based or opt-in newsletters, indicating a mix of engagement levels across the county.

Hazard awareness campaigns are also prevalent in several jurisdictions. Iowa City and Johnson County run community-wide campaigns, while University Heights partners with county resources to offer awareness programs. The Clear Creek Amana Community School District participates in initiatives like Severe Weather Awareness Week and Safety Week, highlighting a proactive approach within educational settings. However, some smaller jurisdictions, such as Swisher and Hills, do not actively conduct formal awareness campaigns, suggesting an opportunity to expand outreach in these areas.

Local news coverage is accessible to most jurisdictions, with Iowa City and University Heights benefiting from broader media attention. However, Tiffin and Solon report limited media presence, typically covered only during notable events. This disparity in local news coverage underscores the potential benefit of more consistent media engagement to ensure community-wide awareness of hazard-related information.

Social media serves as a valuable tool for outreach in Johnson County. Iowa City and Johnson County maintain active and widely followed accounts across multiple platforms, providing consistent updates. Coralville reaches over 12,000 followers through Facebook and Nextdoor, while other jurisdictions like Solon and North Liberty leverage social media for broader communication. However, some areas, including University Heights, currently lack an active social media presence, pointing to a gap in digital engagement that could be addressed to enhance outreach.

Support for underserved and vulnerable communities varies across the county. Coralville's Public Library operates an ambassador program for outreach to underserved populations, while Johnson County has dedicated positions and committees focused on



these efforts. However, jurisdictions such as Oxford and Shueyville lack targeted support mechanisms, indicating an area for potential growth in community engagement and advocacy for vulnerable groups.

Johnson County's public outreach efforts for mitigation reflect a blend of traditional and digital communication methods. Expanding hazard awareness campaigns, enhancing social media outreach in underrepresented areas, and increasing support for vulnerable communities could improve the county's overall resilience and preparedness for potential hazards.

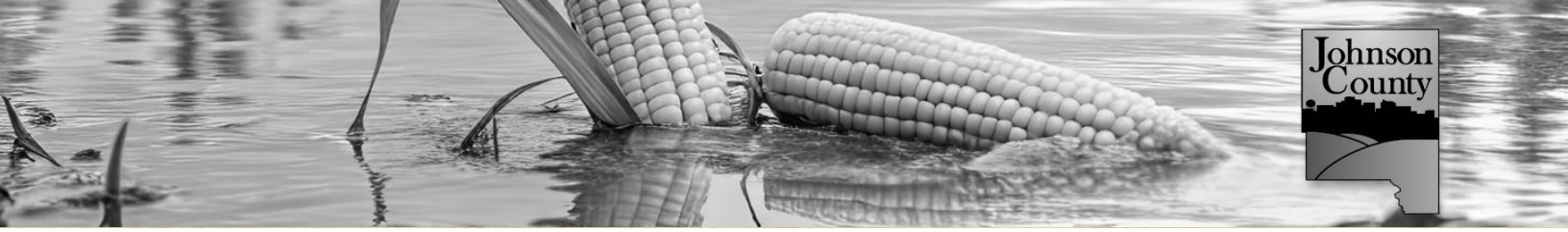
2.9.12 Expansion and Improvement of Public Outreach

The assessment of public outreach capabilities in Johnson County, Iowa, highlights various strategies and opportunities for expanding communication to reduce risk. Many jurisdictions recognize the importance of increasing social media engagement to enhance public outreach. Coralville actively promotes its social media accounts, using them to share relevant information with residents, while Iowa City suggests coordinated outreach efforts to improve community engagement. The University of Iowa continues to evaluate and refine its outreach strategies, focusing on effective communication.

Several jurisdictions identify specific needs to improve outreach capabilities. Tiffin, for example, highlights the need for additional staff to support expanded communication efforts, and Solon advocates for shared local resources with schools and organizations to strengthen community ties. Johnson County emphasizes the importance of reaching non-English-speaking and other vulnerable populations, suggesting a focus on inclusive communication methods. The Iowa City Community School District points to collaboration with community partners and additional funding as key elements for enhancing outreach.

Some jurisdictions remain uncertain about specific strategies for outreach expansion, such as North Liberty, Shueyville, and Oxford. Meanwhile, Clear Creek Amana Community School District indicates a commitment to continued collaboration with the county, reflecting a willingness to support broader communication efforts. University Heights leverages Johnson County resources, including Emergency Management and Metropolitan Planning Organization (MPO) partnerships, to expand its outreach capabilities.

Overall, these findings suggest that Johnson County could benefit from a coordinated approach to public outreach that leverages both traditional and digital channels. Expanding social media presence, improving outreach to underserved populations, and



fostering collaborative efforts could strengthen public awareness, reduce risk, and improve community preparedness across the county.

2.10 Changes in Development

Element Addressed in Section
Element E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3)), including requirement **E1-a**.

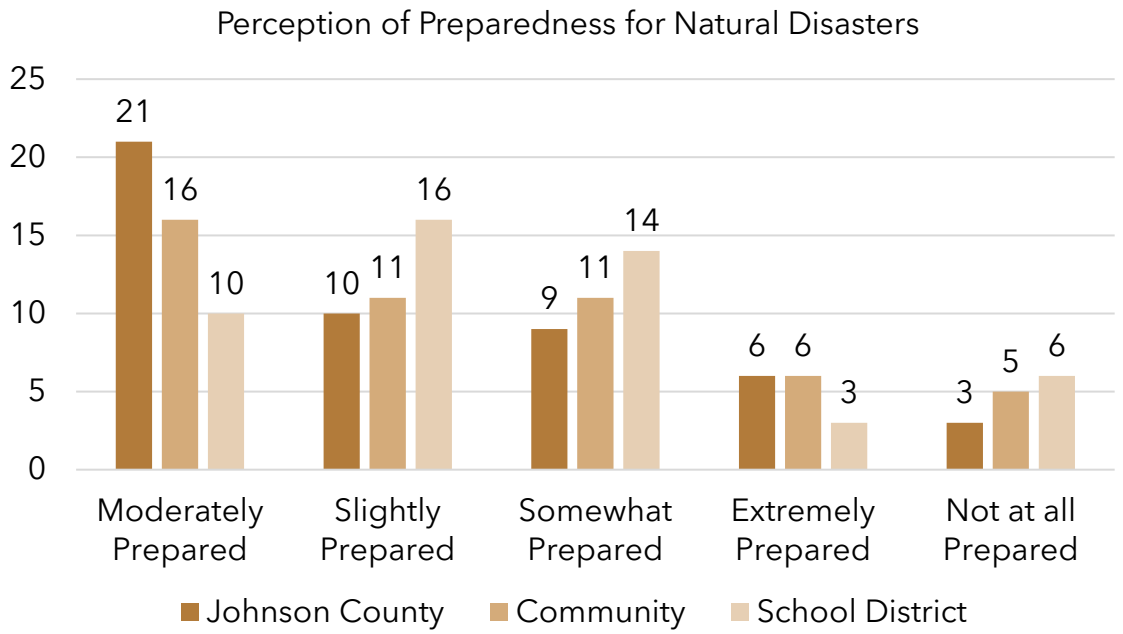
Since the previous plan update, no significant changes in development, even with new housing developments, have occurred in hazard-prone areas of Johnson County that have affected the jurisdiction's overall vulnerability to hazards. There have been no major construction projects, land use changes, or shifts in population trends that would increase or decrease vulnerability. Additionally, no significant updates to local policies, standards, codes, regulations, or land use plans have been implemented that would alter the county's hazard risk profile. Conditions in underserved communities and gaps in social equity remain consistent with the previous plan, with no notable changes affecting vulnerabilities.

2.11 Public Feedback

This section collects public input for this Plan, gathering data from respondents on their community, concerns about natural hazards, levels of preparedness, and mitigation preferences. Public input is essential for local jurisdictions to understand community needs and concerns, enabling them to develop effective mitigation strategies. The survey, completed by 49 respondents, was distributed electronically via social media posts and websites. The feedback helps guide decisions aimed at reducing risks, improving resilience, and enhancing preparedness for natural disasters.

2.11.2 Concerns and Preparedness for Natural Hazards

The following data gathers respondents' perspectives on how vulnerable they believe their community is to natural disasters, such as floods, droughts, or severe storms. It asks how concerned they are about the potential impacts of these hazards, as well as their views on how prepared their community, Johnson County as a whole, and local school districts are for such events. This section helps identify gaps in preparedness, areas where residents feel vulnerable, and the overall community sentiment toward disaster readiness. This information is vital for shaping hazard mitigation strategies and ensuring that plans address the most pressing concerns of the population.

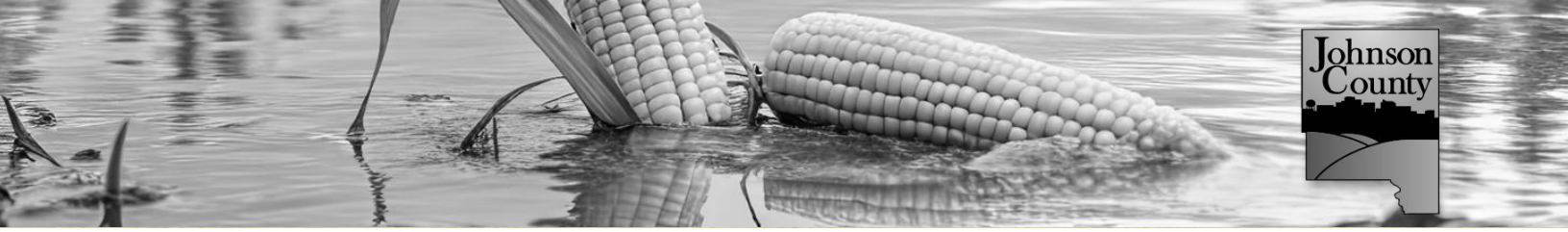


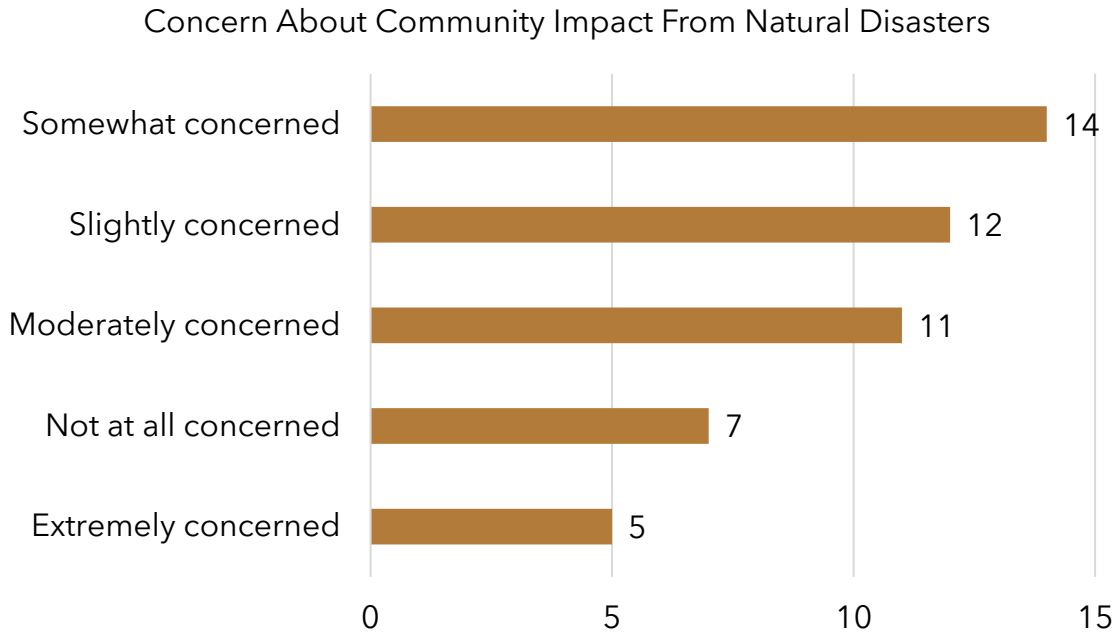
Johnson County, the broader community, and the school district. "Moderately Prepared" is the most common perception for Johnson County, with 21 responses, significantly higher than the community (16) and school district (16) in the same category. This suggests a stronger confidence in Johnson County's preparedness.

"Slightly Prepared" shows consistent responses across all three groups, each at 10 or 11, indicating a shared perception of minimal preparedness. "Somewhat Prepared" has higher perceptions for the community (14) and school district (11), while Johnson County is lower at 9.

"Extremely Prepared" is the least chosen across all three categories, with 6 for Johnson County and school district and only 3 for the community, indicating a low overall perception of high preparedness. Similarly, "Not at all Prepared" has minimal responses, with Johnson County and school district both at 5 or 6, while the community sits at 3.

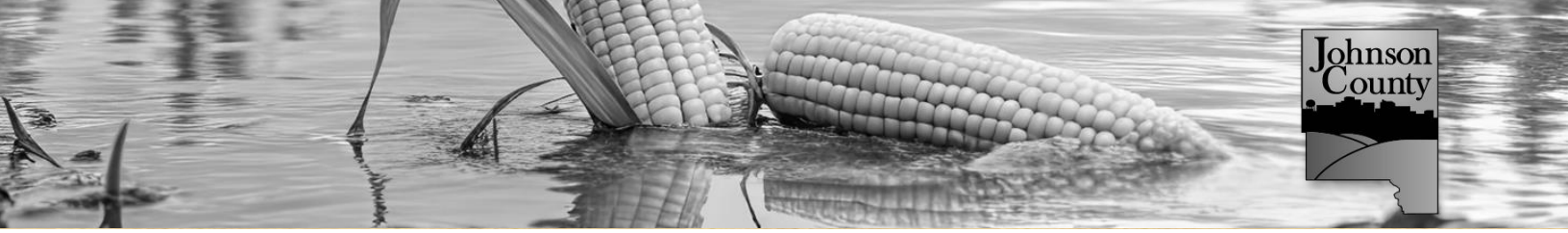
Overall, the chart suggests that there is moderate confidence in preparedness, particularly within Johnson County, while perceptions of full preparedness remain low across all groups.

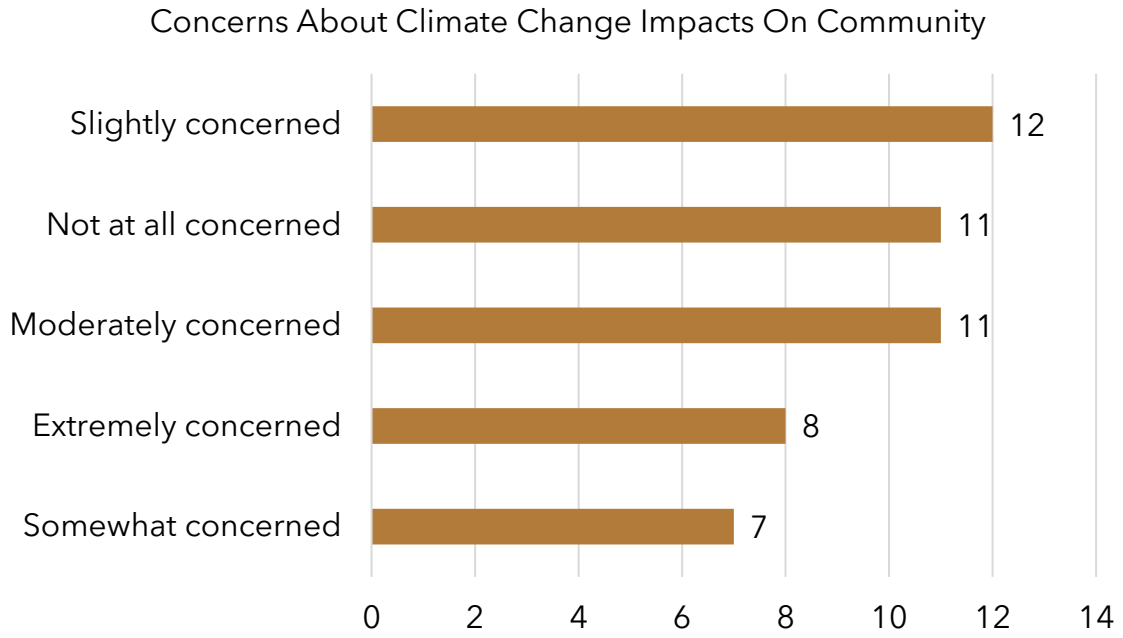




The highest level of concern falls under "Somewhat concerned," with 14 respondents, indicating a moderate level of general awareness and concern. Following this, "Slightly concerned" ranks next with 12 respondents, and "Moderately concerned" has 11, reflecting a balanced spread among individuals with moderate to low concern.

"Not at all concerned" is represented by 7 respondents, showing a minority who feel minimal worry regarding the impact of natural disasters. Lastly, "Extremely concerned" is the least common response, with only 5 respondents indicating high levels of concern. This distribution suggests that, while there is awareness and concern about natural disasters, only a small segment of the population is highly concerned about their community's vulnerability.





The most common response, with 12 respondents, is "Slightly concerned," indicating a minimal yet present awareness of climate change impacts. "Not at all concerned" and "Moderately concerned" both have 11 respondents, showing a relatively even split among those with low to moderate concern levels.

"Extremely concerned" represents a higher level of worry, with 8 respondents, while "Somewhat concerned" has the fewest responses, at 7. This distribution suggests a general tendency towards low to moderate concern about climate change impacts, with fewer individuals expressing strong or extreme concern.

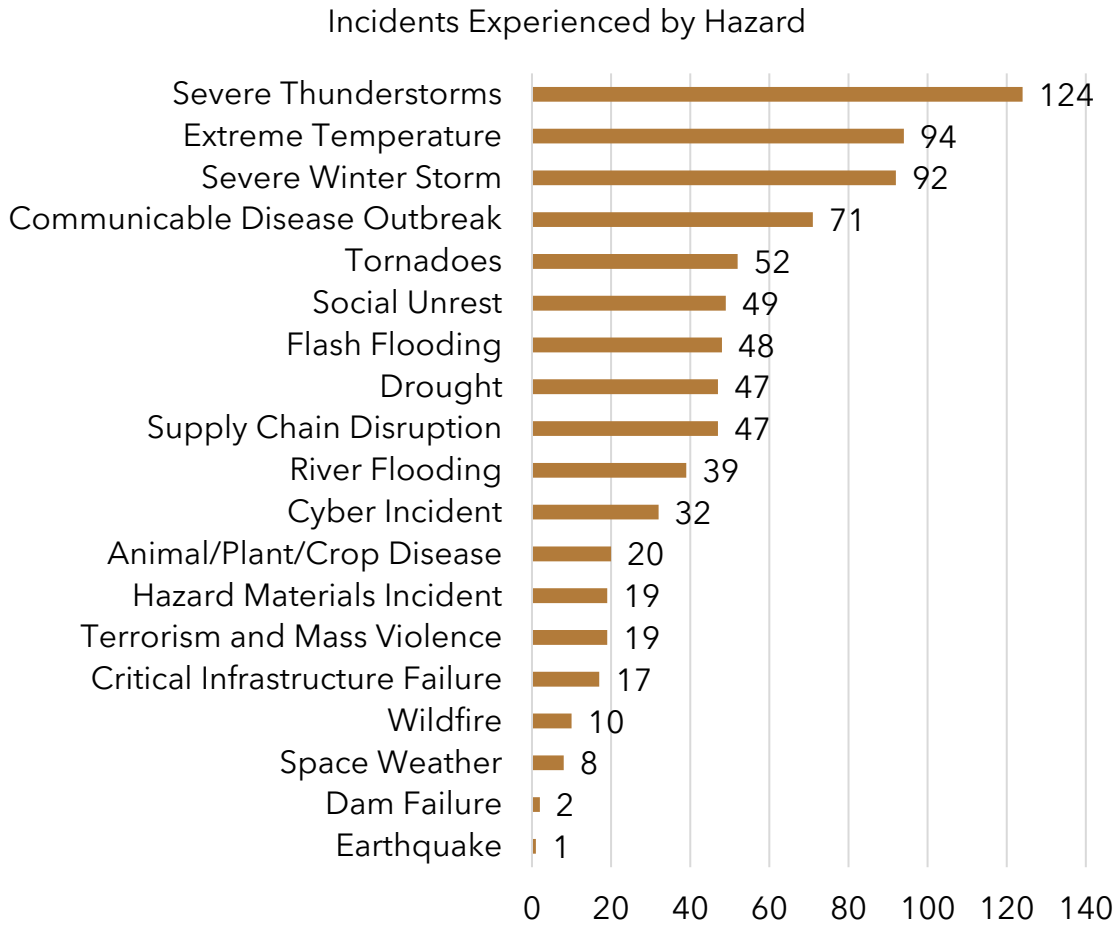
2.11.3 Hazards Affecting the Community

The following data collects information on which natural hazards residents believe pose the greatest threat to their community. It asks respondents to rank the top hazards they are most concerned about and to report how frequently these hazards—such as flooding, drought, or extreme temperatures—have caused harm, endangered lives, or damaged property in the past five years. This section provides a clear understanding of the community's experiences with and perceptions of various hazards, helping local authorities prioritize mitigation efforts and focus on the risks that residents feel are most significant.

The top five (5) hazards participants felt presented the greatest threat to their community were:

- River Flooding
- Tornadoes
- Severe Thunderstorms
- Extreme Temperatures
- Communicable Disease Outbreak

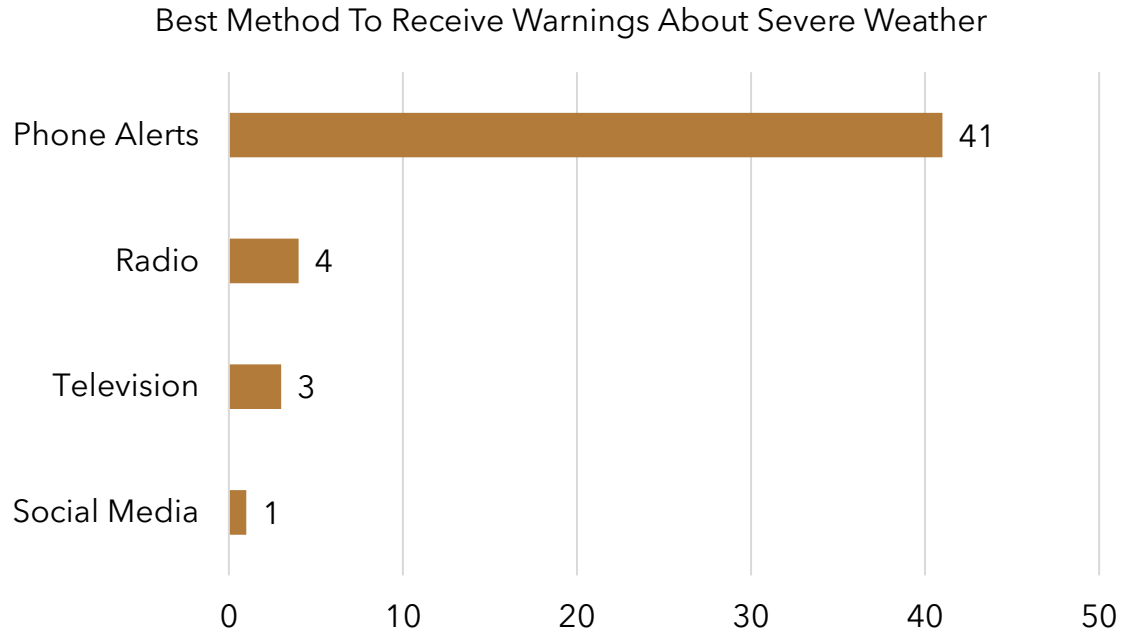
The following breaks down all hazards and ranks them by the number of times the respondents experienced them:



2.11.4 Emergency Notifications and Preparedness Programs

The following data collects insights on how residents receive warnings about severe weather and other hazards, as well as their preferences for emergency communication methods. It asks respondents to identify the best way to receive notifications, such as through phone alerts or social media, and assesses whether they feel they get enough

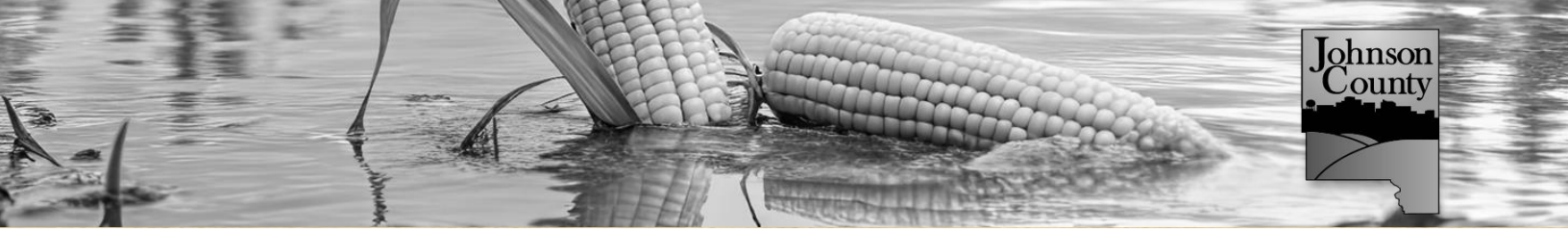
notice before a hazard occurs. Additionally, this section gathers input on the types of preparedness programs residents would like to see offered, including community mitigation activities. This information helps local authorities improve communication systems and tailor preparedness programs to meet community needs.



The responses indicate that people primarily receive severe weather warnings from government agencies, including county authorities, and weather sources like the National Weather Service (NWS) and NOAA. Local news outlets are also a common source for these warnings. In some cases, individuals rely on updates from their workplace, school, and community, including relatives, friends, or neighbors. A few respondents mentioned that no one is actively monitoring specific hazards, such as air toxics near chemical plants, indicating concerns over gaps in environmental monitoring.

Enough Notice	
Yes	No
43	6

Some of the responses indicated a desire for more timely and detailed warnings about specific hazards beyond common weather events. While hazards like snow, rain, and tornadoes are adequately covered by existing notification systems, there are concerns about environmental threats, particularly from unregulated chemical emissions by local industrial facilities. Some respondents express frustration with the lack of enforcement or



monitoring of air quality by regulatory agencies, specifically mentioning PFAS and other air toxins from nearby chemical plants. There is also a call for greater public health involvement and responsiveness to these environmental health concerns, highlighting a sense of need for more proactive hazard mitigation and community health protections.

2.11.5 Mitigation Participation and Thoughts

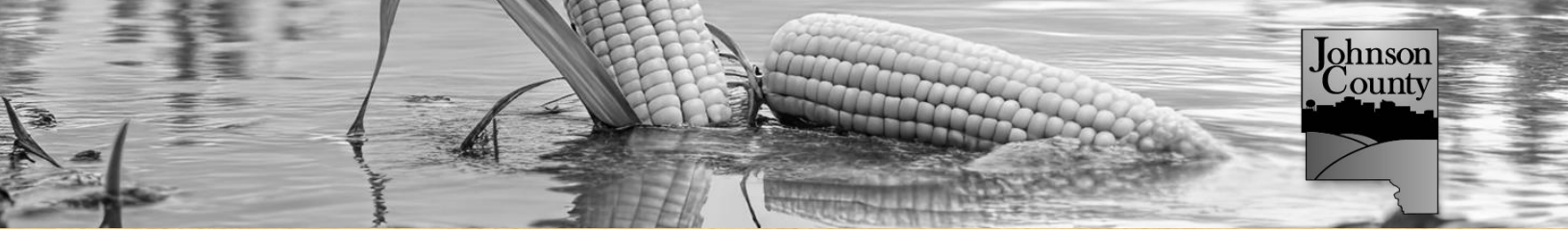
The following data collects respondents' willingness to participate in residential mitigation activities, such as flood-proofing homes or creating defensible spaces to reduce wildfire risk. It asks whether residents feel their home or community is resilient to natural hazards and seeks feedback on potential programs or initiatives that could enhance resilience. Additionally, the section invites respondents to share any thoughts or ideas about risk reduction, resiliency, or vulnerability to natural disasters. This input helps local authorities gauge public interest in mitigation efforts and gather ideas for improving community safety.

Interested in Participating in Residential Mitigation Activities		
I Don't Know	Yes	No
18	21	10

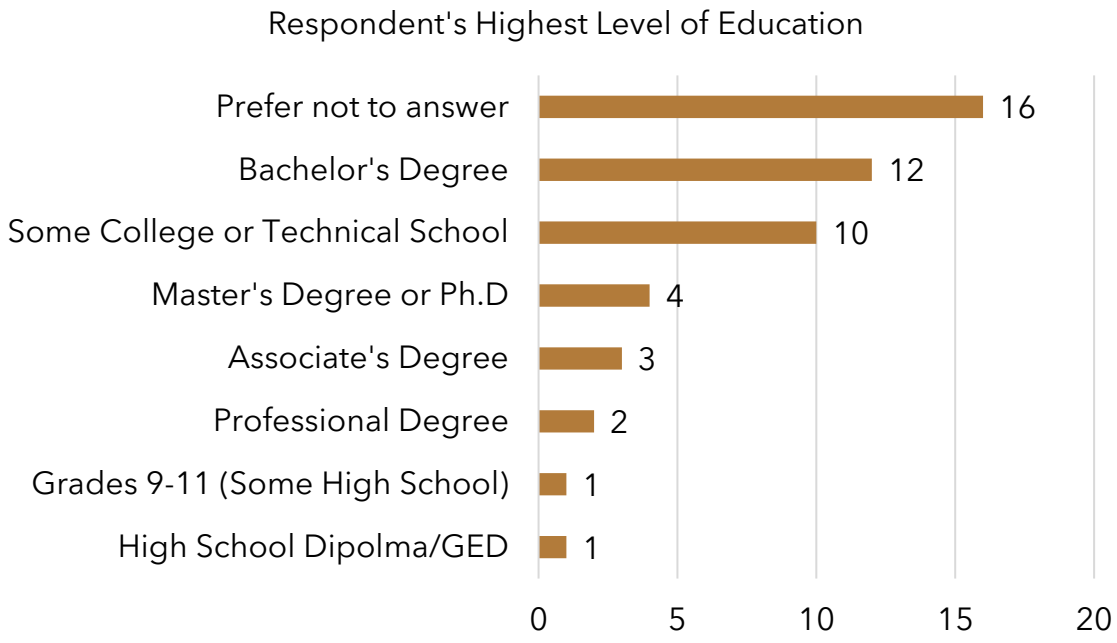
The respondents expressed interest in a range of mitigation-specific programs to enhance community resilience and personal property protection. Popular options include property tax breaks for homeowners who improve disaster resilience, community outdoor warning sirens, and disaster preparedness or awareness fairs. Many respondents also showed interest in low-interest loans and property retrofitting grants, especially for elevation or floodproofing measures. Building code improvements, such as adding high-wind straps or smoke detectors, and vegetation ordinances to create defensible space around properties were also frequently mentioned. Additionally, some participants suggested more localized programs, such as air quality testing near industrial sites, lead pipe removal grants for low-income residents, and educational programs on groundwater and well system protection. A small portion of respondents indicated no interest in additional programs.

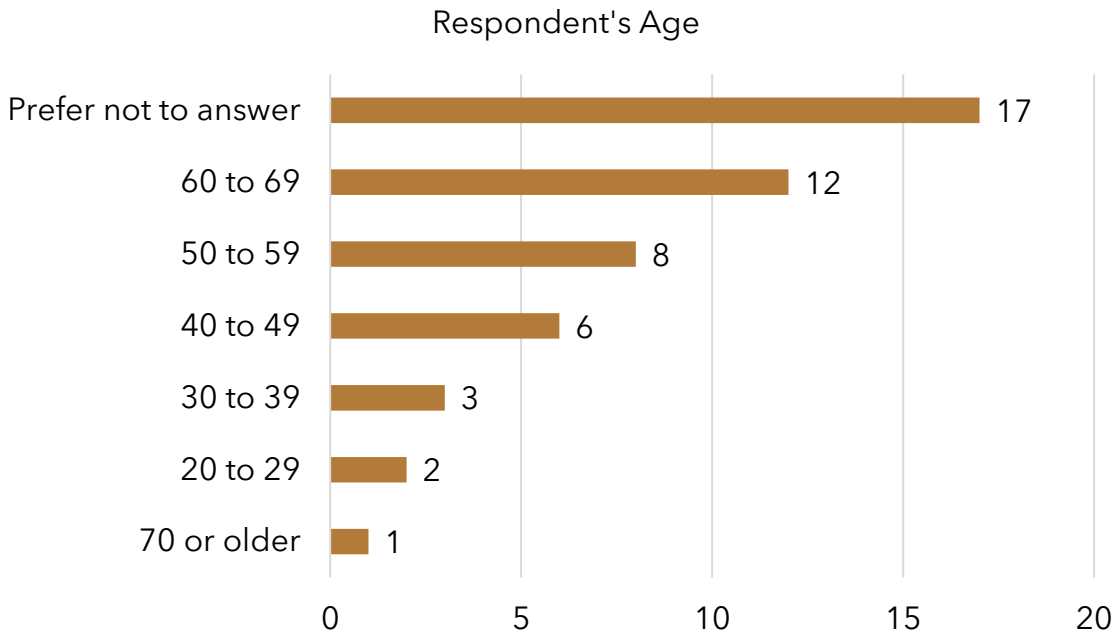
2.11.6 Demographic Information

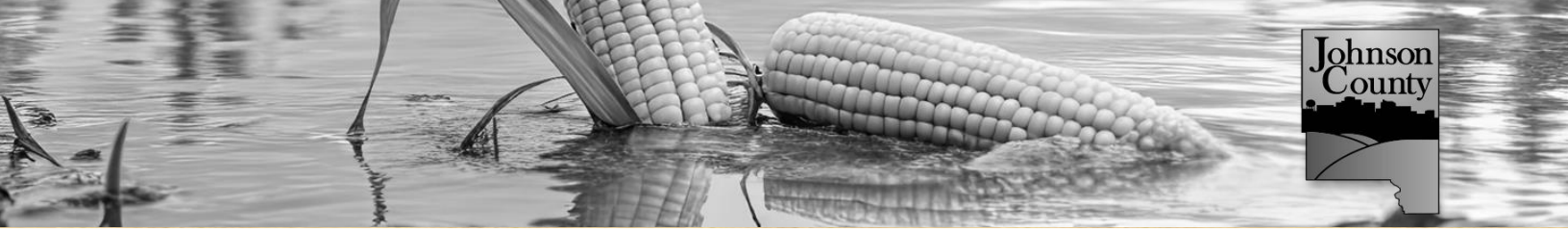
The following data collects details about the respondents' backgrounds, such as their age, gender, race, education level, household income, and housing situation. It also asks whether the respondent is answering on behalf of a household or an organization. This demographic information helps local authorities understand the characteristics of the

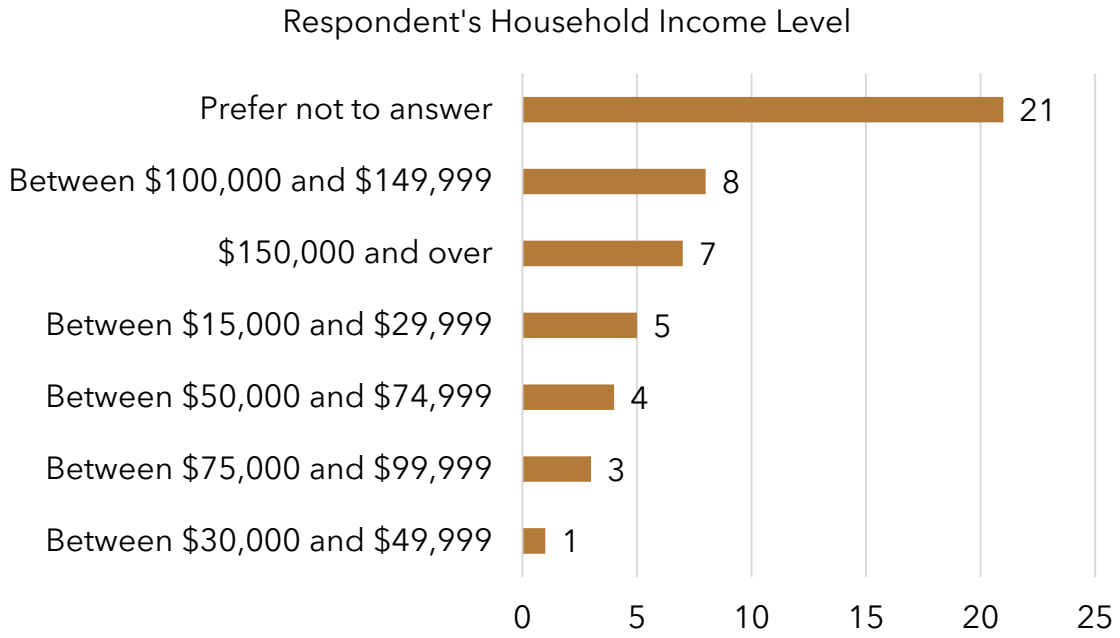


population they are serving, ensuring that hazard mitigation strategies are inclusive and address the needs of diverse community members.

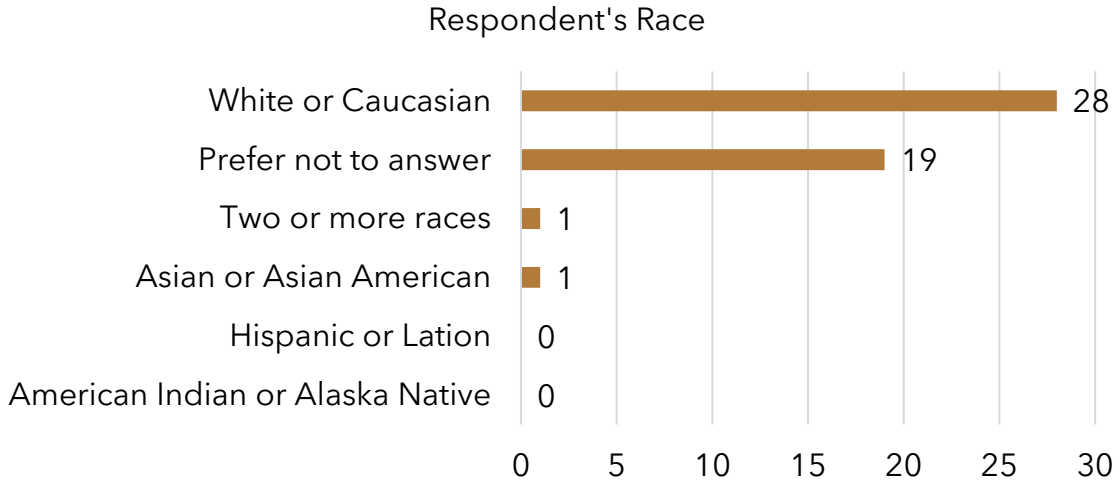






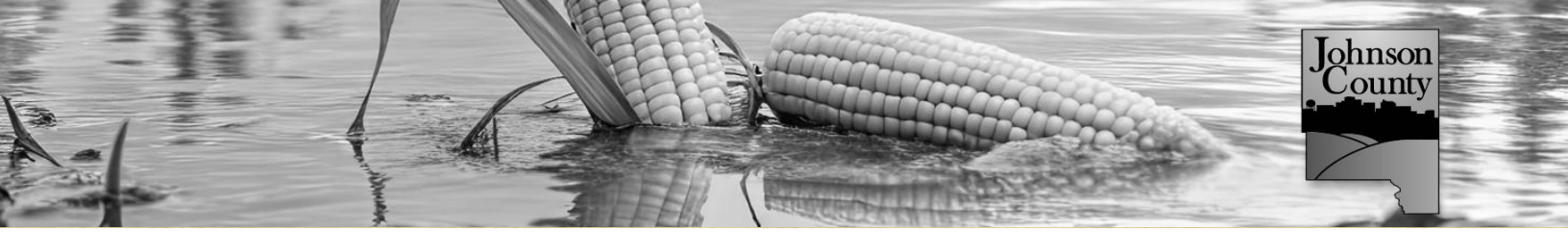


Respondent's Gender		
Prefer not to answer	Male	Female
18	17	14



Respondent's Housing Situation		
Homeowner	Renter	Prefer not to answer
32	3	14

Section 3: Risk Assessment



SECTION 3: RISK ASSESSMENT

3.1 Overview

This section identifies and profiles relevant hazards, and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazardous incidents. The following terms are used throughout the Plan:

- **Hazard:** Event, incident, or physical condition that has the potential to cause fatalities, injuries, property damage, (critical) infrastructure damage, agricultural loss, damage to the environment, interruption of business, and other types of harm or loss.
- **Vulnerability:** Degree of susceptibility to physical injury, harm, damage, or economic loss; depends on an asset's construction, contents, and economic value of its functions.
- **Risk:** Product of a hazard's likelihood of occurrence and its consequences to society; the estimated impact that a hazard would have on people, services, critical infrastructure, and structures in a community. Risk can thus be seen as where hazards intersect with vulnerabilities.

This Plan covers the breadth of threats and hazards facing the planning area as a whole but does not categorize its analysis or hazard profiles among "natural," "technological," or "manmade" hazards—instead, the focus is to provide a comprehensive review of hazards and their impacts to the planning area. Additionally, the frequency, magnitude, and behavior of natural hazards can be affected by human actions and choices, such as land use and forest management practices. Though this section covers all hazards the mitigation actions only cover natural hazards as identified in FEMA guidance.

3.1.1 Methodology

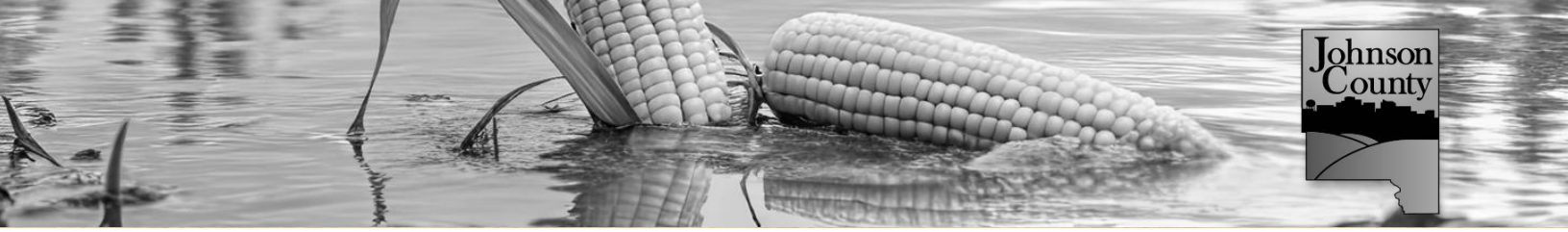
After the hazards of concern were identified for the planning area in coordination with the Johnson County Emergency Management Agency, the hazards were ranked to describe their probability of occurrence and impact on the population, property (general building stock including critical facilities), and the economy. Each covered jurisdiction was invited to rank the hazards. These responses were blended to identify an overall risk profile for the planning area. This is due to no significant changes to the geography or climate for the planning area.

The probability of occurrence is an estimate of how often a hazard incident occurs. A review of historic incident assists with this determination. Each hazard of concern is rated in accordance with the numerical ratings and definitions below:

Rating	Probability Category	Definition
1	Rare	Hazard incident is not likely to occur within 100 years (>1% chance of occurrence in any given year)
2	Occasional	Hazard incident is likely to occur within 100 years (1% change of occurrence in any given year)
3	Frequent	Hazard incident is likely to occur within 25 years (4% chance of occurrence in any given year)

The impact of each hazard is considered in three categories: impact on the population, impact on the property (general building stock including critical facilities), and impact on the economy. Based on documented historical losses and a subjective assessment by the planning stakeholders, an impact rating of high, medium, or low is assigned with a corresponding numeric value for each hazard of concern. In addition, a weighting factor is assigned to each impact category: three (3) for population, two (2) for property, and one (1) for economy. This gives the impact on the population the greatest weight in evaluating the impact of a hazard.

Category	Weighting Factor	Low Impact (1)	Medium Impact (2)	High Impact (3)
Population	3	14% or less of your population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location	15% to 29% of your population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location	30% or more of your population is exposed to a hazard with potential for measurable life safety impact, due to tis extent and location
Property	2	Property exposure is 14% or less of the total replacement cost for your community	Property exposure is 15% to 29% of the total replacement cost for your community	Property exposure is 30% or more of the total replacement cost for your community
Economy	1	Loss estimate is 9% or less of the total replacement cost for your community	Loss estimate is 10% to 19% of the total replacement	Loss estimate is 20% or more of the total replacement



	cost for your community	cost for your community

The risk ranking for each hazard is then calculated by multiplying the numerical value for the probability of occurrence by the sum of the numerical values for impact. The equation follows: Weighting Factor (1, 2, or 3) X Impact Value (6 to 18) = Hazard Ranking Value. Based on the total for each hazard, a priority ranking is assigned to each hazard of concern (high, medium, low).

3.1.2 Sources for Hazard Data

Historical data, catastrophic potential, relevance to the jurisdiction, and the probability and potential magnitude of future occurrences were all used to identify and prioritize the list of hazards most relevant to Johnson County. Hazard data was obtained from various federal, state, and local sources to include:

- Federal Emergency Management Agency (FEMA)
- National Oceanic and Atmospheric Administration (NOAA)
- United States Geological Survey (USGS)
- United States Forest Service
- United States Department of Agriculture
- Homeland Security Information Network
- Centers for Disease Control and Prevention
- Environmental Protection Agency
- Iowa Department of Homeland Security and Emergency Management (HSEMD)
- Iowa Department of Natural Resources (DNR)
- Iowa Environmental Mesonet (IEM)
- Iowa Geological Survey
- Johnson County Emergency Management
- Johnson County Conservation Board
- Johnson County Public Health
- Johnson County Assessor

3.1.3 Integration and Use

The risk assessment in this Plan serves as the planning area's primary risk assessment for the threats and hazards facing the planning area. It also helps fulfill the requirements for local hazard analysis and risk assessments.

3.2 Hazard Identification and Ranking

Element Addressed in Section
Element B1. Does the plan include a description of the type, location and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i)), including requirement **B1-a.**

The planning stakeholders conducted a hazard identification process to determine the hazards that threaten the planning area. This section details the methodology and results of this effort.

Through the update, the previously adopted plan's hazards were reviewed by planning stakeholders and determined to be still relevant to the planning area and should be kept in the new update, with some reorganization and regrouping. The following is the list of hazards assessed:

- Animal/Plant/Crop Disease
- Communicable Disease Outbreak
- Critical Infrastructure Failure
- Cyber Incident
- Dam Failure
- Drought
- Earthquake
- Extreme Temperatures
- Flash Flooding
- Hazardous Materials Incident (includes radiological)
- River Flooding
- Severe Thunderstorms
- Severe Winter Storms
- Social Unrest
- Space Weather
- Supply Chain Disruption
- Terrorism and Mass Violence
- Tornadoes
- Wildfire

The planning stakeholders ranked all the hazards identified above based on their likelihood of occurrence and associated impact. The table below demonstrates the hazards and associated ranking:

HAZARDS	RANKING
Tornadoes	21.09
Severe Thunderstorms	20.67
Severe Winter Storm	19.94
River Flooding	18.93
Flash Flooding	16.66
Social Unrest	16.47
Supply Chain Disruption	16.13

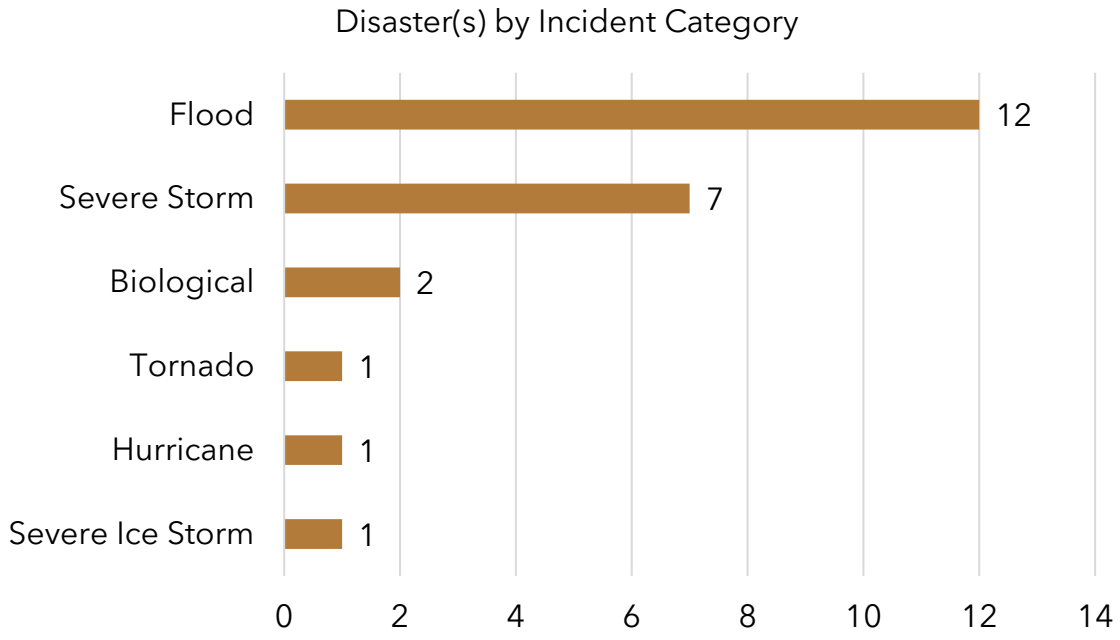
Extreme Temperature	15.59
Cyber Incident	14.52
Drought	14.16
Terrorism & Mass Violence	13.91
Critical Infrastructure Failure	13.17
Communicable Disease Outbreak	12.50
HazMat & Radiological	11.69
Animal/Plant/Crop Disease	7.85
Dam Failure	7.71
Earthquake	7.51
Space Weather	6.00
Wildfire	5.57

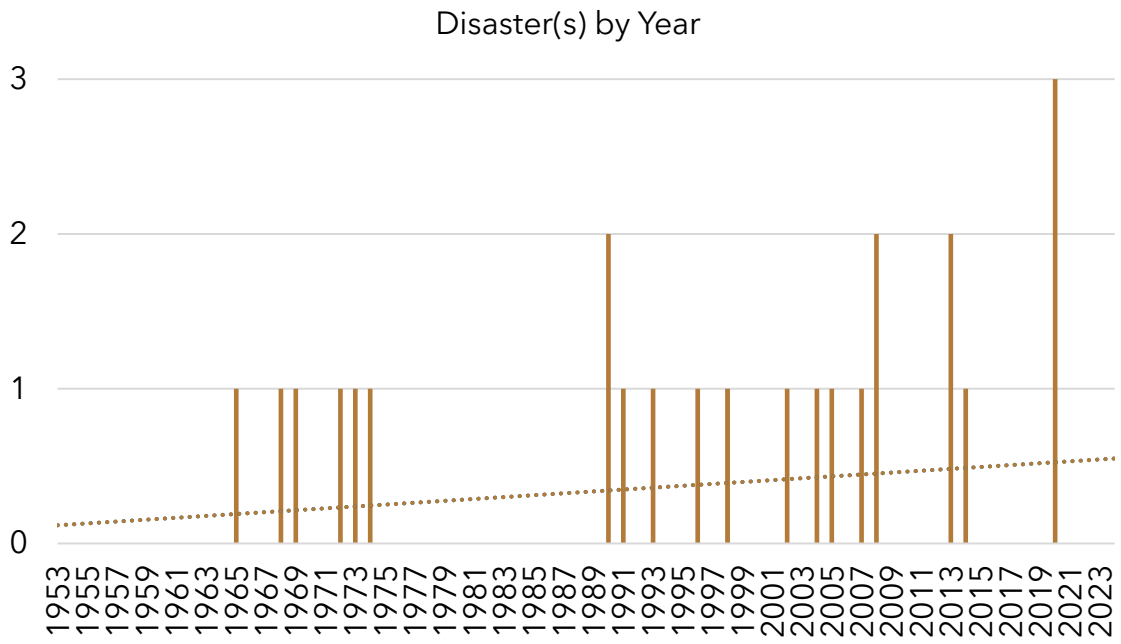
3.3 Disaster Declaration History

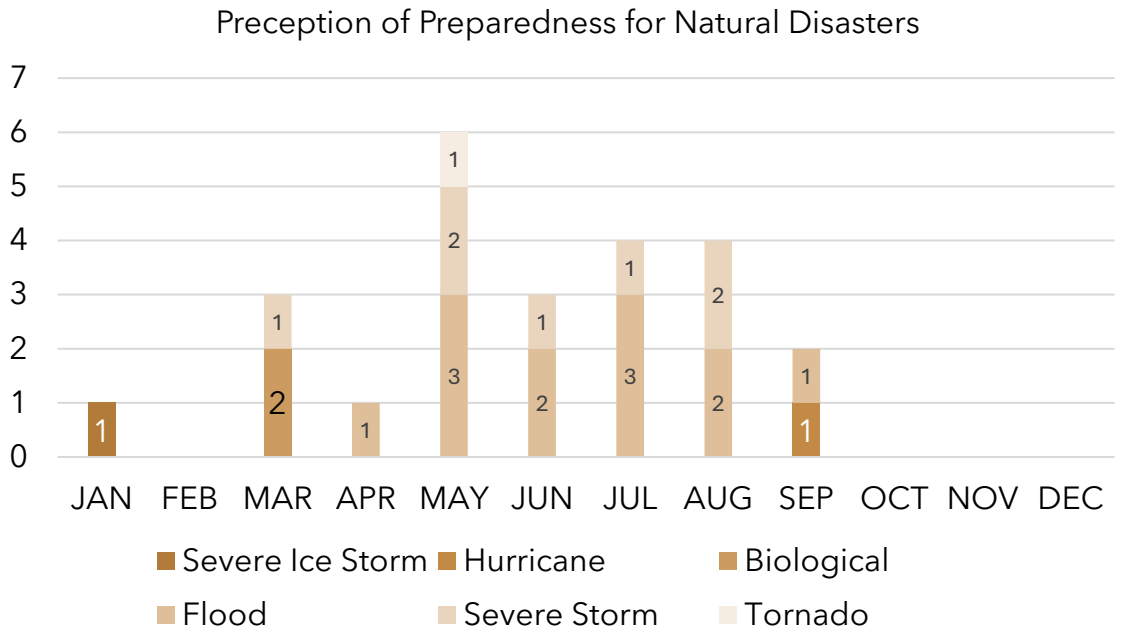
Element Addressed in Section

Element B1. Does the plan include a description of the type, location and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i)), including requirement **B1-d.**

This summary of disasters does not include statewide declarations that didn't directly impact Johnson County, and the following charts only summarize federal disaster declarations.



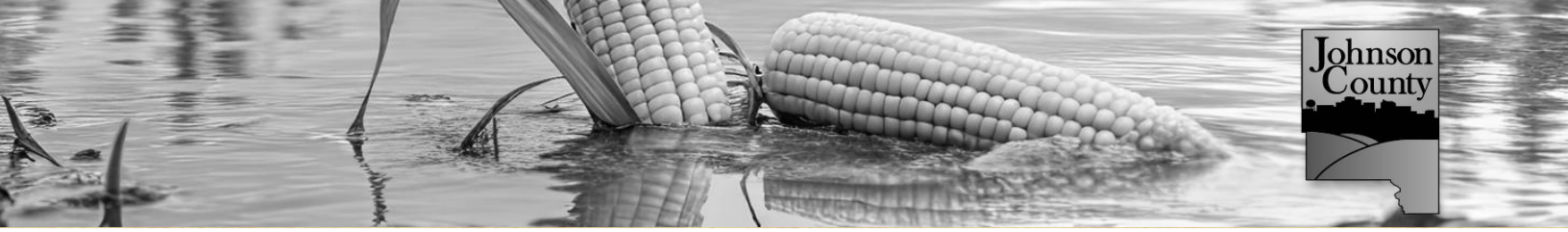




3.3.1 Severe Storm

State Proclamation 2023-08 | 04/01/2023

The Iowa Disaster Proclamation issued on April 1, 2023, declared a state of disaster emergency for Johnson County and nine other counties, including Cedar, Clinton,



Delaware, Des Moines, Dubuque, Grundy, Keokuk, Linn, Mahaska, Wapello, and Washington. This proclamation followed a series of severe storms that began on March 31, 2023, and continued thereafter. The storms caused damaging winds, straight-line winds, heavy rains, hail, thunderstorms, and tornadoes, resulting in significant damage to public and private property, downed power lines, power outages, and widespread debris. Johnson County experienced considerable impacts, prompting the activation of the Iowa Emergency Response Plan to deploy state resources, supplies, and equipment. The proclamation also authorized individual disaster assistance to aid eligible residents in their recovery efforts. This emergency declaration aimed to address critical needs and support the affected communities in response and recovery activities.

DR-4557 | 08/17/2020 (State Proclamation 2020-25)

This storm generated hurricane-force winds exceeding 100 mph, leading to widespread destruction of homes, businesses, and critical infrastructure. The agricultural sector experienced substantial losses, with extensive damage to crops across large areas, impacting the local economy. Power outages affected thousands of residents within the planning area, with some communities experiencing prolonged disruptions that lasted for weeks. The disaster required significant recovery and rebuilding efforts, supported by federal assistance through FEMA, as the community worked to restore normalcy and reinforce resilience against future severe weather events.

State Proclamation 2019-19 | 05/31/2019

The Iowa Disaster Proclamation issued on May 31, 2019, declared a state of disaster emergency for Johnson County and six other counties, including Appanoose, Cedar, Davis, Lucas, Monroe, and Pottawattamie, following severe storms that began on May 17, 2019, and continued thereafter. These storms brought heavy rains, damaging hail, straight-line winds, tornadoes, and flash flooding, resulting in widespread destruction to public and private property. Johnson County experienced significant impacts, including damage to infrastructure, flooding, and property loss. The proclamation activated the Iowa Emergency Response Plan, enabling the use of state resources, supplies, and equipment to support local response and recovery efforts. It also authorized individual disaster assistance for eligible residents in the impacted counties, providing vital support to those adversely affected by the disaster. These measures aimed to address immediate needs and facilitate recovery efforts for the affected communities.

State Proclamation 2018-26 | 10/11/2018

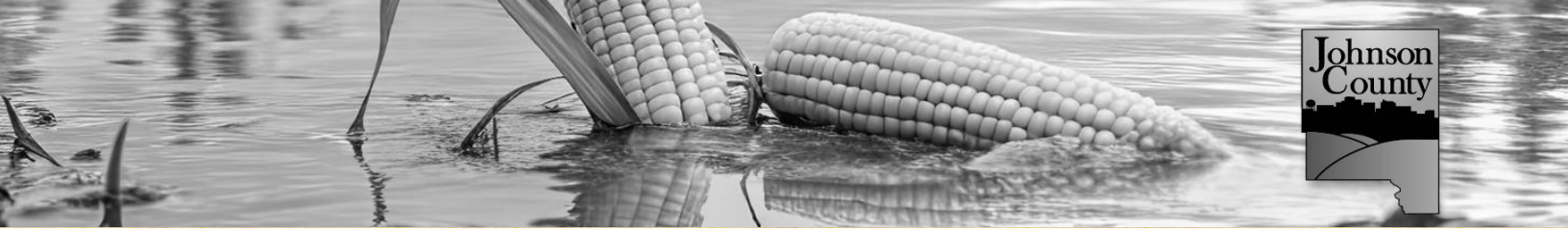
The Iowa Disaster Proclamation issued on October 11, 2018, declared a state of disaster emergency for Johnson County and several other counties in response to severe storm systems that began on October 4, 2018. These storms included damaging winds, straight-line winds, heavy rains, thunderstorms, flash flooding, flooding, and tornadoes, leading to significant damage to public and private property. Johnson County experienced substantial impacts, including damage to infrastructure, property, and disrupted services. The proclamation activated the Iowa Emergency Response Plan, authorizing the deployment of state resources, supplies, and equipment to support recovery efforts. It also approved individual disaster assistance for affected residents in Johnson County and other impacted areas, facilitating immediate relief and recovery efforts. This measure addressed critical needs while enabling the allocation of resources for response and mitigation activities.

State Proclamation 2017-07 | 07/22/2017

The Iowa Disaster Proclamation issued on July 22, 2017, declared a state of disaster emergency for Johnson County, along with Bremer, Buchanan, and Clinton counties, due to a severe storm system that began on July 19, 2017, and continued thereafter. This storm system resulted in heavy rainfall, flash flooding, tornadoes, and widespread destruction, including loss of life and personal injuries. The impacts included significant damage to public and private property, downed power lines and poles, debris piles, and power outages. Local resources and capabilities were reported as exhausted, prompting state intervention to provide necessary resources, supplies, and materials for response and recovery. The proclamation activated the Iowa Emergency Response Plan and authorized individual disaster assistance to help eligible residents in Johnson County and other affected areas. This measure aimed to address immediate needs and facilitate the recovery process for communities impacted by the storm.

State Proclamation 2016-03 | 08/15/2016

The Iowa Disaster Proclamation issued on August 15, 2016, declared a state of disaster emergency for Johnson County following severe storms that began on August 11, 2016, and continued thereafter. These storms produced heavy rains and flash flooding, resulting in substantial damage to public and private property within the county. Reports from local emergency management highlighted that Johnson County's resources and capabilities were overwhelmed, necessitating state intervention. The proclamation activated the Iowa Emergency Response Plan, authorizing the use of state resources, supplies, and equipment to assist in recovery and response efforts. Additionally, the



proclamation approved individual disaster assistance to support residents adversely impacted by the storm. This measure aimed to address the immediate needs of the community and facilitate their recovery process.

DR-4187 | 08/05/2014 (State Proclamation 2014-09)

Severe storms, tornadoes, and flooding affected the planning area, causing significant damage to both public infrastructure and private properties. The intense storms brought heavy rainfall and high winds, which led to localized flooding, road closures, and damage to homes and businesses. Public infrastructure, including transportation networks and utilities, was impacted, requiring extensive repair efforts. The agricultural sector also faced challenges due to flooding in low-lying areas. Emergency response teams were actively engaged in managing the situation, while recovery efforts focused on restoring essential services and reinforcing flood-prone areas to better withstand future events.

DR-4126 | 07/02/2013 (State Proclamation 2013-07)

A series of severe storms with heavy rainfall and flash flooding impacted the planning area, leading to substantial disruptions. The intense rainfall overwhelmed drainage systems, causing flash floods that affected residential neighborhoods, roadways, and local businesses. Many roads became impassable, creating challenges for emergency responders and limiting access in certain areas. Public infrastructure, including stormwater systems and transportation networks, required significant repairs to restore functionality and prevent future flooding issues. Recovery efforts focused on addressing immediate infrastructure repairs and evaluating areas for potential flood mitigation improvements to enhance resilience for the planning area against future severe weather events.

State Proclamation 2013-02 | 04/19/2013

The Iowa Disaster Proclamation issued on April 19, 2013, declared a state of disaster emergency for Johnson County, along with Cedar, Mahaska, Scott, and Washington counties, due to severe storm systems beginning on April 17, 2013. These storms caused significant impacts, including heavy rainfall, flash flooding, and widespread flooding, which led to considerable damage to private property and infrastructure. Local resources and emergency management capacities were reported as being exhausted, prompting the need for state assistance. The proclamation activated the Iowa Emergency Response Plan, allowing the deployment of state resources, supplies, and materials, and authorized individual disaster assistance for eligible residents. This

measure aimed to address the immediate needs of impacted communities and facilitate recovery efforts.

State Proclamation 2010-27 and 2010-28 | 08/03/2010

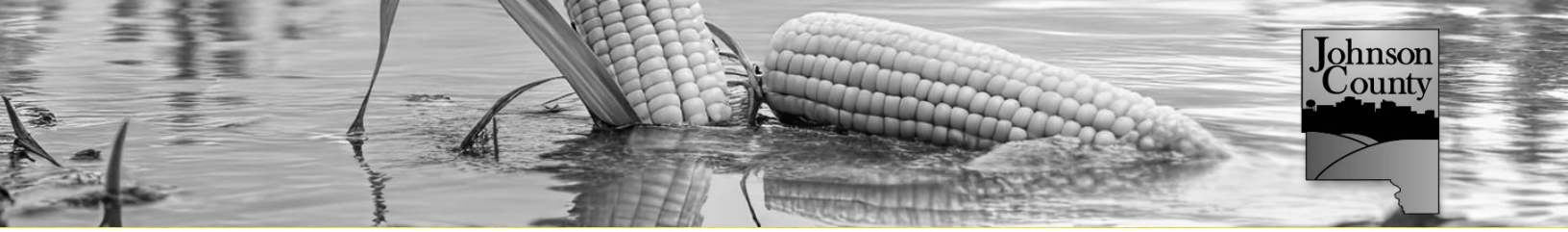
The Iowa Disaster Proclamation issued on August 3, 2010, declared a state of disaster emergency for Johnson County and Appanoose County following severe storm systems that began on July 30, 2010, and continued thereafter. These storm systems caused significant weather events, including flooding and flash flooding, which led to widespread damage to both private and public property, such as residences and businesses. The proclamation highlighted the need for immediate assistance to address the impacts of the storms and authorized the implementation of the State Individual Assistance Grant Program to support eligible residents. This program aimed to minimize hardship and aid recovery efforts for the affected communities.

DR-1763 | 05/27/2008 (State Proclamation 2008-15 and 2008-36)

Catastrophic flooding from prolonged heavy rainfall severely impacted the planning area, resulting in widespread devastation. Rivers and streams overflowed, inundating residential areas, businesses, and critical public infrastructure. Many homes and buildings were damaged or destroyed, displacing residents and leading to significant property losses. The agricultural sector was heavily affected, with large portions of farmland submerged, resulting in crop and economic losses. Infrastructure, including roads, bridges, and utilities, suffered extensive damage, necessitating a long-term recovery process. The disaster highlighted the need for enhanced flood mitigation strategies and prompted efforts to improve resilience against future flooding, with federal, state, and local support directed toward rebuilding and reinforcing vulnerable areas within the planning area.

DR-1688 | 03/14/2007

The planning area experienced severe storms and flooding that led to significant damage and disruption across communities. Heavy rains caused rivers and streams to swell, resulting in widespread flooding that affected homes, businesses, and essential infrastructure. Numerous roads were washed out or became impassable, hampering transportation and emergency response efforts. The agricultural sector faced notable losses, as fields were flooded and crops were damaged. Recovery efforts included extensive repairs to public infrastructure and support for affected residents and businesses.



DR-1518 | 05/25/2004

The planning area experienced severe storms that triggered extensive flooding throughout the region. Intense, prolonged rainfall caused rivers and streams to rise quickly, leading to widespread flooding that inundated homes, businesses, and farmlands. Roadways and bridges were compromised, making travel hazardous and isolating certain areas. Emergency responders encountered difficulties due to blocked routes and rising floodwaters, especially in lower-lying zones. The agricultural sector faced significant crop damage as fields were submerged, resulting in notable economic impacts for local farmers. The incident was marked by persistent high waters and widespread property damage across affected areas.

DR-1121 | 06/24/1996

Severe flooding impacted the planning area following a period of intense and prolonged rainfall. The heavy precipitation caused rivers and streams to overflow, inundating homes, businesses, and agricultural lands. The floodwaters compromised numerous roadways, creating transportation challenges and isolating certain areas. Emergency services faced difficulties as they responded to affected residents, particularly in low-lying zones that experienced the worst of the flooding. The event led to widespread property damage across residential and commercial sectors, impacting daily life and local infrastructure within the planning area.

3.3.2 Biological

DR-4483 | 03/23/2020

The COVID-19 pandemic prompted a major disaster declaration under DR-4483, addressing the public health crisis that spread across the United States, including the planning area. This declaration allowed federal support for state and local governments as they managed the extensive health and societal impacts of the pandemic. In the planning area, healthcare systems faced intense pressure due to an influx of COVID-19 patients, with hospitals and clinics expanding resources to meet care demands. The declaration supported the enhancement of local healthcare infrastructure, the implementation of widespread testing, and vaccination efforts that became crucial as the pandemic continued. Economic impacts were severe, as local businesses, especially small enterprises, encountered unprecedented challenges from shutdowns and operating restrictions. Federal assistance provided financial relief through grants and loans, helping businesses adapt and survive. Schools and public services shifted to virtual operations, and federal aid helped maintain essential services despite the

disruption. The disaster response helped to alleviate the health, economic, and social challenges caused by the pandemic within the planning area.

EM-3480 | 03/13/2020

Issued on March 13, 2020, EM-3480 was an emergency declaration designed to address the urgent response needs at the onset of the COVID-19 pandemic. This initial declaration enabled a swift mobilization of federal resources to support healthcare systems, implement testing and quarantine measures, and provide protective equipment to mitigate the virus's spread. Focused on stabilizing healthcare operations and enhancing immediate public safety, EM-3480 provided critical early support to help manage the initial outbreak in the planning area. The declaration allowed for short-term interventions to curb the virus's transmission and protect vulnerable populations in the early days of the pandemic.

Together, EM-3480 and DR-4483 served complementary roles in managing the pandemic in the planning area. EM-3480 addressed immediate needs at the pandemic's onset, while DR-4483 facilitated long-term recovery efforts, including sustained public health initiatives and economic relief, helping the planning area navigate both the immediate and extended impacts of COVID-19.

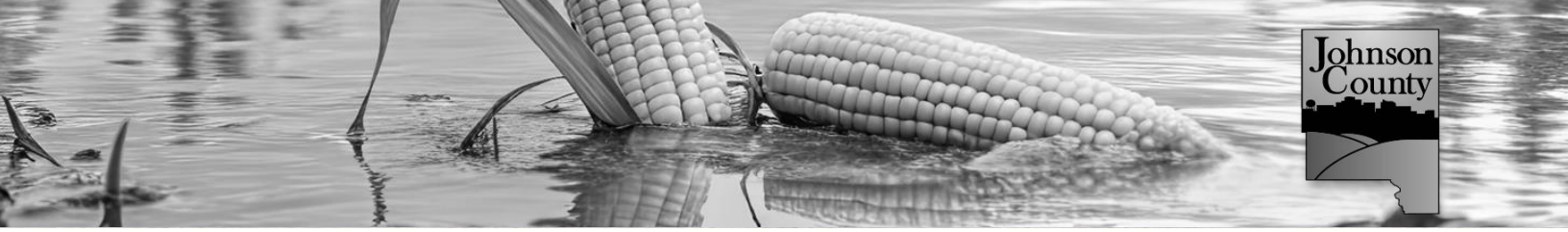
3.3.3 Flood

DR-4119 | 05/31/2013

Severe storms, tornadoes, and flooding impacted the planning area, causing widespread property damage and disruptions to infrastructure. The intense storms brought high winds and heavy rainfall, which led to flash flooding in several areas. Residential neighborhoods, businesses, and public infrastructure, including roads and utilities, were affected as floodwaters rose, making travel hazardous and isolating certain communities. Tornadoes accompanying the storm system caused additional structural damage to homes and buildings, further complicating response efforts. Emergency services were mobilized to address immediate needs, assist affected residents, and restore essential services in the wake of the severe weather.

DR-1420 | 06/19/2002

The planning area experienced a series of severe storms that resulted in extensive flooding, causing significant damage to homes, businesses, and public infrastructure. Prolonged and heavy rainfall led to riverine flooding, with rivers and streams overflowing



into low-lying areas, affecting residential and commercial properties. Roads and bridges were compromised or closed due to high water, limiting transportation access and making travel conditions hazardous. The agricultural sector faced challenges as fields were flooded, resulting in crop damage and economic losses for local farmers. Emergency responders worked to support affected residents and manage the immediate impacts of the flooding, as the community dealt with widespread property and infrastructure damage.

DR-1230 | 07/02/1998

Severe storms and flooding impacted the planning area, leading to widespread property damage and significant disruptions. Intense rainfall caused rivers and streams to swell, resulting in flooding that affected residential neighborhoods, commercial areas, and agricultural lands. Numerous roadways were submerged, creating hazardous travel conditions and isolating some communities. Homes and businesses experienced flood damage, and the agricultural sector suffered crop losses due to inundated fields. Emergency response teams were deployed to assist residents and manage the immediate aftermath, focusing on restoring access and addressing critical needs in the heavily affected areas.

DR-996 | 07/09/1993

The planning area was part of the Great Flood of 1993, one of the most significant and devastating flood events in U.S. history. Prolonged and intense rainfall across the Midwest led to extensive flooding as rivers and streams overflowed, inundating vast areas, including residential, commercial, and agricultural lands. Many homes and businesses were severely damaged or destroyed, while farmlands were submerged, resulting in substantial crop losses and economic impacts on local agriculture. Transportation networks, including roads and bridges, were extensively compromised, disrupting travel and isolating communities. Emergency responders worked tirelessly to evacuate residents, protect property, and address immediate safety needs as floodwaters continued to rise. The event caused widespread disruption, with lasting impacts on infrastructure and the local economy.

DR-911 | 07/12/1991

Severe storms and flooding affected the planning area, resulting in significant damage to homes, businesses, and infrastructure. Intense and sustained rainfall led to flash flooding, causing rivers and streams to overflow and flood low-lying areas. Residential neighborhoods and commercial properties experienced water damage, with some

buildings partially submerged. Roads and bridges were compromised, creating travel hazards and limiting access for emergency responders. The flooding also impacted the agricultural sector, with crop damage in flooded fields. Emergency teams were mobilized to assist residents, manage evacuations, and restore essential services amid the immediate impacts of the storm and rising waters.

DR-879 | 09/06/1990

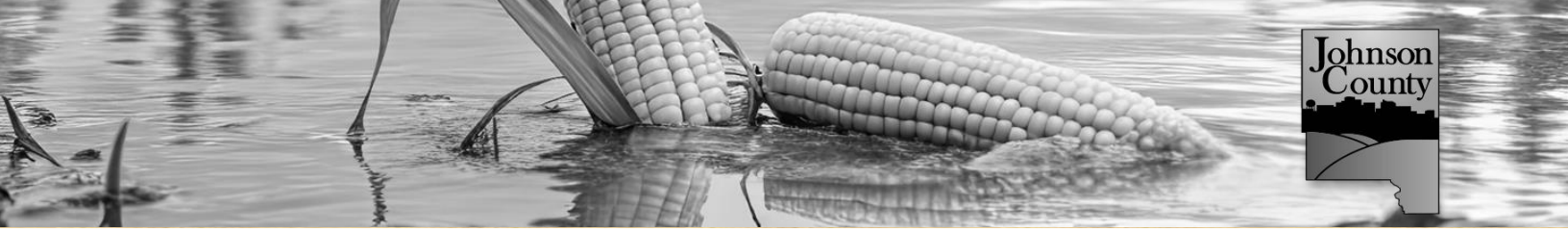
Severe storms and subsequent flooding impacted the planning area, causing extensive damage to residential, commercial, and agricultural properties. Heavy rainfall led to rivers and streams rising rapidly, resulting in flooding that affected low-lying areas. Many homes and businesses sustained water damage, while the transportation network, including roads and bridges, was disrupted, creating hazardous travel conditions and complicating emergency response efforts. Agricultural lands were also affected, with flooded fields leading to crop losses. Emergency responders were engaged in assisting residents, managing evacuations, and addressing immediate needs as communities dealt with the widespread effects of the flooding.

DR-868 | 05/26/1990

The planning area was struck by severe storms that included both high winds and heavy rainfall, leading to significant flooding and damage across the region. The intense storm system caused rivers and streams to rise, flooding residential and commercial areas and resulting in property damage. High winds contributed to structural damage to homes, businesses, and public infrastructure, while flooding compromised numerous roadways and bridges, making travel dangerous and limiting access for emergency services. The agricultural sector also faced losses, as fields were inundated with water, damaging crops. Emergency teams worked to assist affected residents, manage evacuations, and restore essential services amidst the widespread impact of the storm and flooding.

DR-443 | 06/24/1974

Severe storms and flooding struck the planning area, causing widespread damage to homes, businesses, and infrastructure. Heavy and prolonged rainfall led rivers and streams to overflow, inundating low-lying areas and resulting in significant property damage. Many roads and bridges were compromised or became impassable, disrupting transportation and complicating emergency response efforts. Residential neighborhoods and agricultural lands suffered, with crops damaged by floodwaters. Emergency services were mobilized to assist residents, manage evacuations, and restore access to critical areas as communities dealt with the immediate impacts of the flooding.



DR-386 | 05/23/1973

The planning area experienced severe storms that led to extensive flooding, causing significant damage to homes, businesses, and infrastructure. Heavy rainfall over an extended period caused rivers and streams to swell, resulting in widespread flooding in low-lying areas. Numerous roads and bridges were flooded or damaged, creating hazardous travel conditions and isolating parts of the community. Residential areas, commercial properties, and agricultural lands were affected, with floodwaters damaging buildings and crops. Emergency responders were deployed to assist residents, manage evacuations, and address critical needs as the community contended with the immediate effects of the flooding.

DR-348 | 08/18/1972

Severe thunderstorms brought intense rainfall, leading to flash flooding that affected numerous communities across the county. Low-lying areas experienced significant inundation, particularly near rivers and streams, resulting in substantial property damage to homes, businesses, and agricultural land. Transportation infrastructure, including several rural roads and bridges, suffered damage, disrupting local transportation and access to critical services for days. The floodwaters also impacted local utilities, with power outages reported in multiple areas, complicating response efforts. This disaster underscored the vulnerability of Johnson County's infrastructure to severe weather events and highlighted the need for improved flood mitigation strategies to protect against future flooding incidents.

DR-269 | 08/14/1969

severe storms brought heavy rainfall and flooding to the planning area, causing widespread damage to properties, infrastructure, and agricultural lands. The intense and sustained rainfall led rivers and streams to overflow, flooding low-lying areas and impacting homes, businesses, and farmland. Roads and bridges were submerged or damaged, disrupting transportation and complicating emergency response efforts. Residential and commercial properties suffered from water damage, while crops in flooded fields were destroyed, affecting the agricultural sector. Emergency services were mobilized to assist affected residents and restore access to essential services amid the immediate challenges posed by the flooding.

DR-193 | 04/22/1965

The planning area was impacted by severe storms that resulted in significant flooding. Heavy and prolonged rainfall caused rivers and streams to rise, leading to widespread flooding in low-lying areas. Residential neighborhoods, businesses, and agricultural lands were affected, with floodwaters causing substantial property and crop damage. Numerous roads and bridges were compromised, creating hazardous conditions and limiting accessibility for residents and emergency responders. The flooding led to widespread disruptions as emergency teams worked to assist residents, conduct evacuations, and address immediate needs across the impacted areas.

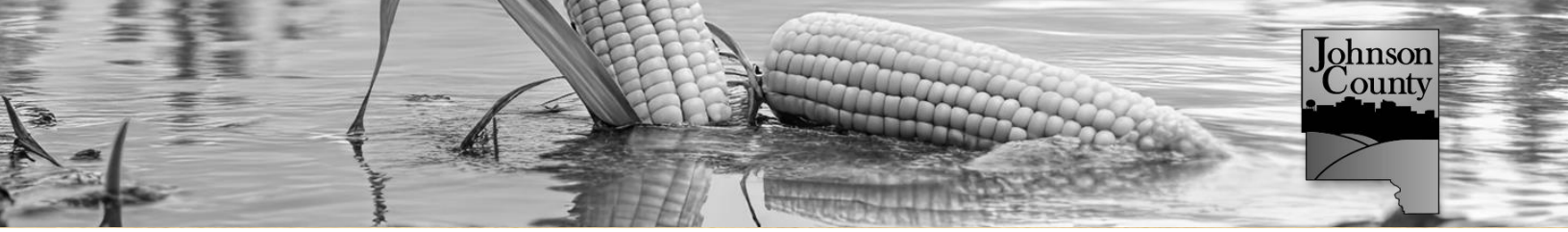
3.3.4 Severe Winter Storms

State Proclamation 2011-03 | 02/05/2011

The Iowa Disaster Proclamation issued on February 5, 2011, declared a state of disaster emergency for Johnson County in response to a severe winter weather system that began on January 31, 2011, and continued thereafter. This storm system produced blizzard conditions characterized by heavy snowfall, high winds, and dangerously low temperatures. The hazardous weather resulted in significant impacts on the county, including disruptions to transportation, challenges in maintaining critical infrastructure, and risks to public safety. Local officials reported the need for state assistance to support recovery and response efforts. The proclamation authorized state agencies to provide necessary goods and aid to assist Johnson County in addressing the immediate impacts of the winter storm and mitigating further risks to the community.

DR-1737 | 01/04/2008

The planning area experienced a severe ice storm that caused widespread disruptions and damage. Heavy ice accumulation on trees, power lines, and structures led to extensive power outages as lines snapped and utility poles were damaged. Many roads became hazardous due to ice, resulting in dangerous travel conditions and increased accidents. The weight of the ice caused tree limbs to break, which added to infrastructure damage and obstructed roadways. Emergency response teams worked to restore power, clear roads, and assist residents impacted by the cold temperatures and lack of electricity, while utility crews faced challenging conditions to repair the extensive damage to the power grid.



3.3.5 Hurricane

EM-3239 | 09/10/2005

EM-3239 was an emergency declaration issued in 2005 in response to the widespread impacts of Hurricane Katrina. While the planning area was not directly affected by the hurricane, the declaration provided support for state efforts to assist evacuees displaced by the disaster.

In the planning area, as in other parts of Iowa, local agencies and communities played a significant role in accommodating evacuees who relocated from the Gulf Coast. Local authorities, in coordination with state and federal agencies, provided temporary housing, food, medical care, and other essential services to those displaced by the hurricane. The planning area utilized community resources to assist with logistics, including setting up shelters and arranging transportation for evacuees.

The emergency declaration enabled federal resources to support these efforts, ensuring that the planning area had the financial and logistical assistance necessary to care for evacuees. Federal aid helped cover the costs of providing essential services, including housing and medical care, which were critical in managing the needs of evacuees during this period and providing stability while recovery efforts continued in areas directly impacted by Hurricane Katrina.

3.3.6 Tornado

DR-240 | 05/29/1968

A powerful tornado struck the planning area, causing significant damage to homes, businesses, and infrastructure. The tornado's strong winds destroyed or severely damaged buildings, uprooted trees, and downed power lines, leading to widespread power outages. Residential neighborhoods were heavily affected, with many homes sustaining structural damage or being completely leveled. Roads were obstructed by debris, complicating emergency response efforts and limiting accessibility for residents. The agricultural sector also suffered as crops and farm structures were damaged. Emergency responders worked to assist those affected, conduct search and rescue operations, and clear debris to restore access and essential services to impacted areas.

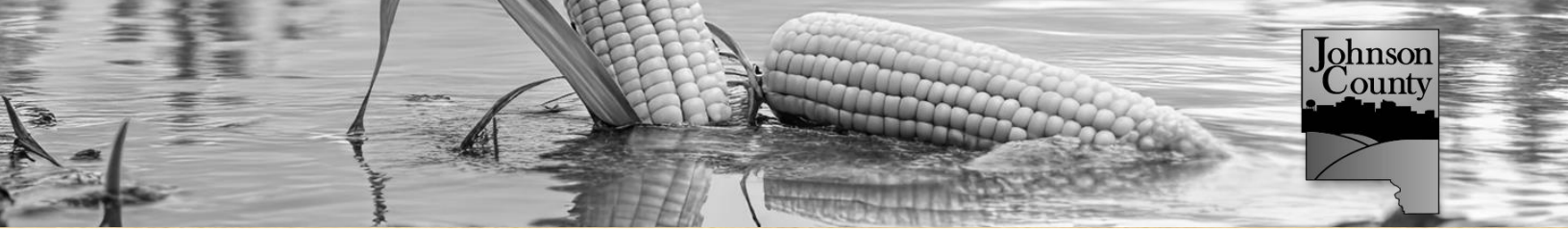
3.4 Risk Assessment

3.4.1 Hazard Profiles

Element Addressed in Section
Element B1. Does the plan include a description of the type, location and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i)), including requirement **B1-b, B1-c, B1-e, and B1-f.** **Element B2.** Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii)), including requirements, **B2-a and B2-b.**

The hazard profiles in this section consist of the following elements:

- **Description:** A general overview of the hazard being considered.
- **Location/Extent:** Discuss what parts of the planning area are most likely to be impacted by the hazard.
- **Magnitude/Severity:** Summarizes the anticipated magnitude and severity of a hazard incident based mainly on past occurrences and specific aspects of the planning area. It also factors in the speed of onset and duration. Calculated and assessed using the incident of record, which represents an anticipated worst-case scenario or common occurrence.
- **Past Occurrences:** Overview history of the hazard's occurrences, complied from multiple data sources, to include information provided by the planning team and the public. Significant incidents are profiled in greater detail and include scope, severity, and magnitude, and known impacts.
- **Likelihood of Future Occurrences:** Estimates the likelihood or probability of future occurrences of the hazard. Note that while the frequency of natural hazards can generally be estimated based on past data and best available science, estimating the frequency of many human-caused hazards is much more speculative due to the generally smaller number of incidents and uncertainty around attacker capabilities and intensions. The identified probabilities are not quantified but rather built on history. If it has happened before, it will most likely occur again. If it hasn't happened locally, the chance of it occurring lessons unless the hazard is becoming more prevalent across the Nation.
- **Climate Change Considerations:** Discusses how the projected impacts of climate change may affect the likelihood and severity of the hazard in the future.



- **Vulnerability:** Analysis of potential impacts on the following categories in the planning area: people, economy, built environment, and general property (including critical infrastructure), historical, cultural, and natural environment, future land use and development (how projected trends in land use, and development have the potential to increase or decrease the impact of the hazard).
- **Consequence Summary:** Summarizes the key consequences of the hazard and its impact on the public; the economic condition of the planning area; historical, natural, and cultural environment; build environment, general property, and critical infrastructure; public confidence in government; continuity of operations including continued delivery of government services; and cascading hazards.

3.4.2 Animal/Plant/Crop Disease

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
1.92	1.42	1.17	1.50	7.85

3.4.2.1 Description

An Animal/Plant/Crop Disease disaster hazard occurs when infectious diseases or invasive pests spread through livestock, crops, or plant populations, leading to severe economic, environmental, and public health consequences. These hazards can originate from viruses, bacteria, fungi, parasites, or non-native species that disrupt natural ecosystems and agricultural production.

Animal disease hazards involve outbreaks in livestock, such as foot-and-mouth disease or avian influenza, which can decimate animal populations. In extreme cases, widespread culling of infected or at-risk animals is necessary to prevent further spread. These outbreaks not only threaten food supplies but can also lead to significant economic losses for farmers and ranchers. Additionally, some diseases, known as zoonotic diseases, can spread from animals to humans, further complicating disaster response efforts and creating public health risks.

On the plant and crop side, crop diseases such as wheat rust or citrus greening can severely reduce agricultural yields, resulting in higher food prices and food insecurity. Invasive species and pests, such as the emerald ash borer or gypsy moth, can damage forests, crops, and plant life, often requiring expensive pest management and control measures. These diseases and pests can spread rapidly, particularly in areas with large monocultures, making prevention and containment critical.

The economic and environmental impacts of these disease hazards are substantial. They include not only the immediate loss of production but also long-term damage to ecosystems and biodiversity. Preventative measures, such as monitoring systems, quarantine protocols, vaccination programs, and the development of disease-resistant crops, are essential to managing these hazards. International cooperation is also crucial in mitigating the spread of highly contagious diseases across borders, with global organizations like the World Organization for Animal Health (OIE) and the Food and Agriculture Organization (FAO) coordinating efforts to combat these threats.

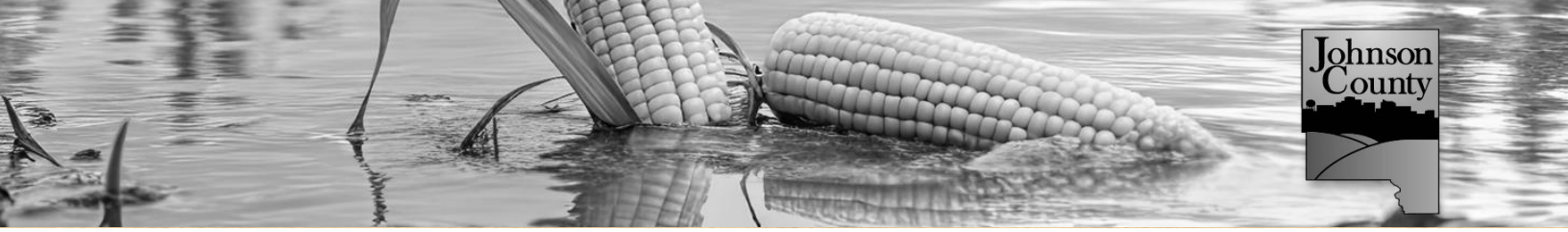
Overall, animal, plant, and crop disease hazards require proactive measures to prevent outbreaks, rapid response when they occur, and long-term strategies to protect the environment and food supply from future threats.

3.4.2.2 Location

In Johnson County, Iowa, the areas most susceptible to animal, plant, and crop diseases are primarily the agricultural zones and regions with intensive farming activities. Farms cultivating monoculture crops, such as corn and soybeans, are at higher risk due to the lack of crop diversity, which can allow diseases to spread more easily. Livestock operations with high concentrations of animals, like cattle, swine, and poultry farms, are also vulnerable to disease outbreaks, including avian influenza and bovine tuberculosis, as close quarters can accelerate disease transmission. Additionally, areas near rivers, lakes, and wetlands may face increased risks due to the presence of wildlife that can serve as disease vectors, potentially introducing pathogens to domestic animals and crops. Zones where urban development meets agricultural land may experience higher susceptibility as well, as increased human activity in these areas can introduce invasive species and pathogens that impact both plants and animals. To mitigate these risks, biosecurity measures, crop diversification, and careful monitoring of wildlife interactions are essential across the county.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable



3.4.2.3 Magnitude/Severity

The magnitude and severity of an animal, plant, or crop disease disaster hazard in the planning area, is determined by several key factors, starting with the spread rate and geographic range of the disease. A disease that rapidly spreads over large areas, affecting multiple farms or ecosystems, is considered higher in magnitude. Effective containment through biosecurity measures and quarantines can reduce the severity. Additionally, the virulence and mortality rate of the disease are critical in measuring severity. Highly virulent diseases that result in mass culling of livestock or the loss of crop yields lead to more severe impacts due to their direct effect on agricultural productivity. The mortality rate in affected animals or plants also plays a role, with higher mortality correlating to a higher severity rating.

The economic losses associated with the disease are another key indicator of severity. This includes both the direct loss of crops and livestock and the broader indirect costs such as market disruptions, trade restrictions, and recovery efforts. The longer an outbreak persists, particularly across growing seasons or livestock cycles, the more severe its impact. The difficulty of intervention also influences severity, as delays in implementing vaccines, pest control, or quarantines can lead to greater spread and damage. Finally, public health and environmental impacts must be considered, particularly with zoonotic diseases that pose risks to humans. Long-term environmental degradation, such as the loss of biodiversity, can also elevate the hazard's severity, affecting both agricultural output and ecosystem health.

The following is a severity chart used to assess the impact and intensity of an animal, plant, or crop disease disaster hazard in the planning area. This chart categorizes the magnitude of a hazard based on key factors such as the spread and geographic range of the disease, mortality rates, economic losses, and the effectiveness of intervention measures. These severity levels are determined by analyzing historical data and potential risks, using guidelines provided by agencies like FEMA, the USDA, and local resources such as the Johnson County Hazard Mitigation Plan. By evaluating the financial toll on the agricultural sector, public health risks (particularly with zoonotic diseases), and the effectiveness of containment efforts, this chart helps authorities prioritize responses and allocate resources accordingly.

Severity Levels
Moderate – Localized outbreaks affecting a limited number of farms, with manageable losses through containment measures, quarantine, and treatment.

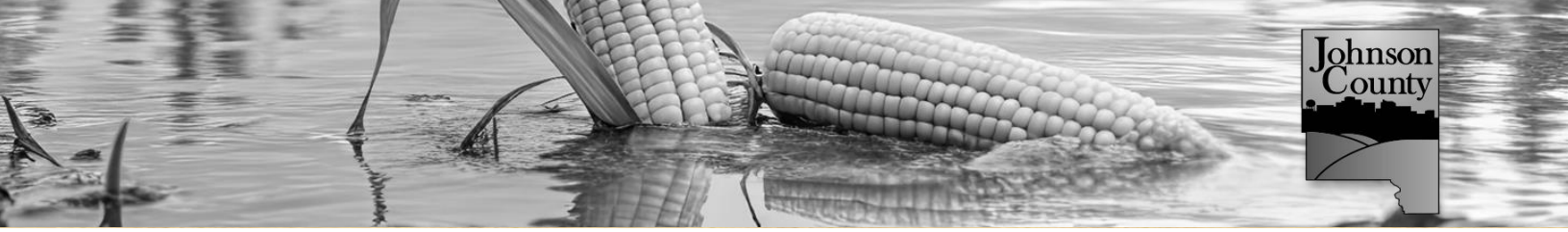
Severity Levels
High – Widespread disease affecting large portions of the planning area's agricultural production, requiring extensive mitigation efforts, culling, or crop destruction, and possibly resulting in significant economic losses and environmental damage. **Catastrophic** – A rapid, uncontrollable spread of disease that devastates livestock or crop production across the county, leading to long-term economic, environmental, and public health challenges. This could include prolonged food supply disruptions, substantial government intervention, and possibly a declaration of a national disaster.

3.4.2.4 Past Occurrences

Here are some examples of past occurrences of animal, plant, or crop disease hazards in Johnson County, Iowa, and the region, including impacts on the planning area:

- 2015 Avian Influenza Outbreak: In 2015, Iowa experienced a severe outbreak of Highly Pathogenic Avian Influenza (HPAI), leading to the culling of over 34 million birds. This outbreak caused significant economic losses and disrupted the poultry industry.
- 2018 Tar Spot in Corn: Tar spot, a fungal disease affecting corn, was first identified in Iowa in 2018. By 2019, it had spread to 59 counties, primarily in the northeast, east-central, and central regions, impacting crop yields and quality.
- 2022 Avian Influenza Resurgence: In 2022, HPAI resurfaced in Iowa, affecting nearly 13.7 million birds across the state. This outbreak led to increased biosecurity measures and had significant economic repercussions for the poultry industry.
- 2024 H5N1 Outbreak in Dairy Cows: In 2024, the H5N1 avian influenza virus was detected in dairy cows in Iowa and other Midwestern states, marking an unusual cross-species transmission. This outbreak raised concerns about animal health and potential human health implications.

Examining past occurrences of animal, plant, and crop disease outbreaks provides valuable insights for the planning area, allowing for improved preparedness and response strategies. While the incidents listed may not have all directly impacted the planning area, each case offers lessons in containment, biosecurity, and economic resilience. Reviewing these events helps identify patterns in disease spread, assess vulnerabilities in agricultural practices, and establish protocols that reduce the risk of future outbreaks. By understanding the impacts and responses to these diseases regionally, the planning area can better prepare to mitigate similar threats, ensuring stronger defenses against potential economic and environmental consequences.



3.4.2.5 Likelihood of Future Occurrence

Given Johnson County's significant agricultural activities, the likelihood of future occurrences of animal, plant, and crop diseases is considerable. Historically, Iowa has faced multiple outbreaks, such as the 2015 and 2022 avian influenza incidents, which led to substantial economic losses and highlighted the vulnerability of the state's poultry industry. Additionally, the detection of the H5N1 avian influenza virus in dairy cows in 2024 underscores the potential for cross-species disease transmission, raising concerns about animal health and public safety. These events suggest that Johnson County, with its extensive livestock and crop production, remains at risk for similar outbreaks. Continuous monitoring, stringent biosecurity measures, and proactive disease management strategies are essential to mitigate these risks and protect the county's agricultural sector.

3.4.2.6 Climate Change Considerations

Climate change considerations for animal, plant, and crop diseases are generally limited, as this hazard does not directly stem from natural processes. However, climate change can indirectly influence the prevalence and distribution of pathogens, pests, and diseases affecting agriculture. Warmer temperatures, altered precipitation patterns, and increased extreme weather events may create conditions that favor the spread of certain diseases or pests. For instance, milder winters can allow pests to survive in larger numbers, while wetter conditions could promote the growth of fungal pathogens. While climate change may not be a primary factor in the emergence of animal, plant, or crop diseases, these indirect influences could increase the likelihood of certain disease outbreaks, warranting consideration in long-term agricultural planning.

3.4.2.7 Vulnerability

People

If an outbreak of animal, plant, or crop disease were to occur in Johnson County, Iowa, it could significantly impact residents, particularly those in agriculture or reliant on local food resources. Farmers and livestock producers would face immediate economic hardship due to potential loss of livestock, reduced crop yields, or mandatory culling and crop destruction to control disease spread. Vulnerable and underserved populations, including low-income households (16.9% of the county's population), may struggle with rising food prices and decreased access to fresh, local produce, exacerbating food insecurity. Households without reliable transportation (6.1%) or those living in rental

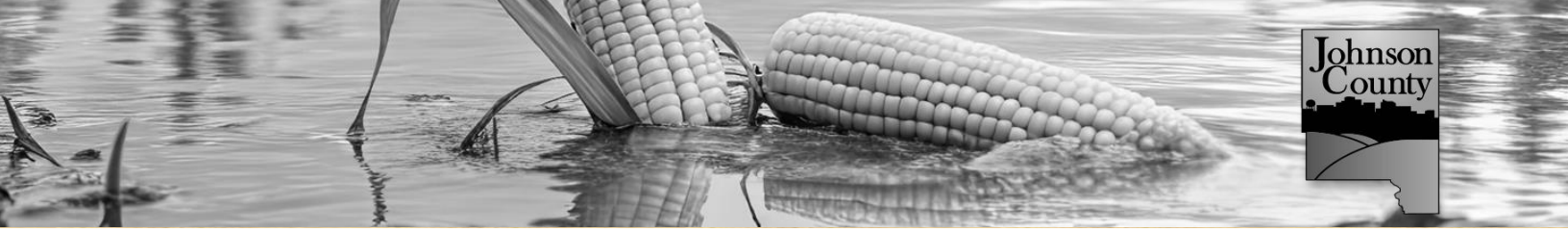
housing with limited storage for bulk food purchases may experience greater difficulties in adjusting to food supply disruptions.

Public health concerns would be particularly acute in cases where zoonotic diseases emerge, necessitating swift intervention and preventative measures. Vulnerable populations, such as older adults (9.6% aged 65 and older) and individuals with disabilities (7.1%), could face heightened risks due to weakened immune responses and challenges in accessing healthcare services. Limited English proficiency among some residents (4.4%) could create barriers in receiving timely health advisories and disease prevention guidance, increasing exposure risks. Additionally, workers in low-wage agricultural or food service jobs may experience job loss or financial strain if industry operations are affected, disproportionately impacting historically marginalized communities.

The broader population could experience secondary effects, such as increased demand on local food banks and social services due to financial strain on households affected by supply chain disruptions. Veterinary and agricultural support services may be overwhelmed, reducing response capacity for smaller producers and those with limited resources. The economic and social stress of an outbreak may contribute to increased mental health challenges, particularly for vulnerable and underserved populations already facing financial or food access barriers.

Economy

An outbreak of animal, plant, or crop disease in Johnson County, Iowa, would have a substantial economic impact, particularly due to the county's reliance on agriculture as a key economic sector. If livestock or crops are affected, local farmers may experience significant financial losses from reduced productivity, mandatory culling, or crop destruction. This could lead to a ripple effect across the economy, impacting suppliers, processors, and local markets dependent on agricultural goods. With reduced output, prices for affected products may increase, impacting both local businesses and consumers. Additionally, job losses could occur in sectors tied to agriculture, and decreased export potential could strain economic growth. Overall, the financial burden on the agricultural community could extend to the broader county economy, underscoring the importance of robust disease prevention and biosecurity measures to protect economic stability.



Built Environment

General Property

If an animal, plant, or crop disease outbreak were to occur in Johnson County, Iowa, property values, particularly for agricultural land, could be negatively impacted. Farmland that experiences a loss in productivity due to disease may be seen as less valuable, especially if outbreaks persist over time or if specific lands become known for recurring issues. Properties used for livestock or crop production could face decreased demand, as potential buyers may view them as higher-risk investments. Furthermore, if restrictive measures or quarantines are imposed, it could deter land use or development in certain areas, impacting land desirability. While the effect on residential property values might be minimal, any prolonged impact on agricultural properties could alter the broader property market, especially in rural and farm-intensive zones.

Critical Infrastructure

An outbreak of animal, plant, or crop disease in Johnson County, Iowa, could indirectly impact critical infrastructure, particularly those linked to agriculture and food supply. For example, transportation networks used to move livestock or crops might face disruptions if quarantine zones are established, limiting the movement of goods and potentially impacting local supply chains. Facilities involved in food processing, storage, and distribution may experience operational strains due to restricted access to agricultural inputs or increased biosecurity measures. Veterinary services, laboratories, and agricultural support services could become overwhelmed, affecting their ability to maintain regular operations. Additionally, if the outbreak leads to a need for increased sanitation, disinfection, or disposal of diseased livestock or plants, waste management facilities may experience higher demand. These pressures on critical infrastructure emphasize the importance of a robust response plan to minimize service disruptions and protect essential agricultural support systems.

Historical, Cultural, and Natural Environment

An outbreak of animal, plant, or crop disease in Johnson County, Iowa, could have notable impacts on the county's historical, cultural, and natural environment. The 1876 Coralville Schoolhouse Museum and Heritage Museum of Johnson County showcase the region's agricultural heritage, which could be affected if traditional livestock breeds or heirloom crop varieties are lost due to disease. Such losses may alter long-standing farming practices that have been integral to the community's identity for generations.

In terms of the natural environment, Hickory Hill Park and the Hawkeye Wildlife Management Area could experience disruptions if invasive pathogens spread beyond farmland, impacting native plant species and local wildlife habitats. Additionally, disease control measures such as culling livestock or applying chemical treatments might affect biodiversity in these protected areas, harming species that depend on agricultural landscapes for survival.

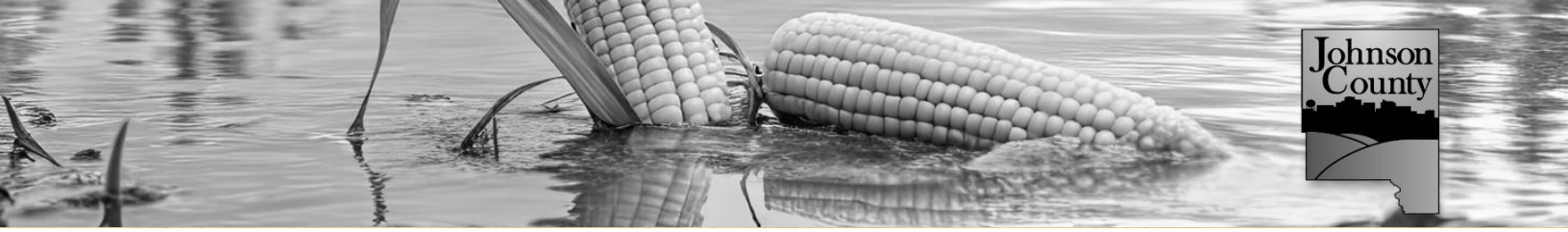
From a cultural perspective, community events like the Johnson County Fair, which highlights local agriculture, could be disrupted if livestock participation is restricted or if crop-related events are limited due to biosecurity concerns. Preserving the historical and cultural ties to agriculture while minimizing ecological harm would be a crucial part of the county's response, requiring a balance between disease management and protecting the region's environmental and cultural assets.

Future Land Use and Development

If an outbreak of animal, plant, or crop disease were to occur in Johnson County, Iowa, it could influence future land use and development, particularly in agricultural areas. Farmland heavily affected by disease may become less desirable for traditional agriculture, leading landowners to consider alternative uses, such as shifting from livestock or high-risk crops to less disease-prone farming practices, organic farming, or even non-agricultural development. Additionally, if biosecurity concerns persist, new zoning regulations or land-use restrictions might be introduced to prevent future outbreaks, which could limit certain agricultural operations. This could also lead to increased interest in buffer zones or controlled spaces between agricultural and residential areas to reduce disease spread. As a result, long-term planning may prioritize disease resilience in land-use policies, potentially altering the landscape of agriculture and rural development in the county.

3.4.2.8 Consequence Summary

An outbreak of animal, plant, or crop disease in Johnson County, Iowa, would have wide-reaching consequences across multiple aspects of the community. Economically, it could lead to significant financial losses for farmers, disruptions in the local food supply, and increased prices for agricultural products. For residents, the outbreak could impact public health if zoonotic diseases are involved and create additional financial burdens due to rising food costs. The county's agricultural heritage might be affected, as traditional farming practices face challenges, and the natural environment could see disruptions if disease control measures harm local ecosystems. Additionally, critical infrastructure tied to agriculture, such as transportation and processing facilities, may



experience strains, and future land use might shift as biosecurity concerns influence development plans. Overall, the community would face both immediate and lasting impacts, highlighting the need for robust prevention and response strategies.

Category	Narrative
Impact on the Public	• Health risk if zoonotic diseases spread to humans • Increased anxiety and stress due to economic uncertainty and public health concerns • Potential disruption to daily life if quarantine or movement restrictions are imposed
Impact on the Economic Condition of the Planning Area	• Loss of agricultural productivity, leading to financial strain on farmers and related industries • Job losses in the agricultural sector, which could ripple through local businesses and services • Reduced tax revenue from the agricultural sector, affecting public finances and services
Impact on the Historical, Cultural, and Natural Environment	• Indirect effects on the funding and maintenance of historical and cultural sites due to economic downturns • Damage to natural ecosystems and biodiversity, especially if invasive species or crop diseases spread • Alteration of the rural landscape, impacting the planning area's visual and environmental identity
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values, particularly in agricultural areas, as land becomes less productive. • Increased strain on waste management systems due to the disposal of diseased animals or crops. • Limited impact on physical infrastructure, though logistical strains may arise in transportation and communication systems.
Impact on the Public Confidence in Government	• Loss of trust in local or state government if disease containment measures are seen as ineffective or slow. • Increased scrutiny on government responses, potentially leading to political and social unrest.
Impact on Responders	• Health risks for responders involved in managing the outbreak, especially if zoonotic diseases are present. • Increased workload and pressure on local emergency services, healthcare, and agricultural authorities.
Impact on continuity of operations, including continued delivery of government services	• Redirection of resources toward outbreak management, potentially delaying other public services. • Disruption of normal government operations if widespread quarantines or public health emergencies are declared.

Category	Narrative
Cascading hazards	• Food shortages and price hikes, impacting local food security and leading to broader economic challenges. • Trade restrictions on affected crops or livestock, potentially leading to long-term economic repercussions. • Environmental degradation if disease spreads to natural habitats, causing loss of biodiversity and altering ecosystems.

3.4.3 Communicable Disease Outbreak

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.00	2.67	1.33	2.25	12.50

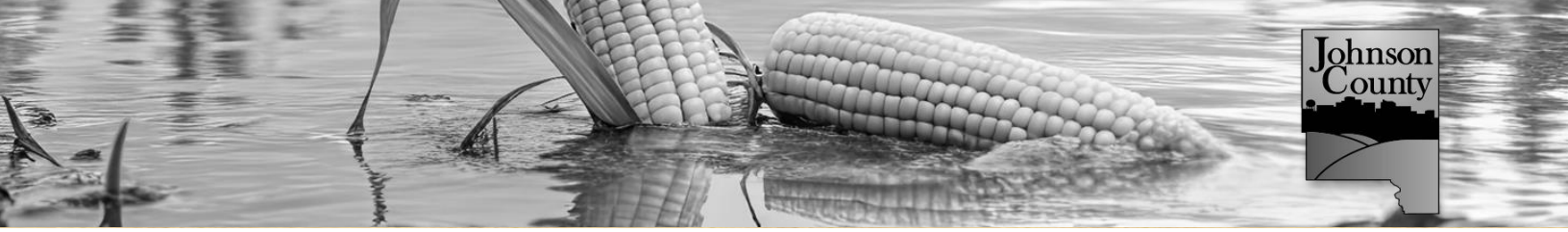
3.4.3.1 Description

The scale of a communicable disease outbreak or biological incident is described by the extent of the spread of the disease in the community. An outbreak can be classified as an endemic, an epidemic, or a pandemic depending on the prevalence of the disease locally and around the world.

- **Endemic:** Something that is natural to or characteristic of a particular place, population, or climate. For example, threadworm infections are endemic in the tropics.
- **Epidemic:** A disease that spreads rapidly through a demographic segment of the human population, such as everyone in a given geographic area, a similar population unit, or everyone of a certain age or sex, such as the children or women of a region.
- **Pandemic:** Widespread epidemic with effects felt worldwide.

Many potentially devastating diseases are spread through physical contact, ingestion, insects, and inhalation. Airborne diseases and those spread through physical contact pose higher risks to the community because they are difficult to control. Diseases such as influenza, Pertussis, Tuberculosis, and Meningitis are all spread through these methods and pose a threat to all communities. Health agencies closely monitor for diseases with the potential to cause an epidemic and seek to develop and promote immunizations.

A pandemic is a global disease outbreak. Pandemic flu is a human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity and for which there is



no vaccine. This disease could spread easily from person to person, causing serious illness, and can sweep across the country and around the world in a very short time. The Centers for Disease Control and Prevention (CDC) has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation.

An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines.

Pandemics are generally thought to be the result of a novel strain of viruses. Because of the process utilized to prepare vaccines, it is impossible to have vaccines pre-prepared to combat pandemics. Additionally, for novel viruses, identification of symptoms, mode of transmission, and testing/identification may require development, causing significant delays in response actions. A portion of the human and financial cost of a pandemic is related to the lag time to prepare a vaccine to prevent the future spread of the novel virus. In some cases, current vaccines may have limited activity against novel strains. Regardless of strong or weak local healthcare systems, disease outbreaks can strain and overwhelm community resources if there is a significant outbreak. Area vulnerable populations, young children, the elderly, under-resourced households, and those with underlying health conditions will be the hardest hit during any disease outbreak.

3.4.3.2 Location

In Johnson County, Iowa, specific areas are more susceptible to communicable disease outbreaks due to factors such as population density, communal living arrangements, and frequent social interactions. Urban centers like Iowa City, which host large populations and institutions such as the University of Iowa, are particularly vulnerable. The university environment, with dense student housing and frequent gatherings, can facilitate the rapid spread of illnesses. Additionally, healthcare facilities, including hospitals and long-term care centers, face higher risks due to the concentration of individuals with varying health conditions and the potential for healthcare-associated infections. Schools, from primary to secondary education levels, are also susceptible, as close contact among students in classrooms, cafeterias, and extracurricular activities creates an environment conducive to disease transmission. Communal living settings, such as nursing homes and correctional facilities, present increased susceptibility due to close quarters and shared amenities. While rural areas are less densely populated, they may face challenges in accessing healthcare services promptly, which can affect disease management and

containment. Overall, areas with high population density, communal living situations, schools, and frequent social interactions are most at risk for communicable disease outbreaks in Johnson County.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

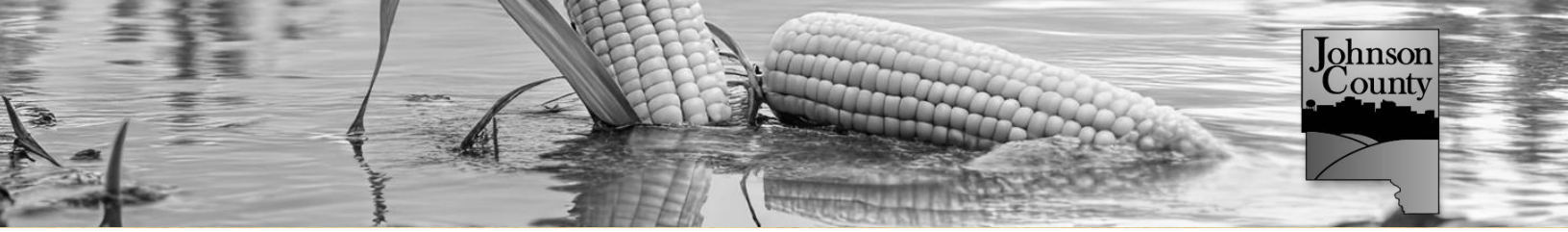
Applicable Not Applicable

3.4.3.3 Magnitude/Severity

The magnitude of a disease outbreak or public health emergency will vary significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is more easily transmitted from person to person, but advances in medical technologies have significantly reduced the number of deaths caused by influenza over time.

Today, a much more significant percentage of the world's population is clustered in cities, making them ideal breeding grounds for epidemics. Additionally, the explosive growth in air travel means a virus could spread around the globe within hours, quickly creating a pandemic. Under such conditions, there may be very little warning time. Most experts believe we will have just one to six months between the time that a dangerous new influenza strain is identified and the time that outbreaks begin to occur in the United States. Outbreaks are expected to coincide throughout much of the nation, preventing shifts in human and material resources that normally occur with other natural disasters. Unlike most other public health emergencies or community disasters, these and many other aspects make the influenza pandemic. Pandemics typically last for several months to 1-2 years.

As seen with the recent COVID-19 pandemic, which impacted the planning area, the rapid spread of the virus combined with the need for increased hospital and coroner resources, testing centers, first responders, and vaccination administration sites caused significant strain on medical systems and public health departments.



The Pandemic Intervals Framework (PIF) is a six-phased approach to defining the progression of an influenza pandemic. This framework guides influenza pandemic planning and provides risk assessment, decision-making, and action recommendations. These intervals provide a common method to describe pandemic activity, which can inform public health actions. The duration of each pandemic interval might vary depending on the characteristics of the virus and the public health response.

The six-phase approach was designed to easily incorporate recommendations into existing national and local preparedness and response plans. Phases 1 through 3 correlates with preparedness in the pre-pandemic interval, including capacity development and response planning activities, while Phases 4 through 6 signal the need for response and mitigation efforts during the pandemic interval.

Pre-Pandemic Interval
Phase 1 – The natural state in which influenza viruses circulate continuously among animals (primarily birds) but do not impact humans. **Phase 2** – Animal influenza virus circulating among domesticated or wild animals is known to have caused human infection and is thus considered a potential pandemic threat. Phase 2 involves cases of animal influenza that have circulated among domesticated or wild animals and have caused specific cases of infection among humans. **Phase 3** – Animal or human-animal influenza virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. Limited transmission under these circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic. Phase 3 represents the mutation of the animal influenza virus in humans so that it can be transmitted to other humans under certain circumstances (usually very close contact between individuals). At this point, small clusters of infection have occurred.

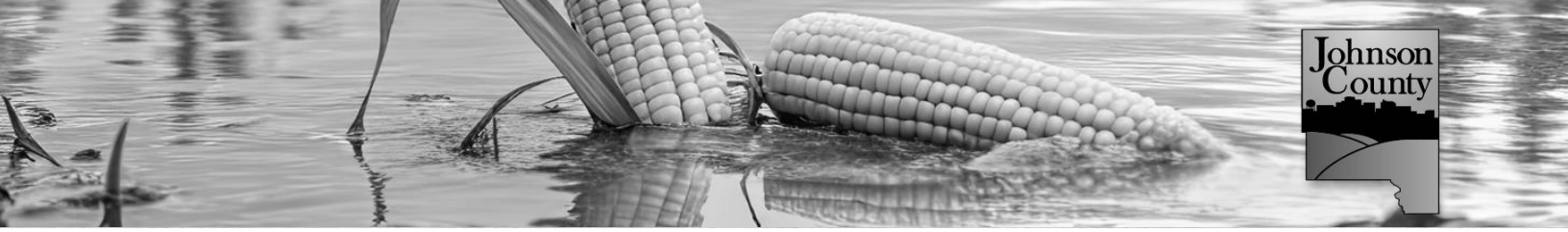
Pandemic Interval
Phase 4 – Characterized by verified human-to-human transmission of the virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upward shift in the risk for a pandemic. Phase 4 involves community-wide outbreaks as the virus continues to mutate and become more easily transmitted between people (for example, transmission through the air) **Phase 5** – Characterized by verified human-to-human spread of the virus into at least two countries in one World Health Organization (WHO) region. While most countries will not

Pandemic Interval
be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short. Phase 5 represents human-to-human transmission of the virus in at least two countries. **Phase 6** – The pandemic phase, is characterized by community-level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is underway. Phase 6 is the pandemic phase, characterized by community-level influenza outbreaks.

3.4.3.4 Past Occurrences

Since the early 1900s, five lethal pandemics have swept the globe:

- 1918-1919 Spanish Flu: The Spanish Flue was the most severe pandemic in recent history. The number of deaths was estimated to be 50-100 million worldwide and 675,000 in the United States. Its primary victims were mostly young, healthy adults. At one point, more than 10% of the American workforce was bedridden.
- 1957-1958 Asian Flu: The 1957 Asian Flu pandemic killed 1.1 million people worldwide, including about 70,000 people in the United States, mostly the elderly and chronically ill. Fortunately, the virus was quickly identified, and vaccine production began in May 1957.
- 1968-1969 H3N2 Hong Kong Flu: The 1968 Hong Kong Flu pandemic killed one million people worldwide and approximately 100,000 people in the United States. Again, the elderly were more severely affected. This pandemic peaked during school holidays in December, limiting student-related infections, which may have kept the number of infections down. Also, people infected by the Asian Flu ten years earlier may have gained some resistance to the new virus.
- 2009-2010 H1N1 Swine Flu: This influenza pandemic emerged from Mexico in early 2009 and was declared a public health emergency in the US on April 26. By June, approximately 18,000 cases had been reported in the US and the virus had spread to 74 countries. Most cases were fairly mild, with symptoms similar to the seasonal flu, but there were cases of severe disease requiring hospitalization and a number of deaths. The CDC estimates that 43-89 million people were infected worldwide, with an estimated 8,870 to 18,300 H1N1 related deaths, including 12,469 deaths in the United States.
- 2020-2024 COVID-19: The COVID-19 or novel corona virus was detected in December 2019 and was declared a pandemic in March of 2020. As of August 18, 2024, more than 775 million cases have been reported around the world with over



7 million deaths, including approximately 103 million cases and 1.2 million deaths in the US.

Reviewing past occurrences of communicable disease outbreaks provides valuable insights that help the planning area improve preparedness for future incidents. While the specific cases may not always be localized to Johnson County, analyzing these events offers lessons in effective containment strategies, public health communication, and resource allocation. By examining trends and outcomes from these incidents, the planning area can identify vulnerable populations, assess gaps in healthcare infrastructure, and strengthen response protocols to reduce the spread and impact of future outbreaks. This proactive approach to understanding communicable disease threats enhances the community's ability to respond swiftly and effectively, protecting public health and minimizing disruption.

Over the past five years, Johnson County, Iowa, has seen several communicable diseases reported with notable frequency. According to the Johnson County Public Health Department, chlamydia has been one of the most commonly reported infections, affecting individuals across various age groups. Gonorrhea, another sexually transmitted infection, is frequently reported as well. Campylobacteriosis, a bacterial infection often resulting from the consumption of contaminated food or water, has also been common in the area, along with salmonellosis, which is typically linked to contaminated food products. Additionally, hepatitis C, a viral infection affecting the liver, has been reported across various demographics. These diseases have been consistently monitored by local health authorities, who work to mitigate their impact on the community.

3.4.3.5 Likelihood of Future Occurrence

Communicable disease outbreaks pose a significant risk to Johnson County, Iowa, based on local, regional, and state data. The county's Public Health Department actively monitors and investigates reportable diseases such as tuberculosis, hepatitis, and sexually transmitted infections to control their spread. The interconnectedness of communities, coupled with population mobility, increases the likelihood of future communicable disease occurrences, as pathogens can spread quickly within densely populated areas, schools, and communal living settings. Continuous vigilance, public education, and a strong healthcare infrastructure are essential to mitigating the impact of such outbreaks. Given these factors, the probability of communicable disease outbreaks occurring in Johnson County remains a concern that requires ongoing preventive efforts.

3.4.3.6 Climate Change Considerations

Climate change considerations for communicable disease outbreaks are generally limited, as this hazard does not directly stem from natural environmental changes. However, climate change may indirectly affect the prevalence and distribution of certain communicable diseases by altering environmental conditions that impact pathogen survival and spread. Warmer temperatures and changes in humidity can create conditions favorable for certain viruses and bacteria, potentially extending the transmission seasons for some diseases. Additionally, increased frequency of extreme weather events may disrupt healthcare access and sanitation, indirectly affecting disease containment efforts. While climate change may not be a primary driver of communicable diseases, these indirect influences could increase the likelihood or intensity of outbreaks, warranting consideration in long-term public health planning.

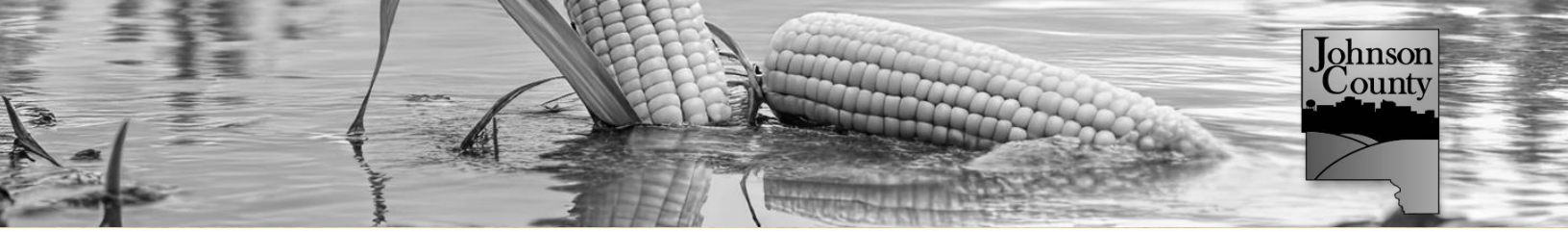
3.4.3.7 Vulnerability

People

If a communicable disease outbreak were to occur in Johnson County, Iowa, it could significantly impact the local population, with vulnerable and underserved populations facing heightened risks. Residents may experience health complications, with older adults (9.6% aged 65 and older), young children, and individuals with preexisting health conditions at greater risk for severe illness. Those without health insurance (3.5%) or with limited access to healthcare services may experience delays in receiving medical care, exacerbating health outcomes. Overburdened hospitals and clinics could struggle to meet demand, particularly for individuals with disabilities (7.1%) or chronic illnesses who rely on regular medical treatment.

Quarantine measures or movement restrictions might be implemented to contain the disease, disrupting daily life, work, and education. Low-income households (16.9%) and individuals in service industry jobs with limited sick leave may face financial strain due to lost wages or inability to work remotely. School closures could disproportionately affect children from underserved families who rely on school-based meal programs and have limited access to digital learning resources. Households without reliable internet access or those in overcrowded housing situations may face greater difficulties in adapting to remote work or virtual schooling.

Mental health impacts may be particularly severe, as social isolation, financial stress, and uncertainty contribute to increased anxiety and depression. Underserved populations, including non-English speakers (4.4%), may encounter barriers in accessing timely and



accurate health information, further increasing risk exposure. The strain on public health infrastructure, combined with economic disruptions and social stressors, would compound the challenges faced by vulnerable communities, deepening existing disparities in health outcomes across Johnson County.

Economy

A communicable disease outbreak in Johnson County, Iowa, could have notable economic impacts. Increased healthcare demand would place financial strain on local hospitals, clinics, and public health services, potentially requiring additional resources and staffing to manage the surge in patients. Businesses, particularly those reliant on in-person interactions, could suffer from workforce shortages due to illness or quarantine measures, reducing productivity and, in some cases, leading to temporary closures. The education sector might also be affected, with schools facing costs related to enhanced sanitation, potential closures, and shifts to remote learning. Local businesses in hospitality, retail, and service industries could see decreased customer traffic, impacting revenue. The overall economic burden could extend to the broader community as healthcare costs rise, supply chains face disruptions, and consumer spending slows, particularly if residents prioritize essential goods over discretionary purchases during the outbreak.

Built Environment

General Property

If a communicable disease outbreak were to occur in Johnson County, Iowa, the impact on property values would likely be minimal in most cases but could vary depending on the outbreak's duration and severity. Short-term outbreaks may have little to no impact on property values, as the effects would be largely contained within healthcare and economic sectors. However, if the outbreak is prolonged or leads to significant economic disruption, it could affect property demand, particularly in densely populated or high-traffic areas. In such cases, commercial properties, especially those reliant on public foot traffic, might experience reduced demand, potentially lowering their value. Residential property values may remain relatively stable, but long-term changes in population density preferences or shifts toward remote work environments could influence market dynamics over time.

Critical Infrastructure

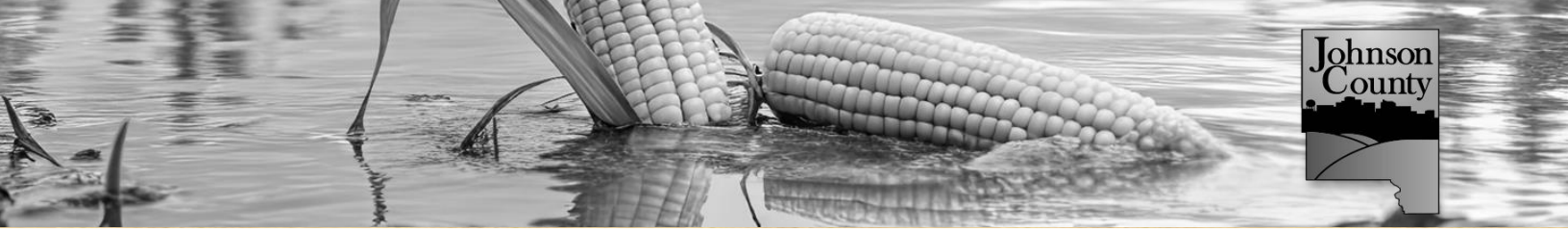
A communicable disease outbreak in Johnson County, Iowa, could place considerable strain on critical infrastructure, particularly in the healthcare sector. Hospitals, clinics, and emergency services may experience high demand, potentially overwhelming capacity and leading to resource shortages in staffing, equipment, and hospital beds. Public health agencies would also face increased demands for disease monitoring, testing, and vaccination efforts. Additionally, transportation infrastructure could be impacted if restrictions on movement or quarantines are implemented, affecting the flow of goods and people. Utility services, such as water and sanitation, might see increased usage and need for enhanced sanitation measures, while schools and government offices may require operational adjustments or closures, disrupting services and essential functions. The strain on critical infrastructure underscores the importance of resilience planning to ensure continuity of these essential services during a public health crisis.

Historical, Cultural, and Natural Environment

A communicable disease outbreak in Johnson County, Iowa, would likely have minimal direct impact on the historical, cultural, and natural environment. However, there could be indirect effects on cultural institutions such as the Old Capitol Museum, Iowa City Public Library, and Englert Theatre, which may close temporarily or limit attendance to prevent the spread of disease. This could disrupt local cultural activities, performances, and tourism, reducing revenue and community engagement in heritage preservation efforts.

Events like Iowa City's Arts Festival and Mission Creek Festival, which celebrate local history, literature, and the arts, might be canceled or scaled down, affecting the county's cultural vibrancy. Additionally, historical sites such as Plum Grove Historic Home, the residence of Iowa's first territorial governor, could experience reduced visitor numbers or postponed maintenance if funding shifts toward public health initiatives.

The natural environment would remain largely unaffected; however, increased use of public spaces like Terry Trueblood Recreation Area and Kent Park for socially distanced outdoor activities could result in higher maintenance demands. In some cases, prolonged closures or reduced public funding might delay conservation or restoration projects at historical landmarks, impacting their upkeep and long-term preservation.



Future Land Use and Development

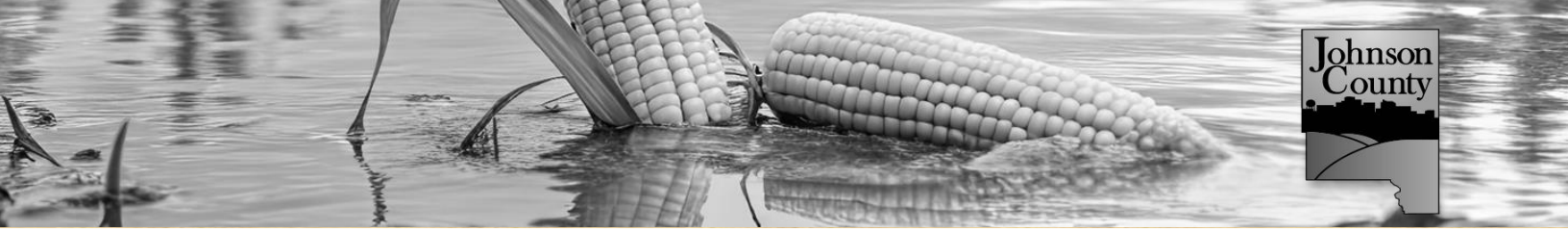
A communicable disease outbreak in Johnson County, Iowa, could prompt shifts in future land use and development, especially if the outbreak highlights new needs in healthcare, housing, or public spaces. For instance, there may be increased interest in developing healthcare facilities or expanding existing ones to better prepare for future health crises. Residential developments could see a shift toward designs that accommodate remote work, such as homes with dedicated office spaces. Public and commercial spaces might incorporate designs that allow for physical distancing, improved ventilation, and sanitation facilities to enhance safety. Additionally, zoning and land use plans may prioritize open spaces, parks, or recreational areas that provide safe environments for social interaction. While these changes may be subtle, a local outbreak could accelerate trends toward more adaptable and health-conscious development in the county's future planning.

3.4.3.8 Consequence Summary

A communicable disease outbreak in Johnson County, Iowa, could lead to widespread consequences affecting public health, the economy, infrastructure, and daily life. Health services would be strained as hospitals and clinics handle increased patient loads, impacting healthcare availability and response times. Economically, businesses may experience disruptions, particularly those relying on in-person operations, while schools, workplaces, and cultural institutions could face temporary closures. Public anxiety and the need for preventative measures might alter community activities, reducing social gatherings and affecting the county's cultural engagement. Essential services and infrastructure, such as transportation and sanitation, could be stressed, necessitating adjustments to maintain continuity. In the long term, these impacts could prompt changes in healthcare capacity, public space design, and remote work infrastructure, reflecting a shift toward resilience and health-conscious development in the community.

Category	Narrative
Impact on the Public	• Sickness, fatalities • Vulnerable populations are especially susceptible to illness/fatalities depending on the communicable disease • Mental health impacts both during and after • Disruptions to daily life with potential school and workplace closures
Impact on the Economic Condition of the Planning Area	• Loss in quality of services from staffing shortages (sickness or fatalities of staff)

Category	Narrative
	• Secondary impacts from reduction in private sector business staffing shortfalls, supply chain disruptions, and consumer shift in economic engagement • Financial strain on healthcare facilities and increased healthcare costs
Impact on the Historical, Cultural, and Natural Environment	• Zoonotic diseases may be spread between animals and humans • Animal carcass disposal and/or culling of entire herds may be needed • Potential impacts from pesticide use or other response actions • Potential delays in preservation and restoration projects for historical sites
Impact on Built Environment, General Property, and Critical Infrastructure	• Minimal effect on residential property values; possible reduced demand for certain commercial properties • Strain on healthcare, transportation, and sanitation infrastructure
Impact on the Public Confidence in Government	• Public scrutiny on the effectiveness of response and containment efforts • Potential erosion of trust if measures are seen as inadequate or slow
Impact on Responders	• Potential staffing challenges due to ill responders • Exceeding surge capacity in medical facilities and ambulatory resources for patients
Impact on continuity of operations, including continued delivery of government services	• Potential continuity of government challenges due to sick workers; issues due to potential isolation, quarantine, and social distancing • Potential resource diversion from other services to manage the outbreak • Adjustments needed to maintain essential services and operations
Cascading hazards	• Economic downturn impacting local businesses and employment • Increased risk of mental health crises due to stress and isolation • Possible secondary outbreaks if containment measures are not effectively implemented



3.4.4 Critical Infrastructure Failure

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.08	2.17	1.83	2.33	13.17

3.4.4.1 Description

Disruptions in critical infrastructure sectors—spanning natural, technological, and manmade hazards—pose significant risks to every facet of daily life in the planning area. Infrastructure failures can severely impact public health, government operations, community functions, and the economy. These disruptions may arise as secondary or cascading effects of other hazards (e.g., floods damaging power substations) or directly from issues such as faulty equipment, inadequate maintenance, long-term degradation, or accidental damage (e.g., excavation incidents impacting buried utility lines).

Critical infrastructure assets, including electric power grids, transportation networks, pipelines for natural gas and oil, water and wastewater systems, storage facilities, and Internet and telecommunications systems, are vital. When disrupted, these systems often have immediate, noticeable effects on the public and impede essential services. For instance, power outages can disrupt heating, refrigeration, and emergency communications, while water system failures compromise sanitation and public health.

Notably, most critical infrastructure is privately owned and operated, meaning that service delivery is largely contingent on private-sector efforts and resources. However, significant challenges—such as supply chain interruptions and sudden fluctuations in demand—can quickly exceed the capacity of these sectors to adapt, resulting in widespread and prolonged disruptions. Resilience strategies, such as redundancy in power grids, targeted structural reinforcements, and clear communication pathways between public and private sectors, are essential to mitigate these risks.

3.4.4.2 Location

In Johnson County, Iowa, areas particularly susceptible to critical infrastructure failure include those prone to flooding, regions with aging infrastructure, densely populated urban centers, and rural areas with limited redundancy in infrastructure systems. Flood-prone areas along the Iowa and Cedar Rivers are highly vulnerable, as past events have demonstrated significant damage to essential facilities, such as bridges and water treatment systems, during major flooding incidents. Urban centers, including Iowa City and Coralville, face elevated risk due to the presence of critical infrastructure like

hospitals, universities, and utility hubs. These urban regions are particularly susceptible to disruptions during large-scale hazard events due to the density of essential services.

Aging infrastructure poses an additional risk, as older systems and facilities are more likely to degrade over time, increasing the likelihood of failure. In rural parts of the county, infrastructure systems often have fewer redundancies, which can result in prolonged service disruptions during failures and may limit access to essential services. Recognizing these vulnerabilities, Johnson County has developed various mitigation strategies, such as regular infrastructure assessments, floodplain management initiatives, and emergency response plans, to enhance resilience and minimize the impact of potential infrastructure disruptions. These measures are designed to protect communities, maintain continuity of operations, and ensure faster recovery in the event of critical infrastructure failures across the county.

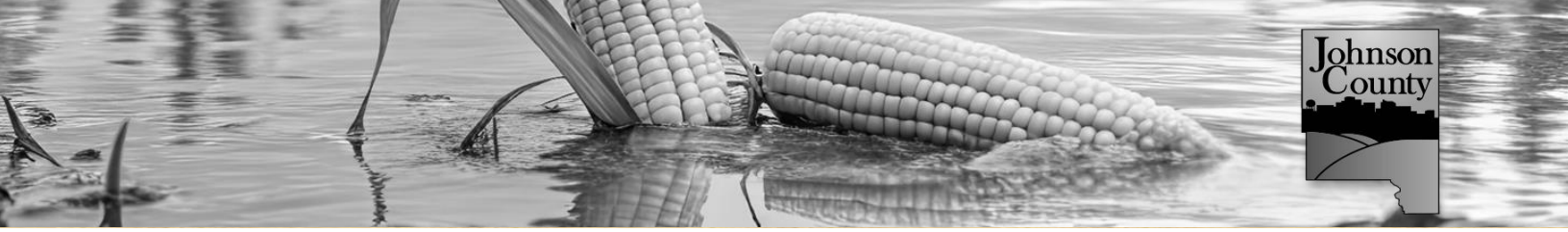
Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.4.3 Magnitude/Severity

The magnitude and severity of critical infrastructure failure hazards are evaluated by the scale of their impact across essential sectors, including energy, water and wastewater systems, transportation networks, telecommunications, healthcare, and emergency services. Severity is determined by the extent of population and service impact, the duration of the disruption, and any secondary or cascading effects that emerge from the failure.

For instance, an energy supply failure would disrupt power to homes, businesses, healthcare facilities, and essential services across the county. The severity of this failure escalates if the outage is prolonged, particularly under extreme weather conditions that heighten risks for vulnerable populations. Water and wastewater system failures introduce public health risks, such as water contamination or restricted access to clean water, which can overburden healthcare facilities and lead to widespread health issues.



Similarly, transportation infrastructure failures—like road or bridge closures caused by flooding or structural damage—can hinder emergency response, isolate communities, and delay goods movement, impacting public safety and economic stability. Telecommunication failures disrupt communication between emergency responders and the public, compounding the effects of other hazards by impairing coordination and information flow.

In the most severe cases, failures in healthcare infrastructure, such as hospitals or emergency response services, prevent timely medical care, potentially leading to significant health impacts and increased mortality during emergencies. The overall magnitude of any infrastructure failure is also amplified by its cascading impacts, where disruptions in one sector trigger additional failures across other sectors, intensifying the community-wide impact.

Thus, critical infrastructure failures in the planning area are assessed based on the breadth of disruption, duration, and the potential for secondary consequences, such as critical service outages or the triggering of additional hazards.

3.4.4.4 Past Occurrences

Significant power or utility outages are listed below. In some cases, major outages that occurred outside, but near to, the planning area have been included to show the range of possible outcomes.

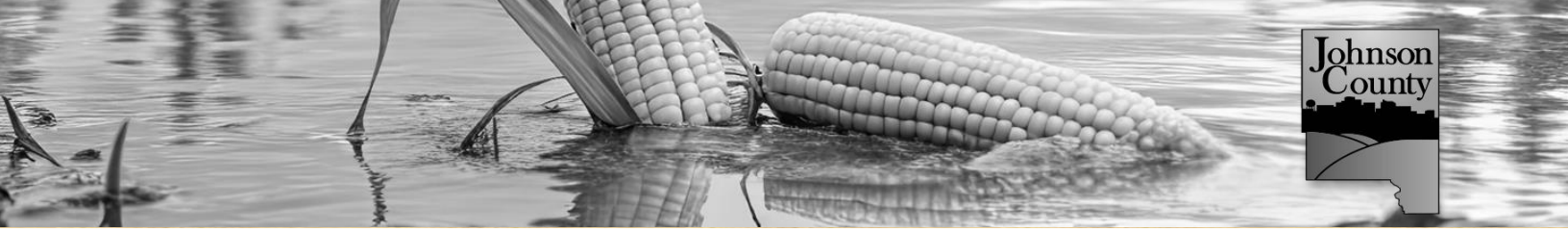
- Flooding (2008): In June 2008, severe flooding caused extensive damage to infrastructure across the county. The University of Iowa campus suffered flooding in multiple buildings, including Hancher Auditorium and the Voxman Music Building, leading to substantial disruptions in university operations. Additionally, the Coralville Reservoir Dam overflowed, resulting in the closure of major transportation routes such as Interstate 80 and U.S. Highway 6, which impeded mobility and emergency response efforts.
- Iowa Derecho (2020): On August 10, 2020, a powerful derecho—a widespread, long-lived windstorm—swept through Iowa, including Johnson County. The storm caused extensive damage to power lines and communication networks, leading to prolonged outages that affected homes, businesses, and critical services. The widespread nature of the damage strained local resources and highlighted vulnerabilities in the county's infrastructure to severe weather events.

- Cedar Rapids Flood (2008): Severe flooding damaged energy, transportation, and water treatment infrastructure, displacing residents and leaving many without essential services for extended periods.
- Northeast Blackout (2003): A software failure in the energy grid led to power outages for 50 million people, including parts of the Midwest, causing transportation delays, business closures, and reliance on backup power for healthcare.
- Missouri River Flooding (2019): Widespread spring flooding caused significant damage to roads, bridges, water systems, and farmland, leading to prolonged power outages and service disruptions in Iowa.
- Texas Power Grid Failure (2021): Extreme cold overwhelmed the Texas power grid, causing widespread outages, water system failures, and emergency service delays, with severe impacts on healthcare and public safety.

Examining past occurrences of critical infrastructure failures offers valuable insights that enhance the planning area's preparedness for future incidents. Although some events may not be localized to Johnson County, analyzing these instances aids in understanding potential vulnerabilities and the cascading impacts that infrastructure disruptions can have across sectors. Historical events, such as the 2008 floods and the 2020 derecho, reveal how severe weather and natural hazards can lead to widespread outages, affect emergency response capabilities, and disrupt essential services. By reviewing these and other similar incidents, the planning area can identify patterns, prioritize infrastructure improvements, and implement proactive measures to mitigate risks, ultimately building a more resilient community equipped to respond to future hazards.

3.4.4.5 Likelihood of Future Occurrence

Based on historical data and regional trends, Johnson County, Iowa, faces a moderate to high likelihood of future critical infrastructure failures. The county's susceptibility to natural hazards, such as flooding and severe storms, has previously led to significant disruptions. For instance, the 2008 floods caused extensive damage to transportation networks and utility services, while the 2020 derecho resulted in widespread power outages and communication breakdowns. These events underscore the county's vulnerability to infrastructure failures triggered by natural disasters. Additionally, the aging infrastructure in certain areas increases the risk of failures due to wear and degradation over time. Given these factors, it is prudent for Johnson County to anticipate and prepare for potential infrastructure disruptions in the future.



3.4.4.6 Climate Change Considerations

For critical infrastructure failure, climate change considerations are generally minimal since this hazard is not directly tied to natural causes. However, climate change can indirectly impact the likelihood and severity of infrastructure failures by intensifying natural hazards, such as extreme weather events, that may lead to secondary infrastructure disruptions. For example, an increase in severe storms, flooding, or prolonged extreme temperatures could strain power grids, water systems, and transportation networks, making them more vulnerable to failures. Rising temperatures may also accelerate wear on infrastructure materials, increasing maintenance needs and the risk of mechanical breakdowns. While climate change itself does not cause infrastructure failures, it can contribute to conditions that heighten the demand for infrastructure resilience and adaptability in Johnson County.

3.4.4.7 Vulnerability

People

If a critical infrastructure failure were to occur in Johnson County, Iowa, it would likely have significant impacts on the community, with vulnerable and underserved populations experiencing the greatest hardships. An energy grid failure could disrupt power across the county, affecting homes, businesses, healthcare facilities, and emergency services. Elderly residents (9.6% aged 65 and older), individuals with disabilities (7.1%), and those dependent on powered medical devices would be at heightened risk, particularly during extreme weather conditions. Households with lower incomes (16.9%) may struggle to afford alternative power sources or temporary accommodations, exacerbating disparities in recovery and access to essential services. In urban centers like Iowa City and Coralville, power outages would strain emergency response capabilities, disproportionately affecting renters and residents in multi-unit housing with limited control over backup power options.

A failure in the water or wastewater systems would compromise access to clean water, increasing public health risks, particularly in densely populated areas. Underserved communities, including those without reliable transportation (6.1% of households), may face additional challenges in obtaining bottled water or alternative sanitation solutions. For individuals with preexisting health conditions, water shortages could lead to higher rates of illness, increasing demand on healthcare facilities. Similarly, transportation infrastructure failures, such as road or bridge closures, would isolate some communities, delay emergency response times, and disrupt supply chains. Those with mobility

impairments or limited financial resources would struggle the most with disruptions to essential services, particularly in areas where public transportation is less accessible.

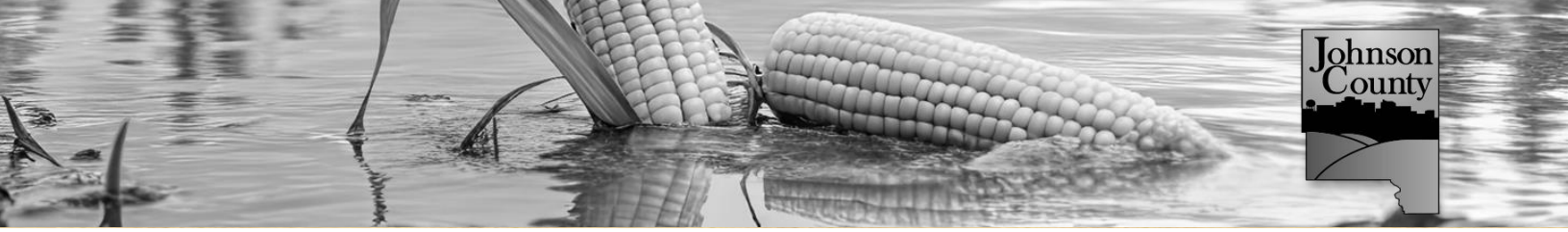
Telecommunications failures could sever crucial communication channels, preventing residents from receiving timely emergency updates and safety instructions. This could be particularly harmful to individuals with limited English proficiency (4.4%) who rely on translated alerts or accessible communication formats. Without reliable digital access, lower-income and rural residents may experience delays in receiving critical information, further widening the gap in emergency preparedness and response. The cumulative effect of these disruptions would amplify uncertainty, disproportionately affecting vulnerable and underserved populations, while also straining public confidence in infrastructure reliability and emergency management efforts.

Economy

A critical infrastructure failure in Johnson County, Iowa, would likely lead to substantial economic disruptions, affecting businesses, local government finances, and the county's overall economic stability. Prolonged power outages, for instance, would disrupt business operations across sectors, particularly those dependent on reliable energy, such as healthcare, retail, and technology services. Johnson County's economic centers, like Iowa City and Coralville, would experience significant impacts, as small businesses and major institutions, including the University of Iowa and healthcare facilities, rely on consistent power and services to operate. Even short-term closures could result in substantial revenue losses for small businesses that may have limited resources to absorb financial impacts.

Additionally, a failure in water or wastewater infrastructure could severely disrupt operations in sectors that require a consistent water supply, such as healthcare, food service, and higher education. Forcing these industries to halt operations or absorb significant expenses to address water-related issues could lead to ripple effects on the local economy. Transportation infrastructure disruptions, such as road or bridge closures, would further hinder the movement of goods and people, affecting supply chains and increasing transportation costs for local businesses.

While Johnson County is less agriculturally dependent than some surrounding areas, disruptions could still impact local food producers and distributors that serve the community and regional markets. Repair and restoration costs associated with infrastructure failures would strain local government budgets, potentially diverting funds from essential services or community development projects. Overall, a critical infrastructure failure in Johnson County would create a ripple effect throughout the



economy, leading to immediate revenue losses and long-term financial challenges as businesses and local government work to recover and restore services.

Built Environment

General Property

If a critical infrastructure failure were to occur in Johnson County, Iowa, it could lead to a decline in property values, particularly in areas directly affected by the disruption. Prolonged outages in essential services, such as electricity, water, or transportation, may diminish the appeal of certain neighborhoods, especially if these areas develop a reputation for unreliable services. For residential properties, repeated or severe disruptions to utilities and service access can make locations less attractive to potential buyers, potentially lowering market demand and decreasing property values over time.

Commercial property values could also be affected, as businesses rely on consistent infrastructure to operate effectively. If businesses face recurring service disruptions, they may consider relocating, and potential investors might hesitate to enter a market where infrastructure reliability is in question. Furthermore, if infrastructure failures necessitate significant repairs or upgrades, increased property taxes or utility costs might be required to fund these efforts, indirectly impacting property values by raising the overall cost of ownership. In the long term, sustained investments in infrastructure resilience would be crucial to preserving or enhancing property values and ensuring Johnson County remains an attractive place to live and do business.

Critical Infrastructure

If Johnson County, Iowa, were to experience a critical infrastructure failure, it would likely have cascading impacts across various essential systems, compromising services and potentially leading to further disruptions. For example, a failure in the electrical grid could disrupt water treatment and wastewater facilities, affecting water quality and availability for residents, businesses, and healthcare facilities across the county. Similarly, a telecommunications outage would impair emergency communication systems, hindering coordination among first responders and emergency management teams, and leaving the public without critical information or instructions during the incident.

Transportation infrastructure, such as major roads and bridges, could be impacted if the initial failure weakens structural integrity or delays maintenance. This would not only isolate some communities but also restrict access for emergency vehicles and complicate the delivery of essential goods and services, intensifying the strain on the local economy.

These cascading effects underscore the interconnected nature of critical infrastructure systems, where disruptions in one sector can amplify challenges in others. Robust backup systems, regular maintenance, and proactive resilience planning are essential for Johnson County to mitigate the extent of service disruptions and ensure continuity of critical functions during an infrastructure failure.

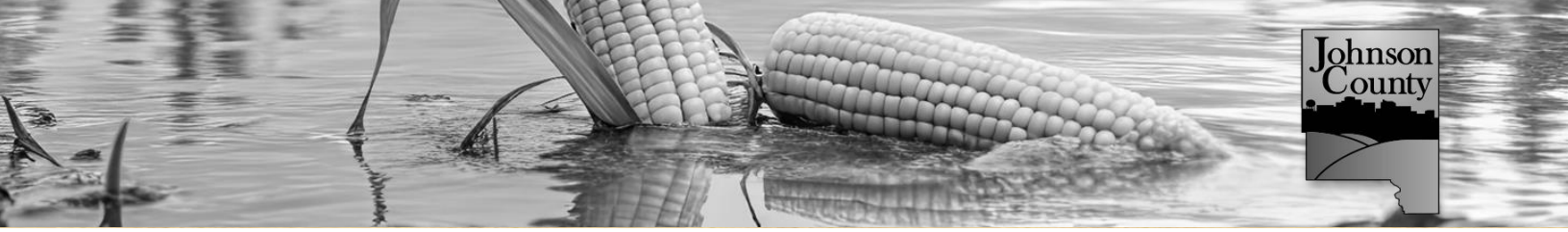
Historical, Cultural, and Natural Environment

If a critical infrastructure failure were to occur in Johnson County, Iowa, it could have adverse impacts on the county's historical, cultural, and natural environment. Historic sites such as the Old Capitol Museum and the University of Iowa Museum of Natural History could suffer damage if essential services like climate control systems fail for an extended period. Museums and archives, including those at the Iowa Women's Archives, rely on stable environmental conditions to preserve delicate artifacts and documents; a prolonged power outage or HVAC disruption could lead to deterioration of these irreplaceable materials. Additionally, cultural events at venues like the Hancher Auditorium and Englert Theatre could be interrupted, reducing community engagement and economic activity linked to the arts.

The county's natural environment could also be significantly affected. A failure in wastewater treatment facilities, such as the South Wastewater Treatment Plant, could result in untreated wastewater contaminating the Iowa River, threatening water quality and harming aquatic ecosystems. This could impact wildlife at Hickory Hill Park and Macbride Nature Recreation Area, as well as recreational activities like fishing and boating. Additionally, a disruption to transportation infrastructure—such as a major bridge failure—could limit access to natural areas like Lake Macbride State Park, reducing residents' ability to engage with conservation lands and delaying necessary environmental management efforts.

Future Land Use and Development

If a critical infrastructure failure were to occur in Johnson County, Iowa, it could influence future land use and development patterns by reshaping priorities and perceptions around infrastructure reliability and resilience. Prolonged or repeated failures in essential systems like energy, water, and transportation infrastructure might discourage new development in affected areas, as developers, investors, and residents may perceive these regions as less stable or desirable. This could shift development interest to areas with more robust infrastructure or those perceived to be less vulnerable, potentially altering growth patterns within the county.



Future land use decisions might also place a stronger emphasis on infrastructure improvements and resilience in planning and zoning processes. For instance, areas at higher risk of service disruptions due to environmental factors, such as flood-prone zones, may face new restrictions or requirements for infrastructure reinforcements, impacting both residential and commercial development plans. Johnson County might also prioritize investments in infrastructure redundancy, ensuring that future developments are better protected from potential disruptions. This shift could lead to the adoption of stricter building codes, higher standards for utility resilience, and strategic land use policies that prioritize areas with existing reliable infrastructure.

In the long term, a significant infrastructure failure would likely lead to a reassessment of land use policies, focusing on sustainable, resilient growth and increased investment in critical infrastructure upgrades to support the county's future development goals.

3.4.4.8 Consequence Summary

A critical infrastructure failure in Johnson County, Iowa, would have widespread consequences, impacting essential services, community wellbeing, and economic stability. Disruptions in power, water, and telecommunications would affect daily life, with heightened risks to vulnerable populations and increased strain on healthcare facilities. Local businesses would face operational challenges, potentially leading to revenue losses and higher costs, while residents might experience limited access to essentials and services. Public confidence in local governance could wane if response efforts are hindered by infrastructure challenges. Environmental impacts, such as compromised water quality from wastewater issues, would harm local ecosystems and recreational areas. In the long term, the incident would likely influence land use policies and development priorities, focusing on resilience and strengthening critical systems to prevent future disruptions.

Category	Narrative
Impact on the Public	• Disruptions to daily life and access to essential services. • Increased risk to vulnerable populations (elderly, medically dependent). • Limited access to healthcare and emergency services.
Impact on the Economic Condition of the Planning Area	• Revenue losses for local businesses due to operational shutdowns. • Higher costs for businesses and local government recovery. • Potential relocation of businesses seeking more reliable infrastructure.

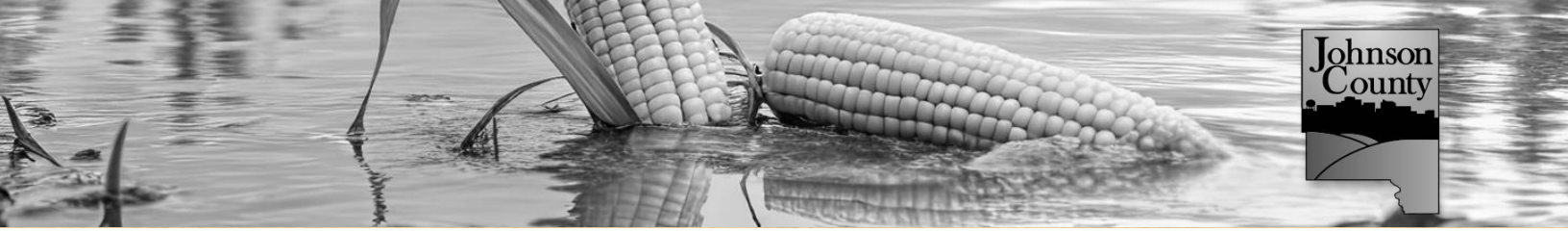
Category	Narrative
Impact on the Historical, Cultural, and Natural Environment	• Damage to climate-sensitive collections and historic sites. • Contamination risks to rivers and wildlife habitats. • Interruption of cultural events and restricted access to natural areas.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decreased property desirability in areas with frequent service disruptions. • Potential decline in property values near affected infrastructure. • Strain on aging infrastructure with costly repair needs.
Impact on the Public Confidence in Government	• Reduced trust if response and recovery efforts are delayed. • Increased public concern about infrastructure reliability.
Impact on Responders	• Limited coordination capabilities due to telecommunications failure. • Challenges in accessing isolated or cut-off areas. • Increased demand for emergency resources and personnel.
Impact on continuity of operations, including continued delivery of government services	• Disrupted government functions due to infrastructure dependencies. • Delayed public services and limited communication with residents. • Resource diversion from other community programs to fund recovery.
Cascading hazards	• Power outages leading to water and wastewater system failures. • Transportation disruptions impacting emergency response and supply chains. • Environmental hazards from untreated wastewater affecting public health.

3.4.5 Cyber Incident

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.42	2.17	1.83	2.00	14.52

3.4.5.1 Description

The U.S. Department of Homeland Security's National Cyber Incident Response Plan defines cyber incidents as:



Types of Cyber Incident

Cyber Incident – An event occurring on or conducted through a computer network that actually or imminently jeopardizes the confidentiality, integrity, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon.

Significant Cyber Incident – A cyber incident that is (or group of related cyber incidents that together are) likely to result in demonstrable harm to the national security interests, foreign relations, or economy of the United States or to the public confidence, civil liberties, or public health and safety of the American people.

While not all cyber incidents are intentional, this profile focuses on malicious incidents or cyber attacks. These attacks can be carried out by cybercriminals seeking financial gain or by cyber terrorists aiming to damage or destabilize systems for political purposes. Both types are collectively referred to here as cyber attacks.

Cyber attacks use malicious code to disrupt, alter, or exploit computer operations or data. With increased reliance on networked technologies, vulnerability to such attacks has become a growing concern. According to the Federal Bureau of Investigation (FBI), "cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated," affecting both public- and private-sector networks. Cyber threats include:

- Distributed Denial of Service (DDoS) Attack: Overwhelms a network, server, or website with excessive traffic, causing unavailability and disrupting normal operations.
- Data Breach: Unauthorized access to or theft of sensitive data, such as personal or financial information, often resulting in identity theft or financial loss.
- Phishing Attacks: Social engineering attacks using deceptive messages (often emails) to trick individuals into revealing sensitive information, like passwords or financial details.
- Malware Attacks: Malicious software, including viruses, worms, trojans, and spyware, that disrupts operations, steals data, or gives attackers control over systems.
- Ransomware: Malware that encrypts data, rendering it inaccessible until a ransom is paid. This attack type can paralyze operations across all levels, from individuals to large organizations.
- Critical Infrastructure/SCADA System Attack: Targets digital control systems managing critical infrastructure (e.g., power grids, water systems), threatening public safety and economic stability.

Two additional attack methods related to those above are:

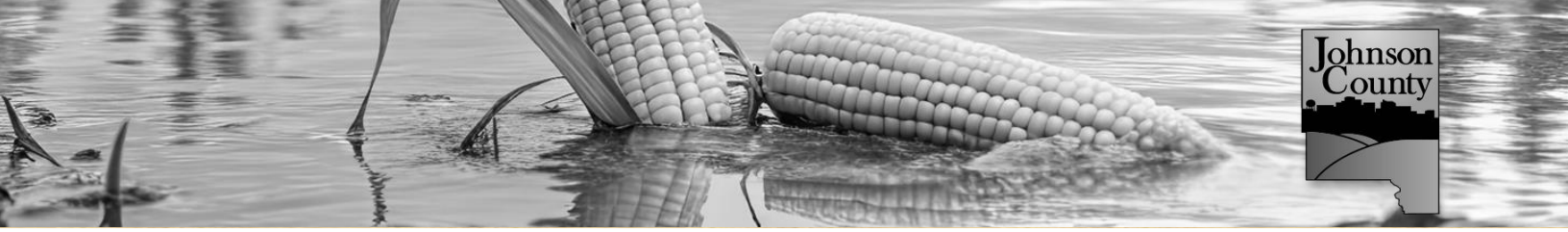
- Unpatched Software Exploitation: Exploits vulnerabilities in unpatched software, giving attackers unauthorized access to systems or data. Regular updates are essential, as patches often address known security weaknesses.
- Advanced Persistent Threats (APT): Long-term, targeted attacks where intruders maintain undetected access to a network, usually to steal data. APTs are typically conducted by highly skilled, well-funded actors, including state-sponsored groups, and employ sophisticated techniques to evade detection.

3.4.5.2 Location

In Johnson County, Iowa, certain sectors and areas are particularly susceptible to cyber incidents due to their reliance on digital systems, critical infrastructure, and networked technologies. Urban centers like Iowa City and Coralville house major institutions, including the University of Iowa, local government offices, and healthcare facilities, all of which depend heavily on digital systems for daily operations, data management, and public services. Cyber incidents targeting these systems could disrupt essential services and affect a significant portion of the county's population.

Critical infrastructure sites, such as those managing water treatment, power distribution, and transportation networks, are also increasingly digitalized and therefore vulnerable to cyber attacks. A disruption in these areas would have broad impacts, potentially affecting public safety and the availability of essential services. The healthcare sector, which includes hospitals, clinics, and public health systems across Johnson County, is another high-risk area. These facilities rely on electronic health records, networked medical devices, and patient management systems, making them susceptible to ransomware, data breaches, and other cyber threats. A cyber incident here could jeopardize patient care, compromise sensitive patient data, and increase operational challenges.

Educational institutions, including the University of Iowa and local schools, also face significant risks. These institutions rely on secure digital systems for managing student records and facilitating online learning, and are frequently targeted for ransomware and phishing attacks in other regions. Finally, local government offices and emergency response agencies in Johnson County rely on interconnected systems for data storage, communication, and coordination. A cyber incident affecting these systems could hinder emergency response efforts, delay public services, and disrupt essential government functions. Together, these vulnerabilities underscore the need for robust cybersecurity measures in Johnson County to safeguard public safety, continuity of services, and the resilience of critical infrastructure.



Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.5.3 Magnitude/Severity

The magnitude and severity of a cyber incident hazard in the planning area, would be measured based on several key factors that assess the overall impact and scope of the incident. The severity is typically determined by evaluating the following elements:

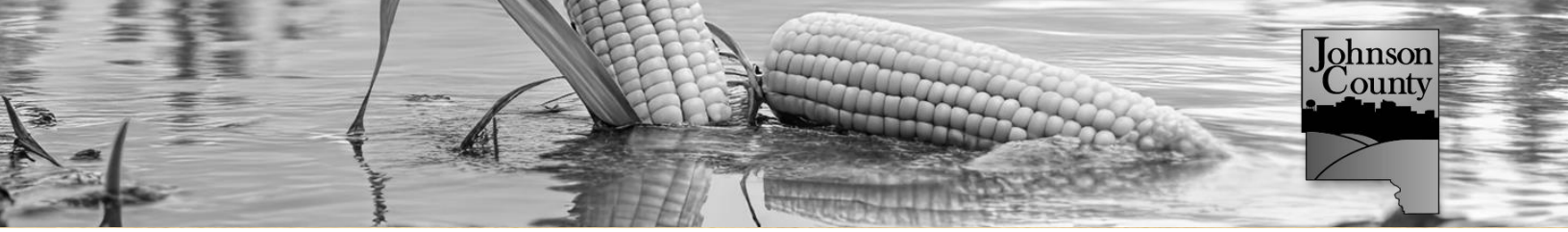
Element	Measurement
Scope of the Attack	The number of systems, networks, or services affected plays a significant role in determining the magnitude. A targeted attack on one system would be considered less severe than an attack that impacts multiple critical systems such as government operations, healthcare facilities, or public utilities. The geographic reach of the attack, whether it affects only local systems or has national or international connections, also influences the overall severity.
Duration of the Incident	The length of time the attack disrupts services is a critical factor. Short-term disruptions may cause inconvenience but are typically rated lower in severity. In contrast, long-term or persistent attacks, especially those that involve data breaches or ransomware, which may take days, weeks, or even longer to resolve, are considered more severe.
Type of Attack	The nature of the cyber incident matters greatly. For example, a Distributed Denial of Service (DDoS) attack might only cause temporary unavailability, whereas a ransomware attack that locks down critical infrastructure systems would be classified as more severe due to its direct impact on operational capacity and data integrity. Advanced Persistent Threats (APTs), which maintain long-term unauthorized access to sensitive data, would also be considered highly severe.

Element	Measurement
Impact on Critical Services	The severity is measured by the disruption to essential services such as healthcare, law enforcement, emergency response, water treatment, and energy supplies. Cyber incidents affecting critical infrastructure like SCADA systems (which control industrial operations such as water treatment or electrical grids) are considered high-severity events due to their potential to harm public safety and disrupt daily life.
Economic and Social Consequences	Economic losses and the broader social disruption caused by the cyber incident also contribute to its severity. For example, if businesses are unable to operate for extended periods or personal data is stolen, leading to identity theft or financial fraud, the overall severity of the incident increases. Social consequences, such as public distrust or panic, can further elevate the impact of a cyber incident.
Recovery and Mitigation Efforts	The difficulty and cost associated with recovering from the attack play a role in determining its magnitude. Incidents requiring extensive recovery efforts, including system repairs, data recovery, and long-term security upgrades, are deemed more severe.

3.4.5.4 Past Occurrences

Here are some past occurrences of cyber incidents across the U.S. that have had significant impacts:

- Colonial Pipeline Ransomware Attack (2021): The Colonial Pipeline, which supplies nearly half of the East Coast's fuel, was targeted by a ransomware attack, forcing a temporary shutdown. Approximately 100 gigabytes of data were stolen, and the company paid a $4.4 million ransom. The attack led to fuel shortages and price spikes across the Eastern U.S.
- Equifax Data Breach (2017): Equifax, a major credit reporting agency, suffered a breach that exposed the personal information of 147 million Americans, including Social Security numbers and financial data. The breach was caused by a failure to patch a known vulnerability in their system.
- Target Data Breach (2013): The Target Corporation experienced a massive data breach during the holiday shopping season, compromising 40 million credit and debit card records and personal information of 70 million customers. Attackers infiltrated Target's network by gaining access through a third-party vendor.
- U.S. Office of Personnel Management (OPM) Breach (2015): Hackers breached the OPM, stealing sensitive data from 22.1 million federal employees. The stolen



information included Social Security numbers, fingerprint data, and detailed background checks, creating significant national security concerns.

- WannaCry Ransomware Attack (2017): The WannaCry ransomware spread globally, affecting over 200,000 systems in more than 150 countries. The attack exploited a vulnerability in Windows systems, causing significant disruption to healthcare services, businesses, and government agencies.

These examples highlight the range and severity of cyber incidents, affecting both private companies and government entities, with widespread impacts on data security, public safety, and the economy.

Johnson County, Iowa, has proactively addressed the growing threat of cyber incidents through collaborative initiatives. In 2021, local law enforcement agencies, including the University of Iowa Department of Public Safety, the Iowa City Police Department, and the Johnson County Sheriff's Office, established the Joint Forensic Analysis Cyber Team (J-FACT). This task force focuses on tackling cybercrime in Eastern Iowa by analyzing electronic devices and investigating cases ranging from child exploitation to child pornography. The formation of J-FACT underscores the county's commitment to enhancing cybersecurity measures and responding effectively to cyber threats.

While Johnson County has not experienced significant cyber incidents, neighboring regions have faced notable challenges. For instance, in 2021, the Linn-Mar School District in Linn County, Iowa, suffered a ransomware attack that disrupted its computer systems and threatened to expose sensitive data. Similarly, the Cedar Rapids Community School District experienced a cyberattack that led to the exposure of personal data for thousands of Iowans receiving Medicaid.

These incidents in nearby areas highlight the importance of continuous vigilance and robust cybersecurity practices to protect against potential threats. Johnson County's proactive measures, such as the establishment of J-FACT, demonstrate a commitment to safeguarding its digital infrastructure and responding effectively to cyber incidents.

3.4.5.5 Likelihood of Future Occurrence

Based on local, regional, and state information, the likelihood of future cyber incidents in Johnson County, Iowa, is moderate to high and is expected to increase as reliance on digital technology grows. While Johnson County has not experienced large-scale cyber incidents, the creation of the Joint Forensic Analysis Cyber Team (J-FACT) indicates an awareness of rising cyber threats. Regionally, neighboring counties have faced notable cyber incidents, such as ransomware attacks on school districts in Linn County, which

demonstrate that cyber threats are a present and growing concern within the area. Statewide, Iowa's growing integration of digital systems in government services, education, healthcare, and critical infrastructure increases vulnerability to a range of cyber threats, from data breaches to ransomware. This trend aligns with national observations from agencies like the FBI, which report that cyber intrusions are becoming more frequent and sophisticated. Given these factors, it is increasingly likely that Johnson County will experience cyber incidents in the future, necessitating continued investment in cybersecurity measures and preparedness strategies to protect against potential disruptions.

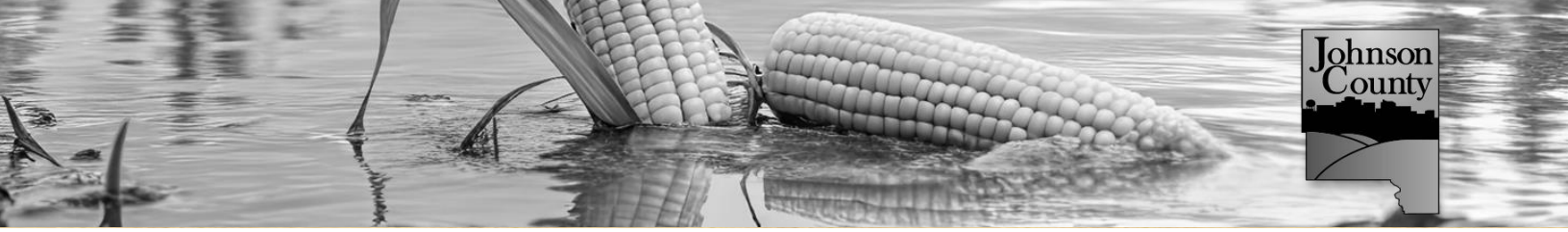
3.4.5.6 Climate Change Considerations

Climate change considerations for cyber incidents are minimal since this is not a natural hazard. However, climate change could indirectly increase the risk of cyber incidents by creating conditions that amplify vulnerabilities in digital infrastructure. For instance, extreme weather events driven by climate change, such as severe storms or flooding, can strain or disrupt critical infrastructure like power and telecommunications systems, which cyber attackers may exploit during periods of instability. Additionally, the increased frequency of natural disasters may push organizations to rely more heavily on remote and digital systems, expanding the potential attack surface for cyber threats. Although climate change itself does not directly cause cyber incidents, its impacts on infrastructure resilience and operational dependencies on digital systems may contribute indirectly to heightened cyber risks.

3.4.5.7 Vulnerability

People

If a cyber incident were to occur in Johnson County, Iowa, it could have significant impacts on the population, disrupting daily life, compromising personal data, and potentially affecting access to essential services. A cyber attack targeting healthcare facilities could interfere with patient care by limiting access to electronic health records or critical systems, putting vulnerable and underserved populations, including elderly residents (9.6% aged 65 and older) and individuals with chronic conditions, at greater risk. Those without health insurance (3.5%) or facing financial barriers to healthcare could experience delays in accessing alternative medical support if local healthcare systems are impacted. Similarly, if a cyber incident compromised utility services, residents could experience interruptions in electricity, water, or telecommunications, which would be particularly concerning for those in low-income households (16.9%) who may lack the financial means to recover from service disruptions.



Data breaches affecting local government or school systems could expose residents' personal information, leading to identity theft or financial loss, disproportionately impacting those already facing economic insecurity. Underserved communities, including individuals with limited English proficiency (4.4%), may be particularly vulnerable to scams or fraud resulting from leaked personal data, as language barriers could limit access to protective resources. Additionally, a cyber attack affecting schools could disrupt access to digital learning tools, disproportionately affecting students from low-income households or those without stable internet access at home, exacerbating educational inequities.

Beyond financial and service-related disruptions, a cyber incident could undermine public trust in digital systems, increasing feelings of vulnerability and uncertainty. Residents who rely on digital banking, online government services, or telehealth for essential needs may face difficulties in accessing critical resources, further marginalizing those with fewer in-person alternatives. If emergency response systems or communication networks were targeted, underserved populations with limited technology access could struggle to receive timely alerts or assistance. The cumulative effect of such disruptions would deepen existing disparities, as those with fewer financial and technological resources would have greater difficulty mitigating the impacts of a cyber incident.

Economy

A cyber incident in Johnson County, Iowa, would likely have substantial economic impacts, disrupting local businesses, straining government resources, and potentially affecting critical sectors. For businesses, a ransomware attack or data breach could lead to significant financial losses due to operational downtime, lost productivity, and expenses associated with data recovery or ransom payments. Small businesses, which may lack robust cybersecurity defenses, would be particularly vulnerable, with some potentially facing closure if unable to recover quickly from a cyber attack.

The healthcare sector, a critical component of the county's economy, could incur high costs if patient care systems are compromised, as restoring access to records and rescheduling appointments would require substantial resources. Additionally, a cyber attack on local government systems could divert funds toward recovery and mitigation efforts, impacting budgets for other essential community services and development projects. The economic impact would further extend to public confidence, as residents and investors might perceive Johnson County as less secure, potentially impacting business growth and reducing investment interest in the area. In the long term, the

county might need to increase spending on cybersecurity to strengthen resilience, adding additional economic strain on both government and businesses.

Built Environment

General Property

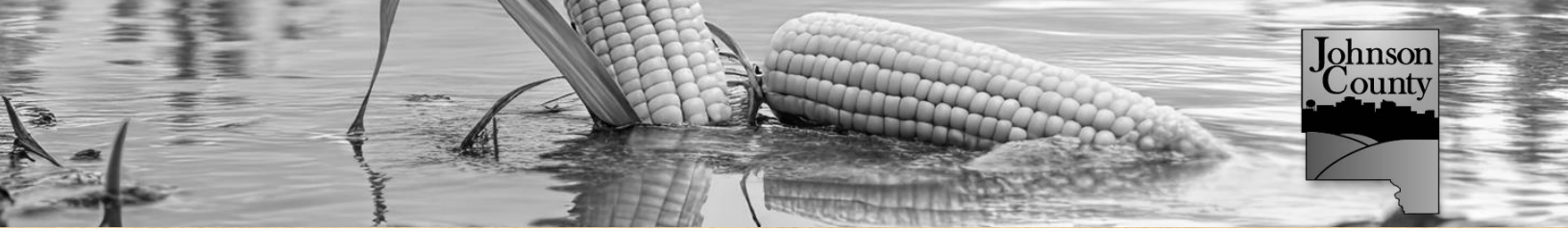
If a cyber incident were to occur in Johnson County, Iowa, it could indirectly affect property values, particularly if the incident exposes weaknesses in essential services or public infrastructure. For example, if a cyber attack compromises local utilities or critical infrastructure, such as water, electricity, or telecommunications, residents may perceive the area as less secure and reliable, potentially lowering property desirability. Prolonged or recurrent disruptions due to cyber vulnerabilities might lead to decreased demand in affected areas, especially if residents feel that vital services could be compromised or disrupted in the future.

Additionally, if local government systems are impacted, resulting in data breaches that expose personal information, public trust in local services may decrease. Potential buyers and investors could view the area as riskier, influencing their decision to purchase property or invest locally. These factors, combined with potential increases in local taxes or service fees to fund cybersecurity enhancements, could add to the cost of property ownership, further impacting property values. While a single cyber incident may not drastically reduce property values, recurrent incidents or those affecting essential services could have a cumulative effect on the real estate market in Johnson County.

Critical Infrastructure

If a cyber incident were to occur in Johnson County, Iowa, it could have severe impacts on the county's critical infrastructure, potentially disrupting essential services and threatening public safety. A targeted cyber attack on the power grid, for example, could cause widespread power outages, impacting residents, businesses, and critical facilities like hospitals. Such outages would not only interrupt daily life but could also hinder emergency response efforts, especially if transportation or communication systems are affected.

Water and wastewater treatment facilities are particularly vulnerable, as cyber attacks on these systems could compromise water quality or limit access to clean water, creating serious public health risks. Similarly, disruptions to telecommunications infrastructure, including internet and phone services, could isolate communities, impede emergency communications, and reduce access to timely information during the incident.



Moreover, Johnson County's transportation networks, such as traffic management systems and transportation hubs, could be impacted, resulting in delays or interruptions in the movement of goods and services. These disruptions to critical infrastructure would have cascading effects, with one compromised system potentially impacting others. The impact of a cyber incident on Johnson County's critical infrastructure highlights the importance of cybersecurity measures to protect these essential systems and ensure continuity of services for the community.

Historical, Cultural, and Natural Environment

If a cyber incident were to occur in Johnson County, Iowa, it could have notable effects on the county's historical, cultural, and natural environments, particularly if the incident targets digital systems essential to these sectors. Cultural institutions such as the University of Iowa Special Collections & Archives, the Johnson County Historical Society Museum, and the Iowa City Public Library rely on digital databases to manage, preserve, and catalog historical documents, artifacts, and records. A cyberattack could disrupt these systems, leading to data loss or corruption of invaluable historical and cultural materials. Additionally, HVAC and environmental control systems at museums and archives, such as those at the Old Capitol Museum, are critical for preserving delicate artifacts; if these systems are compromised, improper climate conditions could cause irreversible damage to these items.

For the natural environment, a cyberattack on critical infrastructure like the Iowa City Wastewater Treatment Facility could lead to untreated waste or hazardous materials being inadvertently released into the Iowa River, threatening water quality and harming local ecosystems. This could impact recreational areas such as Terry Trueblood Recreation Area and Macbride Nature Recreation Area, which depend on clean water and healthy ecosystems for public enjoyment and environmental conservation. Additionally, if communication networks used for conservation and land management are disrupted, it could hinder efforts to monitor and protect natural resources, delaying responses to ecological threats.

Overall, a cyber incident affecting the historical, cultural, and natural environments would not only jeopardize the preservation of these critical assets but also reduce public access to and engagement with these resources, impacting Johnson County's cultural identity, historical record, and natural heritage.

Future Land Use and Development

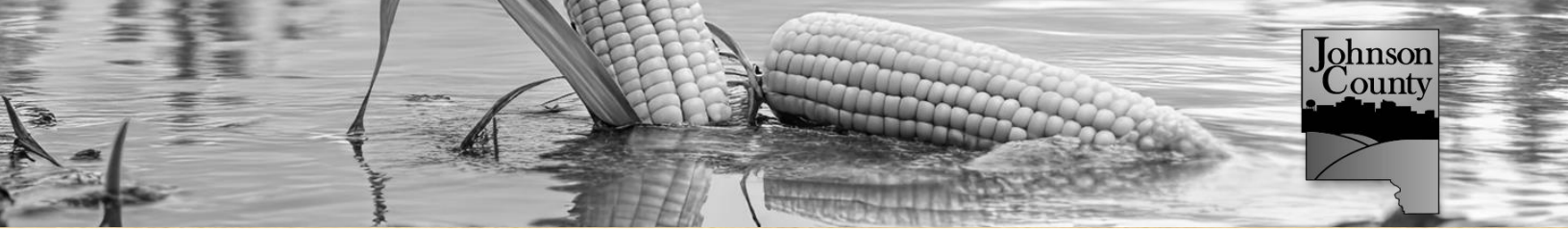
If a cyber incident were to occur in Johnson County, Iowa, it could have implications for future land use and development by shifting priorities toward cybersecurity resilience and infrastructure protections. A significant cyber event exposing vulnerabilities in essential systems, such as utilities or transportation networks, could lead local planners and developers to prioritize areas with strong cybersecurity and reliable infrastructure. Developers and investors may also factor cybersecurity considerations into site selection, favoring locations where critical services are better protected against digital threats, potentially influencing growth patterns within the county.

In response to a cyber incident, Johnson County might introduce more stringent requirements for digital security in new developments, especially for projects involving critical infrastructure or high-density housing. This could result in higher development costs and potentially shift the focus toward urban resilience measures, with increased investment in cyber protections for utilities, data centers, and smart infrastructure. Additionally, local government may consider incorporating cybersecurity assessments into land use planning to safeguard against vulnerabilities and protect the continuity of essential services. Over time, these shifts would guide land use and development practices, emphasizing resilience to both physical and cyber risks and aiming to foster a secure, future-ready environment for Johnson County.

3.4.5.8 Consequence Summary

A cyber incident in Johnson County, Iowa, could disrupt essential services, impact public safety, and strain the local economy. Key systems, including power, water, telecommunications, healthcare, and government services, may be compromised, affecting residents' daily lives and heightening risks for vulnerable populations. Economic losses could result from business downtime, data recovery costs, and potential investment hesitations, particularly if public trust in local infrastructure security diminishes. Cultural and historical institutions might experience data losses, and disruptions in environmental management could harm local ecosystems. In the long term, a significant cyber incident could prompt changes in land use and development practices, with a greater emphasis on cybersecurity and infrastructure resilience to safeguard against future threats.

Category	Narrative
Impact on the Public	• Disruptions to daily life and essential services. • Increased health risks for vulnerable populations. • Potential loss of personal data and privacy.



Category	Narrative
Impact on the Economic Condition of the Planning Area	• Business downtime and revenue losses. • Increased costs for data recovery and cybersecurity measures. • Reduced investment interest due to perceived infrastructure vulnerabilities.
Impact on the Historical, Cultural, and Natural Environment	• Risk of data loss affecting cultural and historical records. • Potential environmental damage from compromised water management systems. • Disruption of public access to cultural and recreational resources.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decreased desirability of areas with vulnerable infrastructure. • Potential decline in property values due to infrastructure instability. • Strain on critical systems, increasing repair and upgrade costs.
Impact on the Public Confidence in Government	• Reduced trust in government's ability to protect infrastructure. • Increased public concern over digital and physical security.
Impact on Responders	• Challenges in coordination if communication systems are compromised. • Increased demand on emergency response resources for public safety.
Impact on continuity of operations, including continued delivery of government services	• Delays in public service delivery. • Potential diversion of resources to recovery and cybersecurity improvements. • Disruptions in data access and critical government functions.
Cascading hazards	• Power outages leading to service disruptions in water and telecommunications. • Environmental hazards from wastewater system failures. • Delayed emergency response affecting public health and safety.

3.4.6 Dam Failure

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
1.17	1.92	2.17	2.50	7.71

3.4.6.1 Description

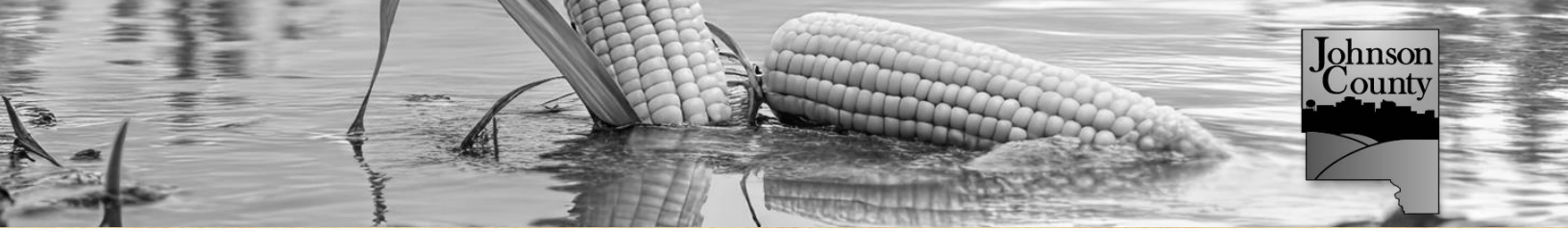
A dam failure hazard occurs when a dam that retains water, wastewater, or other liquids fails to contain its contents as designed, resulting in an uncontrolled release of water. This sudden release can lead to catastrophic downstream flooding, causing extensive property damage, environmental degradation, and potential loss of life. Dam failures may result from various causes, including structural weaknesses, poor design, inadequate maintenance, natural disasters like earthquakes, or extreme weather events that lead to overtopping.

The primary causes of dam failures include overtopping, foundation defects, and structural failures:

- Overtopping occurs when a dam cannot pass excess water through its spillways, typically during heavy rainfall or flooding. This excess water can erode the dam's surface, leading to structural collapse.
- Foundation defects involve weaknesses in the ground beneath the dam, often due to unsuitable site selection or soil instability, causing gradual or sudden failure.
- Structural failures may result from cracks, deteriorating materials, or insufficient design standards, particularly in aging dams. Additionally, seepage (the uncontrolled movement of water through the dam or its foundation) can lead to internal erosion and piping, forming voids within the structure that compromise its stability.

In areas prone to seismic activity, earthquake damage can contribute to dam instability. Poor maintenance and human error—such as improper operations or lack of regular inspections—can further exacerbate these vulnerabilities. Design flaws, particularly in older dams not built to withstand current environmental stresses, also contribute to failure risks. These factors underscore the importance of regular inspections, maintenance, and modernization to prevent dam failures.

Dams are classified according to the potential consequences of failure, not the likelihood. The U.S. Federal Emergency Management Agency (FEMA) and other regulatory bodies use a hazard potential classification system with three main categories:



Classification of Dam Hazards

Low Hazard Potential – Failure or misoperation of the dam would result in minimal property damage, primarily confined to the dam owner's property, with no probable loss of human life. These dams are typically in rural, undeveloped areas.

Significant Hazard Potential – A dam failure in this category could lead to economic losses, environmental damage, or disruption of infrastructure, but with no expected loss of life. These dams are often located near important infrastructure or lightly developed areas.

High Hazard Potential – Failure of these dams would result in probable loss of life due to flooding and damage to homes, businesses, and infrastructure in populated areas downstream. These dams are usually located near communities where the risk to people and property is high.

The Iowa Department of Natural Resources (DNR) ensures dam safety by enforcing compliance with state safety standards, with an emphasis on high-risk structures near populated areas or critical infrastructure. Dams classified with high and significant hazard potential receive more frequent inspections and are subject to detailed safety protocols. Dam owners are responsible for the maintenance and regular inspection of their structures, with reports submitted to the state as part of safety compliance.

A dam failure can lead to widespread flooding, destroying homes, businesses, and infrastructure, disrupting transportation, and potentially contaminating water supplies. The severity of flooding depends on factors such as dam size, water volume, and downstream geography. Dam failures can also have long-lasting environmental impacts, including habitat destruction and river sedimentation.

Effective dam safety programs, routine inspections, and well-maintained Emergency Action Plans (EAPs) for high- and significant-hazard dams are essential to reducing the risk of failure. EAPs ensure that emergency responders are prepared to act quickly and minimize the impact on communities if a failure occurs.

3.4.6.2 Location

In Johnson County, Iowa, areas most susceptible to dam failure hazards are generally downstream from high-hazard dams, where sudden releases of water would directly impact low-lying and floodplain regions. The following areas are particularly vulnerable:

- Iowa City and Coralville: These urban centers face significant risk, especially due to the Coralville Reservoir Dam, which is classified as a high-hazard structure. If this

dam were to fail, large portions of Iowa City and Coralville—including residential and commercial districts, the University of Iowa campus, and critical infrastructure—could experience extensive flooding, with potential water levels reaching several floors up in buildings near the Iowa River. Additionally, failure of other high-hazard structures, such as the Coralville Levee and West Side Levee, could further exacerbate flooding in these densely populated areas.

- Low-Lying and Floodplain Zones: Areas within the 100-year and 500-year floodplains along the Iowa River and its tributaries, including zones around high-hazard dams such as the North Branch Ralston Creek Dam and the Scott Boulevard Dam, are especially vulnerable. Floodplain areas in rural Johnson County, which may have limited flood defenses, could see properties, farmland, and infrastructure inundated in the event of a dam failure.
- Transportation Corridors: Major highways and local roadways near rivers and streams, such as I-80, US-6, and US-218, would be affected by floodwaters from a dam or levee breach, especially near high-hazard structures like the Davis Dam and Scott Boulevard Dam. These corridors are vital for daily transportation and emergency response, so their disruption could isolate communities and hinder evacuation or rescue efforts, amplifying the overall impact of a dam failure.
- University of Iowa Campus and Surrounding Facilities: Located near the Iowa River, the University of Iowa campus is particularly vulnerable to impacts from failures of the Coralville Dam and nearby levees. University facilities, healthcare centers, and research institutions could face severe disruptions, risking damage to critical academic and healthcare operations reliant on river proximity.
- Recreational and Natural Areas: Parks, conservation areas, and recreational sites near high-hazard dams, such as the Coralville Reservoir and Kent Park, are also at risk. A dam or levee failure could cause immediate impacts on these areas, resulting in habitat destruction, sedimentation, and the loss of recreational amenities, which would impact both the environment and public access to these sites.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

In summary, downstream areas, particularly urban centers like Iowa City and Coralville, critical transportation routes, floodplain zones, the University of Iowa campus, and recreational sites near high-hazard dams, are most susceptible in Johnson County to the consequences of a dam failure. These vulnerabilities highlight the need for robust emergency action plans and proactive flood control measures to mitigate potential impacts and safeguard high-risk areas across the county.

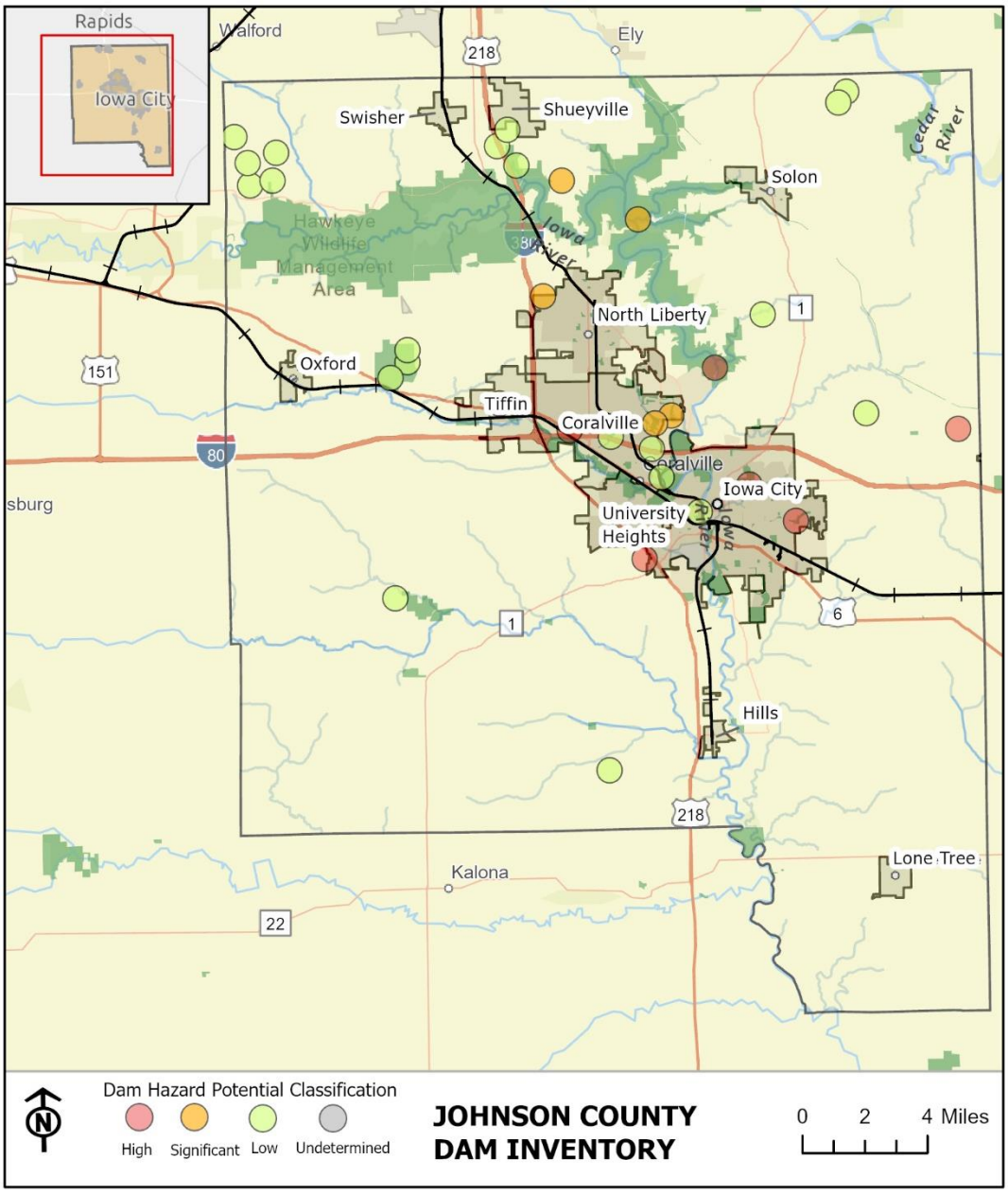


Figure 3-1: Johnson County Dam Map

Figure 3-2: Oaknoll Dam Map

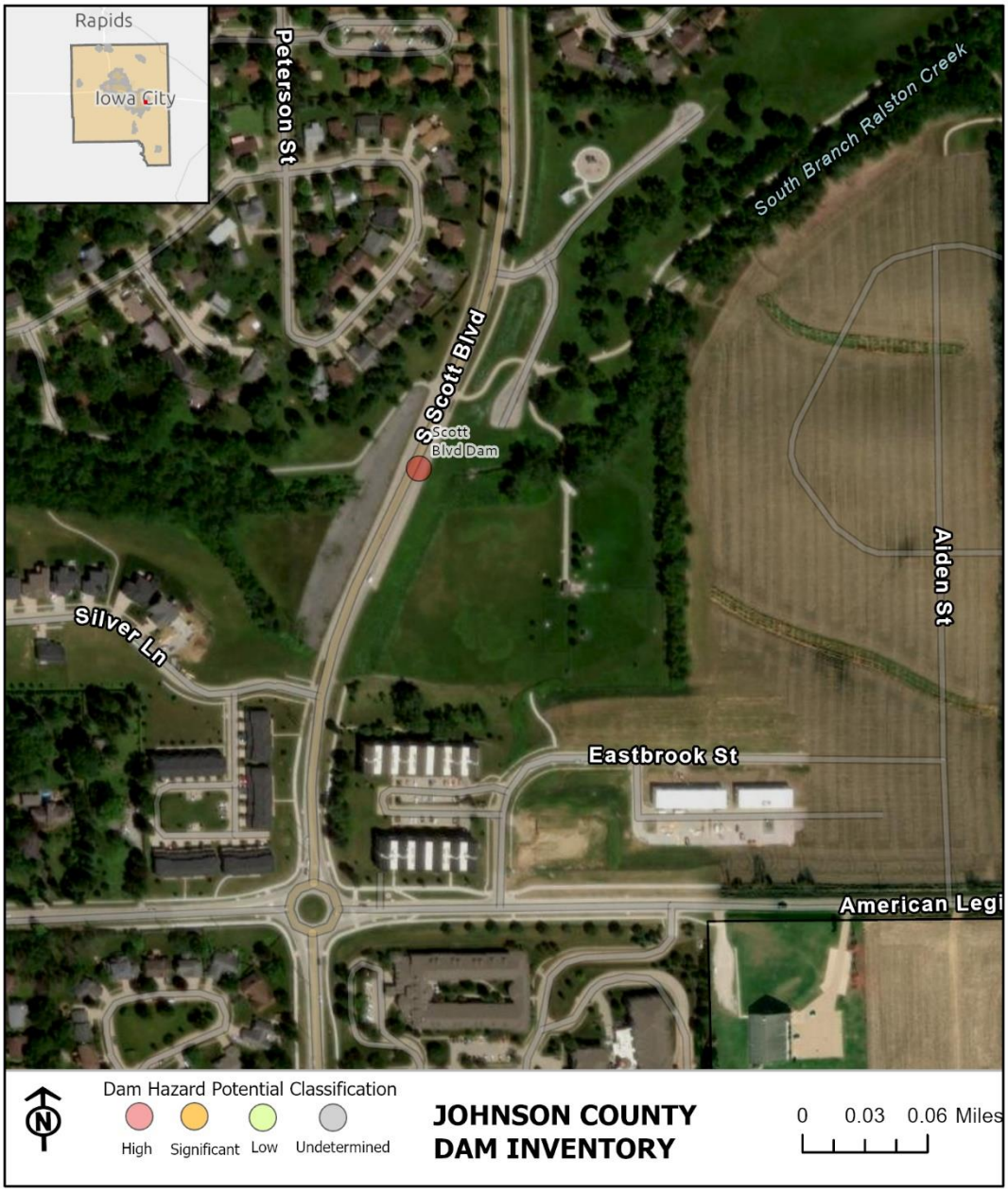


Figure 3-3: Scott Blvd Dam Map

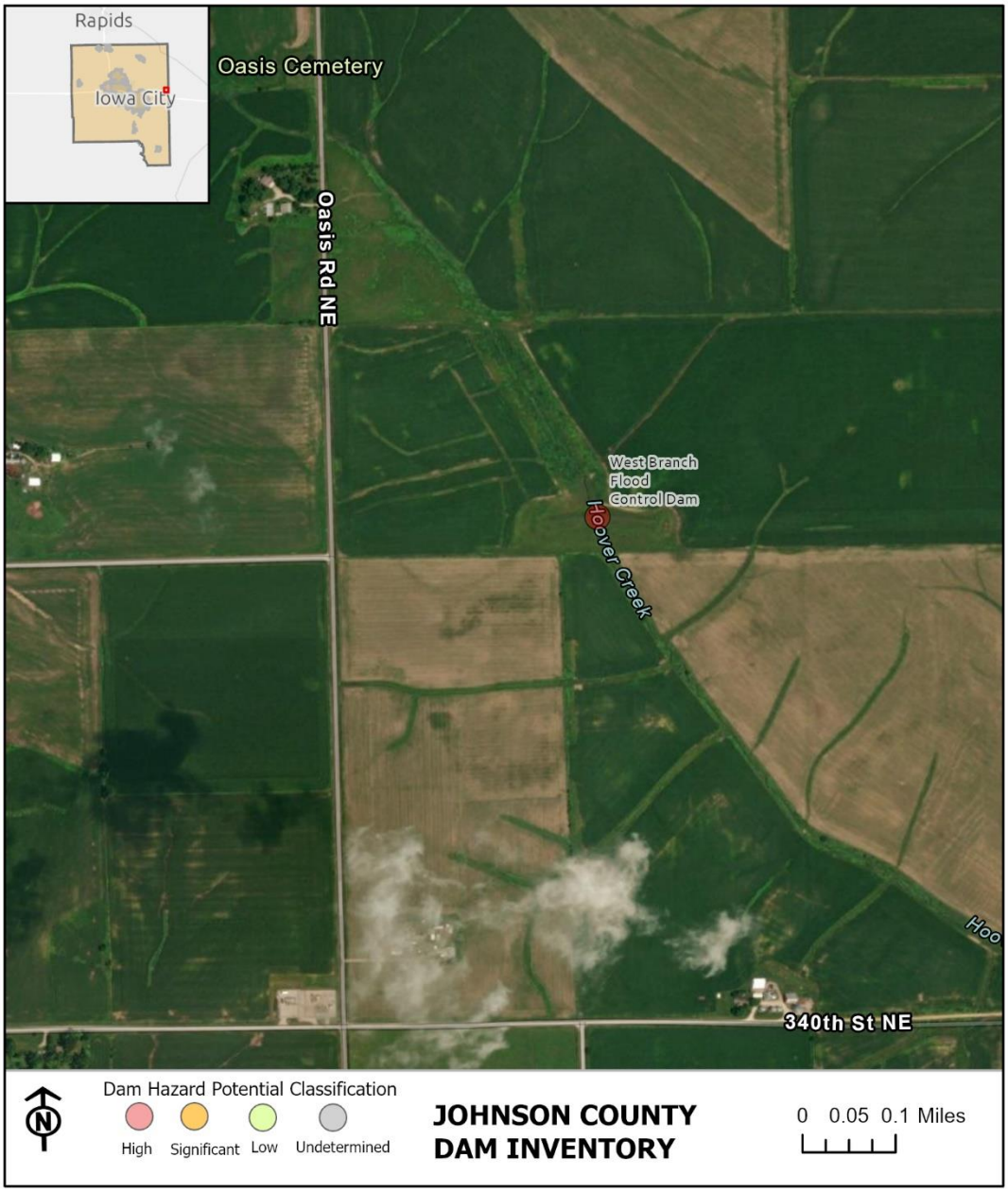


Figure 3-4: West Branch Flood Control Dam Map

Figure 3-5: North Branch Ralston Creek Dam Map

Figure 3-6: Coralville Dam Map

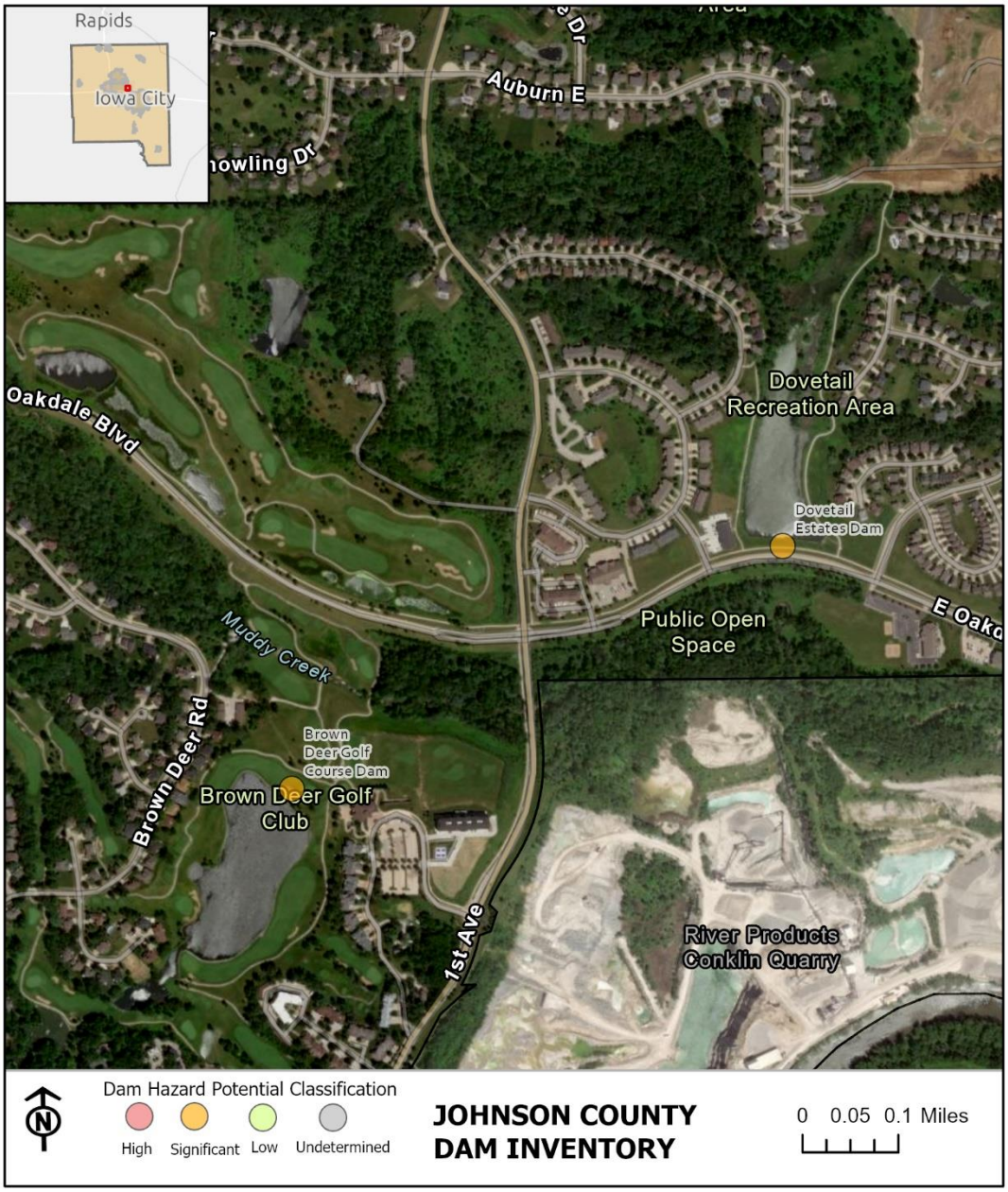


Figure 3-7: Dovetail Estates and Brown Deer Golf Course Dams Map

Figure 3-8: Coralville Regional Detention Basin Dam Map

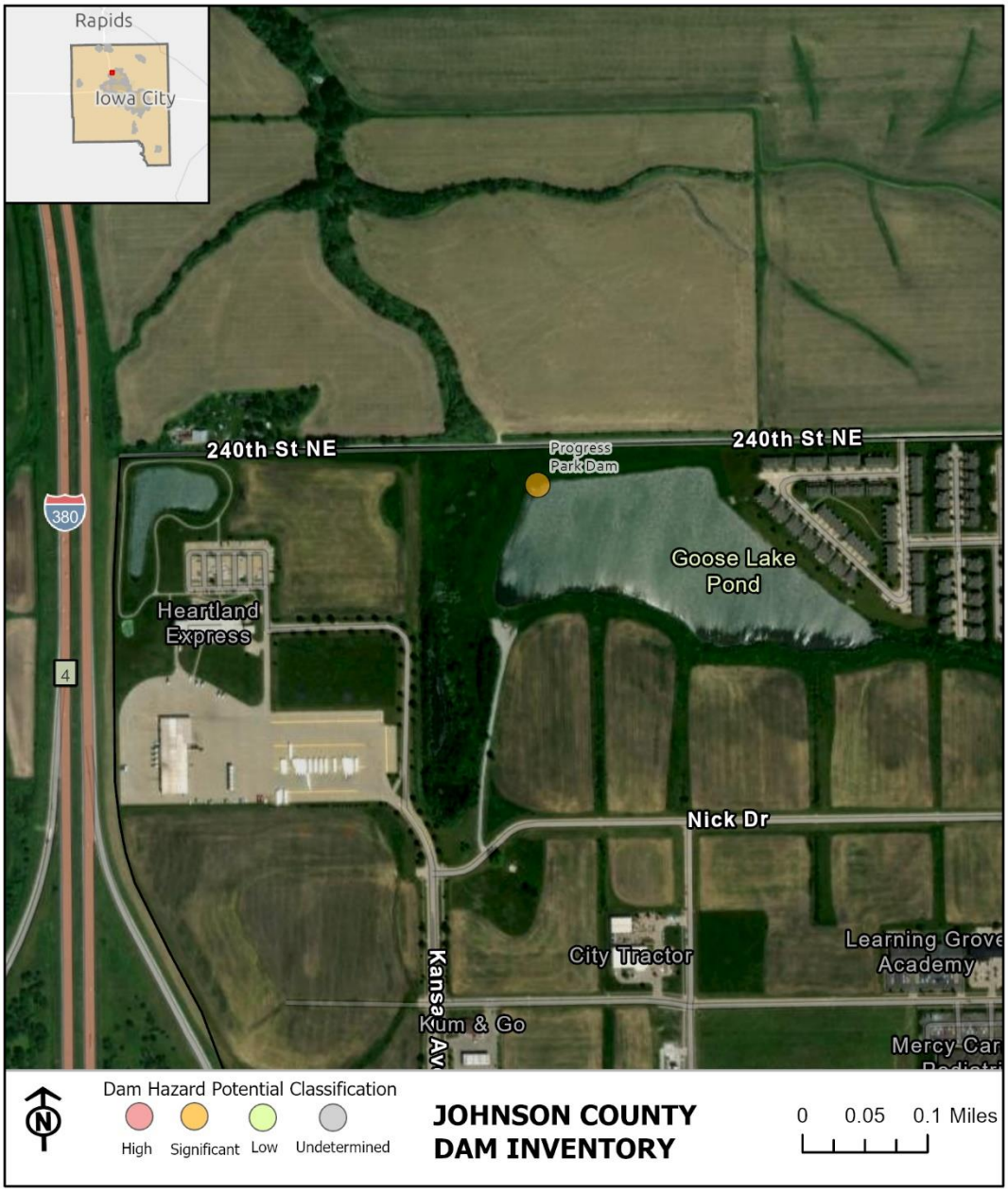


Figure 3-9: Progress Park Dam Map

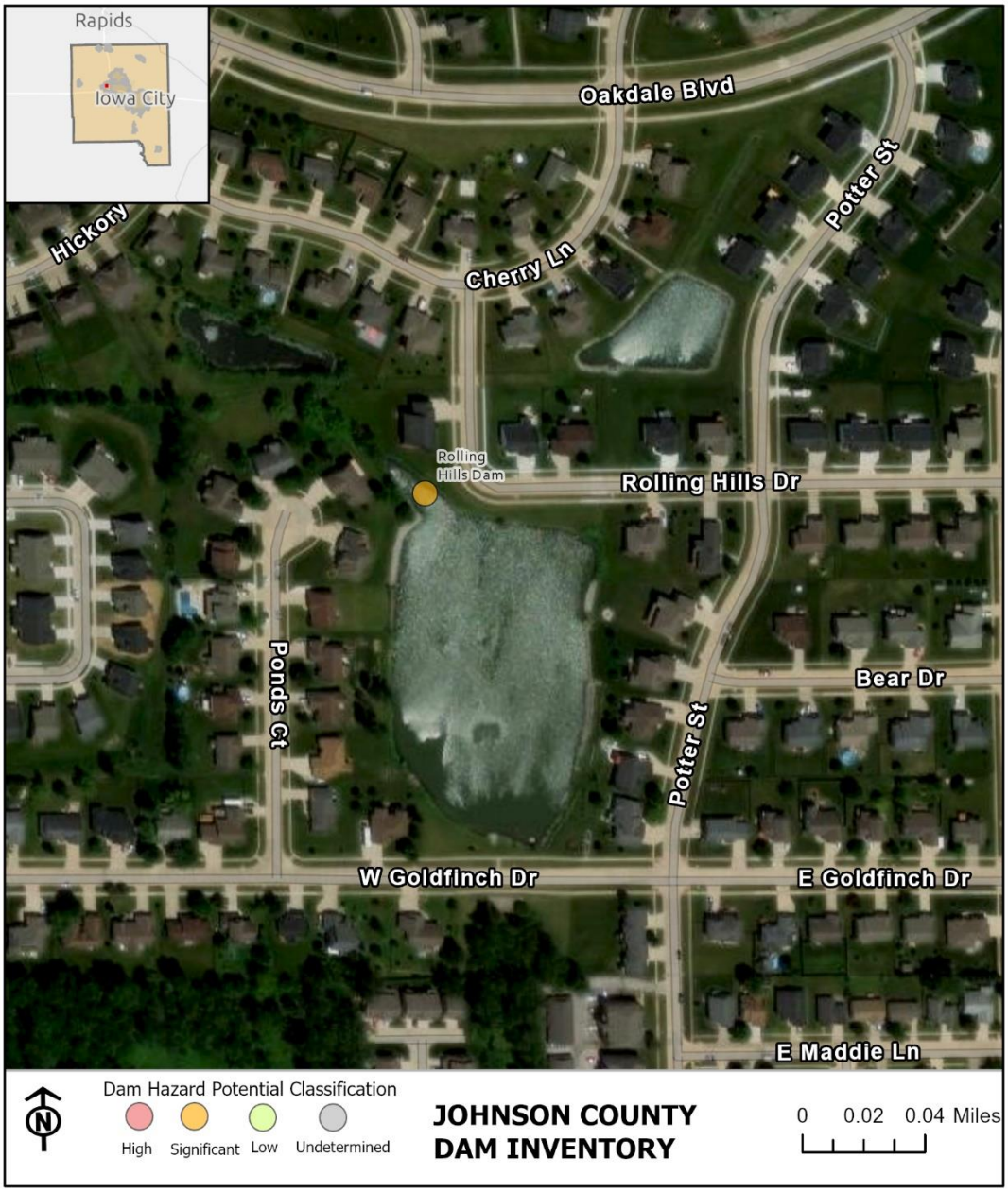


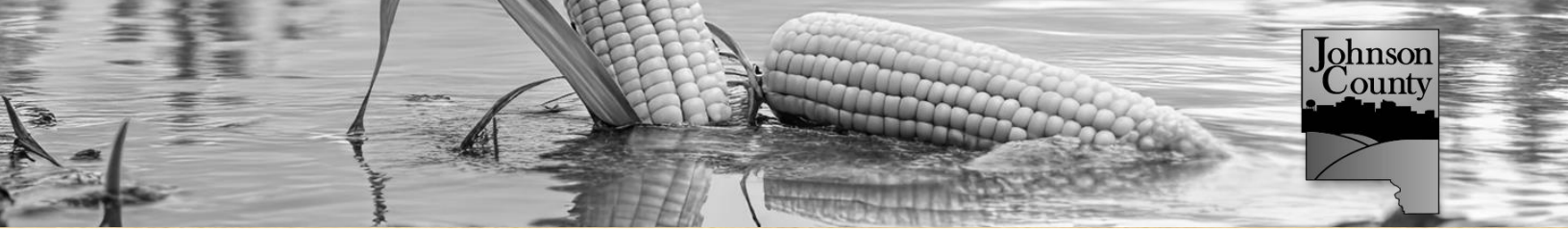
Figure 3-10: Rolling Hills Dam Map

Figure 3-11: Lake Macbride Dam Map

Figure 3-12: Twin Valley Lakes - East Dam Map

3.4.6.3 Magnitude/Severity

Dams are classified by hazard potential, commonly categorized as low, moderate, or high hazard, based on the anticipated impact of a failure. A low-hazard dam typically poses minimal risk to human life and significant infrastructure, with failures expected to result in



localized impacts. In the event of a low-hazard dam failure, the magnitude and severity are usually measured by the extent of minor flooding, often affecting undeveloped land, farmland, or low-density areas. The flooding is generally contained to a small radius, with potential damage limited to minor infrastructure, such as small roads, farm bridges, or culverts. In these cases, the economic and environmental impacts are also low, with possible short-term effects like soil erosion or sediment displacement that are typically temporary and geographically limited.

Conversely, a high-hazard dam failure would have severe consequences for human life, infrastructure, and economic stability. The magnitude and severity of such an incident are measured by the extent of widespread inundation, which could affect urban areas, critical infrastructure, and essential services. Key factors include the flood depth and area, the number of people and properties within the inundation zone, and the disruption to critical infrastructure, such as major highways, power plants, or emergency services. The severity is further influenced by the duration of flooding and the time required for repairs. High-hazard dam failures often necessitate extensive recovery operations, with repairs that could take months or longer, alongside significant environmental consequences, such as extensive erosion, habitat loss, and sediment displacement over larger areas. In summary, low-hazard dams are associated with limited, localized impacts, while high-hazard dams carry the potential for large-scale destruction and prolonged recovery periods.

3.4.6.4 Past Occurrences

Johnson County, Iowa, has experienced significant flooding events related to dam operations, notably involving the Coralville Dam. Constructed between 1949 and 1958 by the U.S. Army Corps of Engineers, the Coralville Dam was primarily designed for flood control on the Iowa River.

In 1993, during a period of extensive rainfall, the Coralville Reservoir reached unprecedented levels, leading to water flowing over the emergency spillway. This overflow caused substantial flooding downstream, affecting areas in Coralville and Iowa City. The event highlighted the challenges in managing extreme weather conditions and the limitations of existing flood control infrastructure.

A more severe incident occurred in June 2008, when the Coralville Reservoir again exceeded its capacity due to prolonged heavy rainfall. Water flowed over the emergency spillway at record levels, resulting in extensive flooding in Coralville and Iowa City. The University of Iowa campus suffered significant damage, with several buildings inundated,

including Hancher Auditorium and the University of Iowa Museum of Art. The flood disrupted local infrastructure, leading to road closures and impacting essential services.

3.4.6.5 Likelihood of Future Occurrence

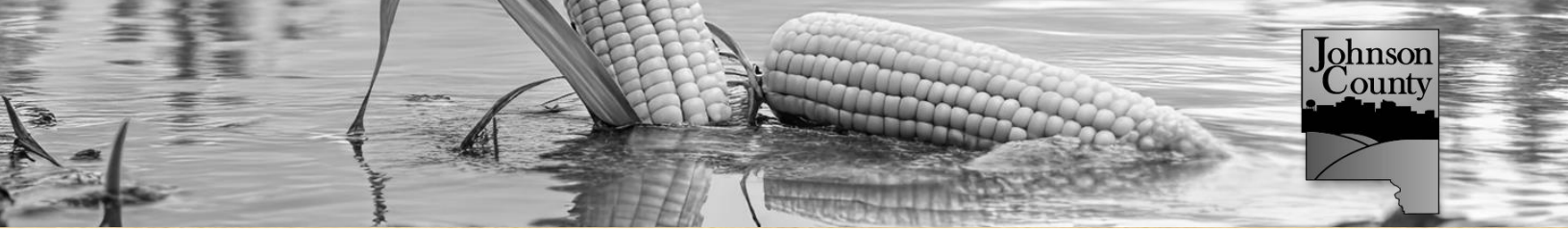
In Johnson County, Iowa, the likelihood of future dam failures is shaped by a combination of infrastructure age, regional climate trends, and state-level dam safety measures. Many of the county's dams, especially those constructed several decades ago, face structural challenges due to aging. Older dams, in particular, may not meet current safety standards and require frequent maintenance to mitigate risks associated with structural wear and degradation over time.

Regionally, the Midwest has seen an increase in extreme weather events, including heavy rainfall and severe flooding, which place additional stress on dam structures. This trend in weather patterns increases the potential for dam-related incidents, as intense rainfall can lead to rapid increases in water levels and potential overtopping, particularly for dams that lack modern flood management adaptations. In response, Iowa's dam safety regulations include regular inspections and maintenance protocols overseen by the Department of Natural Resources, although limited resources may impact the frequency and comprehensiveness of these inspections.

Given these factors, the likelihood of future dam incidents in Johnson County remains a consideration, especially for older structures or those exposed to recurring severe weather. Continuous maintenance, regular inspections, and updates to safety protocols are critical to managing this risk and enhancing the resilience of dam infrastructure in the county.

3.4.6.6 Climate Change Considerations

For dam failure, climate change considerations are typically minimal because it is not a natural hazard in itself but rather a consequence of infrastructure failure. However, climate change can indirectly influence the likelihood of dam-related incidents by intensifying environmental conditions that challenge the structural integrity of dams. In regions like Johnson County, Iowa, increasing occurrences of extreme weather events—particularly heavy rainfall and flooding—can raise reservoir water levels more frequently, pushing dam capacity and increasing the risk of overtopping or structural strain. While climate change may not directly cause a dam failure, the heightened frequency and severity of such weather events may lead to increased wear on dams and reduce the intervals between maintenance or reinforcement needs. Therefore, while climate change is not a direct factor in the hazard of dam failure, its impacts on regional hydrology and



extreme weather patterns are important indirect considerations for dam management and risk mitigation.

3.4.6.7 Vulnerability

People

If a dam failure were to occur in Johnson County, the impact on the population could be severe, particularly for those living or working in areas downstream. A sudden release of water would likely result in flash flooding, endangering lives and creating an urgent need for evacuation. Vulnerable and underserved populations, including low-income residents (16.9%) and individuals without access to personal vehicles (6.1%), could face significant challenges in evacuating safely. People in affected areas could experience immediate risks, including physical injury from swift-moving water, drowning, or being trapped in inundated buildings. Emergency response capabilities may be strained, particularly if healthcare facilities, fire stations, or law enforcement offices are within the flood zone or if access routes are blocked, delaying assistance to those in critical need.

Beyond the immediate dangers, a dam failure would likely result in long-term displacement for residents whose homes are damaged or destroyed. Underserved communities, such as renters or those with lower incomes, may have fewer resources to secure alternative housing, prolonging instability and financial hardship. Individuals with disabilities (7.1%) or older adults (9.6% aged 65 and older) may experience greater difficulty in relocating or accessing necessary support services after the event. Additionally, disruptions in public utilities, including water and electricity, would disproportionately impact those who rely on consistent access to medical equipment or cooling and heating systems, particularly during extreme weather conditions.

Daily life in the county would also be affected by widespread road closures, limiting access to workplaces, schools, and essential services. Contamination of water sources could pose health risks, particularly for underserved populations with limited financial flexibility to purchase bottled water or seek alternative living arrangements. The prolonged recovery period following a dam failure would exacerbate social and economic disparities, leaving those with fewer resources more vulnerable to the cascading effects of displacement, financial loss, and public health challenges.

Economy

A dam failure in Johnson County would have significant economic repercussions, affecting multiple sectors and leading to considerable financial loss. The immediate

impact would be on infrastructure, as floodwaters from a dam breach would likely damage roads, bridges, and utility systems, incurring high repair costs and interrupting critical transportation and supply chains. This would hinder the movement of goods and services, impacting local businesses, particularly those that rely on daily logistics or deliveries, and causing revenue losses across various industries.

The local business community, especially those in the inundation zones, could face extensive property damage, leading to costly repairs and potential long-term closures. Key institutions like healthcare facilities, educational institutions, and government offices would also incur recovery costs if facilities are impacted, while their temporary closure could disrupt the workforce and affect regional productivity. Additionally, agricultural areas within flood-prone zones would suffer from crop loss, soil degradation, and equipment damage, adding strain to the local agricultural economy.

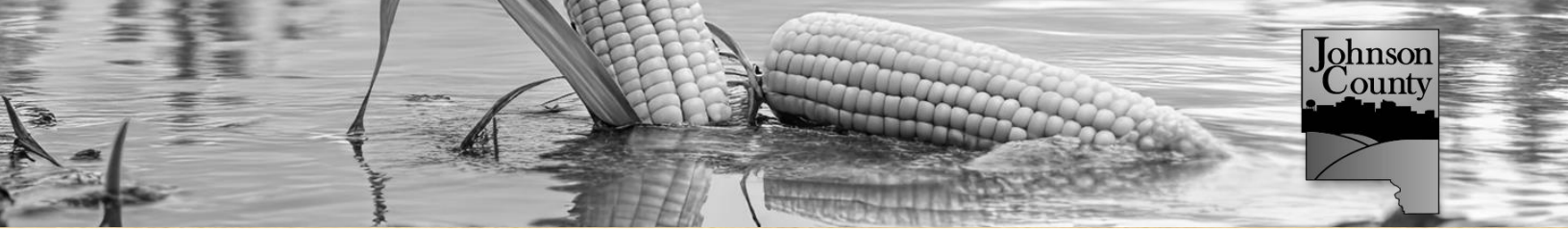
The housing market could also experience negative effects if residential properties are significantly damaged, as property values may decrease in affected areas, leading to economic instability for homeowners and a potential decline in the local tax base. In the long term, the overall economic impact would extend to increased insurance costs, shifts in investment priorities, and possible decreases in local and state funding allocations as resources are redirected toward recovery. These cumulative effects would create a substantial economic burden on the county, extending well beyond the immediate aftermath of the incident.

Built Environment

General Property

A dam failure in Johnson County would likely have a pronounced negative impact on property values, particularly in areas within or near the affected floodplain. Residential and commercial properties subjected to severe flooding or structural damage could experience immediate devaluation due to the costly repairs needed to restore them to their previous state. Even after recovery, these properties may retain a stigma as being in a high-risk area, leading to hesitancy among prospective buyers or investors. This perception of increased risk can deter property demand, resulting in longer listing times, reduced sales prices, and overall depreciation in value for affected areas.

In addition to directly impacted properties, surrounding areas might also experience a decline in property values as buyers and investors factor in the potential for future flooding risks and the possibility of increased insurance costs. A decrease in property values would reduce the local tax base, impacting county revenue and possibly leading



to higher taxes or reallocation of funds for recovery and mitigation efforts. The long-term effect would not only reduce individual property owners' equity but could also create broader economic challenges for the county as it addresses the infrastructure and community needs resulting from the incident.

Critical Infrastructure

A dam failure in Johnson County would have severe implications for critical infrastructure, with potentially extensive and prolonged disruptions. Key infrastructure elements—such as roads, bridges, power lines, and water treatment facilities—would be at immediate risk in flood-prone areas, leading to significant physical damage. Major transportation routes could become impassable due to flooding or structural compromise, which would hinder emergency response and evacuation efforts and disrupt daily commuting and goods movement. Repairs to these essential routes would be costly and time-consuming, affecting regional accessibility and economic recovery.

Power and communication systems could also experience outages if substations, electrical lines, or communication towers are damaged, leading to service interruptions for residents and businesses alike. Water and wastewater treatment plants within the affected area could suffer contamination or operational failure, risking public health and complicating the provision of clean water to affected populations. Healthcare facilities, emergency response centers, and law enforcement buildings near the flood zone would face operational challenges, limiting their ability to provide immediate assistance and potentially leading to relocation efforts if facilities are severely impacted.

The disruption and potential long-term unavailability of critical infrastructure would delay recovery efforts and place a heavy burden on county resources as repairs and mitigation are prioritized. This cascade of impacts would emphasize the vulnerability of critical infrastructure to such an event, underscoring the importance of preparedness and resilient design in county infrastructure planning.

Historical, Cultural, and Natural Environment

A dam failure in Johnson County would have substantial impacts on the county's historical, cultural, and natural environments, potentially causing irreparable damage. Historical sites and landmarks within the floodplain, such as the 1898 Coralville Schoolhouse Museum and the Iowa River Power Restaurant (a repurposed historic power station), would be at risk of severe water damage, compromising their structural integrity and historical value. Restoration of these sites would require specialized materials and methods to preserve their historical authenticity, and in some cases, the damage could

lead to a total loss of irreplaceable assets, reducing the cultural heritage of the community.

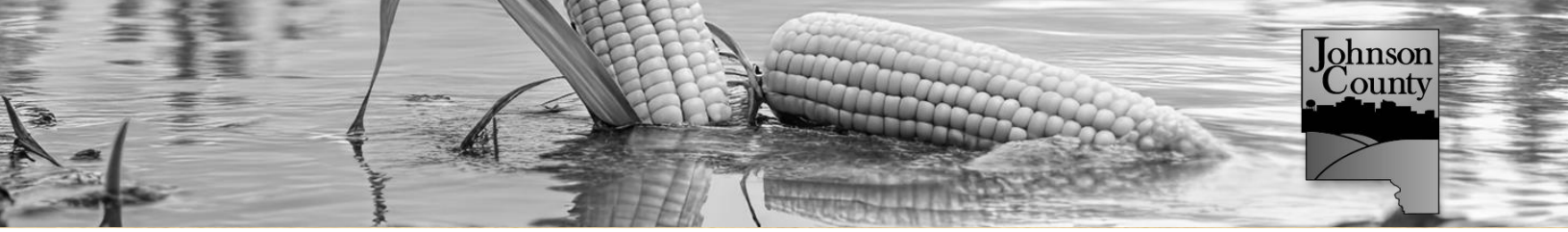
Cultural institutions like the University of Iowa Stanley Museum of Art and the Englert Theatre could also suffer damage, disrupting arts, education, and community activities. If floodwaters reach these locations, it could destroy exhibits, archives, and performance spaces, impacting local artists and reducing tourism and economic activity tied to these cultural venues. The loss of such spaces would diminish community morale and hinder access to cultural enrichment.

The natural environment would also suffer from a dam failure, as floodwaters could erode riverbanks, disrupt ecosystems, and deposit sediment and pollutants across the landscape. Wildlife habitats along the Iowa River Corridor and Hickory Hill Park could be destroyed or degraded, impacting plant and animal species and reducing biodiversity. Wetlands like those in the Hawkeye Wildlife Management Area might be overwhelmed, diminishing their natural ability to absorb floodwaters and buffer future flood events.

Future Land Use and Development

A dam failure in Johnson County would have a profound impact on future land use and development, particularly in areas affected by the flood. In response to the increased perception of risk, land-use policies could shift to impose stricter regulations on construction within identified flood zones, potentially limiting new developments in these high-risk areas. Zoning regulations might be revised to reduce building densities, designate certain areas as no-build zones, or encourage green spaces and buffer zones to mitigate future flooding risks. This change in zoning and land-use restrictions would alter the growth trajectory of the county, potentially redirecting development away from river-adjacent and low-lying areas.

Existing development plans would also need to incorporate resilience measures, such as elevated structures, flood-resistant materials, and improved stormwater management systems. Developers may face higher costs associated with these protective features, which could influence property values and project feasibility. Additionally, the county may need to allocate more resources to flood mitigation infrastructure, like levees and floodwalls, or invest in restoration of natural buffers such as wetlands, affecting budget priorities for other public projects. In the long term, the county's land-use strategy would likely reflect a shift toward resilience-focused development, shaping the future growth and physical landscape of Johnson County to reduce exposure to similar hazards.



3.4.6.8 Consequence Summary

A dam failure in Johnson County would result in severe local consequences, affecting human safety, economic stability, infrastructure integrity, and the environment. Immediate impacts would include significant flooding, endangering lives and leading to widespread evacuation and displacement. Economic repercussions would be substantial, with damage to businesses, residential properties, and essential infrastructure, disrupting local commerce and increasing repair costs. Critical infrastructure, such as transportation routes, power, water, and emergency services, would face prolonged interruptions, complicating recovery efforts and access to essential services. Additionally, historical and cultural sites in flood-prone areas could suffer irreparable damage, while the natural environment would experience habitat loss, soil erosion, and pollutant dispersal, further impacting the region's ecological health. Long-term, these effects would influence future land use, with heightened regulations and resilience measures aimed at preventing similar risks, ultimately reshaping development priorities across Johnson County.

Category	Narrative
Impact on the Public	• Risk to human life and safety, necessitating evacuations • Displacement of residents and disruptions to daily life • Limited access to emergency services and healthcare in affected areas
Impact on the Economic Condition of the Planning Area	• Extensive business and property damage, leading to revenue loss • Increased costs for infrastructure repair and recovery efforts • Reduced local tax base due to property devaluation in affected areas
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical sites, cultural institutions, and community landmarks • Habitat destruction, soil erosion, and pollution in natural areas • Loss of biodiversity and ecosystem degradation in flood-affected zones
Impact on Built Environment, General Property, and Critical Infrastructure	• Decreased property values in flood-prone and impacted areas • Severe damage to roads, bridges, utilities, and water treatment facilities • Long-term infrastructure repair and maintenance needs
Impact on the Public Confidence in Government	• Potential decline in trust if response and recovery efforts are inadequate

Category	Narrative
	• Public concerns about preparedness and prevention of similar incidents • Increased demand for transparency in risk mitigation measures
Impact on Responders	• Increased workload and operational challenges for emergency responders • Potential safety risks and resource strain during rescue and recovery operations • Need for extensive coordination across local and regional response teams
Impact on continuity of operations, including continued delivery of government services	• Disruptions to essential services such as public safety, utilities, and transportation • Temporary relocation of government facilities or personnel from affected areas • Long-term shifts in resource allocation to support recovery and resilience
Cascading hazards	• Potential secondary flooding from overwhelmed stormwater systems • Contamination of water sources and public health risks due to polluted floodwaters • Infrastructure vulnerabilities that could lead to further failures (e.g., power outages)

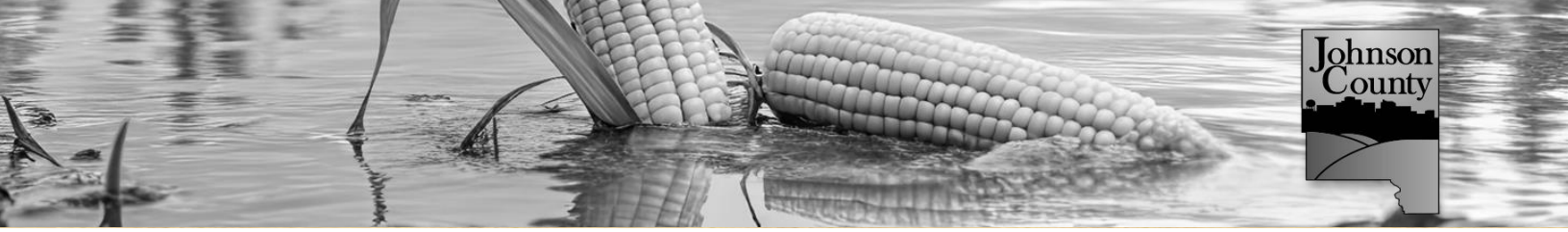
3.4.7 Drought

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.58	2.08	1.58	1.83	14.16

3.4.7.1 Description

A drought hazard occurs when an area experiences an extended period of below-average precipitation, leading to a significant reduction in water availability. Droughts typically develop gradually, beginning with a dry spell that can intensify over time if rainfall remains limited. They are influenced by climatic factors such as changes in weather patterns, ocean temperatures, and atmospheric conditions, and are often worsened by human activities like overuse or mismanagement of water resources.

In agricultural regions, drought poses a major risk by impacting crop yields, leading to crop failures, reduced livestock feed, and higher operational costs for farmers. Economic losses during severe droughts can amount to millions, affecting both individual farmers



and broader agricultural markets. Water shortages also strain public water supplies, prompting municipalities to impose water-use restrictions for households, businesses, and industries.

Beyond agricultural impacts, drought can degrade natural ecosystems by lowering water levels in rivers, lakes, and reservoirs, disrupting wildlife habitats and aquatic ecosystems. Fish populations, for instance, may decline due to insufficient water, and water quality issues can arise as pollutant concentrations increase in reduced water volumes. Additionally, drought creates ideal conditions for wildfires, especially in rural and forested regions, as vegetation becomes more flammable in prolonged dry periods.

Drought conditions are generally monitored by agencies such as the U.S. Drought Monitor and state or local authorities, which issue drought advisories and implement resource management strategies to alleviate impacts. While droughts often develop slowly, their consequences can persist long after normal precipitation returns, affecting economic stability, environmental health, and water resource planning.

3.4.7.2 Location

In Johnson County, drought conditions can impact the entire region, though certain areas are more susceptible due to specific characteristics. Agricultural zones, where corn and soybean cultivation is prominent, are especially vulnerable. Prolonged dry periods can lead to reduced crop yields and strain livestock resources, significantly affecting the local agricultural economy. Rural communities that rely on private wells or smaller water systems are also susceptible, as water levels in wells and small reservoirs can decline during extended droughts, impacting water availability for both residents and agricultural needs.

Additionally, natural ecosystems such as wetlands, forests, and riparian zones along rivers and streams are sensitive to drought. Reduced water levels in these areas can disrupt habitats, affecting biodiversity and the overall health of these ecosystems. While urban areas like Iowa City and Coralville have more robust water infrastructure, they are not entirely immune to the impacts of drought. Extended dry spells can place strain on municipal water supplies, potentially leading to restrictions and conservation measures. Although drought can affect all parts of Johnson County, agricultural lands, rural areas, and natural ecosystems face particular challenges due to their dependence on consistent water availability.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher

Applicable Jurisdictions	
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable **Not Applicable**

3.4.7.3 Magnitude/Severity

The magnitude and severity of a drought in the planning area, or the broader planning area, is primarily measured using the U.S. Drought Monitor, which categorizes drought into five levels: D0 (Abnormally Dry), D1 (Moderate Drought), D2 (Severe Drought), D3 (Extreme Drought), and D4 (Exceptional Drought). These categories reflect the intensity of the drought based on factors such as soil moisture levels, streamflow, precipitation deficits, and vegetation stress. A prolonged period in D3-D4 drought, as seen in some past events in Iowa, can severely impact agriculture, water supply, and fire risks.

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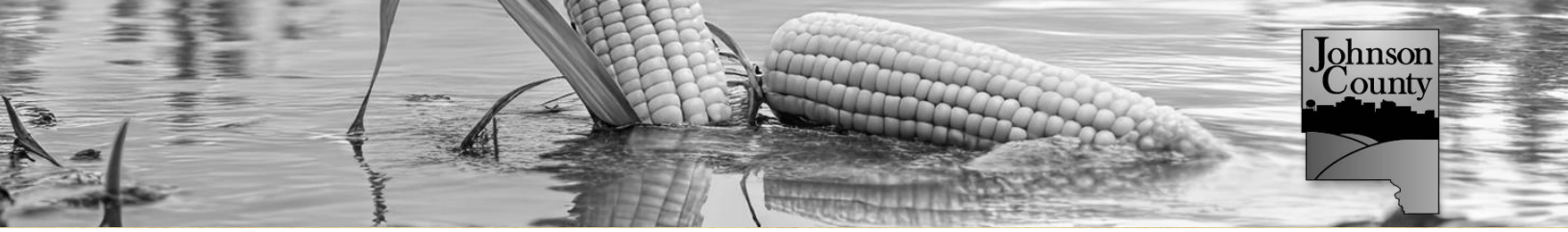


	LEVEL	DESCRIPTION
 Abnormally Dry	D0	• Short-term dryness slowing planting, growth of crops • Some lingering water deficits • Pastures or crops not fully recovered
 Moderate Drought	D1	• Some damage to crops, pastures • Some water shortages developing • Voluntary water-use restrictions requested
 Severe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

In Iowa, agriculture is particularly vulnerable during severe droughts, as low soil moisture hinders crop growth, leading to widespread crop failure and economic losses for farmers. This in turn causes secondary financial impacts on consumers due to reduced produce availability and rising food prices. Additionally, livestock operations are strained due to increased costs of feed and water scarcity.

Beyond agriculture, urban areas in the planning area may also experience rising water costs and restrictions on water usage, which can affect households, businesses, and recreational activities that depend on water sources like lakes and reservoirs. Low water levels can reduce the availability of recreational opportunities, while the risk of wildland fires significantly increases due to the dry conditions, further adding to the severity of a drought.

To assess the severity of drought in comparison to other hazards, historical data from past drought events in Iowa are used. For example, during the 2012 drought, large portions of Iowa were in D3-D4 Extreme Drought for extended periods, resulting in significant economic, environmental, and societal impacts, much like the 2002 drought event referenced. Although critical infrastructure services typically remain unaffected, the overall water supply levels and quality can be severely impacted, making drought a hazard with far-reaching consequences for the entire planning area.

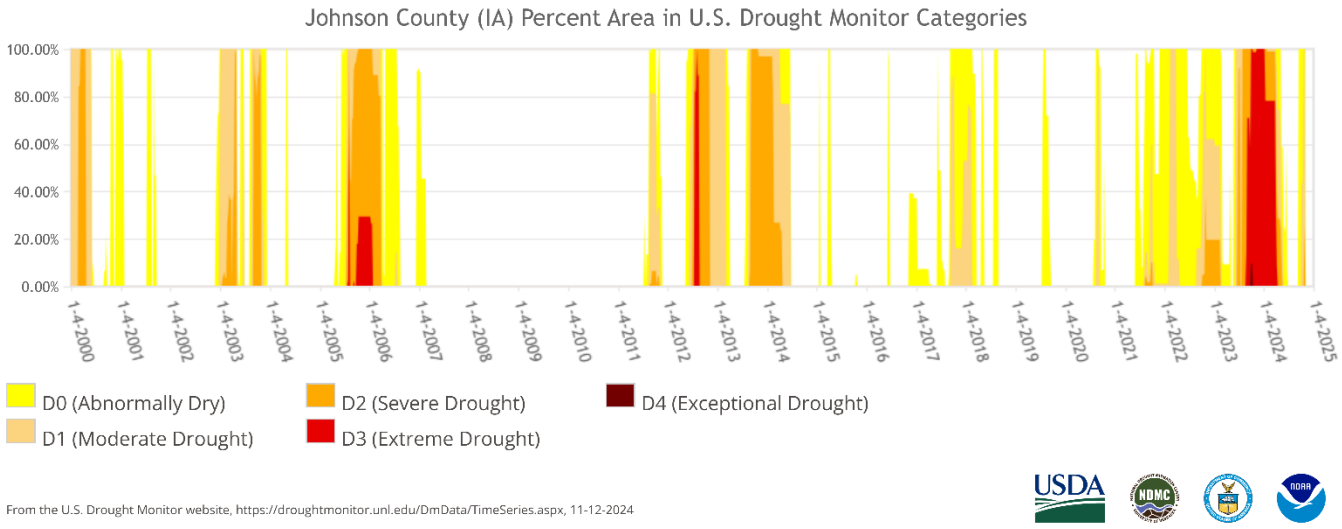
3.4.7.4 Past Occurrences

Droughts in the Midwest, including Iowa, occur periodically, though their frequency and severity can vary. On average, significant drought events affecting the region occur roughly every 10 to 20 years. These droughts can last for several months to multiple years and typically impact agriculture, water resources, and local economies. While not an annual occurrence, the cyclical nature of droughts is driven by climate patterns, making them a recurring challenge for the region. The following are some historical examples of these major droughts:

- 1930s (Dust Bowl): Severe drought throughout the U.S., especially in the Midwest, including Iowa. Resulted in widespread crop failure, soil erosion, and mass migration. Impacted farming communities heavily.
- 1950s (Great Plains Drought): A multi-year drought that affected much of the central U.S. including Iowa. This led to significant agricultural losses and spurred the development of modern water management systems.
- 1988: One of the worst droughts in U.S. history, affecting Iowa and much of the Midwest. This drought caused around $40 billion in agricultural damage, with corn and soybean yields dropping drastically.
- 1993: While this year is known for severe flooding, Iowa and parts of the Midwest faced drought conditions prior to the floods, impacting early planting and agricultural production.
- 2002: The U.S., particularly the Midwest and Western states, experienced moderate to severe drought. Iowa saw reduced crop yields, particularly in corn and soybean production.

- 2012 (Midwest Drought): This was one of the worst droughts in recent U.S. history, with Iowa and surrounding states severely impacted. Corn and soybean yields were drastically reduced, contributing to spikes in food prices.
- 2020 (Western U.S. Drought): While the worst of the drought was in the Western U.S., Iowa and parts of the Midwest also experienced dry conditions, leading to reduced crop yields and stressing water resources.
- 2021: A significant drought affected much of the Western and Midwestern U.S., including Iowa, leading to reduced crop yields, particularly for corn and soybeans, and contributing to wildfires and water shortages in some areas.

The following chart represents weeks in drought during this time period:



From the U.S. Drought Monitor website, https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx, 11-12-2024

3.4.7.5 Likelihood of Future Occurrence

The likelihood of future drought occurrences in Johnson County, Iowa, is moderately high based on historical patterns and state-level data on drought frequency. Over the past few decades, drought events have been relatively common in the region, typically occurring every three to four years, with some resulting in significant agricultural and economic impacts. Given that Iowa has experienced 15 notable drought events since 1997, it indicates a recurring risk aligned with broader climate trends in the Midwest.

Regionally, Iowa's climate patterns suggest a mix of periods of drought and heavy precipitation, which is expected to continue due to natural variability and potential climate change influences. Climate projections for the Midwest, as summarized in state and regional climate assessments, indicate that while precipitation totals may increase overall, seasonal variations could bring drier summers, increasing the drought risk during

critical agricultural growth periods. Locally, Johnson County's substantial agricultural footprint, including extensive cropland, underscores its vulnerability to even short-term droughts, as they can disrupt crop yields and strain water resources. Therefore, the county remains at a continuous but fluctuating risk for drought events in the foreseeable future.

3.4.7.6 Climate Change Considerations

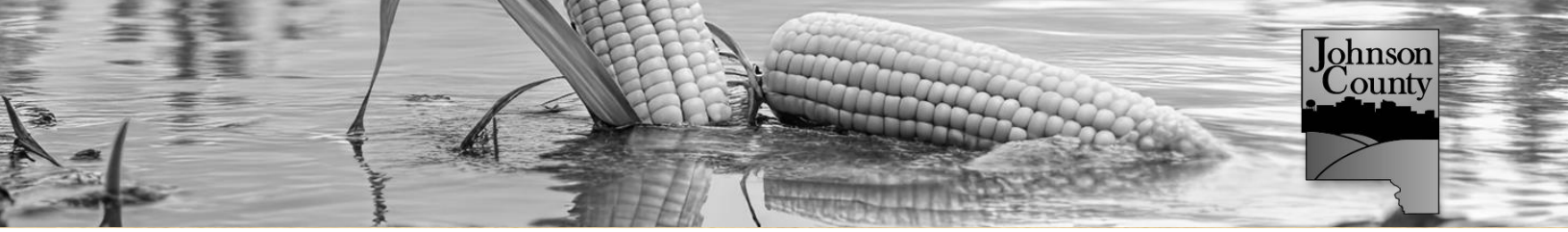
For drought as a hazard, climate change considerations primarily relate to potential shifts in precipitation patterns and temperature trends, even though drought itself is typically classified as a natural hazard with indirect human contributions. In the context of Johnson County, Iowa, climate models project that while total annual precipitation in the Midwest might increase, the distribution of this precipitation is expected to change, with more frequent heavy rainfall events and prolonged dry spells. Warmer temperatures associated with climate change could intensify drought conditions, particularly in summer, by increasing evapotranspiration rates and reducing soil moisture retention. This combination of variable precipitation and higher temperatures may exacerbate drought severity and frequency over time, impacting agriculture, water resources, and ecosystems. However, it is essential to note that while climate change can influence drought characteristics, drought itself remains primarily a naturally occurring hazard driven by climatic variability.

3.4.7.7 Vulnerability

People

If a drought were to impact Johnson County, Iowa, the local population could face several significant challenges, particularly those reliant on agriculture, public health, and water resources. Farmers and agricultural workers would experience reduced water availability and soil moisture, leading to lower crop yields and strained livestock production, directly affecting their livelihoods and financial stability. The economic strain from decreased agricultural productivity could extend to local businesses and suppliers that depend on this sector, with low-income workers (16.9%) in agriculture and food service industries facing heightened financial insecurity. Underserved populations who rely on affordable local produce may experience rising food costs, further straining household budgets.

Public health impacts could also arise, as water scarcity can compromise water quality, with higher concentrations of pollutants in diminishing water sources potentially increasing the risk of waterborne illnesses. Vulnerable populations, including older adults



(9.6%) and individuals with preexisting respiratory conditions, may be particularly affected by worsening air quality, as dry conditions contribute to increased airborne dust and particulates. Households without reliable air conditioning or those in rental housing with limited control over indoor air quality may be at greater risk of heat-related illnesses due to prolonged dry and warm conditions.

Residents of Johnson County may also experience restrictions on water usage, affecting daily routines and quality of life, particularly if local authorities implement conservation measures. Households with lower incomes may struggle with increased utility costs as water rates rise due to scarcity. Recreational areas, including parks and water-based activities, could face closures or limited access, disproportionately impacting families and individuals who rely on public spaces for leisure and well-being. While drought poses no immediate life-threatening risks, its prolonged effects on health, economy, and daily life would be felt most acutely by vulnerable and underserved populations, deepening existing disparities across the county.

Economy

If a drought were to impact Johnson County, Iowa, the local economy would likely experience substantial effects, especially within the agricultural sector, which plays a significant role in the region. Agricultural productivity would be directly affected as crops yield less, and livestock operations incur higher costs for feed and water. This reduction in agricultural output could lead to income losses for farmers and ripple effects throughout the agricultural supply chain, impacting farm equipment suppliers, processing facilities, and transportation services tied to agricultural goods. The economic strain could further reduce consumer spending among impacted agricultural workers and businesses, creating a broader downturn in local economic activity.

Beyond agriculture, drought-related economic impacts could extend to utilities, as water treatment and distribution costs rise in response to increased demand and potential scarcity. Local governments may need to allocate additional resources to manage water supplies, monitor environmental impacts, and potentially support affected residents, leading to increased municipal expenditures. Furthermore, if prolonged, drought conditions could diminish property values in rural areas reliant on farming, reducing property tax revenue and impacting public services. Tourism and recreation, especially those dependent on water bodies, may also suffer as access to lakes, rivers, and recreational parks becomes limited, deterring visitors and affecting related businesses. Overall, a drought in Johnson County would impose multi-sector economic stress, especially in agriculture, local government finances, and water-dependent services, potentially resulting in both short- and long-term financial impacts for the county.

Built Environment

General Property

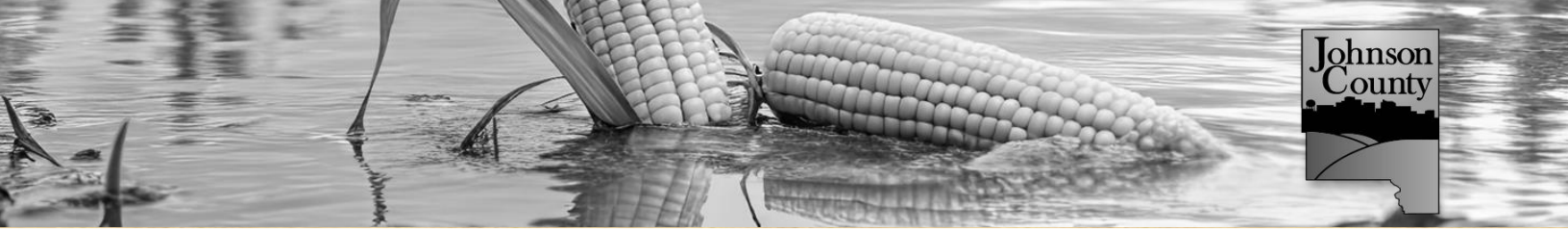
A drought in Johnson County, Iowa, could potentially lower property values, particularly in rural and agricultural areas. Agricultural land values might decrease due to reduced productivity and profitability, as prolonged dry conditions make crop and livestock production more challenging and less financially viable. This depreciation in land value would likely affect the financial stability of farmers, diminishing their equity and access to credit, which could lead to further economic strain on property owners in the agricultural sector.

Residential properties in areas heavily dependent on agriculture or those directly impacted by water scarcity may also see a decrease in value. If drought leads to water restrictions or declining groundwater levels, properties with private wells or reliant on local water bodies for irrigation could become less attractive to buyers. Furthermore, recreational properties or homes located near rivers, lakes, or parks may lose appeal if these areas suffer visibly from drought, with dried-up water bodies and reduced natural beauty impacting property desirability.

While urban properties may be less directly affected, prolonged drought could still impact property values indirectly through increased utility costs, water restrictions, and potential changes in local taxation if government revenue declines from lower rural property valuations. Overall, while the impact on property values may vary by location within the county, prolonged drought conditions would likely lead to a devaluation of agricultural and rural residential properties, with broader economic repercussions for Johnson County's real estate market.

Critical Infrastructure

If a drought were to occur in Johnson County, Iowa, critical infrastructure could face several impacts, especially regarding water supply, energy, and public health systems. Water treatment facilities and distribution networks would experience increased pressure to maintain sufficient water levels for public, agricultural, and industrial use. Prolonged drought conditions could lead to lower water reserves, prompting the need for conservation measures and potential modifications to infrastructure to support water-saving technologies. Additional infrastructure might also be required for water transport or sourcing from alternate supplies, which would incur further costs and logistical challenges for local utilities.



Energy infrastructure could also be affected, as many power plants require water for cooling, especially during peak summer demand when droughts are most likely to occur. Lower water availability could constrain energy production, potentially resulting in higher operational costs and increased energy rates for consumers. In severe cases, limited energy production could impact the reliability of power supply across the county, affecting households, businesses, and essential services.

Public health facilities, emergency response, and firefighting resources would also be impacted, as drought conditions often elevate the risk of wildfires. Fire departments would face a dual challenge of limited water availability for firefighting and increased wildfire risk, placing additional strain on resources and potentially necessitating further investment in firefighting infrastructure and equipment. Hospitals and healthcare facilities may see an increase in patient volume due to respiratory issues and heat-related health concerns, particularly among vulnerable populations, and may require infrastructure support to ensure resilience to increased demand.

Historical, Cultural, and Natural Environment

A drought in Johnson County, Iowa, would have noticeable impacts on the historical, cultural, and natural environment, affecting both preservation efforts and the health of ecosystems. The natural environment would likely face the most direct effects, with water scarcity impacting rivers, lakes, and wetlands. Reduced water levels in the Iowa River and Lake Macbride would stress aquatic habitats, potentially leading to a decline in fish populations and other wildlife that rely on these ecosystems. Vegetation in areas such as Hickory Hill Park and Kent Park would be vulnerable to moisture deficiency, increasing the risk of plant stress, disease, and wildfire. This loss of plant vitality could alter biodiversity, shift the composition of native species, and disrupt the overall ecological balance in the county.

Historical sites and culturally significant landscapes may also suffer as drought affects soil stability and moisture levels, accelerating erosion and endangering structures or landscapes of historical value. The Plum Grove Historic Home, a mid-19th-century residence, could experience structural stress due to soil desiccation, which may cause foundation shifts. Similarly, Oakdale Cemetery, home to historic gravesites, could see increased soil erosion and difficulty maintaining its traditional green spaces. Sites reliant on natural water features, such as the Iowa River Power Dam, may lose part of their aesthetic and historical appeal, reducing visitor engagement and impacting heritage tourism.

The cultural landscape, particularly traditional agricultural practices, may face significant challenges. Prolonged droughts could force changes in crop types, farming practices, and local agricultural traditions that have shaped Johnson County's identity for generations. Events like the Johnson County Fair, which celebrates the area's rich agricultural heritage, could be affected by reduced crop yields, livestock health concerns, and water restrictions. These changes may erode aspects of the county's agricultural legacy, influencing community traditions tied to food production and farm-based events.

Future Land Use and Development

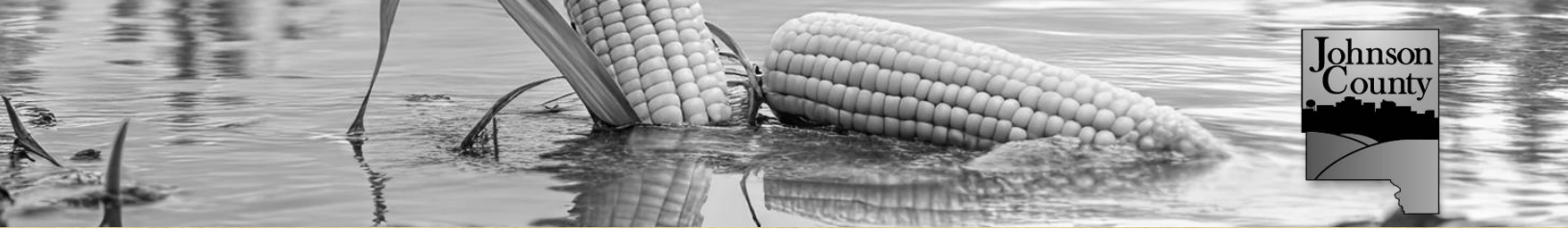
A drought in Johnson County, Iowa, could have significant implications for future land use and development, particularly if such events become more frequent or prolonged. Water scarcity concerns could lead to stricter land-use regulations and influence zoning decisions, particularly in areas prone to water shortages. For example, agricultural land may shift from water-intensive crops to more drought-resistant varieties, impacting traditional farming practices and the types of crops that can be sustainably grown in the region. This shift might also reduce the viability of certain farmland, potentially impacting property values and leading to consolidation of agricultural land or conversion of marginal lands to non-agricultural uses.

Urban and residential development may also be influenced by water availability. Municipalities within Johnson County could implement water conservation ordinances, restricting development in water-stressed areas or requiring new developments to incorporate water-efficient infrastructure, such as drought-tolerant landscaping, rainwater harvesting, or advanced irrigation systems. These requirements could increase the costs of new construction and impact where development is feasible or desirable. In some cases, limited water supplies might also lead to shifts in population growth patterns, as areas with more secure water resources become preferable for residential and commercial expansion.

In industrial and commercial sectors, water-intensive operations might face challenges, potentially deterring new businesses that rely heavily on water, such as food processing or manufacturing. This could shift the local economic base and impact job creation associated with such industries.

3.4.7.8 Consequence Summary

The occurrence of a drought in Johnson County, Iowa, would bring widespread consequences, impacting the agricultural sector, local economy, critical infrastructure,



and community well-being. Agricultural losses would strain farmers' livelihoods, affecting the broader economy as reduced yields ripple through related industries. Water scarcity would challenge critical infrastructure, placing additional demands on water and energy resources, and potentially impacting public health due to compromised water quality and increased respiratory risks. The natural environment would suffer, with stressed ecosystems, potential biodiversity loss, and heightened wildfire risk, while culturally and historically significant sites could face structural challenges and loss of appeal. Future land use and development would likely shift to accommodate water conservation needs, altering growth patterns and influencing zoning and agricultural practices. Altogether, a drought in Johnson County would necessitate adaptive measures across sectors to mitigate these extensive and varied impacts.

Category	Narrative
Impact on the Public	• Increased water restrictions and conservation measures impacting daily life • Health risks from decreased water quality and poor air quality due to dust and particulates • Reduced recreational access to water-based activities and natural areas
Impact on the Economic Condition of the Planning Area	• Significant financial losses for the agricultural sector due to reduced crop yields and livestock challenges • Decreased local spending due to reduced income among farmers and agricultural workers • Potential economic downturn in sectors reliant on agriculture and water-intensive businesses
Impact on the Historical, Cultural, and Natural Environment	• Strained ecosystems with reduced biodiversity, affecting fish, wildlife, and native plants • Increased erosion and damage to historical and culturally significant sites due to soil dryness • Disruption of traditional agricultural practices, impacting cultural heritage
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values for agricultural and rural properties due to decreased productivity • Increased maintenance and operational costs for water and energy infrastructure under drought conditions • Potential degradation of buildings and infrastructure due to soil desiccation
Impact on the Public Confidence in Government	• Public dissatisfaction if water restrictions and conservation measures are perceived as insufficient or inequitable • Increased scrutiny of government response to drought impacts on the community

Category	Narrative
Impact on Responders	• Strain on firefighting resources due to increased wildfire risk and limited water availability for fire suppression • Higher demand on public health services due to respiratory issues and heat-related illnesses
Impact on continuity of operations, including continued delivery of government services	• Additional resources required for drought management and response, potentially straining budgets • Potential for service disruptions in water-dependent government functions
Cascading hazards	• Elevated wildfire risk in dry vegetation areas • Soil erosion impacting agricultural lands and infrastructure stability • Potential for food supply disruptions if agricultural production is significantly impacted

3.4.8 Earthquake

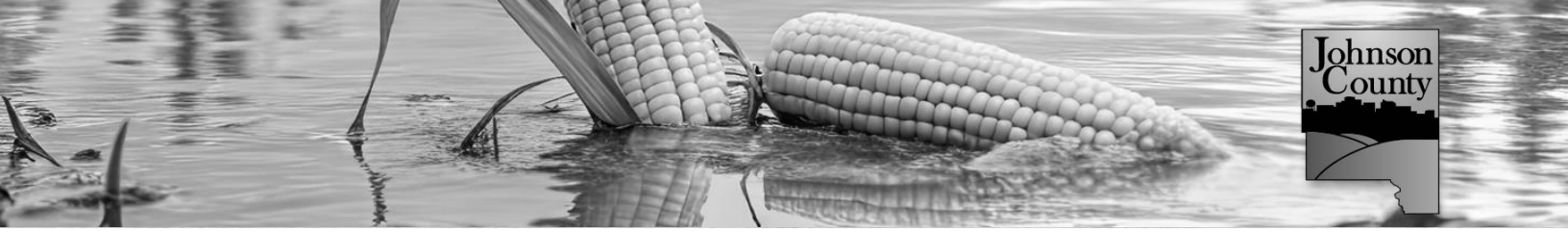
Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
1.17	2.17	2.25	2.00	7.51

3.4.8.1 Description

An earthquake occurs due to a sudden slip on a fault, where stresses in the earth's crust push the sides of the fault together until the rocks slip, releasing energy as seismic waves that cause the ground to shake. Earthquake impacts typically result from falling debris, collapsing structures, and infrastructure damage rather than the ground's movement itself. These effects can disrupt communications, power, and utilities, and may trigger fires, landslides, dam failures, or hazardous material spills, compounding the risks.

Faults, fractures between rock blocks, are categorized into active and inactive faults. Active faults have recently shifted and may move again, whereas inactive faults show no recent movement, indicating dormancy. Faults may move gradually, causing structural strain, or suddenly, as in an earthquake, potentially leading to severe structural failures.

In Johnson County, the probability of a significant earthquake is very low, as it is classified within Seismic Risk Zones 0 and 1 and lies far from major fault lines, including the New Madrid Seismic Zone. While comprehensive earthquake-specific building measures are typically unnecessary, minimal seismic considerations are included in building codes for essential facilities and critical infrastructure.



3.4.8.2 Location

In Johnson County, Iowa, there are no specific areas that are more susceptible to earthquake hazards than others due to the overall low seismic activity in the region. The county's classification within the lowest seismic risk zones indicates that the likelihood of a significant earthquake is minimal across the entire area. Historically, earthquake occurrences have been rare and minor, with no substantial impact on local structures or populations. As a result, the county does not typically prioritize earthquake susceptibility in particular locations within its planning and development efforts.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.8.3 Magnitude/Severity

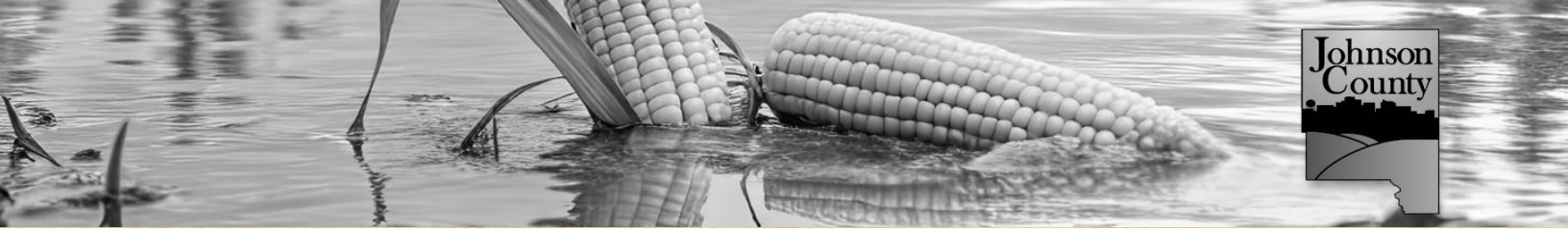
The amount of energy released during an earthquake is typically expressed as a magnitude, measured directly from seismic activity recorded on seismographs. Seismologists have developed several magnitude scales over the years, one of the earliest being the Richter Scale, introduced in 1932 by Dr. Charles F. Richter of the California Institute of Technology. The Richter Magnitude Scale quantifies the magnitude, or strength, of the seismic energy released by an earthquake.

Magnitude	Mercalli Intensity	Effects	Frequency
Worldwide	I	Microearthquakes, not felt or rarely felt; recorded by seismographs	Continual
2.0-2.9	I to II	Felt slightly by some people; no damage to buildings	Over 1M per year
3.0-3.9	II to IV	Often felt by people; rarely causes damage; shaking of indoor objects noticeable	Over 100,000 per year
4.0-4.9	IV to VI	Noticeable shaking of indoor objects and rattling noises; felt by most people in the	10K to 15K per year

Magnitude	Mercalli Intensity	Effects	Frequency
		affected area; slightly felt outside; generally, no to minimal damage.	
5.0 to 5.9	VI to VIII	Can cause damage of varying severity to poorly constructed buildings; at most, none to slight damage to all other buildings; Felt by everyone	1K to 1,500 per year
6.0-6.9	VII to X	Damage to a moderate number of well-built structures in populated areas; earthquake-resistant structures survive with slight to moderate damage; poorly designed structures receive moderate to severe damage; felt in wider areas; up to hundreds of miles/kilometers from the epicenter; strong to violent shaking in epicentral area	100 to 150 per year
7.0-7.9	VIII and greater	Causes damage to most buildings, some to partially or completely collapse or receive severe damage; well-designed structures are likely to receive damage; felt across great distances with major damage mostly limited to 250 km from epicenter.	10 to 20 per year
8.0-8.9	VIII and greater	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	One per year
9.0 and Greater	VIII and greater	At or near total destruction - severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations; permanent changes in ground topography.	One per 10-50 years

Another measure of earthquake severity is Intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface based on felt or observed effects. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. Intensity is measured with the Modified Mercalli Intensity Scale.

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.



MMI	Felt Intensity
IV	Felt by many people indoors; by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, and great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

3.4.8.4 Past Occurrences

While there have not been any earthquakes recorded in Iowa, the following are historical examples of earthquakes in the Midwest:

- 1811-1812 (New Madrid, Missouri): Magnitudes estimated between 7.0 and 7.5 on the Richter Scale. These earthquakes caused severe ground shaking over a wide area, altering the landscape, creating new lakes, and even causing the Mississippi River to flow backward temporarily.
- 1968 (Southern Illinois): Magnitude 5.4. Felt over 23 states, it caused minor structural damage in Illinois and neighboring states, and was one of the strongest earthquakes in the Midwest in modern history.
- 2008 (Mt. Carmel, Illinois): Magnitude 5.2. This earthquake caused minor to moderate damage to buildings and infrastructure, primarily in southern Illinois and Indiana, and was felt across several states, including as far as Iowa and Georgia.
- 2011 (Oklahoma): Magnitude 5.6. Though not in the traditional Midwest, this earthquake was felt throughout the region, causing structural damage in Oklahoma and being linked to oil and gas activity, raising awareness of induced seismicity in the region.

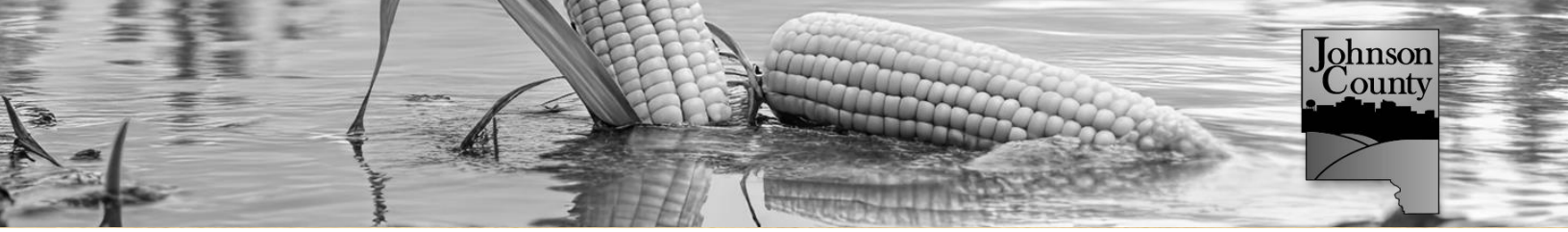
Reviewing past earthquake occurrences, even those not localized to Johnson County, allows the planning area to better understand potential impacts and improve preparedness. Although earthquakes are rare in this region, examining incidents in similar low-risk areas offers valuable insights into the types of secondary impacts that might occur, such as minor structural damage, infrastructure strain, or emergency response requirements. Learning from historical earthquakes in comparable regions aids local planning by highlighting potential vulnerabilities, reinforcing the importance of basic seismic considerations in building codes, and ensuring that critical facilities remain resilient. This approach fosters a proactive mindset, allowing the county to mitigate risks, however minimal, and remain prepared for unforeseen seismic events.

3.4.8.5 Likelihood of Future Occurrence

Based on local, regional, and state data, the likelihood of a significant earthquake occurring in Johnson County, Iowa, is extremely low. Johnson County is located in Seismic Risk Zones 0 and 1, which are the lowest classifications of seismic activity according to U.S. Geological Survey data. These classifications indicate that the area is geologically stable with minimal seismic risk. Iowa as a whole has historically experienced very few earthquakes, and when they have occurred, they have generally been minor in magnitude and impact. While the New Madrid Seismic Zone, a more active fault area, is within the central United States, its distance from Iowa makes it unlikely to impact Johnson County. Therefore, while planning for various hazards is essential, the probability of a notable earthquake event locally remains minimal.

3.4.8.6 Climate Change Considerations

Earthquakes are primarily geological events driven by tectonic processes, so climate change does not directly influence their occurrence or intensity. Unlike climate-driven hazards such as floods, droughts, or extreme weather, earthquakes result from shifts and stresses in the earth's crust that are unaffected by atmospheric changes. While some research has explored minor links between climate-related processes (such as large-scale groundwater extraction or changes in glacial mass) and increased pressure on tectonic faults in specific regions, there is no evidence to suggest that climate change affects earthquake activity in low-seismic-risk areas like Johnson County, Iowa. Consequently, climate change considerations are not relevant for earthquake planning and mitigation in this region.



3.4.8.7 Vulnerability

People

If an earthquake were to occur in Johnson County, Iowa, the impact on people would likely be minimal due to the region's low seismic risk and the unlikelihood of a major event. In the rare case of a minor earthquake, residents might experience mild ground shaking, which could cause temporary discomfort and minor disruption. However, in a more significant and unusual event, the primary concerns would include the potential for falling objects or minor structural damage to homes, schools, or businesses, which could lead to injuries. Emergency response services might experience an increase in calls, especially if people are unfamiliar with earthquake safety procedures. Psychological impacts, such as anxiety and stress, could also arise, especially for those unaccustomed to seismic activity. Overall, while direct physical harm to residents is unlikely, any unexpected earthquake could briefly affect the community's sense of safety and require reassurance and guidance from local authorities.

Economy

If an earthquake were to impact Johnson County, Iowa, the economic effects would likely be minor due to the low probability of a strong seismic event in the area. In the case of a small or moderate earthquake, there might be limited economic impacts, such as minor repairs to buildings, infrastructure, and roads, which would incur some costs to property owners and potentially the local government. Essential services, businesses, and institutions like the University of Iowa could experience brief operational disruptions if equipment or utilities were affected, leading to short-term productivity losses. If an unusual, more severe event were to occur, repair costs would rise, impacting local budgets and potentially requiring state or federal assistance. However, given the low seismic risk in Johnson County, a localized earthquake is unlikely to cause significant economic strain, and any financial impact would generally be manageable within the county’s resources.

Built Environment

General Property

In the unlikely event of an earthquake in Johnson County, Iowa, the impact on property values would likely be minimal, given the region’s low seismic risk and the probable minor nature of any seismic activity. A minor earthquake could result in limited cosmetic damage to structures, such as small cracks in walls or minor foundation shifts, which

would have little effect on property values. However, if an unusual, more severe earthquake were to occur and cause significant structural damage, some properties, particularly older buildings not designed with seismic resilience, could experience a temporary decrease in value until repairs were completed. Generally, due to the infrequent nature of earthquakes in the area, there is minimal risk of long-term depreciation in property values resulting from such an event.

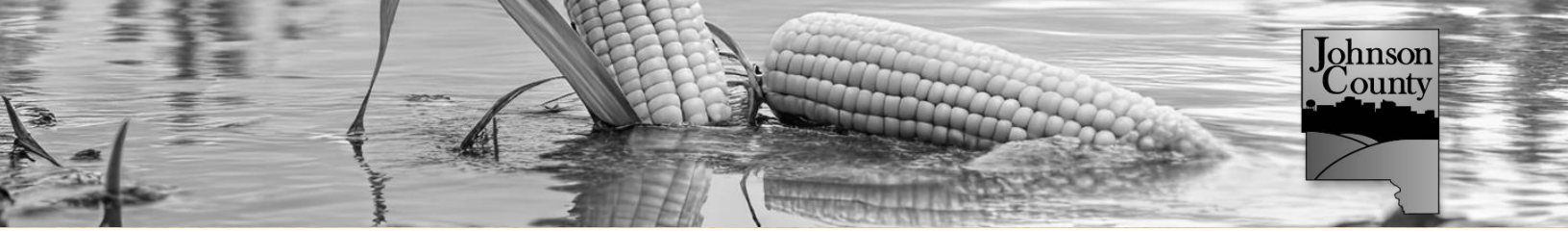
Critical Infrastructure

If an earthquake were to occur in Johnson County, Iowa, the impact on critical infrastructure would likely be minimal due to the low seismic risk and the expected minor nature of any local seismic event. However, in the event of even mild ground shaking, some infrastructure components could experience minor disruptions. Essential services such as water and wastewater treatment facilities, electrical substations, and communication networks might encounter brief interruptions if equipment shifts or minor structural issues arise. Older or less resilient infrastructure may be slightly more vulnerable to damage, such as minor cracks in pipelines or misaligned utility connections. While response services, like fire and medical facilities, would likely remain functional, a significant event could result in temporary delays if minor structural or equipment repairs are needed. Overall, the risk to critical infrastructure from an earthquake in Johnson County is low, and any impact would likely be minor and quickly manageable.

Historical, Cultural, and Natural Environment

If an earthquake were to impact Johnson County, Iowa, the historical, cultural, and natural environment would likely experience minimal effects due to the area's low seismic activity and the typically minor nature of earthquakes in this region. However, in the rare event of even a moderate earthquake, there could be minor damage to historical buildings and sites, especially older structures that may not be built to withstand even low levels of ground shaking. These structures could experience small cracks or slight shifting, which might require cosmetic repairs to preserve their historical integrity. Cultural landmarks, such as monuments or public art installations, could also sustain minor damage, but the need for extensive restoration would be unlikely.

The natural environment would experience little to no impact from such a low-probability event. If any minor soil movement or small landslides did occur, they would likely be limited to sloped or erosion-prone areas and could result in slight landscape changes. Overall, while historical and cultural resources might require minor attention following an



earthquake, the impact on Johnson County's historical, cultural, and natural environment would be minimal and manageable.

Future Land Use and Development

If Johnson County, Iowa, were to experience an earthquake, the impact on future land use and development would likely be negligible due to the area's low seismic risk. Given the unlikelihood of significant seismic activity, an earthquake event would not prompt major changes in land use policies or development practices. However, if even a minor earthquake were to cause noticeable structural impacts, the county might consider minor adjustments to building codes for specific critical facilities, such as hospitals, schools, and emergency services, to ensure resilience against any future low-level seismic activity. Development patterns in residential, commercial, and industrial areas would remain largely unaffected, as Johnson County's low earthquake risk does not necessitate significant land use or construction adaptations. Overall, future land use and development would continue as planned, with little to no influence from a minor seismic event.

3.4.8.8 Consequence Summary

An earthquake in Johnson County, Iowa, would likely result in minimal consequences due to the region's low seismic risk and the expected minor nature of any local seismic activity. Any ground shaking would probably cause only slight cosmetic damage to buildings, such as minor wall cracks or small shifts in foundations, without significant structural failures. Critical infrastructure and essential services might experience brief interruptions but would remain largely functional, with minor repairs easily managed. Historical buildings and cultural sites could experience slight wear, necessitating minor preservation efforts. Overall, the incident would have limited economic, social, and environmental impacts, requiring little adjustment to future land use or development practices and imposing minimal strain on local resources or emergency services.

Category	Narrative
Impact on the Public	• Minimal physical harm or injury expected. • Brief disruptions in daily activities due to minor ground shaking.
Impact on the Economic Condition of the Planning Area	• Minor repair costs for property owners and local businesses. • Temporary productivity losses if small interruptions affect essential services.

Category	Narrative
Impact on the Historical, Cultural, and Natural Environment	• Possible minor cosmetic damage to historical buildings and cultural sites. • Negligible impact on natural areas, with only minor soil shifts or erosion potential.
Impact on Built Environment, General Property, and Critical Infrastructure	• Little to no long-term impact on property values. • Brief, minor impacts on critical infrastructure, such as water or energy facilities, with quick repair needs.
Impact on the Public Confidence in Government	• Minor concerns or questions about preparedness, but overall confidence likely unaffected.
Impact on Responders	• Low demand on emergency responders; primarily focused on inspections and minor repair assistance.
Impact on continuity of operations, including continued delivery of government services	• Minimal disruption; government services would continue with slight adjustments if repairs are needed.
Cascading hazards	• Low likelihood, but minor risk of secondary hazards such as small gas leaks, minor landslides on slopes, or brief utility outages.

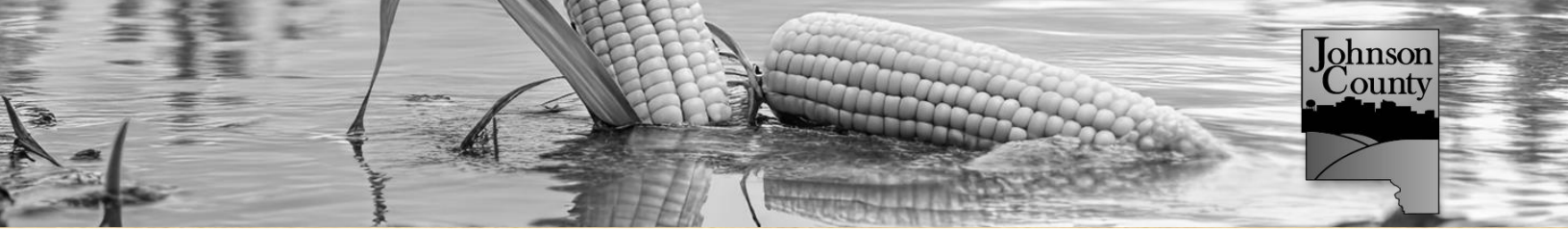
3.4.9 Extreme Temperatures

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.75	2.50	1.50	1.67	15.59

3.4.9.1 Description

Temperatures (including heat index) exceeding 100°F or three consecutive days with temperatures above 90°F are classified as an extreme heat event. A heat advisory is issued when temperatures reach 105°F, and a warning is issued at 115°F.

The heat index is a measure, expressed in degrees Fahrenheit, that indicates how hot it feels when relative humidity is factored into the actual air temperature. High relative humidity increases the perceived temperature because the human body relies on the evaporation of sweat to regulate heat. When humidity is high, perspiration does not evaporate as efficiently, reducing the body's ability to cool itself. At higher temperatures, even a lower level of relative humidity can significantly raise the heat index. For example, at 80°F, relative humidity must exceed 45% to raise the heat index above 80°F. However, at 110°F, much less humidity is needed to significantly increase the heat index.



Extreme cold is characterized by temperatures dropping below 0°F, with wind chill often bringing the perceived temperature significantly lower. A wind chill advisory is typically issued when wind chill values fall below -15°F, and a wind chill warning is issued when values drop below -25°F.

The wind chill factor is a measure, expressed in degrees Fahrenheit, that reflects how cold it feels when wind speed is taken into account with the actual air temperature. The human body loses heat more quickly when exposed to wind, which accelerates the cooling effect. As a result, the wind chill makes the temperature feel colder than the actual air temperature. For instance, when the air temperature is 0°F and the wind is blowing at 15 mph, the wind chill makes it feel like -19°F. The faster the wind, the greater the heat loss from the body, increasing the risk of frostbite and hypothermia in a shorter period of time.

3.4.9.2 Location

In Johnson County, Iowa, extreme temperatures—both heat and cold—can impact the entire region, though certain areas and populations are particularly vulnerable. Urban centers like Iowa City and Coralville may experience the "urban heat island" effect, where concrete and asphalt retain more heat, resulting in higher temperatures than in surrounding rural areas. Rural and agricultural zones are also significantly affected, with outdoor workers and farmers at increased risk of heat-related illnesses due to prolonged exposure, and livestock and crops suffering from heat stress or damage. During extreme cold, these agricultural areas face challenges such as frozen equipment and increased energy needs to maintain heating for both livestock and operations. Vulnerable populations across the county, including the elderly, young children, individuals with pre-existing health conditions, and those without sufficient heating or cooling resources, are especially susceptible to the health impacts of temperature extremes. While extreme temperatures can influence all areas of Johnson County, focusing on these specific zones and groups allows for more effective preparedness and response strategies.

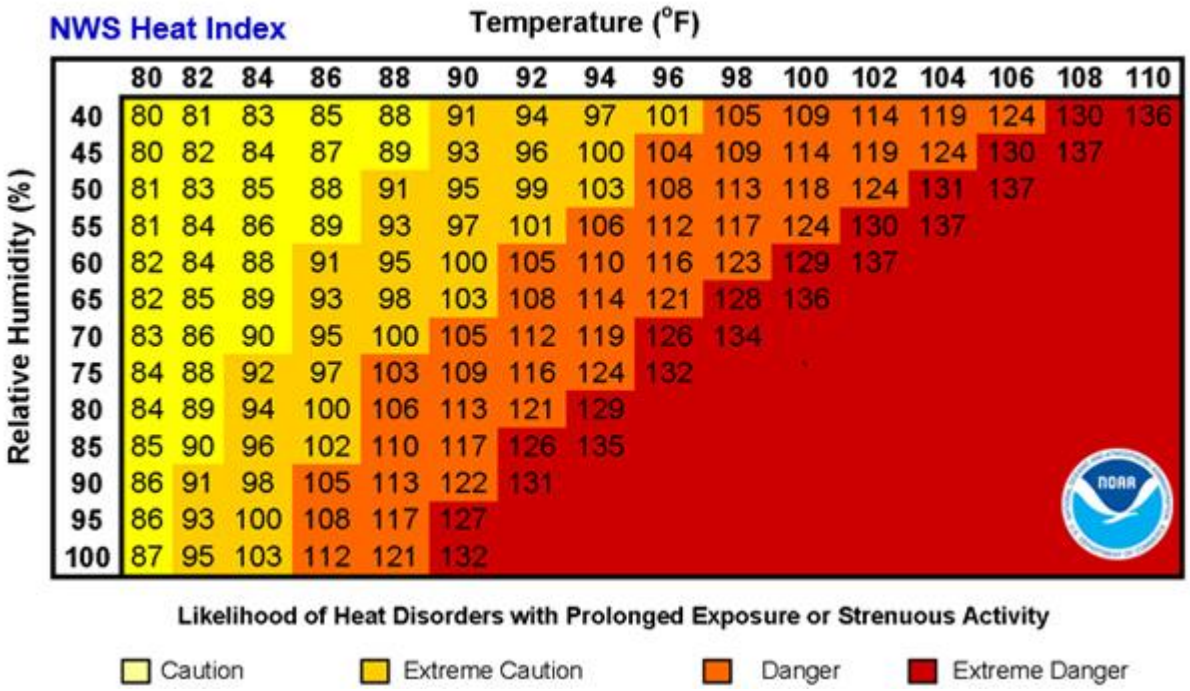
Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa

Applicable Jurisdictions	
City of Solon	

Applicable Not Applicable

3.4.9.3 Magnitude/Severity

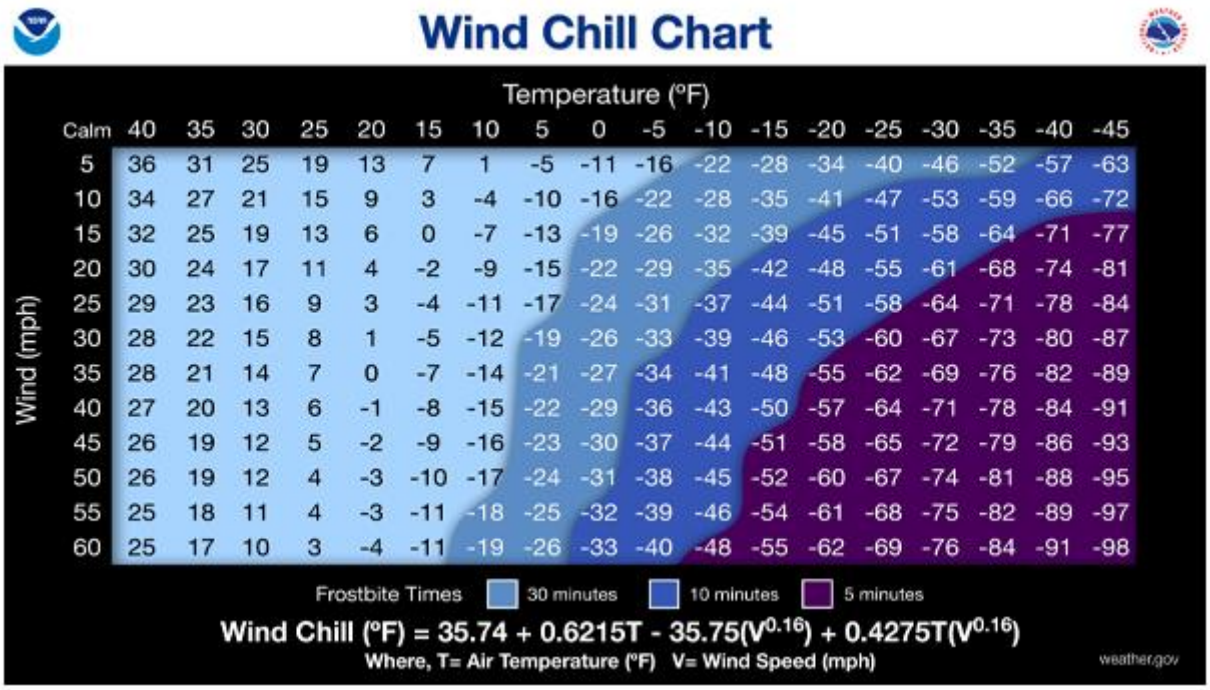
The magnitude and severity of extreme temperatures in the planning area are determined based on historical events, weather data, and the potential impacts on the local population, economy, and infrastructure. For extreme heat, the Heat Index (HI) is a key metric, combining temperature and humidity to indicate how hot it feels. In the planning area, extreme heat is characterized by temperatures exceeding 100°F or three consecutive days of 90°F or higher. When the Heat Index reaches 105°F, a heat advisory is issued, and an excessive heat warning is triggered when the Heat Index reaches 115°F. Extended periods of high heat with limited nighttime cooling (temperatures not dropping below 80°F) can exacerbate the severity of the event.



Iowa experiences high humidity due to warm, moist air masses that frequently move into the region. This moisture is further intensified by the state's vast agricultural lands, where crops like corn and soybeans release water vapor through evapotranspiration. Summer weather patterns, with stagnant air, allow moisture to accumulate in the atmosphere, and Iowa's mid-continent location, lacking coastal influences, means there are no moderating

breezes to disperse it. These factors combine to create humid conditions, especially during the summer when both heat and moisture are at their peak.

For extreme cold, the Wind Chill Index is used to assess the perceived temperature when wind speeds are factored in with actual air temperatures. In the planning area, wind chills below -15°F prompt a wind chill advisory, while wind chills below -25°F lead to a wind chill warning. These cold temperatures increase the risk of frostbite and hypothermia in a short amount of time. The planning area is also vulnerable to freeze warnings and frost advisories, particularly during the growing season, when temperatures between 32°F and 35°F can damage crops.



The magnitude and severity of both extreme heat and cold events are further categorized by their duration, intensity, and the extent of their impact on health, infrastructure, and the local economy. Events are ranked as limited, moderate, or severe depending on their overall reach and effect on the planning area, with prolonged or particularly intense events being classified as more severe. Historical records, such as the highest or lowest temperatures and the duration of extreme events, are used to inform the planning area's mitigation strategies and future preparedness efforts.

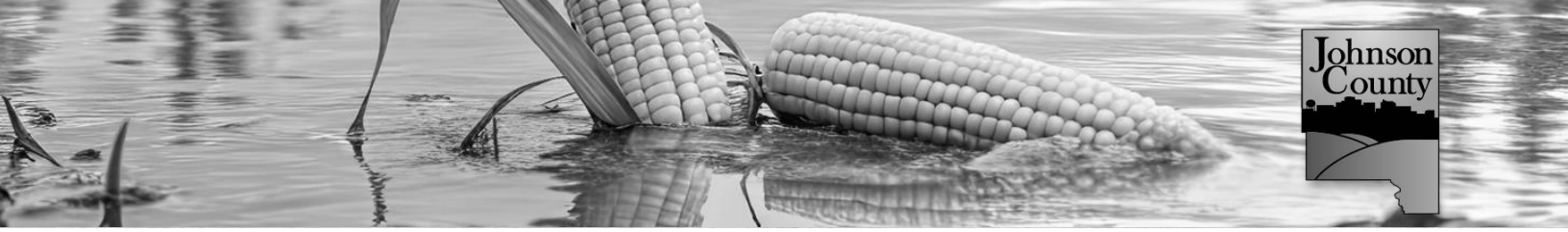
The NWS Quad Cities, IA/IL issues warnings and advisories for extreme temperatures. The following is a breakdown of the various NWS defined watches, warnings, and advisories that could be issued:

- Excessive Heat Warning - When conditions are observed or anticipated for heat index readings to 105° or higher and a minimum heat index of 75°+ both for at least a two day period or four days of expected peak heat index readings forecast at 100° or higher.
- Excessive Heat Watch - There is upcoming potential for heat index readings to 105° or higher for at least a two day period or four days of expected peak heat index readings forecast at 100° or higher.
- Heat Advisory - Maximum heat index is expected to exceed 100°.
- Extreme Cold Warning - Widespread dangerous temperatures and/or wind chill values around -30° or colder are expected.
- Extreme Cold Watch - Widespread dangerous temperatures and/or wind chill values around -30° or colder are possible.
- Freeze Watch - Widespread temperatures below freezing are possible during the growing season.
- Cold Weather Advisory - Widespread temperatures and/or wind chill values around -20° to -30° are expected.
- Frost Advisory - Widespread temperatures of 33 to 36 degrees with favorable conditions for frost are expected during the growing season.

3.4.9.4 Past Occurrences

According to historical records for the planning area, there have been numerous periods with temperatures of 90 degrees or higher since the late 19th century, reflecting a trend of increasingly hot summers. Over the past several decades, the planning area has experienced more frequent and extended heatwaves, including streaks of consecutive days with temperatures above 90°F. For example, in the summer of 2012, the planning area experienced one of the hottest summers on record, with prolonged periods of extreme heat. Temperatures soared above 100°F multiple times, breaking previous records for high temperatures in July and August.

In more recent years, extreme heat events have continued to become more common. During the summer of 2020, the planning area recorded an exceptionally high number of days with temperatures at or above 90°F, reflecting a regional trend of rising average temperatures. This increase in extreme heat events has heightened concerns over public health, agricultural impacts, and the resilience of local infrastructure. Similar to broader climate patterns observed across the Midwest, the average annual temperature in the planning area has shown a gradual increase over time, contributing to more frequent extreme heat conditions.



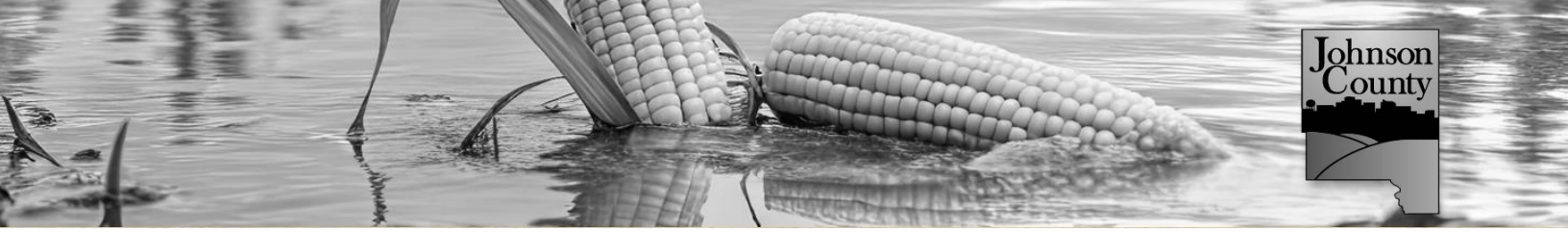
By contrast, the planning area experiences a significant number of cold days annually. On average, the planning area records approximately 147 days per year with minimum temperatures at or below 32°F, reflecting its typical Midwestern climate. Additionally, the area averages around 12 days annually where temperatures drop below 0°F. These cold snaps, often occurring in the winter months, can lead to hazardous conditions, including frozen pipes, hazardous roads, and increased health risks for vulnerable populations. Similar to other parts of the Midwest, the planning area's cold weather extremes are a regular aspect of its climate, requiring preparedness measures for both residents and local infrastructure. The rising trend in extreme cold events, particularly during polar vortex incidents, underscores the importance of effective cold-weather mitigation and response strategies. The following are some historical examples of extreme temperatures:

- Summer 2012: One of the hottest summers on record, the 2012 heat wave saw prolonged periods with temperatures above 100°F in Johnson County and across Iowa. The extreme heat stressed local infrastructure, increased health risks, and led to widespread agricultural damage, including crop losses and livestock deaths. The severity of the 2012 heat wave underscored vulnerabilities in the county's public health and agricultural systems and highlighted the need for enhanced heat preparedness measures.
- Summer 2020: Another intense heat wave struck the region in 2020, with Johnson County experiencing an unusually high number of days with temperatures at or above 90°F. This persistent heat mirrored a broader regional trend of rising temperatures, placing additional strain on local energy resources as demand for air conditioning spiked. Public health was also affected, with increased cases of heat-related illnesses, particularly among vulnerable populations. The 2020 heat wave reaffirmed concerns about the growing frequency of extreme heat events and their implications for community resilience and infrastructure.
- Summer 1988: A severe drought and heat wave swept across the Midwest, including Iowa, with temperatures frequently exceeding 100°F. This event led to widespread agricultural losses, including reduced crop yields and livestock deaths, severely impacting Iowa's economy and farming communities.
- February 1989: A record-breaking cold snap hit the Midwest, with temperatures in Iowa dropping to -20°F or lower. Wind chill values created dangerous conditions, prompting frostbite warnings and leading to frozen pipes, school closures, and hazardous road conditions.
- July 1995: An extreme heat wave impacted much of the Midwest, including Iowa, where temperatures reached 105°F with high humidity. The oppressive heat resulted in numerous heat-related illnesses and deaths across the region,

particularly affecting vulnerable populations. Cooling centers were opened, and emergency response systems were strained.

- August 10-13, 2007: A prolonged heat wave struck Iowa, with temperatures reaching above 100°F in several areas. High humidity levels pushed the heat index even higher, prompting heat advisories and leading to reports of heat-related illnesses and agricultural losses due to heat stress on livestock.
- January 6-7, 2014: Another polar vortex event brought extremely low temperatures to Iowa, with wind chills dipping below -40°F. The extreme cold led to widespread school and business closures, transportation disruptions, and increased heating demand, putting strain on local energy infrastructure.
- July 1936: During the Great Plains heatwave, temperatures in the region soared above 110°F, leading to widespread crop failure, livestock deaths, and numerous heat-related illnesses and fatalities. This event was part of the Dust Bowl era, which caused severe agricultural damage across Iowa and other Midwestern states.
- January 12, 1974: A cold wave brought temperatures in Iowa to as low as -25°F, with wind chill factors making it feel much colder. The extreme cold caused frozen pipes, power outages, and dangerous travel conditions, particularly impacting rural areas with long emergency response times.
- February 1996: An intense cold wave gripped the region, with temperatures in the planning area plummeting to -30°F. Schools were closed, water pipes froze, and frostbite warnings were issued as residents struggled to stay warm. Wind chills dropped as low as -50°F in some areas.
- July 18-23, 2011: A severe heat wave affected the Midwest, with heat index values exceeding 110°F. In the planning area, the high temperatures led to heat advisories and warnings, along with emergency measures such as opening cooling centers. Livestock deaths and agricultural losses were also reported due to heat stress.
- January 29-31, 2019: A polar vortex caused extreme cold temperatures across the Midwest, with wind chills in the planning area reaching -50°F. The cold snap led to school and business closures, and residents were advised to limit outdoor exposure due to the high risk of frostbite and hypothermia.

Examining past occurrences of extreme temperature events enables the planning area to enhance preparedness and resilience to future incidents. By reviewing historical heatwaves and cold snaps, whether they occurred within Johnson County or in nearby regions, the county can better understand the types of challenges and impacts these events bring, such as public health risks, agricultural losses, and infrastructure strain. For example, severe heat events in recent years have underscored the need for accessible cooling centers, while extreme cold incidents highlight the importance of emergency heating measures and frostbite awareness campaigns. Analyzing these incidents,



regardless of their precise location, allows the planning area to proactively address vulnerabilities, implement targeted response strategies, and support the community in adapting to increasingly frequent and intense temperature extremes.

3.4.9.5 Likelihood of Future Occurrence

The likelihood of future extreme temperature events in Johnson County, Iowa, is high, consistent with trends observed locally, regionally, and statewide. Recent climate data indicates an increase in the frequency and duration of extreme heat days, with summer temperatures above 90°F becoming more common and heatwaves lasting longer. The trend aligns with broader patterns across Iowa and the Midwest, where rising annual temperatures contribute to more frequent extreme heat conditions. Similarly, extreme cold events, particularly during polar vortex incidents, are expected to persist, though with less predictability than extreme heat. Cold snaps with temperatures below 0°F remain a regular part of Iowa's winter climate, and their occurrence, driven by atmospheric patterns, may still bring dangerous wind chills and public health challenges. Based on this information, Johnson County should anticipate both extreme heat and extreme cold events in the coming years, with an emphasis on preparedness for the increasingly common and prolonged periods of high temperatures. The following chart shows the annual average temperature with the plotted trend:

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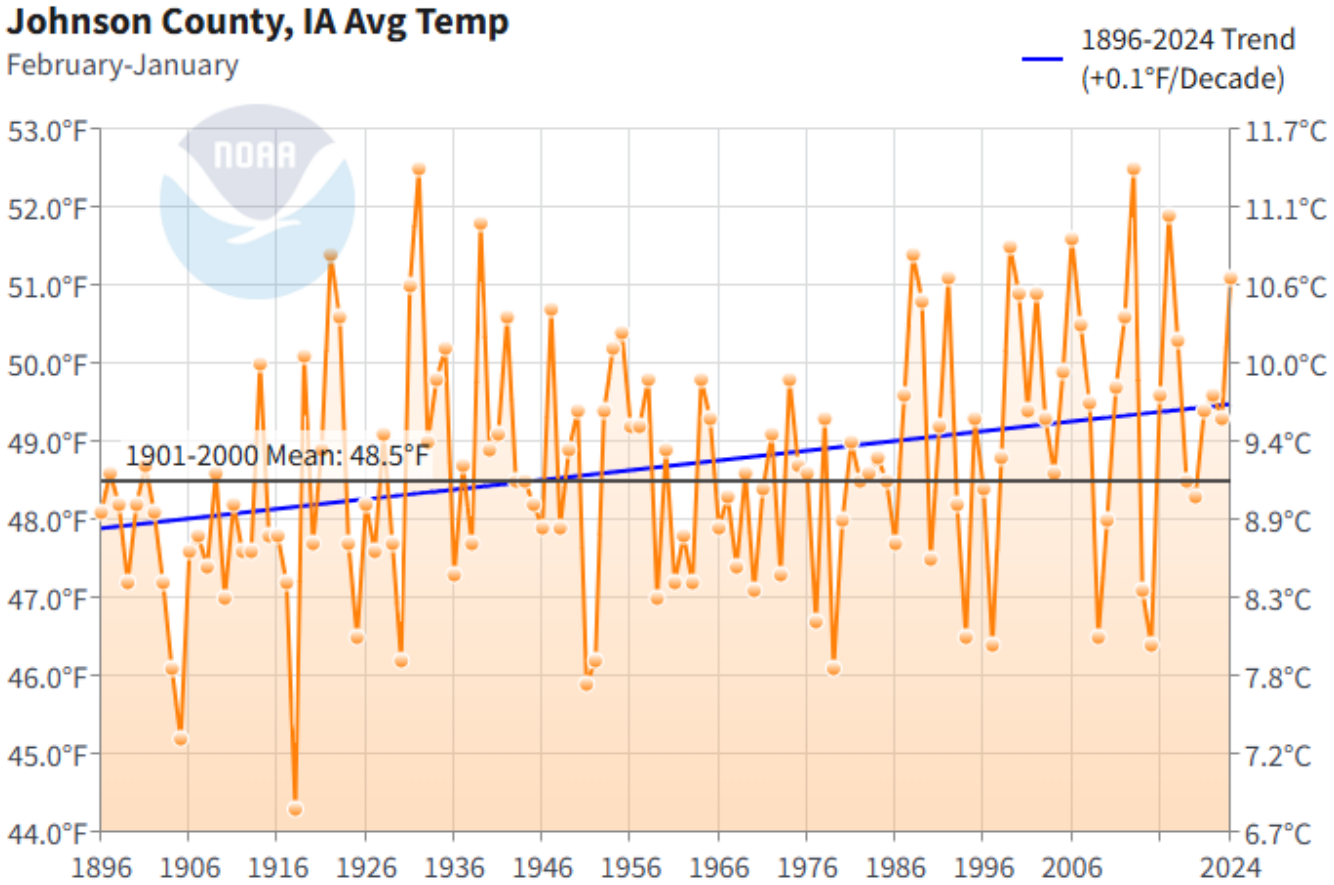
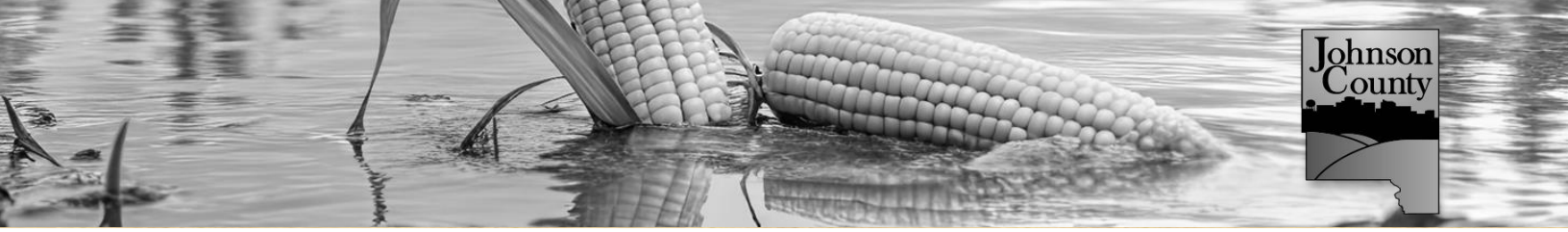


3.4.9.6 Climate Change Considerations

The likelihood of future extreme temperature events in Johnson County, Iowa, is high, consistent with trends observed locally, regionally, and statewide. Recent climate data indicates an increase in the frequency and duration of extreme heat days, with summer temperatures above 90°F becoming more common and heatwaves lasting longer. The trend aligns with broader patterns across Iowa and the Midwest, where rising annual temperatures contribute to more frequent extreme heat conditions. Similarly, extreme cold events, particularly during polar vortex incidents, are expected to persist, though with less predictability than extreme heat. Cold snaps with temperatures below 0°F remain a regular part of Iowa's winter climate, and their occurrence, driven by atmospheric patterns, may still bring dangerous wind chills and public health challenges. Based on this information, Johnson County should anticipate both extreme heat and extreme cold events in the coming years, with an emphasis on preparedness for the increasingly common and prolonged periods of high temperatures.



3.4.9.7 Vulnerability

People

If extreme temperatures were to impact Johnson County, Iowa, the effects on people would be significant, particularly during prolonged periods of extreme heat or cold. In extreme heat, vulnerable and underserved populations—including older adults (9.6% aged 65 and older), young children, individuals with chronic health conditions, and low-income residents (16.9%)—would face increased risks of heat exhaustion, heatstroke, and dehydration. Households without air conditioning or those in rental housing with limited control over temperature regulation may be disproportionately affected, as prolonged exposure to high temperatures can exacerbate respiratory and cardiovascular issues. Similarly, individuals with disabilities (7.1%) or those dependent on powered medical devices may face heightened risks during heat waves if power outages occur.

Extreme cold presents similar threats, with the potential for frostbite, hypothermia, and worsening of preexisting health conditions, especially for those lacking proper heating or shelter. Low-income households struggling with energy costs may be unable to afford sufficient heating, increasing health risks during prolonged cold spells. Individuals without reliable transportation (6.1%) may have difficulty accessing warming centers or medical care in extreme weather conditions, further exacerbating vulnerabilities. Additionally, rural residents and those in mobile or poorly insulated housing may face greater exposure to extreme cold due to structural limitations in their homes.

Both heat and cold extremes would strain community resources, with emergency responders facing increased demand for medical assistance and healthcare facilities seeing higher patient volumes due to temperature-related illnesses. Schools, businesses, and social services may experience disruptions as extreme conditions necessitate closures or modified operations. Underserved populations, including non-English speakers (4.4%), may face additional barriers in accessing public health advisories, emergency assistance, and temporary relief services. The cumulative impact of extreme temperatures would be felt most acutely by those with limited financial and social resources, deepening existing disparities and making recovery more difficult for affected households.

Economy

The economic impact of extreme temperatures on Johnson County, Iowa, would be multifaceted, affecting various sectors and creating both direct and indirect financial strains. During extreme heat events, the increased demand for air conditioning would

lead to higher energy costs for households, businesses, and public facilities, and could strain the power grid, potentially leading to costly outages or utility disruptions. Agricultural operations, a key component of the local economy, would face losses as crops suffer from heat stress, reduced yields, and lower quality, while livestock operations incur additional expenses for cooling and hydration measures. Heat-related impacts on productivity could also affect outdoor industries, such as construction, which may need to reduce hours or implement costly heat mitigation measures for worker safety.

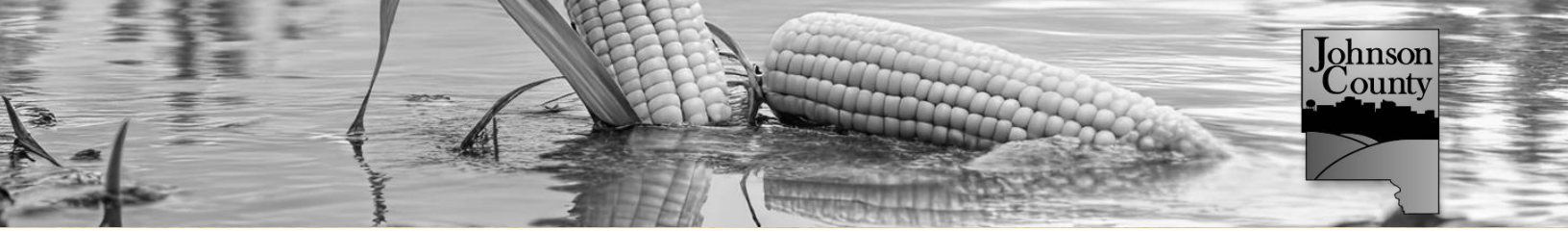
Extreme cold events similarly impose economic costs. Increased heating expenses during cold snaps place financial pressure on residents and businesses, especially those with limited heating resources. Agriculture could suffer from livestock health issues and crop damage from frost, while infrastructure repair costs would rise due to frozen pipes, burst water mains, and damaged roads. Emergency response resources and healthcare facilities may also experience added operational expenses from increased service demand. These temperature extremes create ripple effects throughout the county's economy, impacting household budgets, business profitability, and local government resources for maintaining public health and safety during extreme temperature events.

Built Environment

General Property

Extreme temperatures in Johnson County, Iowa, could influence property values, particularly if such events become more frequent and prolonged. During periods of extreme heat, properties lacking adequate cooling infrastructure, such as air conditioning, may become less desirable, potentially affecting property values in areas without sufficient climate control resources. In agricultural areas, repeated heat events could impact the viability of farmland, especially if crop yields decrease or the costs of maintaining livestock in extreme heat rise, potentially lowering the value of agricultural properties.

Extreme cold events may also impact property values, particularly if cold snaps cause repeated infrastructure damage, such as frozen pipes or structural issues due to the freeze-thaw cycle. Properties with older heating systems or poor insulation may be perceived as less resilient, potentially impacting their appeal and value. While these impacts on property values may not be immediate, over time, increased frequency of extreme temperatures could lead to market adjustments, with properties featuring robust climate resilience measures (e.g., reliable HVAC systems, insulation, and energy-efficient designs) likely retaining or even increasing their value. Conversely, properties without



these adaptations may see a gradual depreciation in value due to heightened exposure to extreme temperature risks.

Critical Infrastructure

Extreme temperatures in Johnson County, Iowa, would place substantial strain on critical infrastructure, with both extreme heat and extreme cold creating specific vulnerabilities. During extreme heat, the energy grid would face increased demand due to air conditioning usage, raising the risk of power outages if capacity is exceeded. High temperatures can also cause physical stress on power lines, transformers, and road surfaces, leading to breakdowns, buckling, or cracking, and increasing maintenance costs. Water supply infrastructure might also be impacted, as higher temperatures raise demand for water and could contribute to issues like water main breaks due to expanding materials.

Extreme cold, conversely, brings different challenges to critical infrastructure. Prolonged cold snaps could lead to frozen or burst water pipes, disrupting water supply to homes and businesses and increasing repair costs for water utilities. Roads and bridges are particularly susceptible to damage from the freeze-thaw cycle, which can cause cracks and potholes, compromising road safety and requiring extensive repairs. In addition, extreme cold can affect transportation services, as vehicles and machinery face higher risks of malfunction due to freezing temperatures, and it can hinder emergency response if roads become hazardous or equipment fails. Both temperature extremes would strain Johnson County's critical infrastructure, necessitating proactive maintenance, adaptation measures, and responsive planning to ensure continuity of services and minimize long-term damage.

Historical, Cultural, and Natural Environment

Extreme temperatures would impact Johnson County, Iowa's historical, cultural, and natural environments in several ways. Prolonged extreme heat could accelerate the deterioration of historical buildings and monuments, particularly those constructed with older materials not designed to withstand high temperatures. The Old Capitol Museum, a National Historic Landmark, could experience damage to its limestone exterior and wooden interior elements as heat causes materials to expand and contract, leading to cracking, warping, or fading. Similarly, Oakland Cemetery, home to historic headstones and the iconic Black Angel monument, may see accelerated weathering and erosion of stone markers.

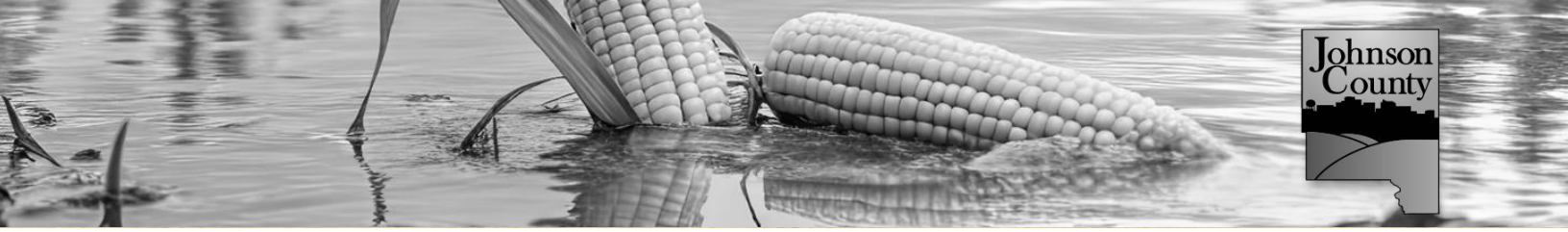
Outdoor cultural events and community gatherings may also be affected, as extreme heat discourages participation or necessitates rescheduling or cancellation. Events such as the Iowa Arts Festival and Northside Oktoberfest could face lower attendance or logistical challenges if high temperatures create unsafe conditions for attendees.

The natural environment would similarly face challenges from extreme temperatures. Heat stress can harm local vegetation in areas like Terry Trueblood Recreation Area and Hickory Hill Park, leading to plant die-off and habitat loss. This disruption to local ecosystems could reduce biodiversity and impact wildlife reliant on stable food and shelter sources. Conversely, extreme cold brings different risks, as sudden freezes can damage native plant species, leading to die-back or delayed regrowth in spring. Macbride Nature Recreation Area, a key habitat for migratory birds and diverse plant life, may experience shifts in species composition due to extreme cold events. Wildlife populations could also suffer from food and shelter shortages, as water sources freeze and vegetation becomes scarce.

Future Land Use and Development

If extreme temperatures were to become more frequent in Johnson County, Iowa, they could influence future land use and development patterns, with an increased focus on climate resilience. In response to prolonged heat events, new residential, commercial, and public developments may incorporate more robust cooling and insulation measures, such as energy-efficient HVAC systems, reflective roofing, and enhanced insulation. Developers may prioritize sustainable building materials that can better withstand temperature extremes, contributing to long-term durability. Heat-prone urban areas, like Iowa City, might consider more green spaces, tree planting, and reflective surfaces to mitigate the urban heat island effect, improving outdoor comfort and reducing cooling costs.

In agricultural areas, frequent extreme temperatures could shift land use practices, with farmers potentially adopting heat- and drought-resistant crops to reduce the impact of intense heat on yields. Land may also be repurposed to accommodate changes in crop types or livestock practices, impacting the county's agricultural landscape over time. Extreme cold may prompt similar adjustments, with insulation requirements and cold-resistant building materials becoming standard in both urban and rural developments to protect infrastructure and reduce heating demands. Overall, future land use and development in Johnson County would likely integrate more climate-adaptive practices, prioritizing resilience to protect residents, sustain agricultural productivity, and support infrastructure under increasingly variable temperature conditions.



3.4.9.8 Consequence Summary

Extreme temperatures in Johnson County, Iowa, would lead to widespread consequences affecting public health, infrastructure, economy, and the environment. Prolonged heat events would increase the risk of heat-related illnesses, particularly among vulnerable populations, and strain energy resources due to heightened demand for cooling, potentially leading to power outages. In agriculture, both extreme heat and cold could reduce crop yields and impact livestock, imposing economic losses on farmers and disrupting food supply chains. Infrastructure, including roads, bridges, water systems, and buildings, would be stressed by both temperature extremes, leading to maintenance and repair costs. Additionally, historical sites and natural ecosystems would suffer, with heat accelerating the degradation of older structures and cold endangering local vegetation and wildlife. Overall, extreme temperatures would impose significant challenges for Johnson County, emphasizing the need for adaptive measures to protect public health, economic stability, and critical resources.

Category	Narrative
Impact on the Public	• Increased health risks from heat-related illnesses and cold-related conditions, especially for vulnerable populations. • Reduced participation in outdoor activities and cultural events due to extreme temperatures.
Impact on the Economic Condition of the Planning Area	• Financial losses in agriculture from crop yield reductions and livestock stress. • Higher energy costs for residents and businesses due to increased demand for heating and cooling.
Impact on the Historical, Cultural, and Natural Environment	• Accelerated deterioration of historical buildings and cultural landmarks. • Damage to local ecosystems, including plant die-off and wildlife distress, impacting biodiversity.
Impact on Built Environment, General Property, and Critical Infrastructure	• Possible decrease in property values for buildings without climate resilience features. • Increased strain and repair costs for infrastructure, such as roads, bridges, and water systems, due to temperature stress.
Impact on the Public Confidence in Government	• Potential public dissatisfaction if government response to temperature extremes is perceived as insufficient or unprepared.
Impact on Responders	• Increased demand on emergency responders for medical assistance and safety checks during extreme weather.

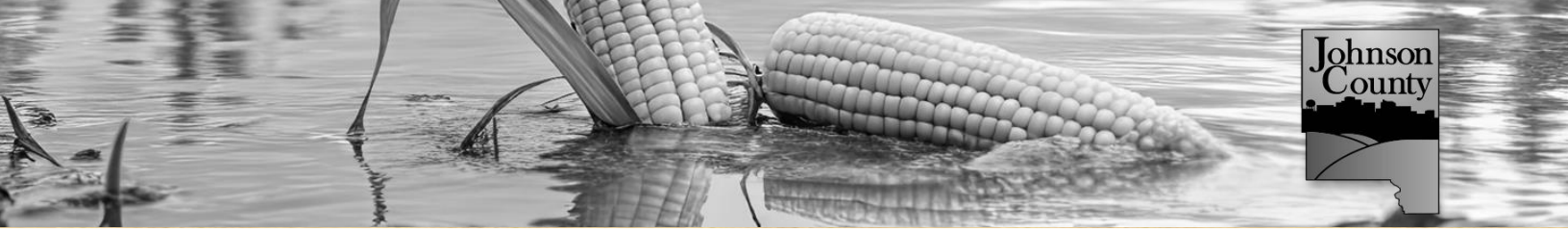
Category	Narrative
	• Higher workload for infrastructure repair crews, especially following temperature-induced damage.
Impact on continuity of operations, including continued delivery of government services	• Disruptions in government services due to power outages, transportation delays, or building maintenance issues. • Additional resources needed for operating cooling or warming centers.
Cascading hazards	• Power outages from grid overload during extreme heat. • Water main breaks and transportation hazards from extreme cold and freeze-thaw cycles.

3.4.10 Flash Flooding

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.67	2.33	1.83	2.08	16.66

3.4.10.1 Description

Flash flooding is a rapid, intense form of flooding that occurs when heavy rainfall overwhelms the ability of the ground or drainage systems to absorb water, leading to quick accumulation within minutes to hours of a storm. This type of flooding is particularly hazardous due to its sudden onset and limited warning time. Flash floods are most commonly triggered by thunderstorms or weather systems that produce concentrated rainfall over a short period. Urban flooding is a specific form of flash flooding that occurs when heavy rainfall exceeds the capacity of drainage infrastructure, especially in densely built areas where impervious surfaces like roads and parking lots prevent water from being absorbed. In Johnson County, urban and suburban areas may be especially susceptible to flash flooding, with potential for water to rise quickly and disrupt transportation, damage property, and create life-threatening conditions. While uncommon, ice jams in drainage systems or small streams can also cause temporary blockages, leading to localized flash flooding when these ice formations suddenly release. The rapid, localized nature of flash floods poses a significant risk to people and property, with little time for communities to prepare or evacuate.



3.4.10.2 Location

In Johnson County, Iowa, certain areas are particularly vulnerable to flash flooding and urban flooding. Urban centers, such as Iowa City and Coralville, have extensive impervious surfaces—including roads, parking lots, and buildings—that prevent water from being absorbed by the ground. This leads to rapid runoff during heavy rainfall events, which can overwhelm local drainage systems and result in urban flooding. Low-lying areas and natural depressions throughout the county are also susceptible, as water tends to accumulate in these zones when drainage systems reach capacity.

Additionally, areas with poor drainage infrastructure or soil that absorbs water slowly face a heightened risk of rapid water buildup during intense rain events. While large-scale river flooding is not the primary concern here, areas near small streams and creeks can experience quick rises in water levels during heavy rainfall, particularly if these waterways are obstructed by debris or ice jams. Identifying and understanding these vulnerable zones is essential for effective flood preparedness and mitigation efforts across Johnson County.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.10.3 Magnitude/Severity

The magnitude and severity of flash flooding are measured primarily through rainfall intensity, flood depth, and flow velocity, as well as the resulting impacts on people, property, and infrastructure. Rainfall intensity—measured in inches per hour—provides an initial indicator, as higher rates over short periods are more likely to overwhelm drainage systems, leading to flash flooding. Flood depth and flow velocity then help gauge the severity, as deeper, faster-moving water poses a greater risk to life and property, with the potential to sweep away vehicles, damage buildings, and erode landscapes. In urban areas, the extent of flooding is also measured by observing the capacity of stormwater systems to manage runoff; overflow points, ponding, and infrastructure strain indicate

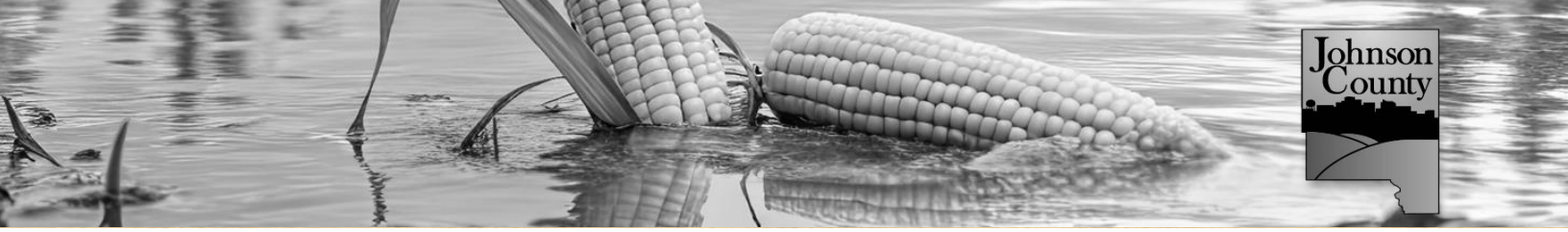
the limits of a system's resilience. Additionally, flash flood warnings and advisories are issued by agencies such as the National Weather Service (NWS), which assess real-time rainfall data and watershed conditions to project flood likelihood and intensity. Severity is further classified by the flood's impacts, with assessments of property damage, economic loss, infrastructure disruption, and any resulting injuries or fatalities, providing a holistic measure of a flash flood's severity in both urban and rural environments.

3.4.10.4 Past Occurrences

Here are notable flash flooding incidents that have impacted Johnson County, Iowa, and the surrounding region:

- June 2008, Iowa City, Iowa: Intense rainfall led to flash flooding, inundating streets and basements, and causing significant property damage.
- August 2010, Ames, Iowa: Ames experienced severe flash flooding after heavy rains, resulting in the closure of Interstate 35 and extensive damage to homes and businesses.
- June 2014, Cedar Rapids, Iowa: Flash floods caused by torrential rains led to evacuations and substantial damage to infrastructure and private property.
- July 2016, Northeast Iowa: Heavy rainfall triggered flash flooding across multiple counties, damaging roads, bridges, and homes, and leading to several water rescues.
- September 2016, Solon, Iowa:
- June 2018, Des Moines, Iowa: Des Moines faced flash flooding after a severe storm, resulting in road closures, property damage, and emergency responses to stranded motorists.
- June 2024, Johnson County, Iowa: Severe storms and flash flooding prompted Governor Kim Reynolds to issue a disaster proclamation for Johnson County and three others, enabling state resources to assist in response and recovery efforts.

Examining past occurrences of flash flooding allows the planning area to better prepare for future incidents by understanding the conditions and impacts associated with these events. Reviewing significant flash floods, both locally in Johnson County and regionally across Iowa, provides insights into typical triggers, such as heavy rainfall or rapid snowmelt, and highlights common vulnerabilities, including urban areas with limited drainage and low-lying regions prone to water accumulation. These events reveal the potential for widespread damage to property, infrastructure, and public safety, underscoring the importance of timely emergency response and resilient infrastructure. Studying these incidents, even if not specific to the planning area, helps identify patterns,



prioritize high-risk zones, and refine mitigation strategies, ultimately enhancing the community's ability to respond effectively to future flash flooding threats.

3.4.10.5 Likelihood of Future Occurrence

The likelihood of future flash flooding in Johnson County, Iowa, is relatively high, reflecting broader local, regional, and state trends. Iowa frequently experiences intense rainfall events, which can overwhelm drainage systems and lead to flash flooding, particularly in urban and low-lying areas with limited water absorption capacity. The Midwest, including Iowa, has seen an increase in the frequency and intensity of heavy rainfall due to changing weather patterns, with storms producing concentrated amounts of precipitation over short periods. As a result, flash flooding events have become more common and impactful across the region. Local development patterns, such as increased urbanization and expansion of impervious surfaces, further heighten the risk by reducing natural drainage and increasing runoff. Given these factors, Johnson County can expect flash flooding incidents to continue periodically, especially during storm seasons, underscoring the need for ongoing preparedness, improved drainage infrastructure, and strategic urban planning to mitigate future risks.

3.4.10.6 Climate Change Considerations

Climate change is a significant consideration for flash flooding, as shifting climate patterns are contributing to more frequent and intense rainfall events, which increase the risk of flash flooding. In Johnson County, Iowa, and across the Midwest, warmer temperatures are leading to more atmospheric moisture, which fuels storms capable of releasing heavy rain over short periods. This concentrated precipitation can quickly overwhelm drainage systems, particularly in urban areas, resulting in rapid water accumulation and flash flooding. Additionally, the frequency of extreme weather events has increased, with climate models projecting that heavy rainfalls will become more common in the coming decades. As a result, climate change not only raises the likelihood of flash flooding events but also necessitates adaptive measures in urban planning, stormwater management, and community preparedness to address the heightened risks associated with these evolving weather patterns.

3.4.10.7 Vulnerability

People

If flash flooding were to occur in Johnson County, Iowa, the impact on residents would be immediate and potentially severe, particularly for those in vulnerable or flood-prone

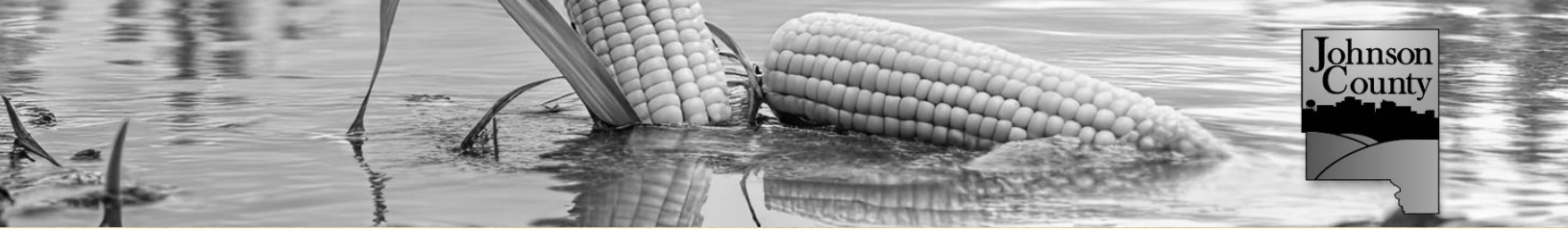
areas. Rapid water accumulation can trap people in vehicles, homes, or low-lying areas with little time to evacuate, posing life-threatening risks. Individuals attempting to drive through flooded streets face significant danger, as even shallow floodwaters can sweep vehicles away. Vulnerable and underserved populations, including elderly individuals (9.6%), people with disabilities (7.1%), and those without reliable transportation (6.1%), would be at higher risk due to mobility challenges or difficulty receiving timely alerts. Renters, who may have fewer options for flood-resistant housing, could experience greater housing instability following a flood event.

In addition to immediate safety risks, flash flooding can result in significant property loss, displacement, and health concerns, especially for residents exposed to contaminated floodwater. Low-income households (16.9%) may struggle with the financial burden of replacing belongings or repairing flood-damaged homes, particularly if they lack adequate insurance. Those living in multi-unit housing or mobile homes may experience greater structural vulnerabilities, increasing their risk of displacement. Road closures and infrastructure damage could also limit access to workplaces, schools, and healthcare facilities, disproportionately affecting individuals who depend on public transportation or community services for essential needs.

Beyond physical and financial impacts, repeated flash flooding events may contribute to long-term mental health challenges, including anxiety and stress, particularly for those with prior flood experiences. Underserved populations, including non-English speakers (4.4%), may face additional barriers in receiving flood warnings or accessing post-disaster assistance. The cumulative impact of flash flooding would be felt most acutely by those with fewer resources to recover, increasing disparities in financial stability, housing security, and overall well-being across Johnson County.

Economy

Flash flooding in Johnson County, Iowa, would have a notable impact on the local economy, affecting multiple sectors and incurring both direct and indirect costs. Immediate economic impacts would include damage to homes, businesses, and infrastructure, leading to costly repairs and recovery efforts. Businesses, especially those in flood-prone urban areas, could suffer financial losses from physical damage to property, inventory loss, and forced closures during and after the event. The disruption of transportation routes due to road closures and water damage could further impact commerce, delaying shipments, hindering employee access to workplaces, and affecting local supply chains.



Agriculture, a key economic sector in the region, could face losses as well, with flash flooding damaging crops, eroding topsoil, and potentially disrupting planting or harvesting schedules. Public funds would likely be redirected to cover emergency response, cleanup, and infrastructure repair costs, straining local budgets. Additionally, high recovery costs and the potential for increased insurance premiums could affect residents and businesses, reducing discretionary income and local spending. Over time, recurrent flash flooding could deter investment and development in affected areas, impacting long-term economic growth. In sum, flash flooding in Johnson County would have a far-reaching economic impact, emphasizing the need for flood mitigation and resilient infrastructure investments to reduce financial risks.

Built Environment

General Property

Flash flooding in Johnson County, Iowa, could negatively impact property values, particularly in areas that are repeatedly affected or identified as high-risk zones. Properties in flood-prone urban and low-lying areas may experience a decline in value due to the increased risk of damage and the costs associated with recovery and repairs. Prospective buyers may be hesitant to invest in these areas due to the potential for recurrent flooding, higher insurance premiums, and the long-term maintenance costs needed to protect homes from water damage.

In addition, properties that sustain significant flood damage may require extensive repairs to regain their previous market value, and even then, stigma related to flooding can deter buyers, further reducing the appeal and market value. Recurrent flash flooding could also lead to neighborhood-wide depreciation if entire communities are perceived as vulnerable. In the long term, if flash flooding becomes more frequent, Johnson County may see a shift in housing demand towards areas with lower flood risks, thereby impacting property values in at-risk areas.

Critical Infrastructure

Flash flooding in Johnson County, Iowa, would pose significant risks to critical infrastructure, particularly in urban areas and low-lying zones. Roads and bridges are highly vulnerable, as sudden water surges can erode road surfaces, damage bridge foundations, and lead to closures that disrupt transportation and emergency response. Flooded streets could also cut off access to essential services, impeding the movement of residents, responders, and supplies throughout the county. Stormwater drainage systems, which are often overwhelmed during intense rainfall events, would struggle to

manage flash floods, potentially causing water to back up into streets and nearby properties, leading to further damage and contamination risks.

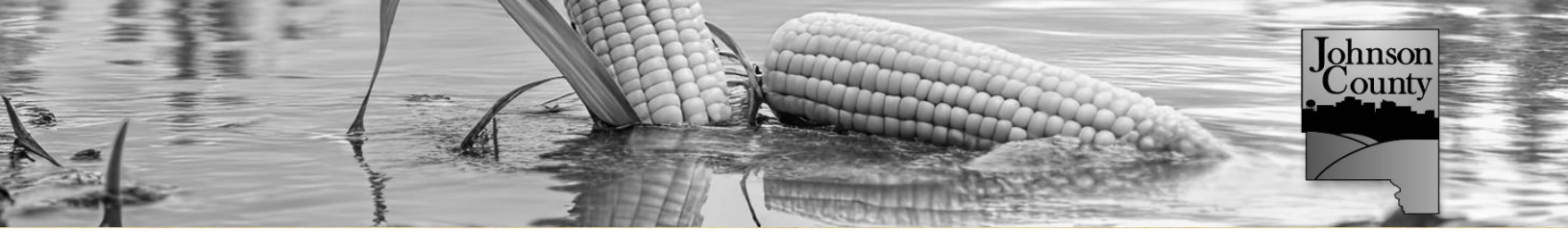
Utilities such as power, water, and wastewater systems are also at risk. Floodwaters can damage electrical substations, leading to power outages, while inundated wastewater facilities can result in contaminated water flowing into nearby areas, posing public health risks. Water supply lines and treatment facilities might also suffer damage, disrupting the provision of clean water. Critical public facilities, including hospitals, emergency response centers, and schools, could be affected if access is restricted or if building systems are compromised by water intrusion. Overall, flash flooding would strain Johnson County's critical infrastructure, increasing maintenance and repair costs and emphasizing the need for resilient infrastructure planning to mitigate future impacts.

Historical, Cultural, and Natural Environment

Flash flooding in Johnson County, Iowa, would impact the county's historical, cultural, and natural environments, posing a threat to irreplaceable resources and landscapes. Historical buildings and cultural landmarks, particularly those in flood-prone areas, are at risk of severe water damage. The Iowa River Power Restaurant, a historic structure along the Iowa River, could experience foundation erosion and structural weakening due to rising waters. Similarly, the Coralville Historic Schoolhouse, which has stood for over a century, could suffer from water infiltration, accelerating the deterioration of original materials. Since many historical structures lack modern flood-resistant features, flash flooding could result in costly restoration efforts or permanent losses.

Cultural assets such as the Pedestrian Mall (Ped Mall) in downtown Iowa City, known for its public art and community events, would also be vulnerable. Rapid flooding could damage public sculptures, seating areas, and small businesses housed in older buildings, disrupting cultural and social activity. Parks and recreational areas, including City Park and Lower City Park, could experience soil erosion, damage to pathways, and loss of mature trees, making them less accessible for public use.

The natural environment, including local rivers, streams, and wildlife habitats, would also face significant disruption. Flash floods can wash away topsoil in areas like Hickory Hill Park, uproot native plant species, and deposit debris and pollutants into waterways, degrading water quality in the Iowa River and Ralston Creek. Wildlife habitats in riparian zones could be destroyed, displacing species and reducing biodiversity.



Future Land Use and Development

Flash flooding in Johnson County, Iowa, would likely influence future land use and development decisions, encouraging a shift toward resilient, flood-adaptive planning practices. Areas that experience frequent flash flooding, particularly low-lying zones and urban areas with inadequate drainage, might see more restrictive zoning policies to limit high-density development in vulnerable locations. New construction projects in flood-prone areas may require enhanced flood mitigation measures, such as elevated foundations, permeable pavements, and increased green spaces to improve natural drainage and reduce runoff.

Urban planning might prioritize stormwater management infrastructure, such as expanded drainage systems, retention basins, and rain gardens, to accommodate future heavy rainfall events. Developers and planners may also assess the feasibility of relocating or redesigning essential infrastructure away from high-risk areas to avoid repeated flood damage. For agriculture and rural areas, persistent flash flooding could lead to land-use changes, with a focus on practices that minimize soil erosion and runoff, such as contour farming, riparian buffers, and no-till practices.

3.4.10.8 Consequence Summary

Flash flooding in Johnson County, Iowa, would bring significant local consequences, impacting public safety, property, infrastructure, and the environment. Rapid water accumulation in urban and low-lying areas could lead to life-threatening conditions, with residents at risk of being trapped in vehicles, homes, or flood-prone zones. Property damage would be extensive, affecting homes, businesses, and critical infrastructure, such as roads, bridges, and utilities, and leading to costly repairs. The local economy would suffer as businesses face closures, inventory loss, and reduced customer access, while agriculture might experience crop and soil damage. Historical and cultural sites, as well as natural habitats, could sustain long-term damage, eroding Johnson County's cultural heritage and biodiversity. Recurrent flash flooding would drive changes in future land use and development practices, emphasizing the need for improved drainage systems, flood-resistant construction, and strategic planning to mitigate future risks and enhance community resilience.

Category	Narrative
Impact on the Public	• Increased risk of injury or entrapment in vehicles, homes, or low-lying areas. • Displacement of residents and disruptions to daily life due to road closures and evacuations.

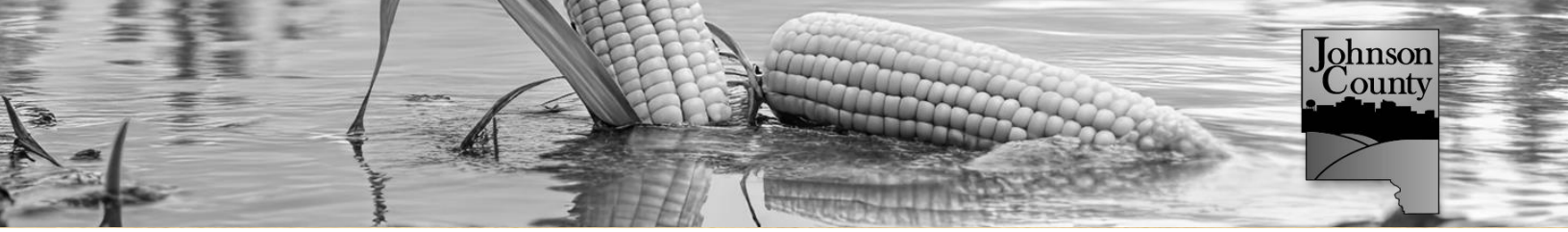
Category	Narrative
Impact on the Economic Condition of the Planning Area	• Financial losses for businesses from closures, property damage, and inventory loss. • Agricultural impacts, including crop damage, soil erosion, and delays in planting or harvesting.
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical buildings and cultural landmarks, requiring costly restoration. • Erosion of natural habitats, loss of vegetation, and harm to local biodiversity.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decreased property values in flood-prone areas due to perceived risk. • Damage to roads, bridges, drainage systems, and utilities, leading to high repair costs.
Impact on the Public Confidence in Government	• Potential public dissatisfaction if flood prevention and response measures are seen as inadequate. • Increased demand for transparent communication and improved mitigation strategies.
Impact on Responders	• Strain on emergency response teams for rescues, evacuations, and road clearance. • Increased workload for infrastructure repair crews, especially for roads and utilities.
Impact on continuity of operations, including continued delivery of government services	• Service interruptions due to damaged facilities, inaccessible roads, and power outages. • Additional resources required for emergency response, cleanup, and temporary shelters.
Cascading hazards	• Potential contamination of water supplies from flooded wastewater systems. • Heightened risk of landslides or soil erosion in saturated areas. • Increased likelihood of utility outages affecting power, water, and communication systems.

3.4.11 Hazardous Materials Incident

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.42	2.00	1.83	1.00	11.69

3.4.11.1 Description

Hazardous materials incidents, including those involving radiological substances, represent a significant potential hazard in Johnson County, Iowa. Such incidents could



occur in various settings, such as transportation accidents involving vehicles carrying chemicals, spills at industrial facilities, or incidents in laboratories and hospitals handling radiological materials. These incidents pose risks to public health, safety, and the environment, as hazardous materials can release toxic, flammable, or radioactive substances, leading to contamination, fires, explosions, and health hazards.

In Johnson County, hazardous materials incidents may be more likely along transportation routes, near industrial or research facilities, and in areas with high volumes of hazardous substances in use or transit. Let me know if you'd like a more specific analysis of local impacts, historical incidents, or likelihood of occurrence for hazardous materials incidents in Johnson County.

3.4.11.2 Location

In Johnson County, Iowa, certain areas are more susceptible to hazardous materials incidents, including radiological events. Major transportation routes, such as Interstate 80 and U.S. Route 218, are commonly used for the transport of hazardous materials, making accidents or spills along these corridors a potential risk for significant incidents. Industrial zones, particularly in Iowa City and Coralville, also present an elevated risk due to the concentration of manufacturing and industrial facilities that store or utilize hazardous substances. These areas have the potential for accidental releases that could impact surrounding communities.

The University of Iowa, with its extensive research activities, involves the use of various hazardous chemicals and radiological materials, which requires strict safety protocols to prevent incidents. Additionally, healthcare facilities throughout Johnson County, including hospitals and medical centers, use radiological substances for diagnostic and treatment purposes. While these facilities adhere to safety standards, the presence of these materials still necessitates vigilance to prevent improper handling or accidental releases. Identifying these susceptible areas is essential for targeted emergency planning and response efforts to mitigate the potential risks associated with hazardous materials incidents.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD

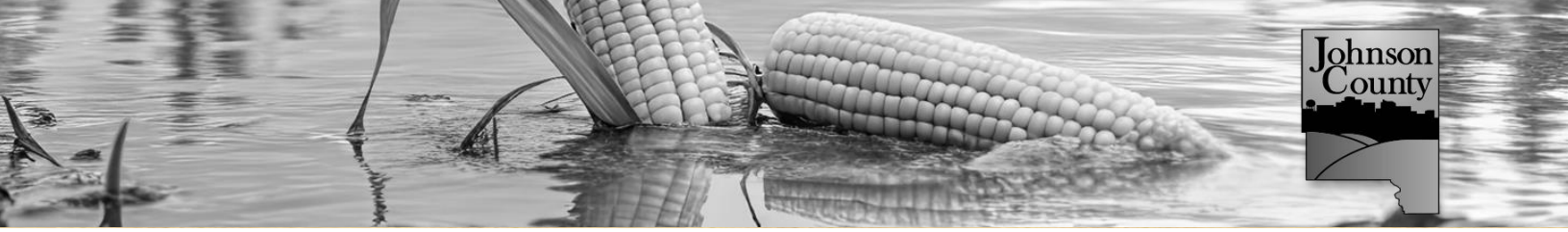
Applicable Jurisdictions	
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.11.3 Magnitude/Severity

The magnitude and severity of hazardous materials incidents, including those involving radiological materials, are measured based on several key factors that assess the potential risk to public health, property, and the environment.

1. Type and Quantity of Material: The chemical or radiological properties of the hazardous material involved are critical in determining the severity. Some chemicals may be highly toxic, flammable, or reactive, while radiological materials pose unique long-term health risks such as radiation exposure or contamination. The larger the quantity of the material released, the more severe the incident.
2. Exposure Risk to the Public: The severity of an incident is also measured by the potential for public exposure. This includes considering the proximity of the release to populated areas, schools, hospitals, or sensitive environments. If a large number of people are at risk of direct exposure to harmful chemicals or radiation, the severity increases significantly.
3. Extent of the Release: The size and scope of the release are critical in assessing severity. A contained spill inside a facility may have limited impacts, while an uncontrolled release into the environment, such as into air, water, or soil, can spread the hazard over a larger area, affecting more people and ecosystems.
4. Response Time and Containment: How quickly emergency responders can contain the hazardous material plays a crucial role in determining the overall severity of the incident. If the material is contained rapidly, the impacts may be minimized. Delayed response or difficulty in controlling the release, particularly in the case of a pipeline rupture or transportation accident, increases the magnitude of the incident.
5. Secondary Effects: Incidents involving hazardous materials may lead to cascading effects, such as fires, explosions, or the long-term contamination of water supplies and soil. These secondary effects greatly increase the severity of the event, as they complicate response efforts and extend the duration of the impact.
6. Duration of Exposure: The length of time that hazardous materials remain in the environment or continue to pose a threat also factors into severity. For example, radiological materials with long half-lives can remain hazardous for extended periods, necessitating long-term clean-up and containment.



3.4.11.4 Past Occurrences

Here are notable hazardous materials incidents in Johnson County, Iowa, and the Midwest:

- December 13, 1994 – Port Neal, Iowa: An explosion at the Terra International fertilizer plant released toxic chemicals, resulting in four fatalities, 18 injuries, and the evacuation of 1,700 residents due to ammonia vapor release.
- May 16, 2021 – Sibley, Iowa: A Union Pacific freight train carrying hazardous materials derailed and caught fire, leading to evacuations within a 2.5-mile radius and significant environmental concerns due to the release of chemicals.
- December 14, 2000 – Algona, Iowa: An anhydrous ammonia pipeline spill resulted in the death of nearly 1.3 million fish, marking the largest fish kill on record in Iowa at that time.
- July 2014 – Muscatine, Iowa: Grain Processing Corporation faced environmental scrutiny for air pollution, including the release of acetaldehyde and lead, leading to new emissions permits and a shift from coal to natural gas to reduce pollution.
- July 18, 2019 – Dubuque, Iowa: A train derailment involving ethanol occurred near the Mississippi River. Multiple railcars caught fire, prompting an extensive emergency response to prevent ethanol contamination of the river.
- October 25, 2007 – Hartford, Illinois: A pipeline explosion in Hartford caused a massive fire that destroyed several homes and forced evacuations. The explosion resulted from gasoline vapors leaking from underground pipes, igniting a fire that lasted several hours.
- June 22, 2008 – Cedar Rapids, Iowa: During the 2008 floods, hazardous materials stored in businesses and industrial facilities were released into floodwaters, contaminating local rivers and surrounding areas with oil, chemicals, and other pollutants.
- February 15, 1999 – Bourbonnais, Illinois: A freight train carrying hazardous materials collided with a semi-truck at a crossing, causing a major derailment. The incident resulted in several chemical spills, including the release of highly flammable materials, which ignited fires that destroyed multiple train cars.
- July 28, 1993 – Des Moines, Iowa: A hazardous chemical spill occurred when a truck carrying anhydrous ammonia overturned on a highway near Des Moines. The release caused respiratory issues, required evacuations, and necessitated an extensive clean-up and medical response.

Examining past occurrences of hazardous materials incidents allows the planning area to better prepare for future events by understanding the types of risks, responses, and impacts associated with these hazards. Reviewing significant incidents, whether they

occurred locally or in neighboring areas, provides insight into common triggers, such as transportation accidents, industrial accidents, or natural disasters that lead to hazardous material releases. These events highlight critical vulnerabilities, such as the need for rapid containment, effective evacuation plans, and coordination with environmental agencies to mitigate contamination. Analyzing these incidents, even if not specific to the planning area, helps identify potential risks, improve response protocols, and implement safety measures to minimize the impact of future hazardous materials incidents on public health, the environment, and infrastructure.

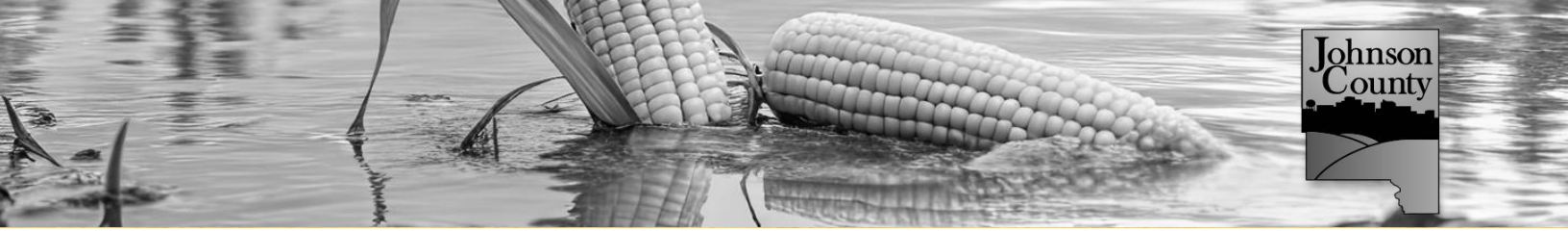
3.4.11.5 Likelihood of Future Occurrence

Hazardous materials incidents in Johnson County, Iowa, are managed by several local and state agencies, which work to ensure public safety through preparedness and response planning. The Johnson County Local Emergency Planning Committee (LEPC) coordinates response efforts and maintains resources to effectively handle hazardous materials incidents, whether from transportation accidents, industrial spills, or facility mishandling. Additionally, the Iowa Department of Natural Resources (DNR) offers a database tracking hazardous substance incidents statewide, providing insight into spill data, responses, and patterns that could inform local preparedness.

On a broader scale, national data from agencies monitoring hazardous materials incidents provide context on the frequency and nature of these events, underscoring the need for continuous safety measures. Locally, the Iowa City Landfill and Recycling Center operates a Hazardous Material Collection Facility, which accepts residential hazardous waste to minimize the risk of improper disposal and reduce potential incidents. By leveraging these resources and data, Johnson County officials and residents are better equipped to understand the likelihood of hazardous materials incidents and implement proactive measures to mitigate associated risks.

3.4.11.6 Climate Change Considerations

Climate change has limited direct influence on the likelihood of hazardous materials incidents, as these events are typically driven by human activities, such as industrial processes, transportation accidents, or facility malfunctions. However, climate change can indirectly increase risks associated with hazardous materials. For example, more frequent extreme weather events, like flooding or hurricanes, could damage facilities that store hazardous substances, leading to accidental releases into the environment. Rising temperatures and severe heat waves can also impact infrastructure by stressing storage containers, pipelines, or transport systems, potentially increasing the risk of leaks or spills. Additionally, as communities adapt to climate change by shifting energy sources or



industrial practices, new hazardous materials may enter the supply chain, introducing new risks. While climate change may not be a direct factor, its indirect effects on infrastructure and environmental conditions underscore the importance of resilient planning and infrastructure for hazardous materials management in Johnson County.

3.4.11.7 Vulnerability

People

If a hazardous materials incident were to occur in Johnson County, Iowa, it could have significant impacts on the local population, depending on the nature and location of the event. Immediate health risks include respiratory issues, chemical burns, or toxic exposure for those in close proximity, with vulnerable and underserved populations, such as older adults (9.6%), young children, and individuals with preexisting health conditions, facing heightened risks. Low-income residents (16.9%) and individuals without health insurance (3.5%) may struggle to access timely medical treatment for exposure-related illnesses. In cases involving radiological materials, prolonged exposure could lead to more serious health effects, including radiation sickness or long-term risks of cancer, disproportionately affecting those with limited access to healthcare and monitoring services.

Evacuations might be necessary to protect residents, particularly in densely populated urban areas like Iowa City and Coralville, leading to temporary displacement and disruptions to daily life. Individuals without reliable transportation (6.1%) may face difficulties evacuating quickly, increasing their risk of exposure. Renters and residents in lower-income housing may have fewer options for alternative shelter if an extended evacuation is required. If hazardous materials contaminate water sources or soil, access to safe drinking water and local agricultural production could be compromised, disproportionately affecting households with limited financial flexibility to secure alternative food and water supplies.

Beyond the immediate physical dangers, a hazardous materials incident could have long-term psychological impacts, as residents experience increased anxiety and stress, particularly if the incident has lasting environmental consequences. Non-English-speaking populations (4.4%) may encounter barriers in receiving timely warnings or health advisories, increasing their vulnerability. The cumulative impact of such an event would likely deepen existing disparities in public health and economic stability, as underserved populations struggle to recover from both immediate exposure risks and the broader social and financial disruptions caused by hazardous material contamination.

Economy

A hazardous materials incident in Johnson County, Iowa, would likely have considerable economic impacts, affecting multiple sectors. Immediate financial costs would arise from emergency response, cleanup, and containment efforts, which can be resource-intensive and strain local budgets. Businesses, particularly those in affected areas or those relying on hazardous materials for operations, may face temporary closures, inventory loss, or production delays, reducing revenues and potentially incurring additional costs for decontamination and safety upgrades.

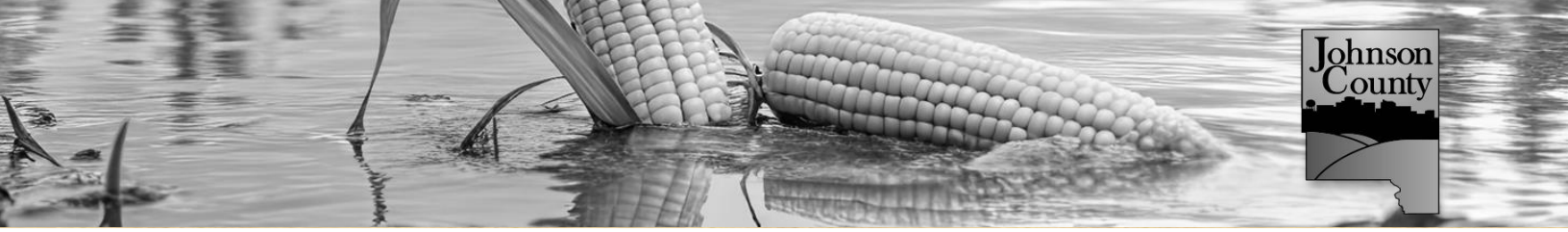
The incident could also impact the local workforce if employees are displaced or unable to work, leading to productivity losses. In cases involving contamination of water or soil, the agriculture sector may experience financial strain, as crops and livestock could be harmed, and farmland devalued, affecting both current yields and future productivity. Property values in affected areas might decline, influencing the real estate market and reducing property tax revenue. Additionally, if hazardous materials incidents become a recurring concern, they could deter investment and development, impacting Johnson County's long-term economic growth. The cumulative economic effects of a hazardous materials incident would highlight the need for robust emergency preparedness and risk mitigation strategies to protect local financial stability.

Built Environment

General Property

A hazardous materials incident in Johnson County, Iowa, could negatively impact property values, particularly in the immediate vicinity of the event. Properties near the site of the incident may see a reduction in value due to concerns about contamination, safety risks, and potential long-term environmental impacts. If the incident involves chemical or radiological substances with lingering effects, prospective buyers may be hesitant to purchase properties in the affected area, perceiving it as less desirable.

Residential properties could experience a notable decline in value if the incident results in lasting health concerns, environmental damage, or restrictions on land use. Commercial and industrial properties in the affected zone might also lose value if additional regulatory requirements or cleanup costs impact business operations. If multiple hazardous materials incidents occur over time, it could establish a pattern of risk that may further depress property values in areas viewed as vulnerable. Consequently, a significant or recurring hazardous materials incident could have lasting effects on the real estate market and local property tax revenues in Johnson County.



Critical Infrastructure

A hazardous materials incident in Johnson County, Iowa, could severely impact critical infrastructure, particularly in urban or industrial areas. Immediate effects might include damage to transportation infrastructure, such as roads and highways, if spills or contamination occur along major transit routes, leading to closures and disruptions. In cases where hazardous materials impact water supply systems—whether through direct contamination or proximity to water treatment facilities—there could be serious implications for the county's drinking water, requiring costly filtration measures or temporary reliance on alternative water sources.

Energy infrastructure, including electrical substations and gas pipelines, could be at risk if an incident occurs nearby, potentially leading to power outages or safety shutdowns. Communication systems might also be affected if they need to be relocated or protected to avoid exposure to hazardous substances. Emergency services, including hospitals, fire departments, and law enforcement, would be strained by the demands of response and decontamination, possibly affecting their ability to respond to other incidents. Overall, a hazardous materials incident would place significant stress on Johnson County's critical infrastructure, underscoring the need for coordinated response planning and resilient infrastructure to ensure continuity of essential services during and after such an event.

Historical, Cultural, and Natural Environment

A hazardous materials incident in Johnson County, Iowa, would have serious implications for the county's historical, cultural, and natural environment. Historical buildings and cultural landmarks, particularly those near industrial areas or major transportation routes, could be at risk of contamination or structural damage. The Old Capitol Museum, a key historical site in Iowa City, could suffer from air pollution or corrosive exposure if hazardous materials were released in the vicinity. Similarly, the Plum Grove Historic Home, a preserved 19th-century residence, could face contamination risks if hazardous runoff were to affect nearby soil and groundwater. Restoration efforts for these sites could be complex and costly, especially if hazardous substances penetrate porous materials or require long-term safety monitoring for preservation efforts.

Cultural assets, such as Mercer Park Aquatic Center and Scanlon Gym and the Iowa City Public Library, could face closures or extensive decontamination if contamination occurred, limiting public access and disrupting community engagement. Parks and recreational spaces, such as Kent Park, might be forced to close temporarily if hazardous

substances were detected in the air, water, or soil, affecting residents' ability to use these spaces for recreation and leisure.

The natural environment would also suffer severe consequences, as hazardous materials could contaminate soil, water, and air, leading to ecosystem damage. The Iowa River and Clear Creek, both critical waterways in the county, could experience toxic runoff, degrading water quality and threatening aquatic life, plant species, and wildlife dependent on these ecosystems. Hawkeye Wildlife Management Area, a key habitat for birds and other wildlife, might be impacted if contamination spread through soil or groundwater, displacing species and reducing biodiversity.

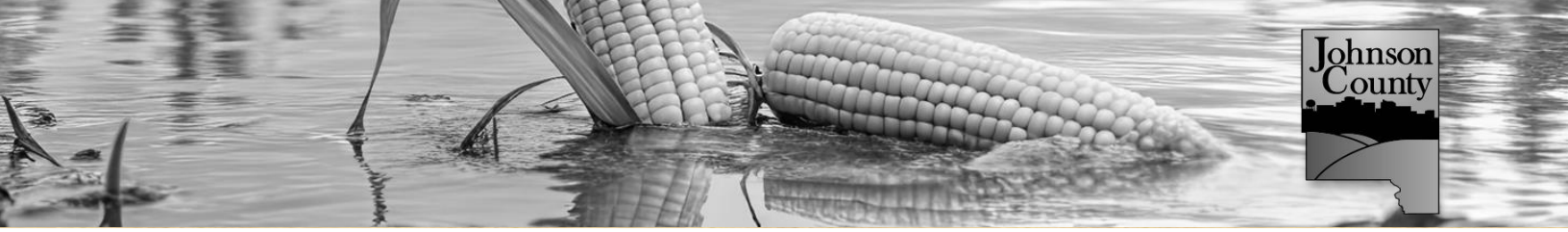
Future Land Use and Development

A hazardous materials incident in Johnson County, Iowa, could influence future land use and development, particularly in affected areas. Land that experiences contamination from chemicals or radiological substances may be deemed unsuitable for residential, agricultural, or recreational use until extensive cleanup is completed, which can take months or even years. Certain zones may require restrictions on development or permanent shifts in land use to ensure public safety and environmental protection. For example, areas previously zoned for residential or commercial development might be repurposed for industrial or restricted-use purposes if contamination risks persist.

Future development near known transportation routes for hazardous materials or around industrial zones might also face stricter regulations, requiring developers to incorporate safety and containment measures to mitigate potential risks. Additionally, new zoning policies may emerge to establish buffer zones between high-risk areas and sensitive land uses, such as residential neighborhoods, schools, and healthcare facilities. These measures could lead to increased costs and a shift in development priorities as the county works to ensure safe and resilient growth patterns. Overall, a hazardous materials incident could lead to a more cautious and regulated approach to land use and development in Johnson County, aimed at preventing future risks and protecting community health and safety.

3.4.11.8 Consequence Summary

A hazardous materials incident in Johnson County, Iowa, would have substantial local consequences, affecting public health, safety, infrastructure, and the environment. Residents in the immediate area could face health risks from toxic exposure, potentially requiring evacuations and extensive medical attention, especially for vulnerable populations. Property damage and devaluation are likely in contaminated areas, with



businesses facing temporary closures and costly cleanup efforts. Critical infrastructure, including water and transportation systems, might be disrupted, impacting essential services and necessitating costly repairs or modifications. The county's historical and natural environment could suffer long-term damage, with historical sites, parks, and ecosystems at risk of contamination that may require extensive restoration. Additionally, future land use and development could be restricted or reprioritized, as areas affected by contamination may face limitations to protect public safety. Overall, a hazardous materials incident would impose significant social, economic, and environmental burdens on Johnson County, highlighting the need for robust preparedness and mitigation strategies.

Category	Narrative
Impact on the Public	• Health risks from toxic exposure, requiring medical attention and possible evacuations. • Anxiety and stress, particularly among vulnerable populations in affected areas.
Impact on the Economic Condition of the Planning Area	• Financial losses from business closures, cleanup costs, and lost productivity. • Strain on local budgets for emergency response and long-term recovery.
Impact on the Historical, Cultural, and Natural Environment	• Potential contamination of historical sites, requiring costly restoration. • Damage to parks, waterways, and wildlife habitats, impacting biodiversity.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decrease in property values in contaminated or high-risk areas. • Damage to transportation, water, and utility systems, with costly repairs and upgrades.
Impact on the Public Confidence in Government	• Public dissatisfaction if the response is perceived as inadequate or delayed. • Increased demand for transparency and preventative measures.
Impact on Responders	• High demand on emergency personnel for evacuation, containment, and decontamination efforts. • Risk of exposure and long working hours impacting responder health and resources.
Impact on continuity of operations, including continued delivery of government services	• Potential interruptions in government services due to infrastructure damage. • Increased need for resources to support response, cleanup, and public assistance.

Category	Narrative
Cascading hazards	• Contamination of water supplies, impacting drinking water and irrigation. • Fire or explosion risks if flammable substances are involved. • Long-term soil contamination affecting agriculture and land use.

3.4.12 River Flooding

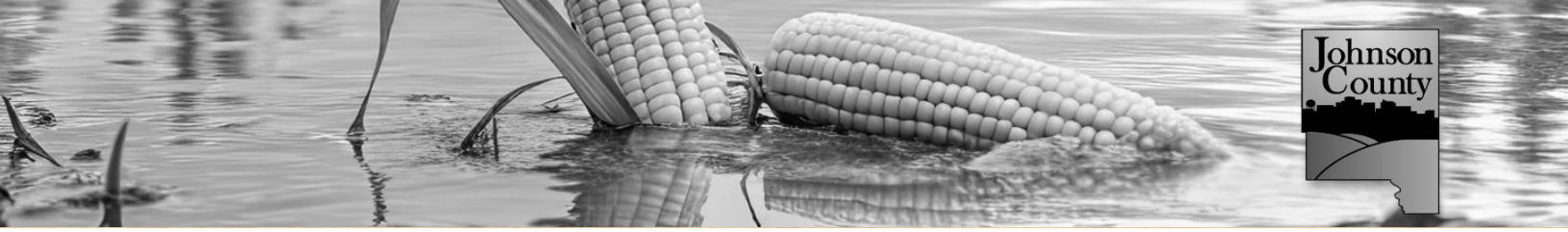
Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.67	2.5	2.17	2.42	18.93

3.4.12.1 Description

River flooding occurs when rivers exceed their capacity due to heavy rainfall, rapid snowmelt, ice jams, or the failure of dams or levees, leading to the inundation of surrounding areas. This type of flooding can develop slowly over days or weeks, or rapidly in the case of intense storms or dam failures. Rivers carry the excess water downstream, potentially impacting entire watersheds. The consequences of river flooding can be severe, including widespread damage to homes, infrastructure, and agricultural land, as well as displacement of populations and disruption of essential services.

Several factors influence the severity of river flooding, including the terrain, soil absorption capacity, and urban development in flood-prone areas. In rural areas, river flooding can lead to erosion, loss of crops, and long-term damage to farmlands, while in urban regions, it can disrupt transportation, utilities, and cause extensive property damage. Furthermore, river flooding can contribute to secondary hazards, such as landslides or the contamination of water supplies. Efforts to mitigate river flooding often include levees, dams, floodplain management, and early warning systems to minimize damage and protect affected populations. Understanding and preparing for river flooding is essential, especially in areas with a history of high water events.

FEMA's Flood Insurance Rate Maps (FIRMs) are essential tools used to identify flood risk in specific areas. These maps are produced by the Federal Emergency Management Agency (FEMA) and serve several purposes, including helping communities enforce floodplain management regulations, determining flood insurance requirements, and informing land-use planning and development decisions. FIRMs depict flood hazard



zones and provide details on the likelihood of flooding in different areas, based on factors such as historical data, terrain, and hydrology. The following provides a description of the different flood zones:

Zone	Description
AE	This zone represents areas that are within the 100-year floodplain, meaning they have a 1% annual chance of flooding in any given year. These areas are subject to significant flood risk, and development is typically subject to stricter regulations. Zone AE areas are usually subject to mandatory flood insurance for federally backed mortgages.
A	Areas in Zone A are also part of the 100-year floodplain, but detailed flood elevation data is not available. These areas may experience flooding, but the specific base flood elevation (BFE) has not been determined. Zone A indicates high flood risk and may require flood insurance.
X (Shaded)	These areas are part of the 500-year floodplain, which means they have a 0.2% annual chance of flooding. While the risk is lower than in the 100-year floodplain, areas in shaded Zone X can still experience moderate flooding. Flood insurance is not required, but it may be recommended depending on the situation.
X (Unshaded)	This represents areas with the lowest flood risk, located outside both the 100-year and 500-year floodplains. While flooding is unlikely, it is still possible. These areas are not subject to flood insurance requirements under the National Flood Insurance Program (NFIP).
AO	Zone AO is used for areas subject to shallow flooding, typically from sheet flow or ponding, where water depths range from 1 to 3 feet. Flood insurance is required for properties in this zone, and the map indicates expected depths of flooding rather than specific elevation.
VE	This zone applies to coastal areas that are subject to high-velocity wave action from storm surges or tsunamis. These areas are within the 100-year floodplain and experience a greater risk of severe damage due to waves. Development in these areas is strictly regulated, and flood insurance is mandatory.
D	Zone D indicates areas where there is a possible but undetermined flood risk. No flood hazard analysis has been conducted in these areas. Flood insurance may not be required, but owners in Zone D should consider purchasing it as the risk is unknown.

FIRMs are critical for both public and private sectors. Communities use them to guide development, mitigate flood risk, and comply with the National Flood Insurance Program (NFIP). Property owners and insurers use FIRMs to determine flood insurance requirements, assess risk levels, and plan for future development or improvements. They

provide detailed information about base flood elevations, floodway boundaries, and areas with specific flooding risks, helping to reduce potential flood losses.

Understanding FIRMs and flood zones is crucial for homeowners, developers, and community planners in flood-prone areas. These maps help make informed decisions to mitigate the risks posed by flooding.

3.4.12.2 Location

In Johnson County, Iowa, certain areas are particularly vulnerable to river flooding due to their proximity to major waterways. The Iowa River Corridor, which includes communities such as Iowa City, Coralville, and North Liberty, faces a high risk of flooding, as demonstrated during significant events like the 2008 floods. These areas are especially susceptible when the Iowa River rises due to heavy rainfall or snowmelt.

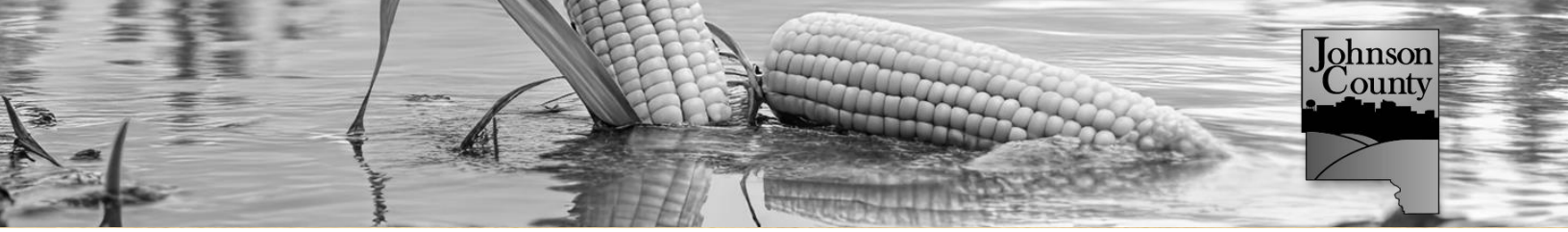
The northeastern part of the county, near the Cedar River Basin, also experiences flood risks, particularly during periods of intense rainfall or rapid snowmelt that can raise water levels beyond the river's capacity. Additionally, the Clear Creek Watershed, which includes parts of Coralville and Tiffin, is prone to flooding from Clear Creek, impacting residential and commercial properties. Low-lying agricultural lands near these rivers and streams are further at risk, as floodwaters can lead to crop damage, soil erosion, and reduced productivity. Identifying these vulnerable zones allows Johnson County to focus on effective flood preparedness and mitigation strategies to protect both residents and vital resources.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.12.3 Magnitude/Severity

The magnitude and severity of river flooding in the planning area are measured based on several key factors:



1. Flood Stage and River Gauge Levels: River flooding is often measured using river gauges, which monitor water levels in rivers and streams. The flood stage is a specific water level at which a river begins to overflow its banks and cause damage to the surrounding areas. These levels are monitored by the National Weather Service (NWS) and the U.S. Geological Survey (USGS) in real time, allowing local authorities to predict the severity of a flood event. Flood severity is categorized into minor, moderate, or major flooding depending on how high the water level rises above the flood stage.
2. Area of Inundation: The size of the area flooded is a key indicator of the flood's magnitude. This is determined by floodplain mapping, which shows how far floodwaters are expected to spread. The larger the area inundated, the greater the flood's severity in terms of potential damage to property, infrastructure, and agriculture.
3. Duration of the Flood: The length of time that floodwaters remain above flood stage also determines the severity of the event. Longer-duration floods can cause more extensive damage as water has more time to erode structures, degrade infrastructure, and impact agriculture.
4. Rate of Water Rise: The speed at which river levels rise is critical in assessing the flood's potential danger. Rapidly rising water allows less time for preparation or evacuation, increasing the threat to life and property. Flash floods, in particular, can occur with little warning.
5. Historical Comparisons: Floods are often measured in relation to historical events, such as the 100-year or 500-year flood. A 100-year flood refers to a flood event that has a 1% chance of occurring in any given year, while a 500-year flood has a 0.2% chance. These categories help quantify the rarity and potential severity of a flood event.
6. Damage Potential: The impact of the flood on people, property, and infrastructure is another measure of severity. This includes the extent of property damage, loss of life, disruption of services, and the economic toll on the community. The more critical infrastructure and population centers affected, the more severe the flooding is considered to be.

3.4.12.4 Past Occurrences

Here are notable historical river flooding incidents in Johnson County, Iowa, and the Midwest:

- June 2008 – Iowa City and Coralville, Iowa: The Iowa River experienced record-high flooding, inundating large portions of Iowa City and Coralville. The flood

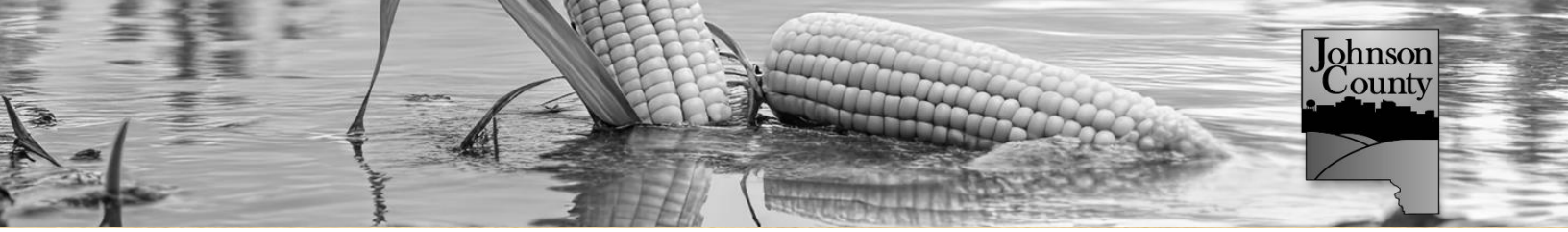
caused extensive damage to homes, businesses, and the University of Iowa campus, resulting in hundreds of millions of dollars in losses and displacing thousands of residents.

- July 1993 – Des Moines, Iowa: The Great Flood of 1993 impacted much of the Midwest, including Iowa. In Des Moines, river flooding led to the failure of the city's water treatment plant, leaving 250,000 residents without drinking water for nearly two weeks and causing widespread property damage.
- April 1965 – Mississippi River, Midwest: Historic flooding along the Mississippi River impacted Iowa, Illinois, and Missouri. The event led to extensive damage to agricultural lands and properties, affecting both rural communities and urban areas near the river.
- June 2014 – Cedar Rapids, Iowa: Heavy rains caused the Cedar River to swell, resulting in flooding in Cedar Rapids and surrounding areas. This event highlighted ongoing vulnerabilities in the region, although flood prevention measures since 2008 helped reduce some potential impacts.
- March 2019 – Missouri River, Midwest: Major flooding along the Missouri River impacted Iowa, Nebraska, and Missouri. The flood damaged agricultural lands, homes, and infrastructure, including roads and bridges, leading to significant economic losses for farmers and rural communities.

Reviewing past occurrences of river flooding allows the planning area to better prepare for future events by highlighting patterns, vulnerabilities, and effective response strategies. Significant incidents, like the 2008 floods in Iowa City and Coralville or the widespread 1993 flooding in Des Moines, provide valuable lessons on the impacts of extreme water levels on infrastructure, residential areas, and essential services. Analyzing these events, even if they occurred outside the immediate planning area, helps identify potential weak points, such as low-lying communities or critical infrastructure located near rivers. Learning from previous flood responses and mitigation efforts, including effective evacuation protocols and structural reinforcements, enables the planning area to implement proactive measures that reduce risks and protect both people and property in the event of future river flooding.

3.4.12.5 Likelihood of Future Occurrence

The likelihood of future river flooding in Johnson County, Iowa, is high based on local, regional, and state-level information. Johnson County's proximity to the Iowa River and other tributaries makes it vulnerable to flooding, especially in low-lying areas and communities near these waterways, such as Iowa City, Coralville, and North Liberty. Historical data, including the significant 2008 flood event, indicate a pattern of river flooding when conditions involve prolonged or heavy rainfall and seasonal snowmelt.



These conditions, typical in the Midwest, lead to elevated water levels that can exceed riverbank capacity, causing widespread flooding.

Regionally, Iowa experiences frequent flooding events due to its climate and geography, with heavy spring rains and snowmelt often contributing to rising river levels. Statewide, climate trends suggest an increased frequency of intense rainfall events, which raises the risk of river flooding over time. Given these factors, Johnson County is likely to experience river flooding periodically, with potential for both minor and major flood events. Preparedness and flood management strategies are essential to reduce the impacts of these recurring incidents on people, property, and critical infrastructure.

3.4.12.6 Climate Change Considerations

Climate change considerations are relevant for river flooding, as shifting climate patterns may increase the frequency and intensity of heavy rainfall events, which contribute directly to flood risk. In Johnson County, Iowa, climate projections indicate that warmer temperatures and altered precipitation patterns could lead to more intense and prolonged rainstorms, especially in spring and early summer. These conditions increase the likelihood of river levels rising beyond normal capacity, particularly when combined with seasonal snowmelt. Additionally, climate change may lead to more frequent and severe storm events, resulting in a higher volume of runoff entering rivers and streams.

This increased runoff not only raises water levels but also adds pressure to flood defenses, infrastructure, and water management systems. Consequently, climate change is likely to exacerbate the already significant risk of river flooding in Johnson County, emphasizing the need for adaptive flood mitigation strategies, including improved drainage systems, floodplain management, and resilient infrastructure planning to protect vulnerable communities from future flood events.

3.4.12.7 Vulnerability

People

If river flooding were to occur in Johnson County, Iowa, it would have significant impacts on the local population, with vulnerable and underserved communities experiencing the greatest hardships. Residents in low-lying or flood-prone areas, such as those near the Iowa River in Iowa City, Coralville, and North Liberty, could face displacement due to inundation of homes and neighborhoods. Floodwaters can create life-threatening conditions, including rapid water rise and strong currents that make evacuation challenging, particularly for individuals without reliable transportation (6.1%). Older

adults (9.6%), individuals with disabilities (7.1%), and renters in multi-unit housing may struggle with evacuation logistics or securing temporary shelter, increasing their risk of harm.

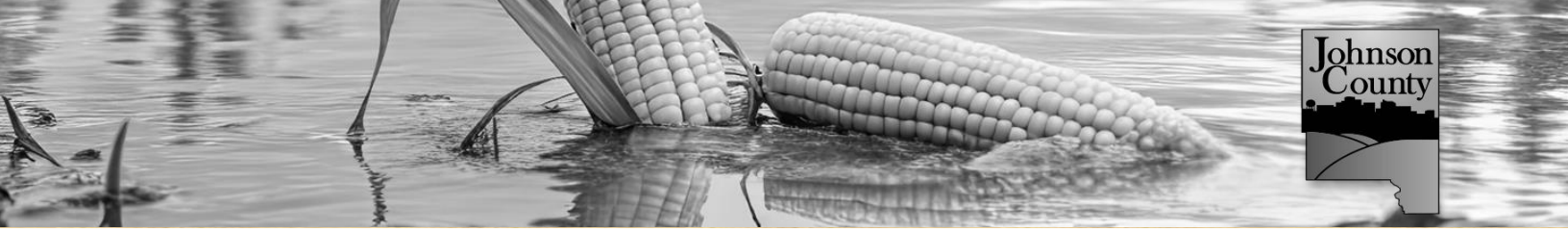
Flooding also poses serious health risks, as contaminated floodwaters can spread diseases and disrupt access to clean drinking water. Low-income households (16.9%) may have fewer resources to secure safe water, food, or alternative housing, prolonging their exposure to unsanitary conditions. Prolonged flooding can also lead to respiratory and skin issues due to mold and waterborne pathogens, disproportionately affecting those in older or poorly maintained housing. Additionally, disruptions to healthcare facilities and emergency response services could limit access to medical care, exacerbating health complications for those with chronic conditions or mobility challenges.

Mental health impacts, such as stress and anxiety, are common among affected individuals, especially if property damage or displacement is extensive. Renters and lower-income families, who may lack flood insurance, could face long-term financial strain due to housing instability and loss of personal belongings. Non-English-speaking populations (4.4%) may encounter difficulties in receiving emergency alerts or navigating recovery assistance programs, further compounding their vulnerability. Overall, river flooding in Johnson County would significantly disrupt public safety, health, and well-being, with the most severe consequences falling on those with fewer financial and social resources to recover.

Economy

River flooding in Johnson County, Iowa, would have substantial economic impacts, affecting businesses, infrastructure, and public resources. Flooded commercial districts, such as those in Iowa City or Coralville, could experience temporary closures, resulting in lost revenue, damaged inventory, and costly repairs for businesses. Agricultural areas in the county would face significant losses if floodwaters damage crops or erode farmland, reducing yields and impacting the livelihoods of farmers.

Public infrastructure, including roads, bridges, and utilities, would likely sustain damage, requiring costly repairs and maintenance. Prolonged disruptions to transportation routes could hinder commerce and delay the delivery of goods and services, further straining the local economy. Additionally, flood recovery efforts, such as debris removal, emergency response, and financial assistance to affected residents, would place considerable demands on local government resources and budgets.



Property devaluation in flood-prone areas may reduce property tax revenue, affecting funding for public services. The cumulative economic effects of river flooding would ripple through multiple sectors, emphasizing the need for effective floodplain management and resilient infrastructure to mitigate future financial losses in Johnson County.

Built Environment

General Property

River flooding in Johnson County, Iowa, could significantly impact property values, particularly in areas directly affected by the flooding. Properties in flood-prone zones, such as those near the Iowa River in Iowa City, Coralville, and North Liberty, may experience a decline in value due to increased perceived risk, the cost of flood insurance, and the potential for future flooding. Homes and businesses that sustain damage from floodwaters often face devaluation, as repairs may not fully restore the property to its pre-flood condition, and buyers may be hesitant to invest in high-risk areas.

Repeated flooding incidents in specific neighborhoods could lead to long-term depreciation of property values, impacting not only individual homeowners but also the broader real estate market in the county. Commercial properties and agricultural land in flooded areas may similarly lose value if flooding disrupts business operations or reduces land productivity. The overall reduction in property values could also decrease property tax revenue for the county, potentially affecting public funding for services and infrastructure. Addressing these risks through effective flood mitigation and resilient land-use planning can help protect property values and maintain economic stability in Johnson County.

Critical Infrastructure

River flooding in Johnson County, Iowa, would have significant impacts on critical infrastructure, disrupting essential services and requiring costly repairs. Transportation infrastructure, including roads and bridges, would be particularly vulnerable, as floodwaters can wash away road surfaces, erode bridge supports, and render major routes impassable. This would hinder emergency response efforts and disrupt daily commutes, supply chains, and the movement of goods and services.

Utilities such as water treatment plants, wastewater systems, and power infrastructure could also be severely affected. Flooding of water treatment facilities or contamination of

water supplies could disrupt access to clean drinking water, while overwhelmed wastewater systems may lead to environmental contamination. Electrical substations and power lines in flood-prone areas risk damage, potentially causing widespread outages that complicate recovery efforts.

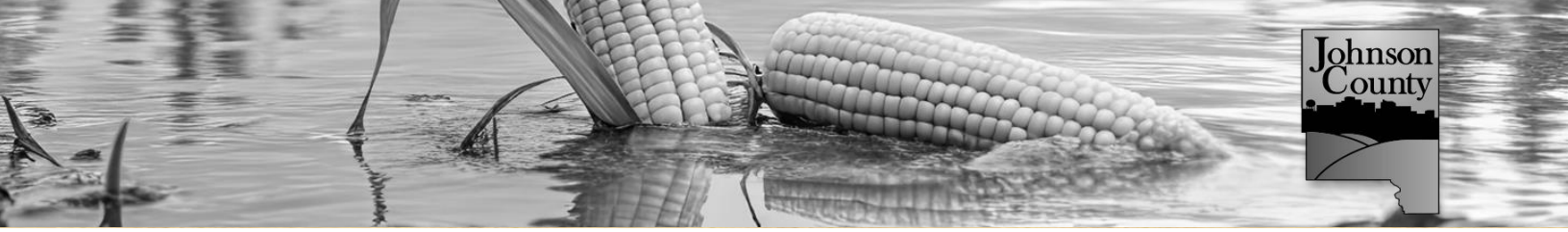
Public buildings, including schools, hospitals, and emergency service facilities, could face flooding or accessibility issues, limiting their ability to operate effectively. Disruption to communication infrastructure, such as cell towers and internet services, could further hamper emergency coordination and public information dissemination. Overall, river flooding would strain Johnson County's critical infrastructure, emphasizing the need for resilient design, flood defenses, and comprehensive emergency planning to ensure the continuity of essential services.

Historical, Cultural, and Natural Environment

River flooding in Johnson County, Iowa, would pose significant risks to the county's historical, cultural, and natural environment. Historical buildings and landmarks, particularly those near waterways or in flood-prone areas, could suffer extensive water damage, leading to structural deterioration and the potential loss of irreplaceable cultural heritage. The Iowa River Power Restaurant, housed in a historic former hydroelectric plant along the Iowa River, is vulnerable to rising floodwaters, which could erode its foundation and damage its historic structure. Similarly, the Johnson County Historic Poor Farm, which dates back to the mid-19th century, could experience significant flooding that threatens its preserved buildings and agricultural heritage. Preservation efforts for these sites could be costly and time-intensive, especially if original materials or historical artifacts sustain irreparable damage.

Cultural spaces, such as Lower City Park and the Iowa City Pedestrian Mall (Ped Mall), may face closures and damage, disrupting community activities, events, and local businesses. Museums such as the University of Iowa Museum of Natural History could also be affected if floodwaters infiltrate their buildings, potentially damaging valuable exhibits and archives.

Natural areas, including riverside ecosystems and wetlands, would be significantly impacted by flooding. Floodwaters can erode soil, wash away vegetation, and deposit debris and pollutants, harming local flora and fauna. The Hawkeye Wildlife Management Area, which serves as a critical habitat for migratory birds and native species, could experience habitat loss and contamination from floodwaters carrying agricultural runoff and other pollutants. Aquatic ecosystems along the Iowa River could suffer from reduced



water quality as sediment and contaminants are carried downstream, disrupting habitats and affecting biodiversity.

Additionally, flooding in agricultural areas could exacerbate water pollution, as fertilizers, pesticides, and other runoff enter waterways, leading to long-term environmental degradation.

Future Land Use and Development

River flooding in Johnson County, Iowa, would influence future land use and development by necessitating stricter zoning regulations and adaptive planning practices in flood-prone areas. Land that experiences repeated flooding may be designated as unsuitable for residential or commercial development, with potential shifts toward uses such as open spaces, parks, or conservation areas to mitigate flood risks. Future development projects near rivers and tributaries, particularly in Iowa City, Coralville, and North Liberty, may require compliance with more stringent building codes, such as elevated structures, flood-resistant materials, or enhanced drainage systems.

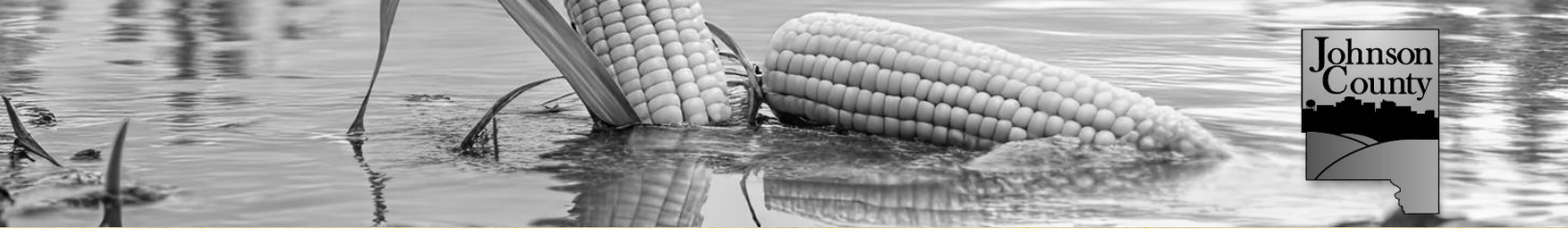
Flood-prone areas may also see increased reliance on floodplain mapping and risk assessments to guide land-use decisions. Infrastructure investments, such as levees, floodwalls, and retention basins, could redirect development efforts to areas outside high-risk zones, reshaping the county's growth patterns. Additionally, property devaluation in flood-affected areas may deter investment and limit future development opportunities.

3.4.12.8 Consequence Summary

River flooding in Johnson County, Iowa, would have widespread consequences, impacting residents, infrastructure, and the local environment. Floodwaters could displace families, damage homes and businesses, and disrupt daily life, particularly in vulnerable areas like Iowa City, Coralville, and North Liberty. Critical infrastructure, including roads, bridges, water treatment facilities, and power systems, could suffer extensive damage, leading to costly repairs and service interruptions. Historical and cultural landmarks, as well as natural ecosystems, would be at risk of significant damage, with potential long-term effects on the county's heritage and biodiversity. The economic impact would be substantial, with losses in property values, business revenue, and agricultural productivity, alongside increased recovery and mitigation costs. Additionally, future land use and development could be reshaped by stricter zoning regulations and heightened flood preparedness measures. These combined effects highlight the need

for proactive flood mitigation and resilient community planning to reduce the impacts of such incidents.

Category	Narrative
Impact on the Public	• Displacement of residents and disruptions to daily life in flood-prone areas. • Health risks from contaminated floodwaters and limited access to essential services.
Impact on the Economic Condition of the Planning Area	• Loss of business revenue due to closures and damaged properties. • Agricultural losses from crop damage and soil erosion. • Increased costs for cleanup, recovery, and infrastructure repairs.
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical landmarks and cultural sites requiring costly restoration. • Ecosystem disruption, including soil erosion, vegetation loss, and waterway contamination. • Long-term harm to aquatic habitats and biodiversity.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decrease in property values in flood-affected areas. • Damage to roads, bridges, utilities, and water treatment facilities, causing costly repairs.
Impact on the Public Confidence in Government	• Potential erosion of trust if flood response or mitigation efforts are perceived as inadequate. • Increased demand for transparency and investment in flood risk reduction.
Impact on Responders	• Strain on emergency personnel due to high demand for evacuations and recovery operations. • Risk of injury or fatigue for responders working in hazardous flood conditions.
Impact on continuity of operations, including continued delivery of government services	• Disruption to public services, including transportation, water supply, and emergency response. • Increased need for resources to maintain operations and support recovery efforts.
Cascading hazards	• Contamination of drinking water supplies and agricultural land. • Increased risk of disease spread from standing water and pollutants. • Potential structural failures, such as dam breaches or landslides, caused by prolonged flooding.



3.4.13 Severe Thunderstorms

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.92	2.75	2.25	2.08	20.67

3.4.13.1 Description

Severe thunderstorms are common in the Midwest, including the planning area, and can develop singly, in clusters, or in long lines. Compared to larger atmospheric events like hurricanes or winter storms, thunderstorms typically affect smaller areas. A standard thunderstorm is around 15 miles in diameter and lasts an average of 30 minutes, though severe storms can travel distances exceeding 600 miles. Thunderstorms form when moisture, rapidly rising warm air, and a lifting mechanism, such as clashing warm and cold air masses, combine to create a powerful system.

Most thunderstorms produce thunder, hail, lightning, and rain, but severe thunderstorms can generate more hazardous conditions, such as straight-line winds of 58 mph or greater, lightning strikes, microbursts, heavy rainfall, and localized flooding. Straight-line winds, which often exceed 60 mph, are a common feature of severe thunderstorms and can cause widespread damage similar to that of a tornado. Derechos, which are long-lasting, large-scale windstorms associated with rapidly moving thunderstorms, also fall under this hazard. While thunderstorms tend to be short-lived compared to other hazards, their potential for significant damage to infrastructure, power systems, and public safety makes them a major concern in the planning area.

3.4.13.2 Location

Severe thunderstorms, often accompanied by high winds, heavy rainfall, lightning, and hail, pose a significant threat to all areas of Johnson County, Iowa, though certain locations face heightened vulnerabilities. Urban areas, such as Iowa City and Coralville, are particularly susceptible to flash flooding due to impervious surfaces like roads, parking lots, and rooftops, which prevent water absorption and cause rapid runoff during intense rainfall. This can overwhelm stormwater drainage systems, leading to street flooding and water intrusion into homes and businesses. Additionally, hailstorms in urban centers can damage vehicles, shatter windows, and dent building exteriors, creating costly repair burdens for property owners.

In rural and open spaces, agricultural lands are at significant risk from the combined effects of hail, high winds, and heavy rainfall. Severe wind gusts can flatten crops and

damage outbuildings like barns and silos, while large hailstones can destroy crops, reduce yields, and harm livestock. Hailstorms also contribute to localized flooding by increasing runoff as ice melts quickly, further impacting planting and harvesting schedules. The economic toll on farmers can be substantial, particularly if storms occur during critical growing periods.

Wooded regions across the county, including residential neighborhoods with dense tree cover, are highly vulnerable to wind and hail damage during thunderstorms. High winds can uproot trees, snap branches, and topple utility poles, leading to prolonged power outages and road blockages. Hailstones, depending on their size, can exacerbate this damage by breaking tree limbs, denting roofs, and damaging vehicles and outdoor equipment. Lightning poses an additional threat in these areas, with the potential to ignite fires, damage structures, or harm individuals caught outdoors.

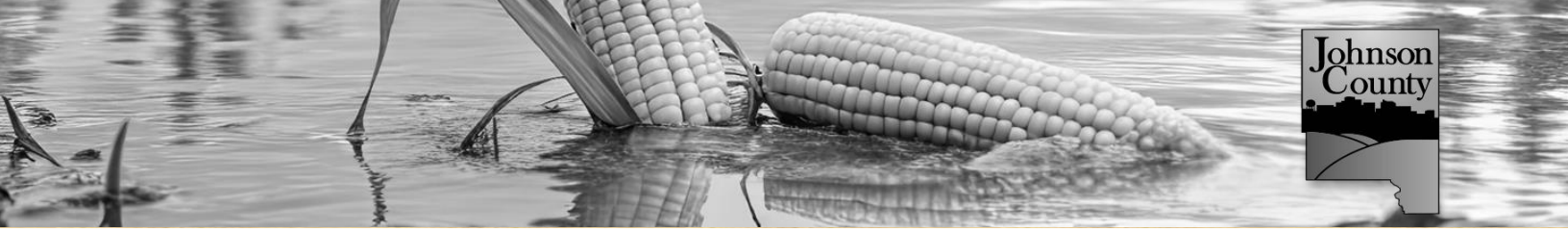
Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.13.3 Magnitude/Severity

The magnitude and severity of severe thunderstorms are measured using several key factors that assess the potential risk to people, property, and infrastructure. One primary measure is wind speed, with the National Weather Service (NWS) defining a severe thunderstorm as one with wind speeds of 58 mph or higher. Stronger winds, including straight-line winds and microbursts, can cause widespread damage to buildings, trees, and power lines. Hail size is another important factor, with severe thunderstorms producing hail that is at least 1 inch in diameter or larger. Hail of this size can cause significant damage to vehicles, homes, crops, and other infrastructure.

Hail Damage	
Pea-sized hail (1/4 inch)	While small, pea-sized hail can cause minor damage, such as denting vehicles and damaging delicate plants. It is generally not large enough to cause significant damage to structures.



Hail Damage	
Marble-sized hail (1/2 inch)	Hail of this size can begin to cause damage to more sensitive plants and may create minor dings on vehicles or metal surfaces. While it can be loud, this size generally doesn't lead to severe property damage.
Dime to quarter-sized hail (3/4 to 1 inch)	At this size, hail can damage roofing materials like shingles, causing granule loss or cracking. It can also dent vehicles and damage crops.
Golf ball-sized hail (1 ¾ inches)	Hailstones of this size can cause significant damage to vehicles, including cracked windshields and dented metal. It can damage roofing, break windows, and cause severe harm to crops and gardens.
Tennis ball-sized hail (2 ½ inches)	Hail of this size is large enough to puncture roofing materials, break windows, and cause extensive damage to vehicles, including shattered glass. It can also cause injuries to people and animals caught outdoors and devastate agricultural fields.
Baseball-sized hail (2 ¾ inches)	Hail this size can cause major structural damage to buildings, punch holes in roofs, break through windows, and severely damage vehicles. In addition to causing widespread property damage, it poses a serious risk to anyone outdoors, leading to injuries.
Softball-sized hail (4 inches and larger)	Hailstones this size can cause catastrophic damage. They can destroy roofs, shatter windows, total vehicles, and cause serious injuries or even death to people or animals exposed to it. Crops and outdoor infrastructure, such as power lines and fencing, can be decimated.

The presence or potential for tornadoes within a thunderstorm also increases its severity. Tornado strength is measured using the Enhanced Fujita (EF) scale, which assesses wind speeds and the damage caused. Though tornadoes are measured post-event based on damage, their potential greatly heightens the storm's severity. Rainfall intensity and the risk of flash flooding also contribute to the severity of thunderstorms. Heavy rainfall, measured in inches per hour, can cause localized flooding, especially in low-lying areas.

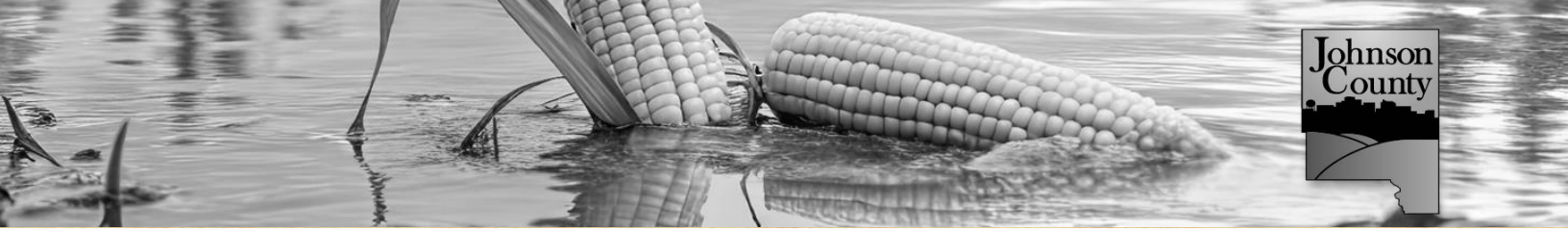
Additionally, the duration and storm coverage are important. Long-lasting storm systems, such as derechos, which produce damaging winds over hundreds of miles, are particularly severe due to their widespread impact. Lastly, lightning frequency—although not part of the official criteria—can heighten the danger by increasing the risk of fires and power outages. Together, these factors help the NWS and local authorities assess the severity of severe thunderstorms and guide public safety measures.

3.4.13.4 Past Occurrences

Here are notable severe thunderstorm events in Johnson County, Iowa, and the Midwest, excluding hail and tornadoes:

- July 11, 2011 (Iowa City, Iowa): A severe thunderstorm produced straight-line winds exceeding 70 mph, resulting in widespread power outages, downed trees, and structural damage to buildings.
- June 29, 2012 (Des Moines, Iowa): A powerful thunderstorm system brought intense lightning and heavy rainfall, leading to flash flooding in urban areas, disrupting transportation, and causing property damage.
- July 13, 2004 (Cedar Rapids, Iowa): Severe thunderstorms with strong winds caused significant damage to infrastructure, including the collapse of a radio tower and extensive tree damage throughout the city.
- May 25, 2008 (Iowa City, Iowa): A massive hailstorm struck Iowa City, producing hailstones up to 3 inches in diameter. The storm caused widespread property damage, including shattered windows and dented vehicles, and resulted in significant insurance claims across the region.
- August 10, 2020 (Midwest Derecho): A widespread, long-lived windstorm known as a derecho swept across the Midwest, including Iowa, with wind speeds up to 140 mph, causing extensive damage to homes, businesses, and agriculture, and resulting in prolonged power outages.
- June 29, 1998 (Wisconsin and Michigan): A severe thunderstorm complex produced damaging straight-line winds across parts of Wisconsin and Michigan, leading to widespread forest damage and power outages affecting thousands of residents.

Examining past occurrences of severe thunderstorms allows the planning area to better prepare for future events by identifying vulnerabilities, understanding potential impacts, and improving response strategies. Historical incidents, such as straight-line windstorms, flash flooding, and lightning-related damages, demonstrate the wide-ranging effects these storms can have on infrastructure, public safety, and local economies. Reviewing significant events, whether they occurred in Johnson County or the broader Midwest region, highlights critical lessons on the importance of resilient infrastructure, effective communication systems, and community preparedness. These insights enable the planning area to refine mitigation efforts, develop robust emergency response plans, and enhance public awareness to minimize risks and improve recovery outcomes for future severe thunderstorm events.



3.4.13.5 Likelihood of Future Occurrence

The likelihood of severe thunderstorms occurring in Johnson County, Iowa, is high, given the county's location in the Midwest, an area frequently impacted by thunderstorm activity. Thunderstorms develop under favorable conditions, such as abundant moisture, warm air, and atmospheric instability, which are common in Iowa, particularly during spring and summer. Local and regional data show that thunderstorms, including those producing damaging winds, heavy rainfall, and lightning, occur regularly throughout the state.

Statewide trends indicate that Iowa experiences an average of 50-60 thunderstorm days annually, with the potential for multiple storms affecting Johnson County each year. Severe thunderstorms often follow weather patterns tied to large storm systems moving through the region, further increasing the likelihood of their occurrence. As climate trends suggest an increase in the frequency and intensity of extreme weather events, Johnson County may see a continued or heightened risk of severe thunderstorms in the future. This consistent threat underscores the importance of preparedness and mitigation efforts to reduce their impacts on people, property, and infrastructure.

3.4.13.6 Climate Change Considerations

Climate change has potential implications for the frequency and intensity of severe thunderstorms, as shifts in atmospheric conditions influence storm formation. In Johnson County, Iowa, and the broader Midwest, warmer temperatures and increased atmospheric moisture—both linked to climate change—create more favorable conditions for thunderstorms. These changes can lead to more frequent heavy rainfall events, which may exacerbate flash flooding risks associated with thunderstorms. Additionally, stronger temperature gradients between warm, moist air and cooler air masses can enhance storm intensity, potentially increasing the occurrence of damaging winds and lightning.

While the direct effects of climate change on severe thunderstorms remain an area of active research, these trends suggest that Johnson County could face a heightened risk of intense storms in the future. Understanding these potential impacts underscores the importance of integrating climate resilience into preparedness and mitigation strategies to address the evolving nature of severe weather events.

3.4.13.7 Vulnerability

People

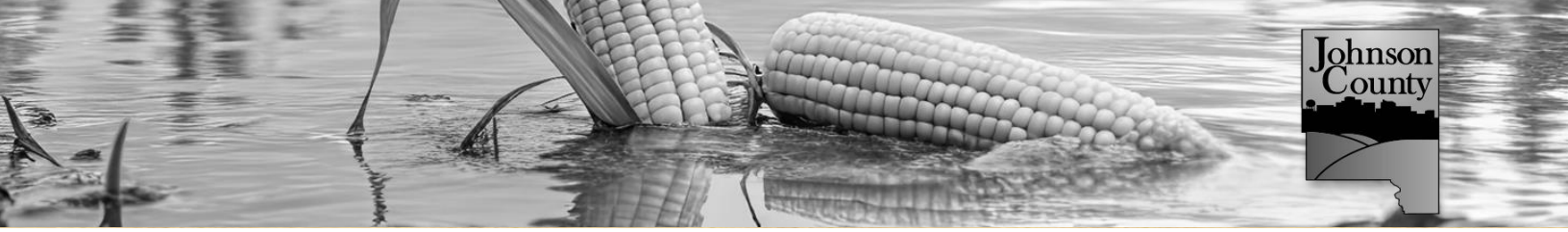
If severe thunderstorms were to occur in Johnson County, Iowa, the impact on residents could be significant, with vulnerable and underserved populations facing the greatest risks. High winds can pose direct threats to personal safety, as falling trees, debris, and structural damage may result in injuries or fatalities. Renters and low-income households (16.9%) living in older or less structurally sound housing may experience greater risks of storm damage and displacement. Heavy rainfall can lead to localized flooding, particularly in urban areas like Iowa City and Coralville, disrupting daily life and displacing residents from their homes, with individuals without reliable transportation (6.1%) facing greater difficulties in evacuating flooded areas.

Lightning associated with thunderstorms increases the risk of fires, electrical damage, and injuries for those outdoors or in improperly grounded structures. Power outages caused by downed lines or damaged substations can leave residents without electricity, impacting essential services such as heating, cooling, and communication systems. Older adults (9.6%), individuals with disabilities (7.1%), and those reliant on powered medical devices would be particularly vulnerable during extended outages. Households with lower incomes may also struggle to afford backup power sources or alternative shelter if prolonged outages occur.

Beyond physical threats, the disruption caused by severe thunderstorms can create psychological stress, particularly for residents repeatedly affected by storm-related damages. Non-English-speaking populations (4.4%) may face challenges in receiving timely weather warnings and emergency instructions. The cumulative effect of these storms can exacerbate existing disparities, as underserved populations have fewer financial resources to recover from storm damage, power disruptions, and temporary displacement. Severe thunderstorms in Johnson County would significantly impact public safety, health, and daily life, with the most severe consequences falling on those with limited financial and social resources.

Economy

Severe thunderstorms in Johnson County, Iowa, would have notable economic impacts, affecting multiple sectors. High winds, lightning, and heavy rainfall could damage homes, businesses, and public infrastructure, leading to costly repairs and cleanup efforts. Local businesses might face temporary closures due to property damage, power outages, or flooded facilities, resulting in lost revenue and potential inventory loss. Commercial



districts in urban areas, such as Iowa City, could be particularly vulnerable, with disrupted operations affecting employees and customers alike.

Agricultural activities in the county would also be impacted, as strong winds and heavy rains can damage crops, erode soil, and harm livestock, reducing yields and profitability for farmers. Public funds would likely be redirected to address emergency response and recovery efforts, straining local budgets. Infrastructure repairs, such as fixing downed power lines, clearing debris, and addressing water damage to roads and bridges, would add to the financial burden on the county.

In addition to these immediate costs, severe thunderstorms can increase insurance claims, potentially raising premiums for residents and businesses over time. If storms become more frequent or severe, they could deter investment or development in vulnerable areas, further affecting the county's long-term economic growth. These economic impacts emphasize the need for proactive measures to mitigate storm-related risks and enhance community resilience.

Built Environment

General Property

Severe thunderstorms in Johnson County, Iowa, could negatively impact property values, particularly in areas that experience repeated damage or are perceived as high-risk. Properties with significant damage from wind, flooding, or lightning strikes may see reduced market value, as potential buyers may view them as less desirable due to the cost of repairs or future risks. Additionally, homes and businesses in areas prone to localized flooding, such as urban centers with limited drainage capacity, could face long-term depreciation if mitigation efforts are not implemented effectively.

Frequent storm damage could lead to higher insurance premiums for properties in affected areas, adding to the cost of ownership and further deterring prospective buyers. Over time, if severe thunderstorms become more frequent or damaging, the stigma associated with living in high-risk zones could result in a broader decline in property values. This trend could also affect property tax revenue for the county, which might reduce funding for essential services and infrastructure improvements. Mitigation measures, such as improved drainage systems and resilient construction practices, are critical to protecting property values and maintaining economic stability in Johnson County.

Critical Infrastructure

Severe thunderstorms in Johnson County, Iowa, could have significant impacts on critical infrastructure, disrupting essential services and requiring costly repairs. High winds can damage power lines, electrical substations, and communication towers, leading to widespread power outages and interruptions in phone and internet services. These outages can hinder emergency response efforts, disrupt businesses, and affect residents reliant on electricity for medical devices or heating and cooling systems.

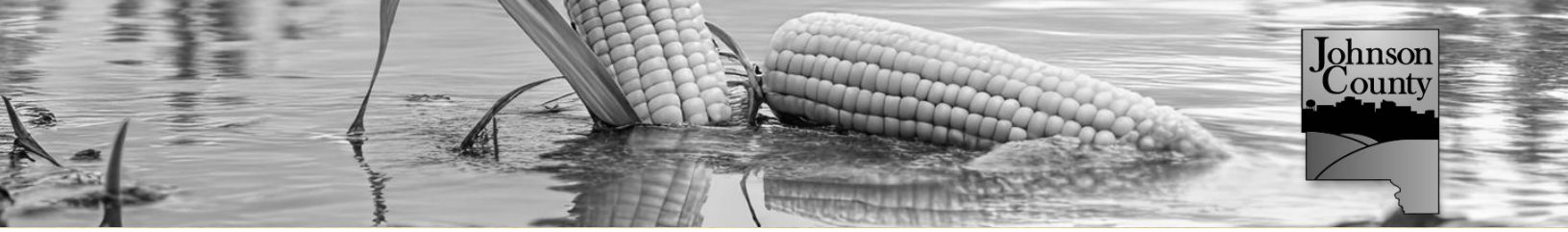
Heavy rainfall associated with thunderstorms can overwhelm stormwater drainage systems, causing localized flooding that damages roads, bridges, and other transportation infrastructure. Blocked or damaged routes could delay emergency services and disrupt daily commutes, particularly in urban areas like Iowa City and Coralville. Lightning strikes pose additional risks to critical facilities, such as hospitals, schools, and emergency operation centers, potentially causing fires or electrical system failures.

Water treatment and wastewater facilities may also be impacted by flooding, leading to potential contamination of drinking water supplies and disruption of sanitation services. The cumulative effects of these disruptions would strain the county's recovery resources and highlight the importance of infrastructure resilience to minimize the impacts of severe thunderstorms on Johnson County's critical systems.

Historical, Cultural, and Natural Environment

Severe thunderstorms in Johnson County, Iowa, could have significant impacts on the county's historical, cultural, and natural environment. Historical buildings and cultural landmarks, particularly those in urban areas like Iowa City, may sustain damage from high winds, heavy rainfall, or lightning strikes. The Old Capitol Museum, a prominent historical site, could experience roof damage or water intrusion, potentially threatening its historic interior. Likewise, the Plum Grove Historic Home, a mid-19th-century residence, could suffer structural weakening if exposed to prolonged heavy rainfall or falling tree limbs. Fragile structures without modern reinforcements may require costly restoration efforts following severe weather events.

Cultural assets, such as the Englert Theatre and the Iowa City Public Library, could face temporary closures or storm-related damage, disrupting public access to educational and artistic programming. Outdoor cultural events like the Iowa City Jazz Festival and the Johnson County Fair may be canceled or postponed due to unsafe conditions or damage to venues, affecting community engagement and local tourism.



The natural environment would also be significantly affected by severe thunderstorms. High winds could uproot trees in Hickory Hill Park and Kent Park, disrupting local ecosystems and increasing the risk of damage to nearby structures. Heavy rainfall may lead to soil erosion, particularly in natural areas along the Iowa River, while flash flooding can deposit debris and pollutants into waterways, degrading water quality and harming aquatic habitats. Wildlife may experience habitat destruction or displacement, further impacting local biodiversity, especially in areas like the Hawkeye Wildlife Management Area.

Future Land Use and Development

Severe thunderstorms in Johnson County, Iowa, could influence future land use and development by prompting the adoption of more resilient planning practices and stricter building regulations. Areas that experience repeated damage from flooding or high winds may require reassessment of zoning regulations, with some zones potentially being restricted or repurposed for open spaces or stormwater management systems to mitigate future risks. Urban areas with limited drainage capacity, such as Iowa City and Coralville, may see increased investment in green infrastructure, such as permeable pavements, rain gardens, and retention basins, to manage stormwater runoff more effectively.

New developments, particularly in flood-prone or wind-exposed areas, may face higher standards for building materials and construction methods to ensure structures can withstand severe weather events. This could include the use of wind-resistant designs, elevated construction in flood-prone zones, and reinforced roofs and windows. These requirements could increase initial development costs but would provide long-term benefits by reducing storm-related damage and repair expenses.

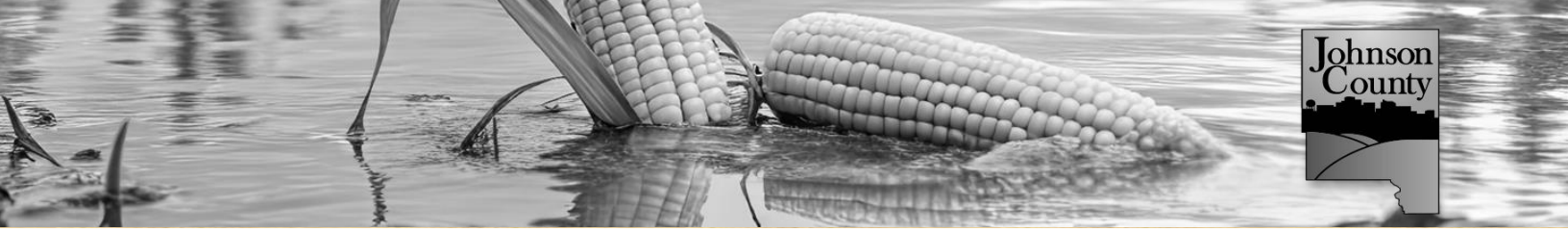
Additionally, repeated incidents of severe thunderstorms may impact the desirability of certain areas for residential or commercial development, particularly if they are perceived as high-risk zones. This could shift growth patterns within the county, concentrating development in areas less vulnerable to severe weather. By integrating resilience into planning and development decisions, Johnson County can minimize the long-term impacts of severe thunderstorms on its land use and growth potential.

3.4.13.8 Consequence Summary

Severe thunderstorms in Johnson County, Iowa, could have widespread consequences, impacting public safety, property, infrastructure, and the environment. High winds and

heavy rainfall can cause injuries, displace residents, and damage homes and businesses, leading to significant repair and recovery costs. Critical infrastructure, such as power lines, roads, and drainage systems, may be disrupted, resulting in power outages, transportation delays, and localized flooding. Historical and cultural landmarks are at risk of structural damage, while natural areas could experience habitat destruction, soil erosion, and waterway contamination. The economic toll would include losses for businesses, agricultural damage, and potential declines in property values, particularly in high-risk areas. These combined effects emphasize the need for preparedness, resilient infrastructure, and effective response measures to mitigate the impacts of severe thunderstorms on the county.

Category	Narrative
Impact on the Public	• Injuries from wind-driven debris and localized flooding. • Displacement of residents due to property damage or flooding. • Increased mental health strain from recurring severe weather events.
Impact on the Economic Condition of the Planning Area	• Loss of revenue for businesses due to closures and property damage. • Agricultural losses from crop damage, soil erosion, and livestock harm. • Increased public spending on emergency response and infrastructure repair.
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical buildings and cultural landmarks requiring costly restoration. • Disruption of cultural events and activities due to unsafe conditions or venue damage. • Habitat destruction, soil erosion, and waterway contamination impacting local biodiversity.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values in repeatedly affected or high-risk areas. • Damage to power lines, roads, bridges, and drainage systems, causing service interruptions and costly repairs.
Impact on the Public Confidence in Government	• Potential erosion of trust if response and mitigation measures are seen as inadequate. • Increased expectations for transparent communication and infrastructure improvements.
Impact on Responders	• Strain on emergency personnel due to high demand for rescues, debris removal, and infrastructure repair. • Risk of injury for responders working in hazardous conditions during storms.



Category	Narrative
Impact on continuity of operations, including continued delivery of government services	• Temporary disruption of public services, including transportation, utilities, and emergency management. • Increased allocation of resources for recovery, delaying other government functions.
Cascading hazards	• Flash flooding leading to road closures and water contamination. • Power outages disrupting medical equipment, communication, and heating or cooling systems. • Potential for lightning-induced fires and further infrastructure damage.

3.4.14 Severe Winter Storms

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.92	2.67	2.08	2.08	19.94

3.4.14.1 Description

Severe winter storms involve extreme winter weather conditions that disrupt daily activities and create hazardous environments. These storms can bring blizzard conditions, heavy snow, blowing snow, freezing rain, sleet, and extreme cold. In the Midwest, including Johnson County, Iowa, severe winter storms are most likely to occur between late October and late March, when cold Arctic air collides with warmer air masses. Blizzards, the most dangerous type of winter storm, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, resulting in snow drifts and visibility reduced to near zero. Severe blizzards are marked by even stronger winds of at least 45 miles per hour, along with falling or blowing snow and temperatures of 10 degrees Fahrenheit or lower.

Heavy snowstorms, which can drop four or more inches of snow in 12 hours or six or more inches in 24 hours, make travel hazardous, strain emergency services, and challenge local infrastructure. Ice storms, characterized by freezing rain that coats surfaces, can bring down power lines, tree branches, and make roads and sidewalks impassable. Severe winter storms in the Midwest are notorious for causing widespread power outages, prolonged transportation disruptions, and dangerous cold-related health risks such as frostbite and hypothermia. These storms underscore the importance of preparation and resilience from individuals, communities, and local governments to minimize their impacts.

3.4.14.2 Location

Severe winter storms can impact all areas of Johnson County, Iowa; however, certain locations are more susceptible due to their geographic and infrastructural characteristics. Rural regions, particularly those with open fields and limited tree cover, are highly vulnerable to blizzard conditions. The lack of natural windbreaks in these areas allows snow to drift across roads and properties, leading to significant transportation challenges and isolation of residents. Communities such as Lone Tree and Swisher may experience prolonged periods without access to essential services during severe storms.

Urban centers like Iowa City and Coralville face different challenges. The dense population and extensive infrastructure in these cities can lead to rapid accumulation of snow and ice on roads, sidewalks, and buildings. This accumulation increases the risk of accidents, impedes emergency response efforts, and disrupts daily activities. Additionally, the prevalence of impervious surfaces in urban areas can exacerbate the formation of ice, making travel treacherous for both pedestrians and vehicles.

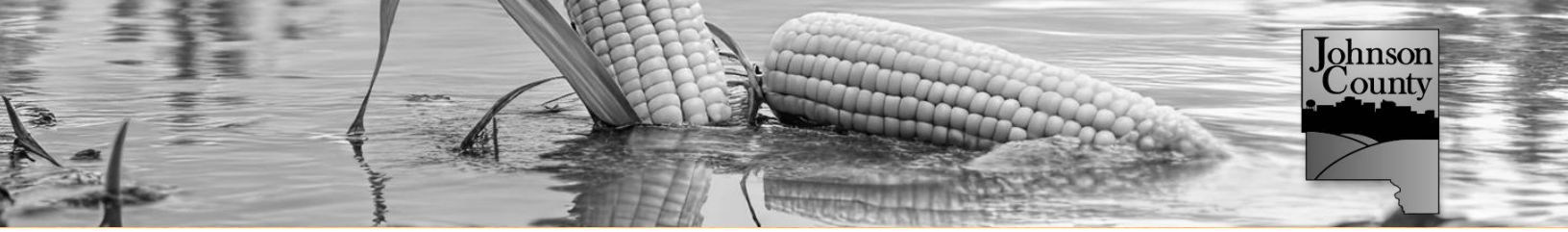
Elevated terrains and areas near water bodies, such as the Iowa River, are also at increased risk. These regions can experience microclimates that result in heavier snowfall or more severe ice accumulation. The combination of elevation and moisture can lead to localized but intense winter weather events, further complicating preparedness and response efforts.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.14.3 Magnitude/Severity

The magnitude and severity of severe winter storms are measured using several key factors, each providing insight into the storm's potential impact. Meteorologists assess snowfall amounts, with heavy snowstorms typically defined as producing four or more inches of snow in a 12-hour period or six or more inches in 24 hours. The intensity and



duration of snowfall can significantly influence travel safety and infrastructure strain. Wind speed is another critical factor, especially during blizzards, which are defined by sustained winds of at least 35 miles per hour combined with blowing or falling snow, reducing visibility to less than a quarter mile for at least three consecutive hours.

For ice storms, ice accumulation is measured in inches, with as little as a quarter inch of ice capable of causing hazardous road conditions, downed power lines, and significant damage to trees. Wind chill, which accounts for the cooling effect of wind on exposed skin, is also used to measure severity, as it indicates the increased risk of frostbite and hypothermia. Temperature extremes, particularly when reaching below 0°F, further highlight the storm's severity due to risks to public health and challenges in maintaining functional infrastructure.

In addition to these direct measurements, the storm's spatial coverage and duration are considered, as broader and longer-lasting events have greater potential to disrupt daily life, strain emergency services, and damage critical systems. By analyzing these factors, emergency management teams can assess the severity of a storm and implement appropriate preparedness and response measures to protect communities.

3.4.14.4 Past Occurrences

Here are notable severe winter storm events that have impacted Johnson County, Iowa, and the broader Midwest:

- January 12-13, 2024 (Johnson County, Iowa): A significant winter storm brought heavy snowfall and strong winds to Johnson County, resulting in hazardous travel conditions, numerous road accidents, and widespread power outages affecting thousands of residents. The storm underscored the need for enhanced winter storm preparedness and resilience.
- December 15, 2021 (Iowa): An unprecedented derecho event swept through Iowa, including Johnson County, bringing severe winds and blizzard-like conditions. The storm caused extensive damage to infrastructure, disrupted transportation, and led to prolonged power outages.
- December 8-11, 2009 (Iowa): A powerful blizzard affected Iowa, including Johnson County, with heavy snowfall and winds exceeding 40 mph. This led to road closures, power outages, and significant snowdrifts that impeded emergency response and daily activities.
- February 1-2, 2011 (Midwest): A major winter storm brought heavy snow and freezing rain across the Midwest, including Iowa. In Johnson County, the storm

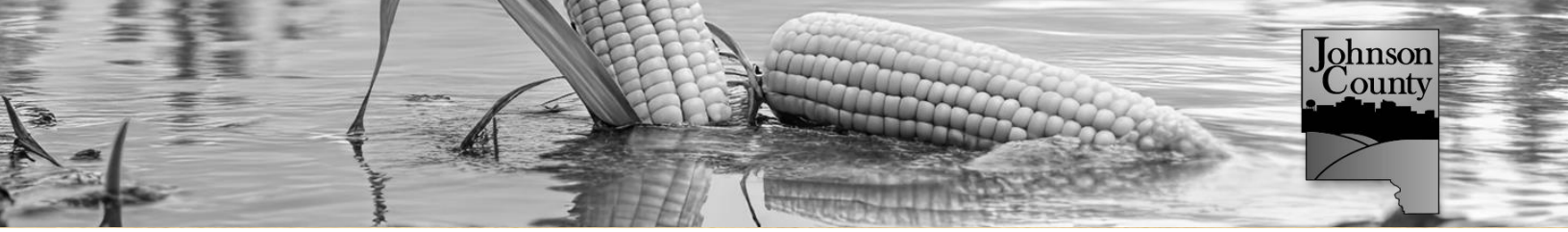
caused hazardous travel conditions, power outages, and delays in school and business operations.

- January 29-February 3, 2015 (Iowa): A prolonged winter storm brought a combination of heavy snow and frigid temperatures to Iowa, impacting Johnson County. The event disrupted transportation, strained local resources, and led to numerous accidents on icy roads.
- March 13-14, 1997 (Midwest): A late-winter blizzard swept through the Midwest, including parts of Iowa. The storm caused significant snowfall and strong winds in Johnson County, leading to closures of schools, businesses, and major roadways.
- December 17-22, 2012 (Midwest): A major winter storm affected the Midwest, including parts of Iowa, bringing heavy snowfall and strong winds. The storm led to significant travel disruptions, power outages, and economic losses.
- Early December 2007 (Midwest): A severe winter storm impacted the Midwest, including Iowa, bringing heavy snow, ice accumulation, and strong winds. The storm caused widespread power outages, hazardous travel conditions, and economic impacts.

Examining past occurrences of severe winter storms provides valuable insights that enable the planning area to better prepare for future events. Historical incidents highlight the diverse impacts of winter storms, including transportation disruptions, power outages, property damage, and public safety risks such as frostbite and hypothermia. These events, whether they occurred locally in Johnson County or across the broader Midwest, underscore the vulnerabilities in infrastructure, emergency response systems, and community readiness. Reviewing past storms also identifies recurring challenges, such as snowdrifts blocking rural roads, power outages affecting vulnerable populations, and the economic strain on businesses and agriculture. By learning from these incidents, the planning area can enhance its mitigation strategies, improve emergency response protocols, and prioritize investments in resilient infrastructure, ultimately reducing the risks and impacts of future severe winter storms.

3.4.14.5 Likelihood of Future Occurrence

The likelihood of future severe winter storms in Johnson County, Iowa, is high, given the county's climate and historical weather patterns. Located in the Midwest, Johnson County experiences the convergence of Arctic air masses with warmer, moist air from the Gulf of Mexico, creating ideal conditions for winter storms. On average, Iowa sees several significant winter storm events each year, often including heavy snow, freezing rain, and high winds. These conditions are most prevalent between late October and late March, with peak activity in mid-winter.



Regionally, the Midwest is prone to severe winter weather due to its flat terrain, which allows cold air to move unimpeded and promotes rapid storm formation. Statewide trends further indicate that Iowa frequently experiences snowfall events capable of causing disruptions, with rural areas often facing snowdrifts and urban centers dealing with ice accumulation. While the intensity of individual storms may vary, the consistent recurrence of winter weather hazards suggests that Johnson County will continue to face severe winter storms annually.

3.4.14.6 Climate Change Considerations

Climate change considerations for severe winter storms are complex and somewhat debated, as these events are influenced by various atmospheric factors. While severe winter storms are natural hazards, climate change may indirectly affect their frequency, intensity, and characteristics. Warming global temperatures can increase the amount of atmospheric moisture, which can lead to heavier snowfall during storms in colder regions like Johnson County, Iowa, where temperatures remain below freezing. Additionally, changes in the jet stream, potentially influenced by Arctic warming, can result in prolonged periods of extreme cold or more intense storm systems.

Conversely, as average temperatures rise, some regions may experience shorter winters or reduced overall snowfall, although extreme events may still occur. For Johnson County, this means that while the overall winter season may shift, the potential for severe storms with heavy snow, ice, and strong winds remains significant. Understanding these possible changes emphasizes the need to maintain and adapt preparedness strategies to address evolving patterns of severe winter weather. This includes updating infrastructure, ensuring emergency response readiness, and educating the community on potential risks.

3.4.14.7 Vulnerability

People

Severe winter storms in Johnson County, Iowa, would have significant impacts on the local population, with vulnerable and underserved populations facing the greatest challenges. Prolonged snowstorms or ice storms can make roads impassable, leading to accidents and preventing residents from commuting to work, school, or medical appointments. Individuals without reliable transportation (6.1%) may be unable to access essential services, while low-income residents (16.9%) may face difficulties affording alternative transportation or emergency supplies. Older adults (9.6%), individuals with disabilities (7.1%), and those with chronic health conditions could experience mobility

challenges, particularly if sidewalks and roads remain hazardous or if public transportation is disrupted.

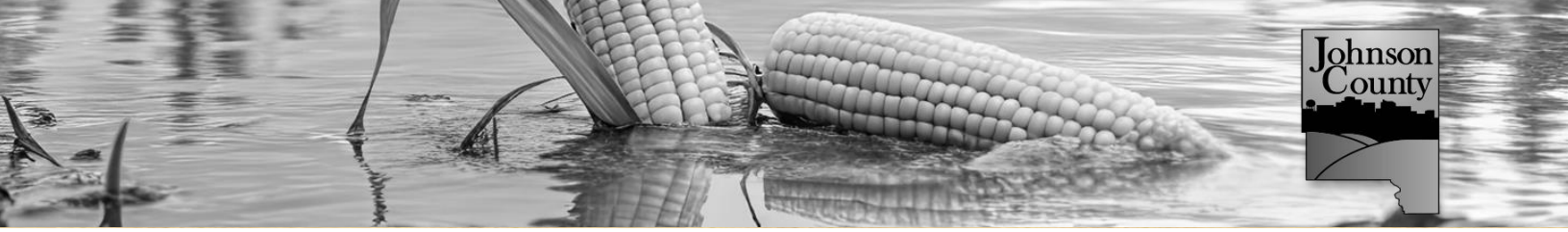
Exposure to extreme cold, particularly during prolonged storms or power outages, increases the risk of hypothermia and frostbite, especially for those without adequate heating or shelter. Low-income households may struggle with rising heating costs, increasing the likelihood of unsafe heating practices or prolonged exposure to cold temperatures. In rural areas, snowdrifts and blocked roads can isolate residents, delaying emergency response and essential supply deliveries. Urban residents may face additional risks from ice accumulation on sidewalks and roads, increasing the likelihood of slips, falls, and vehicle collisions, which disproportionately affect older adults and individuals with mobility impairments.

The disruption caused by severe winter storms also has psychological impacts, including stress and anxiety, particularly for those with limited financial resources to recover from storm-related hardships. Families may struggle to manage childcare, food supplies, and heating costs during extended periods of severe weather, with renters in multi-unit housing having limited control over heating options. Non-English-speaking populations (4.4%) may also encounter barriers in receiving timely weather warnings or emergency assistance. The cumulative impact of severe winter storms would deepen existing disparities, as those with fewer financial and social resources would experience the most significant hardships during and after extreme weather events.

Economy

Severe winter storms in Johnson County, Iowa, would have notable economic impacts, affecting multiple sectors of the local economy. Businesses may experience closures due to hazardous travel conditions, damaged infrastructure, or power outages, leading to lost revenue and productivity. Retailers, restaurants, and service providers are particularly vulnerable, as customers may be unable to access their services during storms or in the immediate aftermath.

The agriculture sector, a vital part of the local economy, could suffer losses if livestock is exposed to extreme cold or if transportation disruptions prevent timely delivery of goods and feed. Snow and ice can damage farm structures, delay planting or harvesting schedules, and increase operational costs for heating and protection. Public infrastructure repairs, such as clearing snow, repairing roads, and restoring power lines, would place a financial strain on local governments, potentially diverting resources from other critical needs.



Additionally, severe storms can lead to increased insurance claims for property damage, vehicle collisions, and business interruptions, potentially driving up premiums for residents and businesses.

Built Environment

General Property

Severe winter storms in Johnson County, Iowa, could impact property values, particularly in areas that experience repeated or significant damage. Homes and businesses with structural issues caused by heavy snow loads, ice accumulation, or wind damage may see a reduction in market value due to the costs associated with repairs or potential future risks. Properties in rural or isolated areas that are more prone to snowdrifts and access challenges during storms might be viewed as less desirable by potential buyers, further affecting their value.

Frequent storm-related damage can increase insurance premiums, which may also deter buyers and contribute to property devaluation in certain areas. Conversely, homes and businesses with upgraded features such as reinforced roofs or improved heating systems may retain their value better, as these properties are seen as more resilient to severe winter weather. Overall, while the long-term impact on property values depends on the frequency and severity of winter storms, localized devaluation is a likely consequence in areas most affected by these events.

Critical Infrastructure

Severe winter storms in Johnson County, Iowa, would significantly impact critical infrastructure, disrupting essential services and operations. Transportation systems, including roads, highways, and bridges, are particularly vulnerable as heavy snow and ice accumulation can make them impassable, leading to accidents, delays, and closures. Snowdrifts and icy conditions could also hinder emergency response efforts and delay the delivery of goods and services.

Electrical infrastructure is at high risk during winter storms, as ice accumulation on power lines and high winds can cause outages that disrupt heating systems, communications, and daily activities. Water and wastewater systems may also be affected if freezing temperatures damage pipes or limit access to treatment facilities. Additionally, public safety infrastructure, such as fire stations, hospitals, and emergency shelters, may experience operational challenges due to blocked access routes or increased demand during the storm.

Communications systems, including cellular and internet services, may face disruptions due to damage to utility poles or equipment. These interruptions could complicate coordination efforts for emergency services and impede residents' ability to access vital information.

Historical, Cultural, and Natural Environment

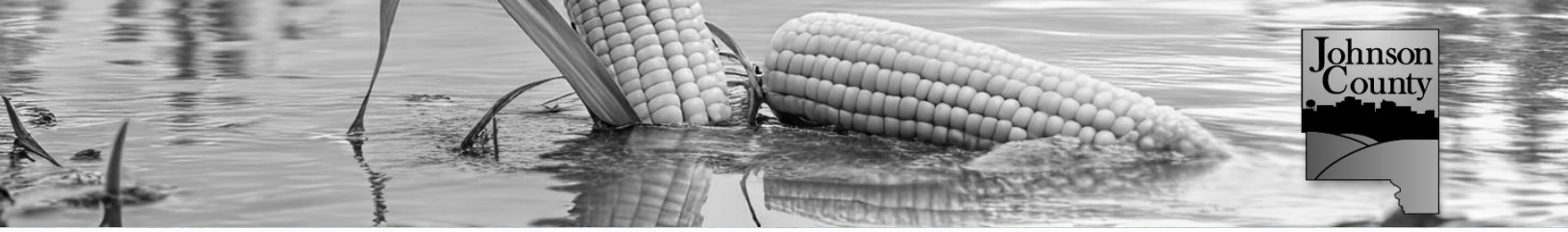
Severe winter storms in Johnson County, Iowa, could have substantial impacts on the county's historical, cultural, and natural environments. Historical buildings and landmarks, particularly those with older or less resilient structures, may suffer damage from heavy snow accumulation, ice formation, or high winds. The Old Capitol Museum, with its historic dome and aging structure, could experience stress from ice buildup and snow weight, potentially leading to roof leaks or water infiltration. Similarly, the Coralville Historic Schoolhouse, an older wooden structure, may be vulnerable to cold-related structural weakening and ice damage, necessitating costly restoration efforts.

Cultural institutions, such as the Iowa City Public Library and Hancher Auditorium, may face disruptions due to power outages, hazardous access conditions, or damage to their facilities. Snow-covered roads and icy sidewalks could delay or cancel cultural events like the Iowa City Book Festival, limiting public engagement and affecting the local cultural economy. Community centers and gathering places could also see reduced participation as residents avoid hazardous winter travel.

The natural environment would also be affected, as severe storms can damage vegetation, including trees and shrubs, through ice accumulation and strong winds. Parks such as Terry Trueblood Recreation Area and Hickory Hill Park could see tree limb breakage and habitat loss, affecting wildlife that relies on these areas for shelter. Some species may struggle to access food or suitable winter shelter due to prolonged snow and ice cover. Additionally, heavy snowmelt after a storm could lead to localized flooding along Clear Creek and the Iowa River, contributing to soil erosion and waterway contamination from road salt and stormwater runoff.

Future Land Use and Development

Severe winter storms in Johnson County, Iowa, could influence future land use and development by necessitating adaptations to mitigate storm-related risks. Areas prone to frequent snowdrifts, ice accumulation, or other storm impacts may require adjustments in zoning regulations to prioritize resilient infrastructure and development practices. For example, rural areas that frequently face transportation challenges during storms may



see reduced desirability for residential or commercial development, shifting growth toward more accessible urban areas.

In urban centers like Iowa City and Coralville, developers may be required to incorporate storm-resilient designs, such as reinforced roofs, advanced drainage systems, and improved insulation, to handle the effects of heavy snowfall and extreme cold. Existing buildings and infrastructure in frequently impacted areas may require retrofitting to meet evolving standards for resilience against winter storms.

Additionally, transportation planning might focus on improving snow and ice management for key routes, ensuring accessibility during future events. These considerations could influence the location and design of new developments, steering investment toward areas less affected by severe winter weather while maintaining infrastructure critical to the county's economic and social needs.

3.4.14.8 Consequence Summary

Severe winter storms in Johnson County, Iowa, can have far-reaching consequences, impacting public safety, infrastructure, the economy, and the environment. Heavy snowfall, ice accumulation, and high winds can disrupt transportation systems, causing road closures, accidents, and delays in emergency response. Power outages from downed lines can leave residents without heat or electricity, posing health risks, particularly for vulnerable populations. Businesses may face closures, lost revenue, and increased operational costs, while agricultural operations could suffer from livestock losses and infrastructure damage. Historical buildings and cultural institutions are at risk of structural harm, and natural habitats may be disrupted by severe cold and snow cover. These combined effects strain public resources and highlight the critical need for community preparedness to mitigate the impact of severe winter weather.

Category	Narrative
Impact on the Public	• Increased risk of injuries and fatalities from accidents, hypothermia, and frostbite. • Displacement and isolation of residents in rural areas due to snowdrifts and impassable roads. • Disruption of daily life and access to essential services.
Impact on the Economic Condition of the Planning Area	• Loss of revenue for businesses due to closures and supply chain delays. • Increased costs for snow removal, infrastructure repair, and emergency response. • Agricultural losses from livestock fatalities, infrastructure damage, and delayed operations.

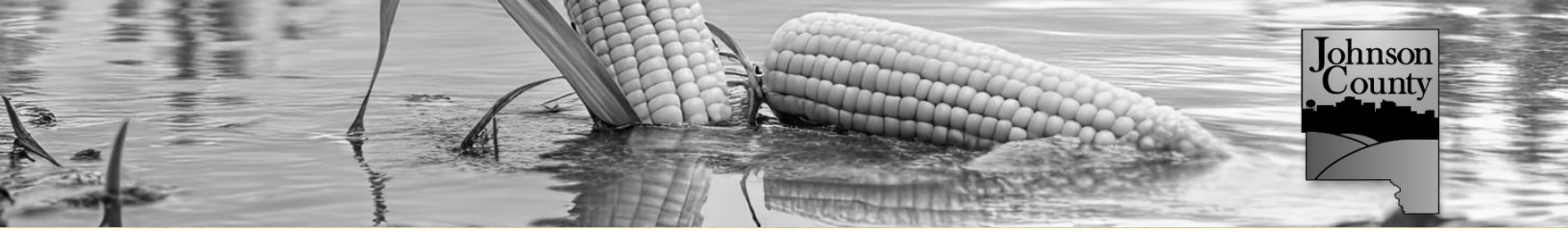
Category	Narrative
Impact on the Historical, Cultural, and Natural Environment	• Structural damage to historical buildings from heavy snow or ice. • Disruption of cultural events and closure of institutions like museums and libraries. • Damage to vegetation and wildlife habitats from ice, wind, and snow cover.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values in frequently impacted areas. • Damage to roads, bridges, and utility systems requiring costly repairs. • Power outages disrupting heating, communication, and daily activities.
Impact on the Public Confidence in Government	• Erosion of trust if snow removal or emergency response is perceived as inadequate. • Increased demand for transparency and improved infrastructure planning.
Impact on Responders	• Strain on emergency services due to increased demand and hazardous working conditions. • Risk of injuries and delays in response times due to impassable roads.
Impact on continuity of operations, including continued delivery of government services	• Temporary suspension or reduction of public services due to infrastructure disruptions. • Redirection of resources to storm-related recovery efforts.
Cascading hazards	• Prolonged power outages impacting heating, communication, and healthcare systems. • Flooding from rapid snowmelt after the storm. • Increased risk of traffic accidents and injuries from icy conditions.

3.4.15 Social Unrest

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.67	2.25	1.92	2.00	16.47

3.4.15.1 Description

Social unrest refers to a broad range of activities in which groups of people express dissatisfaction, frustration, or opposition to political, economic, or social conditions. This



unrest can manifest in protests, strikes, demonstrations, or violent riots and may be driven by issues such as inequality, law enforcement actions, racial tensions, labor disputes, or governmental policies. In Iowa, and particularly in Johnson County, social unrest has historically been tied to movements such as labor rights, student-led protests at the University of Iowa, and more recently, responses to national events such as racial justice movements or public health mandates. While Iowa is often perceived as a predominantly rural and moderate state, its urban centers, including Iowa City, are not immune to large-scale demonstrations or civil disturbances, especially given the presence of a diverse and politically active population. These events can disrupt daily life, strain local law enforcement resources, and sometimes escalate into broader civil disorder that damages property, affects public safety, and undermines community confidence. Understanding the causes and dynamics of social unrest is crucial for local governments and emergency management agencies to maintain public order, protect critical infrastructure, and address underlying grievances that may spark these incidents.

3.4.15.2 Location

In Johnson County, Iowa, urban centers such as Iowa City are particularly susceptible to social unrest due to several key factors. As the largest city in the county and home to the University of Iowa, Iowa City has a high population density and a significant concentration of public spaces that often serve as venues for demonstrations and protests. Areas such as the Pentacrest on the University of Iowa campus and the downtown district are commonly used for public gatherings due to their central location, accessibility, and visibility. These spaces provide ideal settings for individuals and groups to express their views on political, social, or economic issues.

The presence of the University of Iowa further amplifies the potential for social unrest. With a diverse and politically active student body, the university fosters an environment where civic engagement is encouraged, and students often participate in or organize protests and rallies. Issues such as racial justice, environmental activism, public health mandates, and student rights frequently serve as catalysts for such activities. The university's role as a hub of intellectual and cultural activity makes it a natural focal point for expressing dissent or advocating for change.

While rural areas of Johnson County are generally less prone to social unrest due to lower population densities and fewer public gathering spaces, no area is entirely immune. Localized grievances, such as disputes over resource allocation or controversial developments, could spark unrest even in smaller communities. However, the combination of Iowa City's urban infrastructure, diverse demographics, and the presence

of prominent public institutions like the university makes it the area most vulnerable to this hazard within the county.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

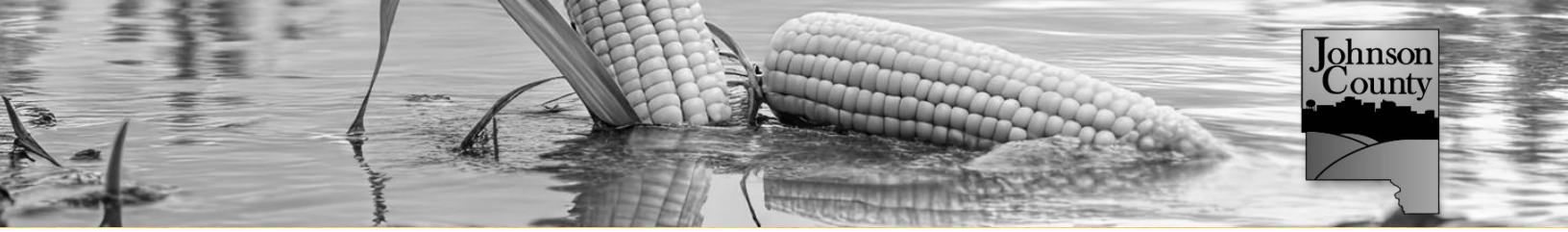
Applicable Not Applicable

3.4.15.3 Magnitude/Severity

The magnitude and severity of social unrest are measured through several key indicators, providing a comprehensive understanding of the event's scope and potential impact. These indicators include the size and nature of the crowd, the level of disruption caused, and the resources required to manage the situation. The number of participants plays a critical role in assessing magnitude; a larger group increases the complexity of crowd control and the likelihood of secondary effects such as traffic disruptions or strain on public safety resources. The nature of the unrest is also significant—peaceful protests are typically less severe in impact compared to events involving violence, property damage, or clashes with law enforcement.

Severity is further evaluated by the extent of physical and economic damage caused during the event. This includes property destruction, such as vandalism or arson, as well as impacts on local businesses due to closures or reduced consumer activity. Injuries or fatalities among participants, bystanders, or law enforcement personnel significantly escalate the severity of an incident. Additionally, the duration of the unrest is an important factor; prolonged disturbances increase resource consumption and may exacerbate tensions within the affected community.

Law enforcement and emergency management agencies often use specific metrics to gauge the severity of social unrest, such as the number of arrests, injuries, or emergency responses required. The deployment level of public safety personnel and the need for specialized equipment or reinforcements are also considered when determining the magnitude of the event. Monitoring social media activity and public sentiment can provide real-time insights into the event's potential escalation, enabling authorities to



respond proportionally and effectively. Together, these factors provide a structured framework for measuring the magnitude and severity of social unrest, aiding in resource allocation and post-incident evaluation.

3.4.15.4 Past Occurrences

Here are notable instances of social unrest in Johnson County, Iowa, and the broader Midwest, highlighting their dates and specific impacts:

- Johnson County, Iowa – May 2019: Demonstrations occurred in Iowa City over a controversial local housing development project, with activists blocking city council proceedings. This delayed municipal decision-making and required increased security at public meetings.
- University of Iowa, Iowa City – November 2015: Students organized a sit-in and march demanding increased support for racial diversity and inclusion on campus. While peaceful, the protests brought significant media attention and led to policy commitments by the university.
- Ferguson, Missouri – August 2014: Protests erupted following the police shooting of Michael Brown, resulting in extensive property damage, clashes between protesters and police, and a nationwide conversation about police accountability and race relations.
- Madison, Wisconsin – February 2011: Massive protests were held at the Wisconsin State Capitol in opposition to proposed legislation limiting collective bargaining rights for public employees. These protests included occupation of the Capitol and brought significant economic and political impacts.
- Chicago, Illinois – July 1919: The Chicago Race Riots were sparked by racial tensions and resulted in significant loss of life, hundreds of injuries, and the destruction of homes and businesses, deeply impacting the city's communities.
- Minneapolis, Minnesota – November 2015: Protests followed the police shooting of Jamar Clark, leading to a 4th Precinct occupation. The unrest included peaceful demonstrations as well as clashes, prompting policy reviews on police-community relations.
- Detroit, Michigan – July 1967: The Detroit Riot, one of the most destructive urban riots in U.S. history, was triggered by a police raid on an unlicensed bar. The event led to extensive property damage, injuries, fatalities, and federal intervention, shaping future urban policies.
- Iowa City, Iowa – May 1970: Students at the University of Iowa joined nationwide protests following the Kent State shootings, with some demonstrations turning into confrontations with police. The unrest disrupted university operations and led to temporary closures of facilities.

- Toledo, Ohio – October 2005: Riots broke out after a planned neo-Nazi march through a predominantly African American neighborhood, leading to significant property damage and strained community relations.

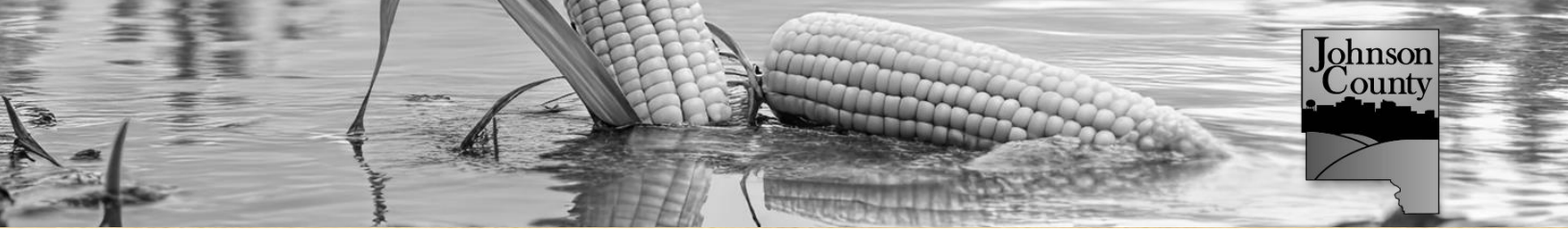
Examining past occurrences of social unrest, whether they occurred within the planning area or in other regions, provides valuable insights for preparedness and response planning. These incidents help identify patterns in the triggers, scale, and impacts of social unrest, offering lessons in resource allocation, interagency coordination, and community engagement. While some events may not be localized to Johnson County, reviewing these occurrences allows the planning area to anticipate potential vulnerabilities, refine response strategies, and implement preventative measures. Understanding the outcomes of similar events in comparable settings ensures that the planning area is better equipped to address future incidents, minimize disruption, and maintain public safety.

3.4.15.5 Likelihood of Future Occurrence

Assessing the likelihood of future social unrest in Johnson County, Iowa, involves analyzing local, regional, and state factors. Historically, the county has experienced episodes of social unrest, particularly in Iowa City, where the University of Iowa's presence contributes to a politically active and diverse population. Events such as protests related to racial justice, public health mandates, and other social issues have occurred in recent years, indicating a pattern of civic engagement that can lead to demonstrations. Regionally, the Midwest has witnessed significant social movements, with neighboring states experiencing notable unrest that can influence local dynamics. Statewide, Iowa has seen various forms of social activism, reflecting broader national trends. Given these factors, it is reasonable to anticipate that Johnson County may continue to experience social unrest, particularly in response to national events or local issues that resonate with the community. Therefore, maintaining preparedness and fostering open communication between authorities and residents remain essential to effectively manage and mitigate potential future incidents.

3.4.15.6 Climate Change Considerations

Climate change considerations for social unrest are minimal, as this hazard is primarily influenced by social, political, and economic factors rather than environmental conditions. Unlike natural hazards, which are directly impacted by changing climate patterns, social unrest stems from human grievances and systemic issues. However, indirect connections may exist; for example, climate change could exacerbate resource scarcity, economic inequality, or displacement due to extreme weather events,



potentially leading to increased societal tensions. While these factors are secondary, they highlight the importance of addressing broader systemic vulnerabilities that could indirectly contribute to social unrest. In Johnson County, the focus should remain on understanding and addressing local and regional socio-political dynamics, as these are the primary drivers of this hazard.

3.4.15.7 Vulnerability

People

If social unrest were to occur in Johnson County, the impact on people could vary depending on the scale and nature of the event, with vulnerable and underserved populations facing heightened risks. Individuals participating in or caught near demonstrations may face potential injury, exposure to tear gas or other crowd control measures, or legal consequences if arrested. Bystanders and residents in affected areas could experience disruptions to daily routines, particularly if unrest leads to road closures, public transportation interruptions, or restricted access to essential services and businesses. Individuals without reliable transportation (6.1%) may have difficulty avoiding impacted areas or accessing alternative routes to work, school, or medical care.

Social unrest can also generate fear and anxiety within the community, particularly if the event escalates into violence or property damage. Older adults (9.6%), individuals with disabilities (7.1%), and low-income residents (16.9%) may face greater difficulties if unrest disrupts access to healthcare, grocery stores, or social services. Non-English-speaking populations (4.4%) may struggle to receive real-time updates or understand safety advisories, further increasing their vulnerability. Prolonged or highly visible incidents of unrest may erode public confidence in local authorities, exacerbating social divisions and psychological stress, particularly for those with prior experiences of marginalization or discrimination.

Educational institutions, such as the University of Iowa, could be affected by disruptions to classes or campus activities, impacting both students and faculty. Renters and lower-income residents living near areas of unrest may experience heightened insecurity due to potential property damage, noise, or large gatherings in their neighborhoods. The cumulative effect of social unrest would disproportionately affect those with fewer resources or limited mobility, increasing stress, economic strain, and disruptions to essential services for vulnerable and underserved communities.

Economy

If social unrest were to occur in Johnson County, the local economy could experience several negative impacts depending on the scale, duration, and severity of the event. Businesses in affected areas, particularly in urban centers like Iowa City, may face temporary closures due to safety concerns, protests blocking access, or property damage. This could result in lost revenue, particularly for small businesses and local retailers, which often lack the financial resilience to withstand extended disruptions.

Property damage, such as vandalism or looting, could impose significant repair and replacement costs on businesses and property owners. In addition, the cost of increased security measures, whether through private security or additional law enforcement resources, would add to the economic burden. Public agencies may also incur substantial expenses for emergency response efforts, cleanup, and repairs to damaged infrastructure, diverting resources from other community needs.

Long-term economic impacts could include a decline in consumer confidence or reduced investment in the area if the unrest generates a perception of instability or insecurity. Events that draw significant negative media attention could harm the local tourism industry, particularly in Iowa City, which attracts visitors to its cultural and academic institutions. If social unrest disrupts university operations, it could impact revenue from tuition, events, and affiliated businesses.

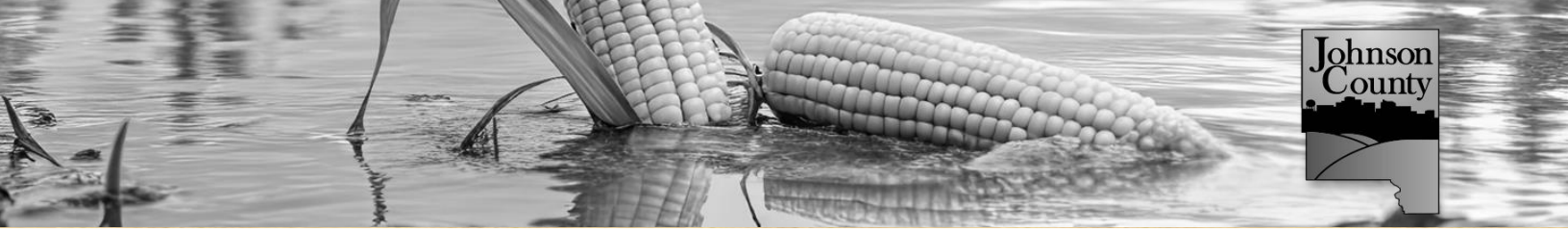
Overall, while the immediate economic impacts of social unrest can be acute, the long-term effects largely depend on the speed and effectiveness of the community's recovery efforts and the measures taken to address the underlying issues that led to the unrest.

Built Environment

General Property

Social unrest occurring in Johnson County could have varying impacts on property values, influenced by the location, severity, and duration of the events. In areas directly affected by unrest, such as Iowa City's downtown district or near the University of Iowa campus, property values could experience a temporary decline. Damage to commercial or residential properties, including vandalism, arson, or looting, may deter potential buyers or tenants, leading to reduced demand and slower market activity.

Neighborhoods perceived as being at higher risk for future incidents of unrest may see a decrease in attractiveness to prospective residents or businesses, further affecting



property values. This is particularly true if unrest garners significant media attention, creating a perception of instability or lack of safety. Commercial properties in these areas may face prolonged vacancies or reduced rental rates as businesses seek less vulnerable locations.

Conversely, the impact on property values may be minimal or short-lived if the unrest is isolated, well-managed, and followed by effective recovery efforts. Restoring public confidence through timely repairs, enhanced security measures, and addressing the root causes of the unrest can mitigate long-term effects on property values.

Critical Infrastructure

Social unrest in Johnson County could significantly impact critical infrastructure depending on the severity and scope of the event. Infrastructure systems such as transportation, utilities, and emergency services could face temporary disruptions, especially in urban areas like Iowa City where unrest is more likely to concentrate. Roads and public transit systems might be blocked or halted by large gatherings, impeding the movement of people and goods. This could create cascading effects on economic activities and access to essential services.

Utility infrastructure, including electricity, water, and communication networks, may also be affected if unrest targets these systems or if service interruptions occur due to damages or precautionary shutdowns. For example, protests near substations or water treatment facilities could result in restricted access, delays in maintenance, or, in extreme cases, intentional damage that disrupts services for residents.

Emergency response operations could be strained as law enforcement, fire, and medical services are diverted to manage the unrest. This may reduce their capacity to respond to concurrent emergencies, increasing risks for the broader community. Critical facilities such as hospitals, schools, and government offices could face operational interruptions if unrest occurs near these locations, potentially delaying vital services.

In cases where key infrastructure is damaged, the costs of repair and restoration could be substantial, delaying normal operations and imposing financial burdens on local agencies and utility providers.

Historical, Cultural, and Natural Environment

Social unrest in Johnson County could pose risks to its historical, cultural, and natural environment, particularly in areas like Iowa City, which features significant cultural

landmarks, historical sites, and public spaces. Monuments and historical buildings such as the Old Capitol Museum and Black Angel statue at Oakland Cemetery could be at risk of damage if they become focal points of unrest or are inadvertently affected by vandalism, graffiti, or fires. Damage to these landmarks could result in the loss of irreplaceable cultural artifacts and heritage, impacting the community's historical identity and tourism appeal.

Cultural venues such as the Englert Theatre, Public Space One (PS1) Art Gallery, and the Iowa City Public Library might also face damage or operational interruptions if located near areas of unrest. Disruptions to cultural events, including performances and exhibits, could diminish community engagement and economic support for the arts. Businesses in historically significant areas, such as the Iowa City Pedestrian Mall (Ped Mall), may also experience closures or property damage, affecting the local economy and reducing public use of these culturally significant spaces.

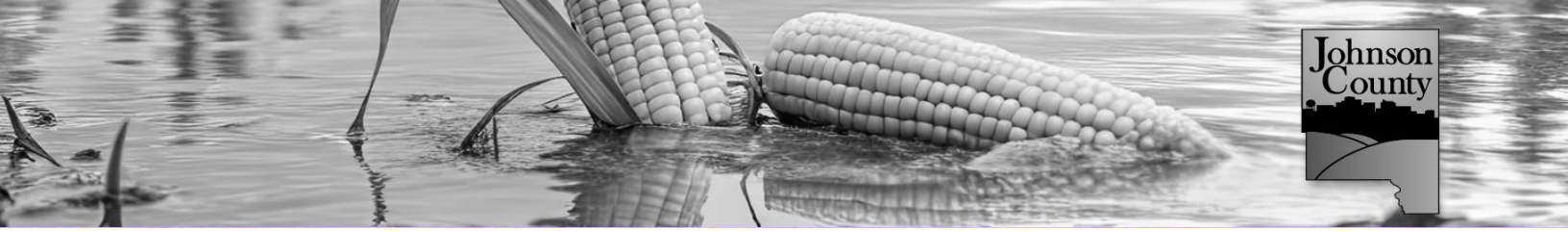
In terms of the natural environment, large gatherings or protests in parks and public spaces, such as College Green Park or Hickory Hill Park, may lead to unintended environmental degradation, including soil compaction, littering, and damage to plant life. If unrest escalates into fires or other destructive actions, it could result in pollution and long-term harm to green spaces and local ecosystems.

Future Land Use and Development

Social unrest in Johnson County could influence future land use and development decisions, particularly in areas directly affected by disturbances. If incidents of unrest are concentrated in urban centers like Iowa City, developers and planners may prioritize enhanced security measures in new projects, such as incorporating design elements to protect against vandalism or improve crowd management. This could increase construction costs and influence the types of projects pursued, potentially discouraging investment in certain areas perceived as high-risk.

Prolonged or repeated unrest may lead to a reevaluation of land use priorities, with some stakeholders advocating for more community-focused spaces that address social grievances, such as affordable housing or public gathering areas. Conversely, areas experiencing significant damage or economic decline due to unrest may face delays in redevelopment or shifts in land use to less vulnerable purposes, such as converting commercial properties to residential use or reducing high-traffic zones.

Zoning regulations and public policies may also evolve to address the risks of unrest. For instance, restrictions could be placed on the development of large venues or facilities in



areas with a history of unrest, or incentives might be offered to encourage investment in rebuilding and revitalizing impacted zones.

3.4.15.8 Consequence Summary

If social unrest were to occur locally in Johnson County, the consequences could be significant, impacting various aspects of the community. Urban centers like Iowa City, with its dense population and the University of Iowa, would likely be the focal points, potentially disrupting daily life, straining law enforcement, and causing damage to property and infrastructure. Local businesses could suffer from closures, vandalism, or reduced consumer confidence, while public services and transportation systems might face operational interruptions. Historical and cultural landmarks could be at risk of damage, diminishing the county's heritage and tourism appeal. Additionally, the unrest could erode public trust in government institutions, create social divisions, and influence future land use and development decisions. These wide-ranging impacts underscore the importance of proactive planning, community engagement, and effective response strategies to mitigate consequences and support recovery.

Category	Narrative
Impact on the Public	• Disruption to daily routines due to protests, blocked roads, or service interruptions. • Increased risk of injury or exposure to crowd control measures. • Psychological effects, such as fear or anxiety, particularly in vulnerable populations.
Impact on the Economic Condition of the Planning Area	• Business closures and loss of revenue, especially for small and local businesses. • Costs associated with repairing damaged properties and infrastructure. • Reduced investment or tourism due to perceived instability.
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical landmarks, cultural sites, or public art installations. • Degradation of parks or natural areas due to large gatherings or vandalism. • Loss of community engagement in cultural activities during unrest.
Impact on Built Environment, General Property, and Critical Infrastructure	• Temporary decline in property values in areas affected by unrest. • Damage to critical infrastructure such as roads, utilities, and public buildings.

Category	Narrative
	• Increased costs for security upgrades or repairs.
Impact on the Public Confidence in Government	• Erosion of trust in law enforcement or government agencies if responses are perceived as inadequate or excessive. • Increased tension between community groups and authorities.
Impact on Responders	• Physical and emotional strain on law enforcement, fire, and medical personnel. • Potential resource depletion due to prolonged or widespread unrest.
Impact on continuity of operations, including continued delivery of government services	• Disruption to government functions, including public meetings and service delivery. • Strain on emergency operations centers and coordination efforts.
Cascading hazards	• Prolonged economic downturn or business closures. • Social divisions and increased community tensions. • Potential escalation into larger or more frequent incidents of unrest.

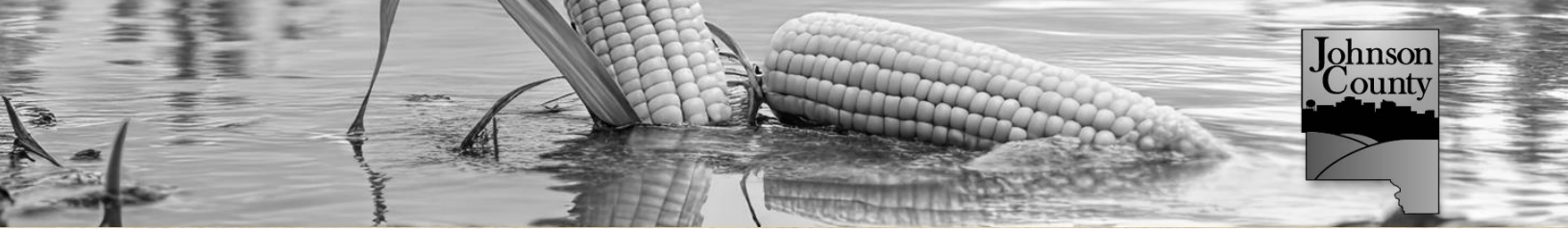
3.4.16 Space Weather

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
1.50	1.42	1.33	1.25	6.00

3.4.16.1 Description

Space weather refers to environmental conditions in space, primarily involving solar activity, that can affect Earth's atmosphere, technology, and systems. The sun emits energy in the form of solar flares, solar wind, and coronal mass ejections (CMEs), which release charged particles and radiation into space. When these particles interact with Earth's magnetic field and atmosphere, they can disrupt satellite communications, GPS systems, power grids, and even air travel.

As a society increasingly dependent on technology, the impacts of space weather are particularly significant. Disruptions to communications, navigation systems, and power infrastructure can have wide-reaching consequences for emergency services, global industries, and daily life. While Johnson County, Iowa, is not directly exposed to solar radiation or magnetic storms, it relies heavily on systems vulnerable to space weather,



such as satellite-based communications and the regional power grid. Understanding and preparing for the potential impacts of space weather is essential to ensure the resilience of critical services, mitigate economic disruptions, and maintain public safety during periods of heightened solar activity.

3.4.16.2 Location

In Johnson County, Iowa, no specific geographic areas are directly more susceptible to space weather, as its impacts are not localized to physical spaces. However, the county's dependence on technology and critical infrastructure makes certain systems and sectors more vulnerable to disruption. For example, areas with critical facilities like hospitals, government buildings, and emergency operations centers are indirectly at risk because they rely heavily on uninterrupted power supply, communications systems, and navigation tools that can be affected by solar storms.

Rural areas of the county, which might rely more on satellite-based communication or GPS systems for agriculture, transportation, and emergency services, could experience unique challenges if these systems are disrupted. Urban centers like Iowa City, with dense populations and higher concentrations of critical infrastructure, may feel the cascading effects of disruptions to power grids or internet connectivity, which are essential for commerce, education, and public safety.

Additionally, Johnson County's connection to regional and national systems makes it inherently vulnerable to larger-scale impacts on interconnected infrastructure. For instance, the regional power grid, if affected by geomagnetic storms, could lead to widespread outages that would impact the entire county, irrespective of its urban or rural character. While the county itself does not face direct exposure to the physical effects of space weather, its reliance on vulnerable systems places it at risk of experiencing significant secondary impacts.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

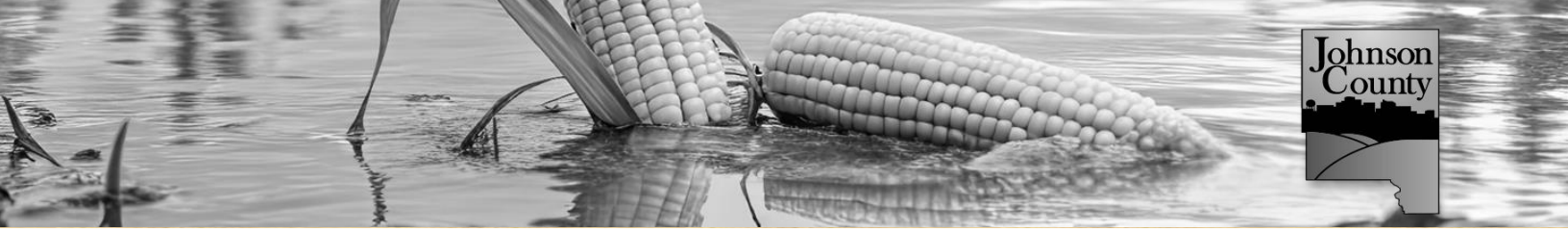
3.4.16.3 Magnitude/Severity

The magnitude and severity of space weather events are typically measured by the intensity of solar activity and its impact on Earth's systems. These events are categorized based on the type of space weather—such as solar flares, geomagnetic storms, and solar radiation storms—and their potential to disrupt technology and infrastructure. Solar flares are measured using the X-ray flux, with classifications ranging from minor (C-class) to major (X-class), where X-class flares are the most intense. Geomagnetic storms, caused by disturbances in Earth's magnetic field, are measured using the Kp index, a scale from 0 to 9 that indicates the severity of the disturbance, with higher numbers signifying stronger geomagnetic storms. The severity of geomagnetic storms is also assessed using the G-scale, which ranges from G1 (minor) to G5 (extreme), based on the storm's ability to disrupt power grids, satellite operations, and radio communications.

- Kp 0-2: Quiet geomagnetic conditions.
- Kp 3: Unsettled geomagnetic conditions.
- Kp 4: Active geomagnetic conditions.
- Kp 5 (G1): Minor geomagnetic storm. Potential for minor power grid fluctuations and auroras visible at higher latitudes.
- Kp 6 (G2): Moderate geomagnetic storm. Some power grid issues, spacecraft operations may need correction, and auroras visible at lower latitudes.
- Kp 7 (G3): Strong geomagnetic storm. Power grid disruptions, voltage issues, and more significant impacts on satellites and radio communications.
- Kp 8 (G4): Severe geomagnetic storm. Widespread voltage control issues in power grids, satellite navigation issues, and auroras visible far from polar regions.
- Kp 9 (G5): Extreme geomagnetic storm. Possible widespread power system failures, severe GPS errors, and auroras visible at much lower latitudes.

Solar radiation storms are measured by the intensity of high-energy particles in space, typically using the S-scale, which ranges from S1 (minor) to S5 (extreme), indicating the potential risks to astronauts, satellites, and aviation. The combination of these scales allows scientists to assess the potential impacts of space weather events on technology, communications, and infrastructure on Earth, and helps organizations prepare and respond to any disruptions caused by heightened solar activity.

- S1 (Minor): Minor impact. Small, temporary effects on satellite operations; minor impact on polar high-frequency radio communication.



- S2 (Moderate): Moderate impact. Passengers and crew at high altitudes and polar routes may experience increased radiation exposure; satellite operations may experience problems.
- S3 (Strong): Strong impact. Potential disruptions in satellite operations and navigation; increased radiation exposure for passengers and crew on polar flights.
- S4 (Severe): Severe impact. High risk for satellite malfunctions, blackout of high-frequency radio communications in polar regions, and high radiation doses for astronauts or passengers on polar flights.
- S5 (Extreme): Extreme impact. Significant damage to satellites, GPS degradation, possible radio communication blackouts over large areas, and dangerous radiation levels for astronauts.

3.4.16.4 Past Occurrences

While Johnson County, Iowa, has not experienced direct, documented impacts from significant space weather events, the broader Midwest region has encountered incidents that highlight potential vulnerabilities:

- August 4, 1972: A severe geomagnetic storm caused disruptions across the United States, including the Midwest. The storm led to voltage collapses in power systems and communication outages. In the Midwest, utilities reported disturbances in electrical grids, and telecommunication lines experienced surges, affecting services in states like Illinois and Iowa.
- March 13, 1989: A powerful geomagnetic storm resulted in the collapse of the Hydro-Québec power grid in Canada, leaving millions without electricity. In the Midwest, particularly in states like Minnesota and Wisconsin, the storm induced geomagnetic currents that caused anomalies in power systems, leading to equipment malfunctions and increased operational costs for utilities.
- October 29-31, 2003 (Halloween Storms): A series of intense solar storms disrupted satellite communications and GPS systems across the United States. In the Midwest, aviation operations experienced navigation issues, and some communication networks faced intermittent outages, impacting both commercial and emergency services.

Examining past occurrences of space weather events, even if they are not localized to Johnson County, provides valuable insights into the potential risks and vulnerabilities posed by this hazard. Significant incidents, such as geomagnetic storms and their impacts on power grids, communication networks, and satellite systems, highlight how interconnected infrastructure can be disrupted on a regional or national scale. By reviewing these events, the planning area can better understand the cascading effects of

space weather, identify critical systems most at risk, and implement mitigation strategies to reduce the impact of future incidents. These lessons inform preparedness efforts, ensuring that local emergency management and infrastructure operators are equipped to maintain continuity and protect essential services during heightened solar activity.

3.4.16.5 Likelihood of Future Occurrence

Space weather events, such as solar flares and geomagnetic storms, are global phenomena that can impact technological systems worldwide, including those in Johnson County, Iowa. The likelihood of these events affecting the county is tied to the sun's 11-year solar cycle, during which periods of heightened solar activity increase the chances of space weather disturbances. Given that Johnson County relies on technologies susceptible to space weather—such as satellite communications, GPS, and the power grid—it is prudent to anticipate potential disruptions during these active solar periods. While the county has not experienced significant impacts from past events, the interconnected nature of modern infrastructure means that space weather events can have far-reaching effects, making preparedness essential.

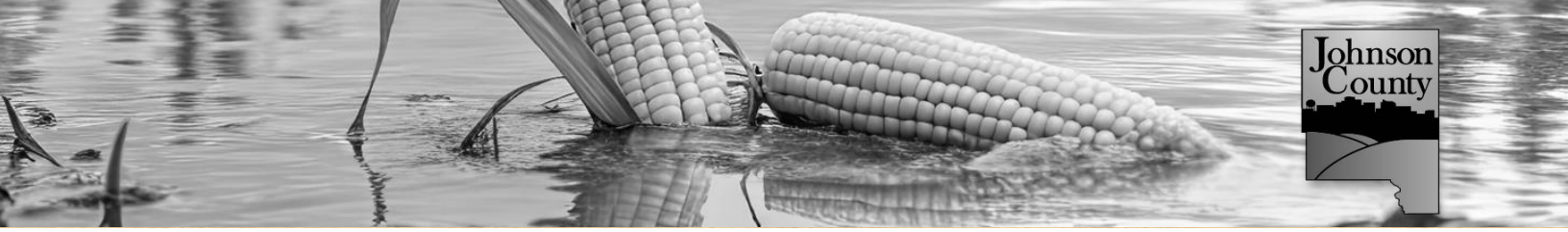
3.4.16.6 Climate Change Considerations

Space weather, as a phenomenon driven by solar activity, is not influenced by Earth's climate or the effects of climate change. The sun’s solar cycles, which govern the frequency and intensity of space weather events such as solar flares and coronal mass ejections (CMEs), are independent of atmospheric or environmental changes on Earth. As a result, there are no direct climate change considerations for this hazard. However, indirect relationships could arise if climate change impacts infrastructure resilience or increases reliance on technologies vulnerable to space weather, such as renewable energy systems and satellite-based communication networks. In Johnson County, the focus should remain on monitoring solar activity and ensuring the robustness of critical systems, as climate change does not alter the fundamental risks posed by space weather.

3.4.16.7 Vulnerability

People

If space weather were to affect Johnson County, the impact on people would primarily result from disruptions to critical technologies rather than direct physical harm. Residents could experience significant challenges, such as interruptions to GPS navigation, communication networks, and internet access, which are essential for work, education, and emergency notifications. Vulnerable and underserved populations, including low-



income households (16.9%) and individuals without reliable internet access, may struggle to access critical information or online services during prolonged outages. Extended disruptions in power supply caused by geomagnetic disturbances could impact heating, cooling, and access to essential services, creating significant risks for older adults (9.6%), individuals with disabilities (7.1%), and those reliant on powered medical devices.

Disruptions to emergency communication systems could hinder public safety efforts and delay response times in medical or law enforcement emergencies. Residents without reliable transportation (6.1%) may have increased difficulty reaching alternative locations for assistance if communication networks fail. In healthcare settings, disruptions to electronic medical records and telehealth services could disproportionately affect individuals with chronic conditions who rely on remote consultations. Additionally, those working in industries dependent on real-time data, such as finance, logistics, or agriculture, could experience economic strain due to technological failures.

Psychological stress could arise from the uncertainty and inconvenience of prolonged outages or disrupted services, particularly for individuals who rely on digital tools for social connection, education, or work. Non-English-speaking populations (4.4%) may encounter additional barriers in accessing timely information about disruptions or alternative resources. The cumulative impact of space weather events would disproportionately affect those with fewer resources to adapt, exacerbating existing disparities in access to essential services and emergency response capabilities.

Economy

If space weather were to impact Johnson County, the local economy could face significant disruptions due to the cascading effects of technological and infrastructure failures. Power outages caused by geomagnetic storms could disrupt businesses, halting operations for industries, retail establishments, and services dependent on electricity. This could lead to lost revenue, especially for small businesses and manufacturers that rely on continuous power for operations.

Agricultural activities in the county, which often utilize GPS-based technology for precision farming, could suffer from navigation and communication disruptions, delaying planting, harvesting, or resource management. These delays could reduce productivity and increase operational costs. Furthermore, any interruptions in internet services or financial systems could hinder transactions, payroll processing, and access to banking services, affecting both businesses and residents.

The tourism and education sectors, key contributors to the local economy due to the presence of the University of Iowa and cultural attractions, might also face challenges if communication systems or power supply are compromised, leading to canceled events or reduced attendance. Emergency repairs to critical infrastructure and systems would impose additional costs on the county, diverting resources from other priorities.

Built Environment

General Property

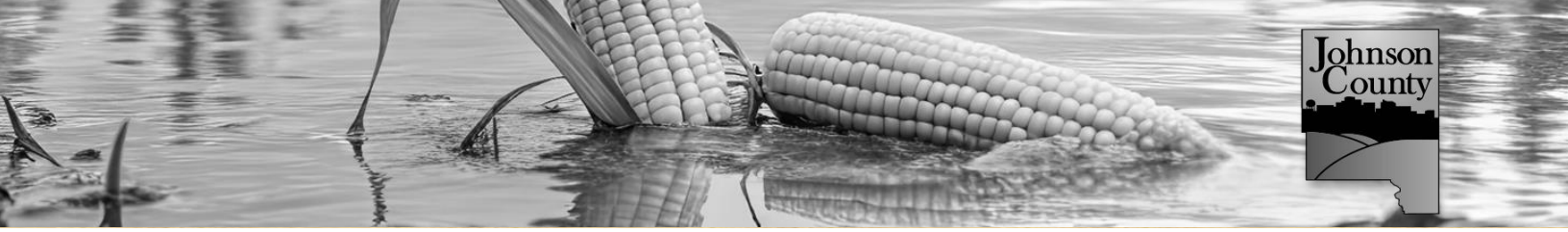
Space weather is unlikely to have a direct, immediate impact on property values in Johnson County. However, prolonged or repeated disruptions to critical infrastructure, such as power grids and communication systems, could create a perception of vulnerability, potentially influencing long-term property values in affected areas. If residents and businesses begin to view the area as prone to technology-related disruptions due to regional or national infrastructure failures, demand for property in the county could decrease.

Additionally, properties heavily reliant on uninterrupted technological systems, such as smart homes or technology-driven businesses, may experience a temporary decline in appeal during or shortly after a significant space weather event. This is especially true if the disruptions highlight vulnerabilities in local infrastructure or preparedness. However, effective response and recovery efforts, coupled with proactive resilience measures, can mitigate these perceptions and preserve property values. Overall, the impact on property values would likely be minimal and tied more to public perception of infrastructure reliability than direct physical effects.

Critical Infrastructure

Space weather could have significant impacts on critical infrastructure in Johnson County due to its reliance on interconnected systems susceptible to geomagnetic disturbances and solar activity. The power grid is one of the most vulnerable components; geomagnetic storms can induce geomagnetically induced currents (GICs) in transmission lines, potentially causing transformers to overheat or fail. Such failures could lead to widespread power outages, disrupting services and operations dependent on electricity.

Communication networks, including cellular, internet, and emergency radio systems, could also experience outages or degraded functionality if satellites and ground-based systems are affected by solar flares or coronal mass ejections. This would hinder both



routine and emergency communications, delaying response efforts and reducing public access to critical information.

Transportation systems, particularly those reliant on GPS for navigation, could be disrupted, affecting logistics, public transit, and aviation. In agriculture, GPS outages could impact precision farming operations, delaying planting or harvesting. Additionally, disruptions to satellite-based systems could affect weather forecasting and emergency management coordination, reducing the county's ability to respond effectively to concurrent or subsequent hazards.

Hospitals, emergency operations centers, and other critical facilities reliant on uninterrupted power and communications may experience operational challenges. Backup systems and resilience planning are essential to mitigate these potential impacts and ensure continuity of services.

Historical, Cultural, and Natural Environment

The impact of space weather on Johnson County's historical, cultural, and natural environment would likely be indirect and limited, as this hazard primarily affects technology and infrastructure rather than physical landscapes or structures. However, indirect consequences could arise from disruptions to systems that support the preservation and management of these resources.

Historical and cultural institutions, such as the University of Iowa Special Collections & Archives, Old Capitol Museum, and Iowa City Public Library, could face challenges if power outages or communication failures disrupt climate control systems or electronic databases critical for preserving artifacts and historical documents. Extended outages might put sensitive materials at risk of damage due to temperature and humidity fluctuations, which could lead to deterioration of fragile paper, textiles, and photographs. Additionally, digital records housed in online repositories or electronic catalogs could be temporarily inaccessible, hindering research and public access to historical resources.

The natural environment would likely remain physically unaffected, as space weather does not directly alter ecosystems or landscapes. However, disruptions to satellite-based monitoring systems, such as those used for tracking weather patterns, soil conditions, and water levels, could temporarily delay conservation efforts. This could impact the ability of land managers to oversee protected areas like Hawkeye Wildlife Management Area or Macbride Nature Recreation Area, as well as agricultural monitoring for farmland across the county. Additionally, space weather events that disrupt GPS and

communication networks could create temporary challenges for environmental research and navigation in rural and natural areas.

Future Land Use and Development

The impact of space weather on future land use and development in Johnson County would likely be minimal and indirect, as this hazard primarily affects technological systems rather than physical land or structures. However, if significant disruptions to power grids, communications, or other critical infrastructure were to occur, these events could influence planning and development priorities in the county.

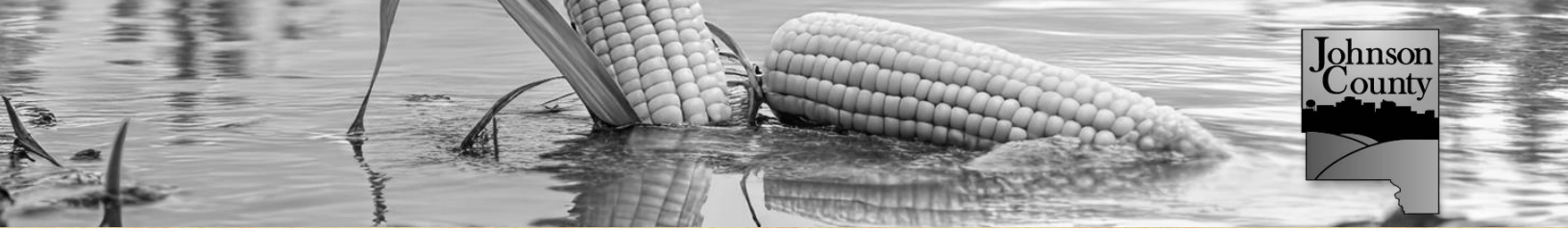
For instance, future development projects might incorporate enhanced resilience measures, such as backup power systems, more robust electrical infrastructure, or redundancies in communication networks, to mitigate the effects of potential space weather disruptions. Urban planning efforts could prioritize ensuring the reliability of critical facilities like hospitals, emergency services, and data centers by locating them near resilient infrastructure or integrating advanced protective technologies.

If space weather events reveal vulnerabilities in specific areas, such as those with high dependency on technology or weak infrastructure, these insights could guide zoning decisions or infrastructure investments to enhance resilience. However, absent repeated or severe impacts, it is unlikely that space weather alone would drive significant changes to land use or development strategies.

3.4.16.8 Consequence Summary

If a space weather event were to impact Johnson County, the consequences would primarily involve disruptions to critical technologies and infrastructure, including power grids, communication networks, and GPS systems. These disruptions could hinder daily life, interrupt business operations, delay emergency responses, and affect key sectors such as agriculture, healthcare, and transportation. While the physical environment and structures would remain largely unaffected, the cascading effects of technological failures could strain public services, reduce access to essential information, and heighten stress within the community. Prolonged outages could exacerbate these challenges, highlighting the need for resilience planning and robust infrastructure to mitigate the impact of such an event.

Category	Narrative
Impact on the Public	• Disruptions to daily life due to power and communication outages.



Category	Narrative
	• Delayed emergency response services affecting safety and health. • Increased stress and anxiety from prolonged technology failures.
Impact on the Economic Condition of the Planning Area	• Loss of revenue for businesses due to operational disruptions. • Increased costs for repairing and upgrading critical systems. • Delays in agricultural operations reliant on GPS technology.
Impact on the Historical, Cultural, and Natural Environment	• Risk to climate-controlled environments for artifacts and archives due to power outages. • Delayed conservation efforts if environmental monitoring tools are disrupted. • Limited public access to cultural and natural resources during outages.
Impact on Built Environment, General Property, and Critical Infrastructure	• Temporary reduction in property appeal if vulnerabilities are exposed. • Damage or failures in critical infrastructure like power grids and communication systems. • Increased costs for infrastructure resilience and upgrades.
Impact on the Public Confidence in Government	• Erosion of trust if disruptions are prolonged or poorly managed. • Perception of inadequate preparedness for technological hazards.
Impact on Responders	• Strain on emergency responders due to disrupted communication and coordination. • Delays in resource deployment and operational challenges.
Impact on continuity of operations, including continued delivery of government services	• Interruption of public services dependent on technology and power. • Reduced ability to coordinate and deliver critical resources.
Cascading hazards	• Prolonged economic disruptions affecting local businesses and agriculture. • Secondary risks such as public unrest or logistical bottlenecks. • Challenges in responding to concurrent emergencies due to system failures.

3.4.17 Supply Chain Disruption

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.58	2.25	1.83	2.17	16.13

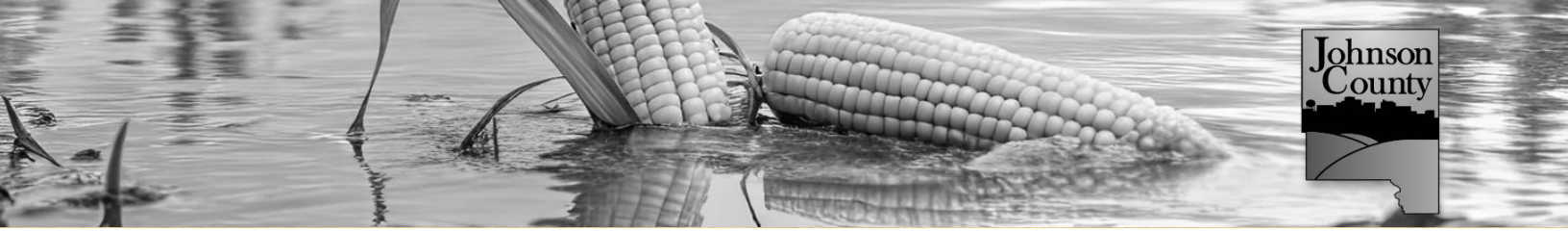
3.4.17.1 Description

Modern supply chains are intricate networks that enable the production, transportation, and delivery of goods and services essential to daily life. The prevalence of the "Just in Time" economy has increased the efficiency of these systems while simultaneously expanding their fragility and susceptibility to disruptions. Supply chain stakeholders regularly manage interruptions stemming from various sources, such as transportation delays due to weather impacts, staffing shortages in production and logistics, and fluctuations in supply and demand driven by seasonal needs or unforeseen events. Because supply chains are often national or international in scope, disasters or disruptions in other regions or countries can have cascading effects on the planning area, including Johnson County.

Supply chain disruptions pose significant risks to all critical infrastructure sectors, as these systems rely on the timely delivery of materials, energy, and information. For example, winter storms in Johnson County can increase local demand for heating fuels while impeding transportation networks, leading to shortages and delayed distribution. The 2020 study by the National Academies of Sciences, Engineering, and Medicine emphasized that resilient supply chains are essential to maintaining the consistent delivery of goods and services. Strengthening local and regional preparedness efforts, particularly in vulnerable sectors like healthcare, energy, and food distribution, is critical to mitigating the risks and consequences of supply chain disruptions.

3.4.17.2 Location

In Johnson County, Iowa, certain areas and sectors are more susceptible to supply chain disruptions due to their reliance on timely delivery of goods and services. Urban centers like Iowa City, with dense populations and a concentration of businesses, healthcare facilities, and educational institutions, are particularly vulnerable. These areas depend heavily on consistent supplies of food, medical equipment, and consumer goods. Disruptions in transportation networks or delays in shipments can quickly impact these communities, leading to shortages and operational challenges.



Rural regions within the county, while less densely populated, also face unique vulnerabilities. Agricultural operations depend on the timely arrival of seeds, fertilizers, and equipment parts. Delays in these supplies can affect planting and harvesting schedules, potentially leading to reduced yields and financial losses for farmers. Additionally, rural areas may have fewer alternative suppliers or logistical options, making them more susceptible to prolonged disruptions.

Critical infrastructure sectors, such as healthcare and energy, are also at risk. Hospitals and clinics require a steady supply of medical supplies and pharmaceuticals. Any interruption can compromise patient care and strain healthcare resources. Similarly, the energy sector relies on the continuous availability of fuel and maintenance parts to ensure uninterrupted power and heating services. Disruptions in these supply chains can lead to outages or reduced service reliability, affecting both residential and commercial customers.

Overall, while all areas of Johnson County could be impacted by supply chain disruptions, urban centers, rural agricultural zones, and critical infrastructure sectors are particularly susceptible due to their specific dependencies and the potential consequences of interrupted supply lines.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.17.3 Magnitude/Severity

The magnitude and severity of supply chain disruptions are measured by assessing several key factors, including the duration, geographic scope, and the criticality of the disrupted goods or services. The duration of a disruption significantly influences its severity; short-term delays might have minimal impacts, while prolonged disruptions can lead to cascading effects across multiple sectors. The geographic scope considers whether the disruption is localized, regional, or global, with broader disruptions typically having greater impacts due to the interconnected nature of modern supply chains.

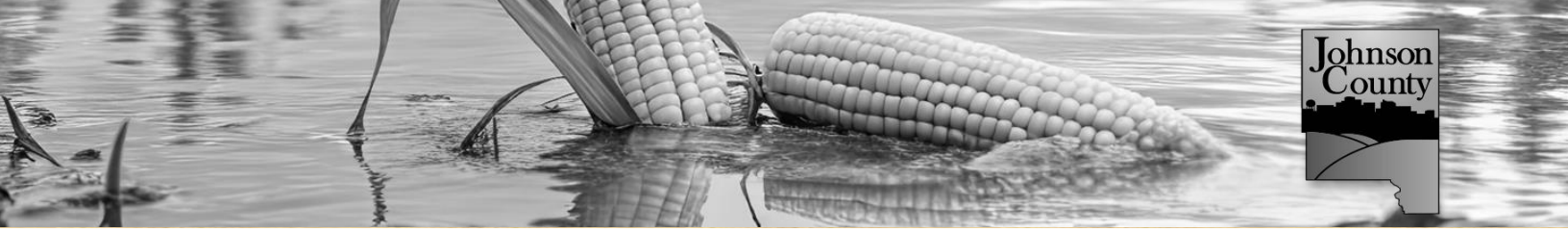
The criticality of affected goods or services plays a crucial role in determining severity. For instance, disruptions to essential supplies like food, fuel, or medical equipment have far more severe consequences than delays in non-essential consumer goods. Metrics such as inventory levels, delivery lead times, and the ability to source alternative suppliers are also critical in assessing the severity. For example, industries or sectors operating on "Just in Time" inventory systems, which maintain minimal stock to reduce costs, are more vulnerable to even minor delays.

Additional factors include economic impact, such as lost revenue or increased costs due to delays, and the number of people or sectors affected by the disruption. These considerations provide a comprehensive framework to evaluate the magnitude and severity of supply chain disruptions, enabling better preparedness and response strategies.

3.4.17.4 Past Occurrences

Here are examples of significant incidents of supply chain disruption in Johnson County, the Midwest, including impacts specific to Iowa:

- August 2020 - Midwest Derecho: The powerful derecho storm caused widespread damage across Iowa and surrounding states, disrupting supply chains due to blocked transportation routes, destroyed grain silos, and power outages. In Johnson County, delays in food and fuel distribution were reported, along with logistical challenges for emergency services.
- March 2020 - COVID-19 Pandemic: The early stages of the pandemic caused significant supply chain disruptions across the Midwest, including shortages of medical supplies, personal protective equipment (PPE), and grocery staples. In Johnson County, hospitals and clinics faced delays in acquiring PPE, while local businesses struggled with disruptions in the supply of goods.
- Winter 2019 - Polar Vortex: Extreme cold weather disrupted transportation networks across the Midwest, including Iowa, causing delays in fuel delivery and shortages of heating supplies. Johnson County residents faced increased prices for fuel and reduced availability of propane and natural gas during critical winter months.
- April 2018 - Mississippi River Flooding: Heavy flooding in the Midwest, particularly along transportation routes like the Mississippi River, disrupted agricultural supply chains. In Iowa, including Johnson County, farmers faced delays in shipping crops and receiving inputs like seed and fertilizer.



- Summer 2017 - Trucking Shortages: A regional shortage of truck drivers in the Midwest caused delays in the transportation of goods, affecting retail and agricultural sectors. In Johnson County, businesses experienced delays in shipments of construction materials and consumer goods.

Reviewing past occurrences of supply chain disruptions, whether localized or in broader regions, provides valuable insights into vulnerabilities and potential impacts. Incidents such as extreme weather events, labor shortages, or infrastructure failures reveal how quickly supply chains can be interrupted and the cascading effects these disruptions can have on critical sectors like healthcare, energy, and agriculture. By analyzing these events, the planning area can identify at-risk systems, develop contingency plans, and implement strategies to minimize future impacts. Learning from both local and regional disruptions ensures the planning area is better equipped to respond to similar challenges, enhancing community resilience and ensuring continuity of essential goods and services.

3.4.17.5 Likelihood of Future Occurrence

Supply chain disruptions are a persistent concern for Johnson County, Iowa, due to several factors. The county's economy is closely tied to agriculture, manufacturing, and healthcare sectors, all of which are vulnerable to supply chain issues. Historical events, such as the August 2020 derecho that caused extensive damage to agricultural infrastructure, highlight the region's susceptibility to natural disasters that can disrupt supply chains.

Additionally, the COVID-19 pandemic exposed vulnerabilities in the national food supply chain, leading to increased demand for locally produced food in Johnson County. In response, the county allocated $200,000 from the American Rescue Plan Act (ARPA) funds to support local food initiatives over three fiscal years, aiming to build a more resilient community-based food system.

Given these factors, the likelihood of future supply chain disruptions in Johnson County remains significant. Proactive measures, including strategic investments and risk management practices, are essential to strengthen the resilience of the local supply chain.

3.4.17.6 Climate Change Considerations

While supply chain disruption is not directly caused by climate change, there are indirect considerations, as climate change can exacerbate factors that lead to such disruptions.

For example, more frequent and severe weather events like floods, storms, and droughts—often linked to climate change—can disrupt transportation networks, damage infrastructure, and delay the movement of goods. These events can affect both local supply chains within Johnson County and the broader regional and global systems upon which the county relies. Additionally, climate-related shifts in agricultural patterns, water availability, and energy resources may increase strain on supply chains over time. Although the hazard itself is not a natural phenomenon, understanding the interplay between climate change and its secondary impacts is important for long-term resilience planning in Johnson County.

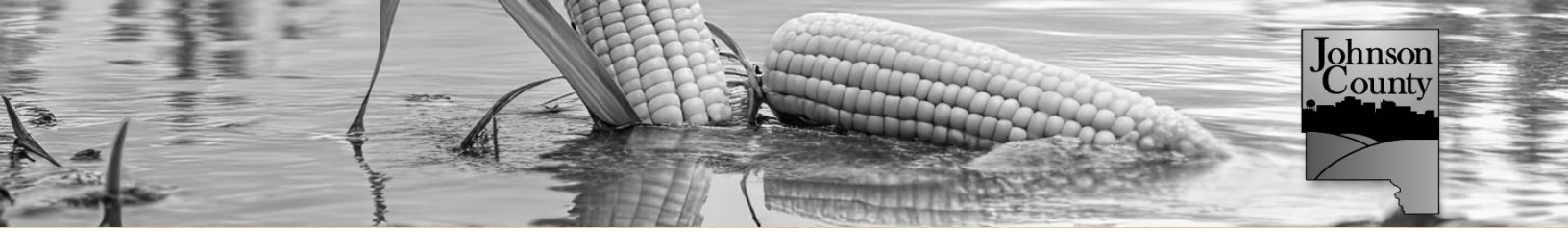
3.4.17.7 Vulnerability

People

If supply chain disruptions were to occur in Johnson County, the impacts on people could be significant, particularly in their daily lives and access to essential goods and services. Residents might experience shortages of food, medical supplies, and other necessities, leading to increased stress and anxiety, especially for vulnerable and underserved populations such as older adults (9.6%), low-income families (16.9%), and individuals with chronic health conditions. Those reliant on prescription medications or medical equipment may face serious health consequences if supply chains delay critical healthcare deliveries. Individuals without reliable transportation (6.1%) may encounter greater challenges in securing alternative sources for necessary goods, particularly in rural areas with fewer retail options.

Prolonged disruptions could also lead to price increases for essential goods, disproportionately straining household budgets for lower-income residents. Families already experiencing financial hardship may struggle to afford rising costs for food, heating, and fuel, exacerbating economic disparities. Renters and individuals in subsidized housing may have limited flexibility to adjust to changing costs, heightening financial insecurity. Transportation disruptions could further impact those who rely on public transit or community services, making it more difficult for underserved populations to access employment, medical care, or essential shopping.

Local businesses may experience operational challenges, resulting in reduced employment opportunities or delayed services that directly affect residents. Workers in service industries, healthcare, and transportation—many of whom are from underserved communities—could face job instability or reduced hours due to supply shortages. Non-English-speaking populations (4.4%) may encounter barriers in obtaining timely information about shortages, alternative resources, or emergency assistance. The



cumulative effect of supply chain disruptions would disproportionately impact those with fewer financial and social resources, increasing economic hardship and reducing access to essential services across Johnson County.

Economy

If supply chain disruptions were to occur in Johnson County, the local economy could face significant challenges. Businesses reliant on timely deliveries, such as retail stores, restaurants, and manufacturers, might experience operational delays, reduced inventory, or increased costs due to alternative sourcing. These impacts could lead to revenue losses, particularly for small businesses that lack the resources to absorb disruptions.

The agricultural sector, a key component of Johnson County's economy, could face delays in receiving essential inputs like seed, fertilizer, and equipment parts, potentially reducing yields and profitability. Similarly, disruptions in the distribution of agricultural products could affect both local markets and external trade, further straining the sector.

Higher costs for goods and services due to scarcity or increased transportation expenses could impact consumer spending, slowing economic activity. Prolonged disruptions could lead to job losses or reduced work hours in affected industries, amplifying economic stress for residents. Additionally, infrastructure repair and mitigation measures required to address the disruption could impose financial burdens on local governments and businesses, diverting resources from other priorities.

Built Environment

General Property

The impact of supply chain disruptions on property values in Johnson County would likely be indirect and dependent on the severity and duration of the event. Prolonged or recurring disruptions could decrease the desirability of certain areas, particularly those reliant on industries most affected by the disruptions, such as manufacturing, agriculture, or retail. For example, if supply chain issues lead to sustained economic downturns or reduced business activity, demand for commercial properties might decline, potentially lowering their market value.

Residential property values could also be impacted if disruptions significantly affect quality of life, such as through prolonged shortages of essential goods, increased costs of living, or reduced employment opportunities. Conversely, areas demonstrating resilience or adaptability to supply chain challenges—such as those with strong local

infrastructure or diverse economic bases—may maintain or even increase their property values.

Overall, while short-term supply chain disruptions are unlikely to have a significant effect on property values, repeated or severe disruptions could create long-term economic and social pressures that influence real estate demand and market stability in Johnson County.

Critical Infrastructure

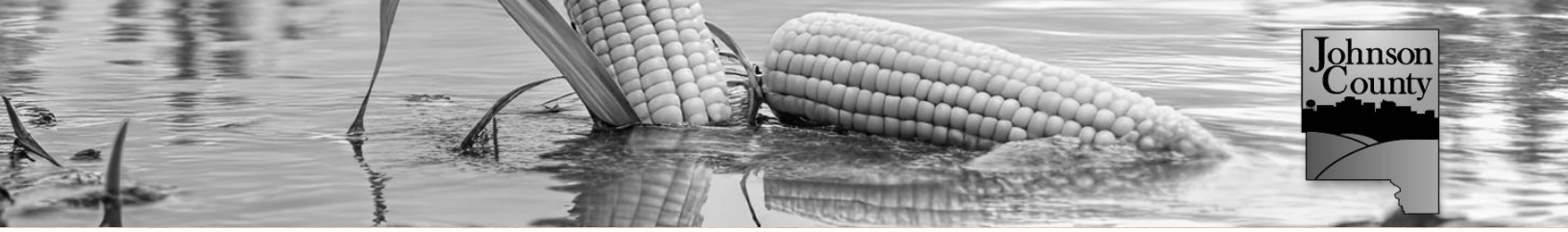
If supply chain disruptions were to occur in Johnson County, critical infrastructure could face significant challenges. Key sectors, such as healthcare, energy, and transportation, are heavily reliant on consistent supply chains to function effectively. Hospitals and clinics, for example, depend on timely deliveries of medical supplies, pharmaceuticals, and equipment. Disruptions could compromise patient care, delay procedures, and strain existing resources, particularly during emergencies or health crises.

The energy sector could also be impacted if fuel supplies, maintenance parts, or other essential resources are delayed. This could lead to interruptions in power or heating services, particularly during extreme weather events when demand is high. Transportation infrastructure, including public transit systems and road maintenance operations, may face delays if spare parts or essential materials, such as road salt in winter, are unavailable.

Water and wastewater treatment facilities rely on chemicals and equipment that could be delayed by supply chain issues, potentially impacting water quality or service continuity. Communication networks, another critical infrastructure component, may also be at risk if replacement parts for towers or data centers are delayed, affecting both public and private communication systems.

Historical, Cultural, and Natural Environment

Supply chain disruptions in Johnson County could have indirect impacts on its historical, cultural, and natural environment. Museums, libraries, and historical sites such as the Old Capitol Museum, Johnson County Historical Society Museum, and University of Iowa Special Collections & Archives may face challenges in maintaining operations if key supplies, such as preservation materials, climate control equipment, or replacement parts for infrastructure, are delayed. Prolonged disruptions could put sensitive artifacts and documents at risk if proper environmental conditions cannot be maintained, potentially leading to irreversible damage to historic records, artworks, and exhibits.



Cultural institutions, such as the Englert Theatre and Public Space One (PS1) Art Gallery, may experience operational interruptions if they are unable to procure necessary materials or equipment for events, renovations, or daily functions. Supply shortages affecting lighting, sound equipment, or exhibit materials could lead to canceled performances, postponed exhibitions, or scaled-back cultural programming. This could limit public access to cultural resources and diminish community engagement in cultural activities, particularly for events like the Iowa City Arts Festival or Mission Creek Festival.

The natural environment could also be indirectly impacted if supply chain disruptions delay efforts to manage natural resources. Conservation initiatives, such as tree planting at Hickory Hill Park or wetland restoration at Hawkeye Wildlife Management Area, may be postponed due to shortages of materials like seedlings, tools, or erosion control products. Additionally, delays in agricultural supply chains could result in reduced access to fertilizers, feed, or irrigation equipment, potentially increasing environmental strain through overuse of existing resources and affecting farmland sustainability across Johnson County.

Future Land Use and Development

Supply chain disruptions in Johnson County could influence future land use and development, though the impacts would likely be indirect and dependent on the severity and frequency of such events. Prolonged or recurring disruptions might lead to changes in development priorities, emphasizing the need for local resilience and self-sufficiency. For instance, the county might prioritize infrastructure improvements to support more reliable transportation and distribution networks, ensuring better access to essential goods and services.

Commercial and industrial development could shift to focus on creating more robust supply chain networks, such as local manufacturing or distribution hubs, to reduce reliance on distant suppliers. This may influence zoning decisions, encouraging mixed-use developments that combine residential, commercial, and industrial uses to streamline logistics and increase efficiency.

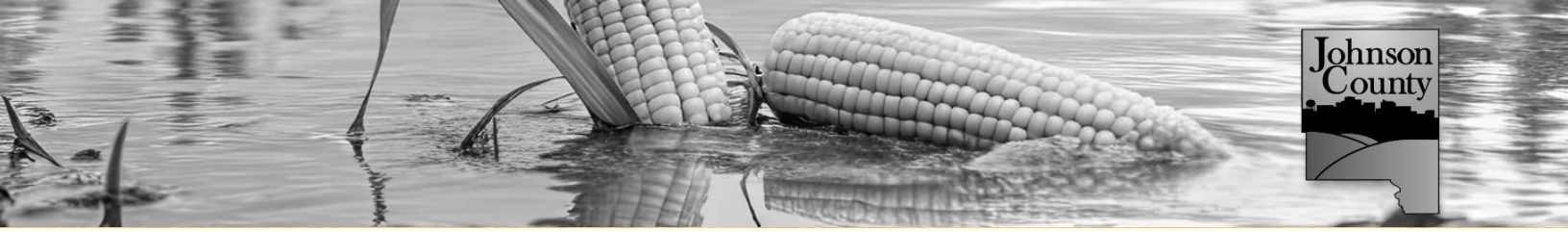
Agricultural land use could also be impacted if disruptions to supply chains highlight vulnerabilities in accessing farming inputs like seed, fertilizer, or equipment. This might encourage a shift toward more diversified or localized farming practices, potentially influencing land use policies to support sustainable agriculture.

Residential development patterns could be affected if supply chain issues reduce the appeal of areas far from critical infrastructure or services. Conversely, areas demonstrating greater resilience to supply chain disruptions may attract more development.

3.4.17.8 Consequence Summary

If a supply chain disruption were to occur in Johnson County, the consequences could be widespread, impacting critical infrastructure, the local economy, and residents' daily lives. Shortages of essential goods, such as food, medical supplies, and fuel, could strain healthcare services, disrupt transportation, and affect public safety, particularly for vulnerable populations. Businesses reliant on timely deliveries might experience operational delays, lost revenue, or increased costs, while agricultural operations could face setbacks due to delays in obtaining necessary inputs. Prolonged disruptions might lead to higher prices for goods and services, economic slowdowns, and challenges in maintaining critical services like energy and water supply. Indirect impacts could also extend to cultural and natural resources, highlighting the need for resilience planning to minimize long-term effects and ensure community stability.

Category	Narrative
Impact on the Public	• Shortages of food, medical supplies, and fuel disrupt daily life. • Increased stress and anxiety, especially for vulnerable populations. • Reduced access to essential goods and services.
Impact on the Economic Condition of the Planning Area	• Loss of revenue for businesses due to operational delays or closures. • Increased costs for sourcing alternative supplies or materials. • Disruptions to agriculture affecting yields and profitability.
Impact on the Historical, Cultural, and Natural Environment	• Risk to preservation efforts for historical artifacts due to delayed supplies. • Interruptions in cultural institution operations, limiting public engagement. • Delays in environmental management projects and conservation efforts.
Impact on Built Environment, General Property, and Critical Infrastructure	• Potential reduction in commercial property demand due to economic instability. • Strain on critical infrastructure like healthcare, energy, and transportation systems.



Category	Narrative
	• Increased maintenance costs due to delayed repairs or supplies.
Impact on the Public Confidence in Government	• Perception of inadequacy in addressing supply shortages or disruptions. • Potential erosion of trust if responses are delayed or ineffective.
Impact on Responders	• Challenges in accessing supplies critical for emergency response operations. • Delays in resource deployment impacting service delivery during emergencies.
Impact on continuity of operations, including continued delivery of government services	• Interruptions in public services reliant on consistent supply chains. • Strain on emergency management coordination due to logistical challenges.
Cascading hazards	• Economic slowdowns affecting employment and consumer spending. • Secondary shortages in related goods and services. • Increased vulnerability to concurrent emergencies due to strained resources.

3.4.18 Terrorism and Mass Violence

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.17	2.08	2.08	2.25	13.91

3.4.18.1 Description

Terrorism, mass violence, bioterrorism, and agroterrorism refer to deliberate acts intended to cause widespread fear, harm, or disruption, often targeting civilians, critical infrastructure, or essential sectors of society. Terrorism typically involves politically, ideologically, or religiously motivated attacks designed to influence governments, spread fear, or further a specific agenda through violence. Mass violence includes incidents such as shootings or bombings that result in significant harm or death to large numbers of people, and these events may or may not have political or ideological motivations.

Bioterrorism involves the intentional release of harmful biological agents, such as bacteria, viruses, or toxins, designed to cause illness or death, spread disease, and disrupt public health and healthcare systems. Similarly, agroterrorism targets agricultural

systems by intentionally contaminating or destroying crops, livestock, or food supplies to weaken the economy and create widespread food insecurity. This is particularly relevant for Johnson County due to its agricultural economy and regional food supply systems.

These hazards are critical to address as they pose significant threats to public safety, health, and economic stability. Terrorism and mass violence result in direct loss of life, physical injuries, and psychological trauma. Bioterrorism and agroterrorism can lead to public health crises, overwhelm healthcare systems, disrupt essential services, and jeopardize food security. Understanding and preparing for these hazards ensures public safety, protects critical infrastructure, and mitigates risks to health and the local economy in the event of an attack.

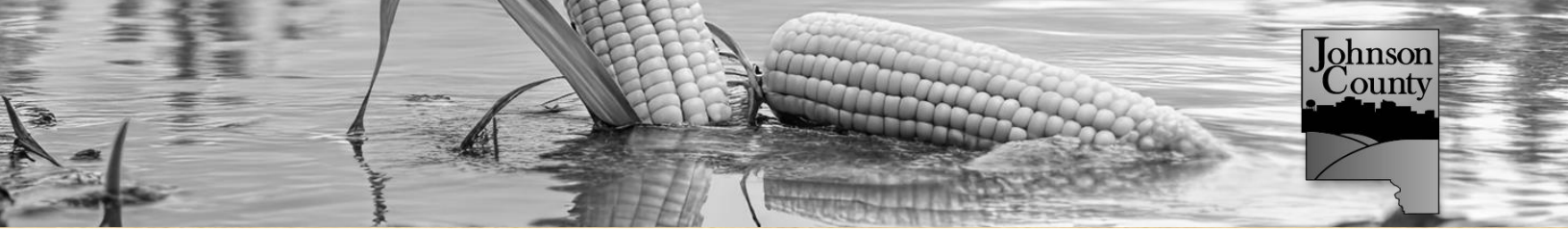
3.4.18.2 Location

In Johnson County, certain areas and sectors are more susceptible to terrorism and mass violence based on population density, critical infrastructure, and economic significance. Urban areas like Iowa City are particularly vulnerable due to the presence of high-profile locations such as the University of Iowa, public venues, and government facilities. These areas attract large numbers of people, making them potential targets for mass violence or terrorism aimed at causing widespread fear and disruption.

Critical infrastructure in the county, including hospitals, transportation systems, and utilities, is another area of concern. Facilities like the University of Iowa Hospitals and Clinics, a regional hub for healthcare, could be targeted to disrupt essential services and overwhelm emergency response capabilities. Transportation hubs and major roads serving as vital connectors for commerce and daily activities could also be at risk from attacks aimed at disrupting mobility and logistics.

The county's agricultural sector, while more dispersed geographically, is susceptible to agroterrorism due to its role in regional food production and supply. Farms, livestock facilities, and food processing centers are potential targets for deliberate contamination or destruction, which could have cascading effects on food security and the local economy. Rural areas with limited security resources may be particularly vulnerable to these types of attacks.

Large public events, such as festivals, sporting events, or political gatherings, are also areas of heightened vulnerability. These events bring together large crowds, creating opportunities for mass violence or acts of terrorism designed to maximize casualties and media attention.



Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

3.4.18.3 Magnitude/Severity

The magnitude and severity of terrorism and mass violence are measured by evaluating several key factors, including the scale of the event, the number of casualties, the extent of property damage, and the broader societal impact. Casualty count is a primary measure, encompassing fatalities, injuries, and those psychologically affected by the incident. Events causing high loss of life or severe injuries are classified as more severe due to their direct human impact and the strain placed on healthcare systems and emergency responders.

Extent of property damage also contributes to assessing severity, particularly if critical infrastructure, such as hospitals, transportation systems, or utilities, is affected. Damage to these systems can have cascading effects, disrupting essential services and prolonging recovery times. For example, an attack targeting a power grid or communication network could cripple response efforts and hinder normal operations for an extended period.

The psychological and societal impact is another critical factor, as terrorism and mass violence often aim to instill fear and disrupt community cohesion. The perceived threat level, media attention, and public response contribute to the overall impact. High-profile incidents that generate widespread fear or require substantial changes in security protocols are considered more severe.

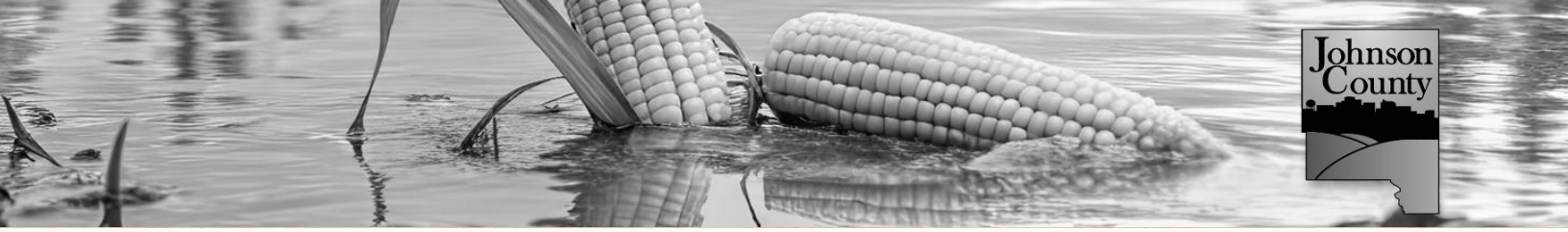
Economic impact is also considered, as incidents can disrupt local and regional economies through lost productivity, increased security costs, and long-term reputational damage to the affected area. The combination of these factors provides a comprehensive framework for evaluating the magnitude and severity of terrorism and mass violence incidents, informing preparedness, response, and recovery strategies.

3.4.18.4 Past Occurrences

While Johnson County, Iowa, has not experienced significant incidents of terrorism or mass violence, the state and the broader Midwest region have encountered notable events:

- January 4, 2024 – Perry High School Shooting, Perry, Iowa: A 17-year-old student opened fire at Perry High School, resulting in multiple casualties and injuries. The incident led to increased security measures in schools statewide and prompted discussions on gun control and mental health support.
- March 7, 2022 – East High School Shooting, Des Moines, Iowa: A drive-by shooting outside East High School resulted in the death of one student and injuries to two others. The event heightened awareness of gang-related violence and led to increased security protocols in schools across Iowa.
- April 10, 2022 – Taboo Nightclub Shooting, Cedar Rapids, Iowa: A mass shooting at a downtown nightclub left two people dead and ten others injured. This incident, the largest mass shooting in Cedar Rapids' history, prompted local authorities to reassess public safety measures in entertainment districts.
- August 5, 2019 – Walmart Shooting, El Paso, Texas (Indirect Impact on Iowa): Although this event occurred outside Iowa, the aftermath raised concerns about security in large retail settings, prompting businesses in Iowa, including in Johnson County, to enhance safety protocols and staff training for mass violence scenarios.
- August 20, 2016 – Iowa State Fair Stabbing, Des Moines, Iowa: An altercation escalated into a stabbing incident that resulted in one fatality and injuries to several attendees. This event led to increased police presence and improved security screening at large public events statewide.
- July 17, 2015 – Chattanooga Recruiting Center Shooting (Regional Impact): Following this attack, which targeted military recruiting centers, recruitment facilities across the Midwest, including in Iowa, implemented stricter security measures to protect staff and visitors.
- July 27, 1996 – Olympic Park Bombing, Atlanta, Georgia (National Response Impact): While not in the Midwest, the bombing's impact on public event security led to enhanced protocols at festivals and gatherings across the U.S., influencing practices in Iowa cities such as Iowa City during events like the Iowa Arts Festival.

Examining past incidents of terrorism and mass violence, whether they occurred locally, regionally, or nationally, provides valuable insights for improving preparedness and resilience in the planning area. These events highlight potential vulnerabilities in public spaces, schools, critical infrastructure, and high-profile gatherings, offering lessons on



how to enhance security protocols and emergency response capabilities. By analyzing the tactics, impacts, and response efforts associated with these incidents, the planning area can identify gaps in its current preparedness measures, implement targeted mitigation strategies, and foster greater collaboration among law enforcement, emergency services, and community stakeholders. Even if such events have not occurred directly in the planning area, understanding how they unfolded elsewhere equips the community to better anticipate and respond to similar threats.

3.4.18.5 Likelihood of Future Occurrence

The likelihood of terrorism and mass violence occurring in Johnson County is influenced by a variety of local, regional, and state-level factors. As home to the University of Iowa, large public events, and critical infrastructure such as hospitals and government facilities, Johnson County presents potential targets for incidents motivated by political, ideological, or personal factors. The county's urban centers, particularly Iowa City, attract large gatherings and high-profile activities, which could increase the risk of mass violence or acts of terrorism.

While Johnson County has not experienced a major terrorism-related event, incidents in other parts of Iowa, such as school shootings and threats involving incendiary devices, highlight the potential for such events to occur. Factors such as increasing societal polarization, the availability of weapons, and the prevalence of ideologically motivated violence at a national level suggest that no community is entirely immune. Schools, public venues, and transportation hubs in the county are particularly vulnerable due to their accessibility and the concentration of people.

Although the likelihood of a large-scale terrorism event remains relatively low, the potential for localized incidents, such as targeted acts of violence or threats, is higher given the regional and national trends.

3.4.18.6 Climate Change Considerations

Terrorism and mass violence are not directly influenced by climate change, as they are primarily driven by human motivations such as ideology, politics, or personal grievances. However, there are indirect ways in which climate change might exacerbate factors contributing to these hazards. For example, climate change could increase resource scarcity, such as water or food shortages, which could heighten tensions and contribute to conflicts that result in violence or terrorism. Additionally, climate-related migration or displacement might strain communities, creating conditions for social unrest or grievances that could be exploited by bad actors. While these connections are

secondary and less direct, understanding how environmental stressors can influence societal stability is important for comprehensive emergency preparedness and risk mitigation efforts in Johnson County. Overall, climate change is not a primary consideration for terrorism and mass violence but may contribute indirectly to conditions that increase vulnerability.

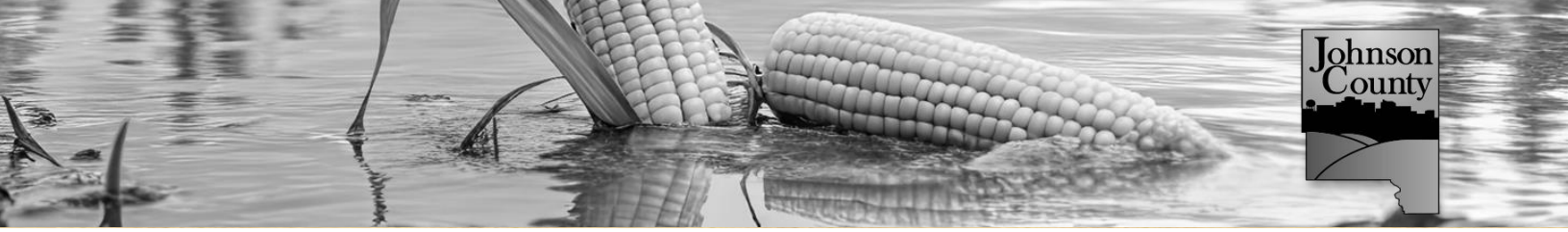
3.4.18.7 Vulnerability

People

If terrorism or mass violence were to occur in Johnson County, the impact on people could be severe and multifaceted, with vulnerable and underserved populations experiencing heightened risks. Direct consequences would include loss of life, physical injuries, and psychological trauma for victims, their families, and the broader community. Incidents of this nature often generate widespread fear and anxiety, even among those not directly affected, disrupting daily routines and creating a lasting sense of insecurity. Individuals without reliable transportation (6.1%) may face additional challenges evacuating or seeking medical care in the immediate aftermath.

For vulnerable populations, including children, older adults (9.6%), and individuals with preexisting mental health conditions, the psychological effects could be particularly profound. Low-income households (16.9%) and those without health insurance (3.5%) may face barriers in accessing trauma counseling and long-term support services. Community cohesion could also be strained, especially if the incident is perceived to be motivated by ideological, racial, or religious factors, which may increase social tensions. Non-English-speaking populations (4.4%) may face difficulties receiving timely information, emergency alerts, or mental health resources, exacerbating their sense of isolation and fear.

Large-scale incidents could overwhelm healthcare facilities and emergency response systems, delaying care for both victims and others in need of medical attention. Renters and individuals in high-density housing may experience heightened insecurity if an attack targets public spaces or multi-unit residences. Survivors and witnesses may face long-term emotional and mental health challenges, with underserved populations at greater risk of prolonged distress due to limited access to professional counseling and social support networks. The cumulative effect of such an event would deepen existing disparities, disproportionately impacting those with fewer resources to recover from both immediate and long-term consequences.



Economy

If terrorism or mass violence were to occur in Johnson County, the economic impact could be substantial, affecting various sectors. Businesses in the immediate vicinity of the incident could face temporary closures, property damage, and lost revenue, particularly if the area becomes inaccessible during investigations or recovery efforts. Larger economic hubs, such as downtown Iowa City or areas near the University of Iowa, would be particularly vulnerable to such disruptions.

The tourism and hospitality industries, which are vital to the county's economy, could also experience declines as visitors might avoid the area due to safety concerns or reputational damage. Costs associated with emergency response, law enforcement, and medical care would impose additional financial strain on local government budgets, diverting resources from other priorities.

Long-term impacts could include increased security costs for businesses and public institutions, as well as higher insurance premiums for property and liability coverage. If the incident causes significant infrastructure damage, repair and rebuilding efforts could further strain the local economy. Additionally, fear and anxiety among residents and potential investors could hinder economic growth, as businesses and consumers may adopt more conservative spending and expansion behaviors.

Built Environment

General Property

If terrorism or mass violence were to occur in Johnson County, the impact on property values would likely depend on the scale, location, and aftermath of the event. Areas directly affected by the incident, particularly those that experience significant damage or gain a lasting association with the violence, could see a temporary or prolonged decline in property values. Commercial properties in high-traffic areas like downtown Iowa City or near the University of Iowa might face reduced demand if businesses or consumers perceive the area as unsafe.

Residential properties near the incident site could also experience a temporary drop in value, as potential buyers may associate the area with fear or insecurity. This effect could be more pronounced if the incident highlights vulnerabilities in local safety or infrastructure, leading to a broader perception of risk. However, these impacts are often mitigated over time as recovery efforts restore normalcy and public confidence.

Conversely, areas perceived as safer or further removed from the incident might see an increase in demand, as residents and businesses seek to relocate to less vulnerable locations.

Critical Infrastructure

If terrorism or mass violence were to occur in Johnson County, critical infrastructure could face significant impacts, depending on the nature and target of the incident. An attack on physical infrastructure, such as transportation systems, utilities, or public buildings, could disrupt essential services and impede daily activities. For example, damage to major roadways or bridges could delay emergency response times, hinder commerce, and isolate affected areas. Similarly, an attack on energy infrastructure, such as power plants or transmission lines, could lead to outages that affect homes, businesses, and critical facilities like hospitals.

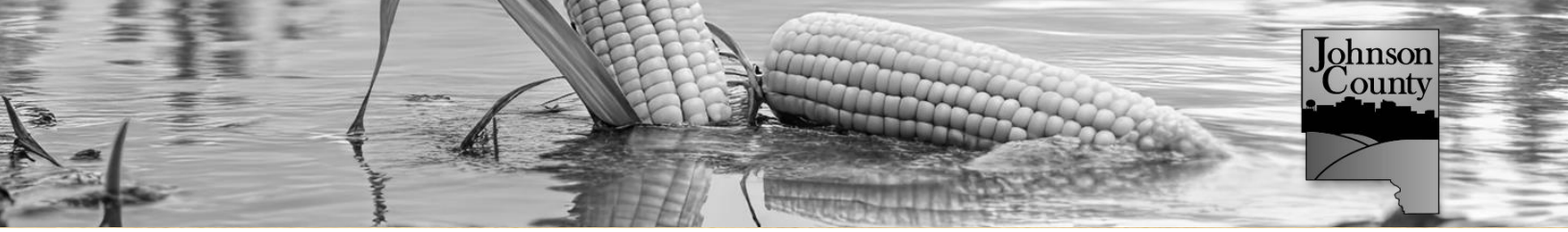
Healthcare facilities could be overwhelmed with casualties, straining resources and potentially delaying care for other patients. Communication networks, which are vital for emergency coordination and public information dissemination, might also be disrupted if targeted or overloaded during the response.

If the incident involves cyberterrorism or an attack on digital infrastructure, the impacts could extend to financial systems, government services, and other sectors reliant on technology. For example, disruptions to data systems could impair the functioning of public safety agencies, educational institutions, or businesses across the county.

Historical, Cultural, and Natural Environment

If terrorism or mass violence were to occur in Johnson County, the historical, cultural, and natural environment could face direct and indirect impacts. Historical landmarks and cultural institutions, such as the Old Capitol Museum, University of Iowa Special Collections & Archives, or Plum Grove Historic Home, could be targeted or inadvertently damaged during an incident, leading to the loss of irreplaceable artifacts, documents, or architectural features. Such damage would not only impact the physical structures but also disrupt the community's connection to its heritage and cultural identity.

Cultural events, such as the Iowa City Arts Festival, Mission Creek Festival, or performances at Hancher Auditorium, might be disrupted or canceled due to safety concerns, reducing public engagement and financial support for the arts. Additionally, if an incident occurs in or near a venue that holds cultural significance, such as the Iowa



City Pedestrian Mall (Ped Mall), the site may develop a lasting association with the event, altering community perceptions and future usage.

The natural environment could also be indirectly affected if the incident involves damage to parks, green spaces, or conservation areas. Explosions, fires, or contamination could harm ecosystems and wildlife in locations such as Terry Trueblood Recreation Area or Hickory Hill Park, leading to long-term environmental recovery efforts. If a hazardous material is involved, water sources such as the Iowa River or Clear Creek could suffer contamination, requiring extensive cleanup and monitoring.

Future Land Use and Development

If terrorism or mass violence were to occur in Johnson County, the event could influence future land use and development by altering planning priorities and community perceptions of safety. Areas directly affected by the incident, particularly those experiencing significant damage or gaining a long-term association with the event, might see slower redevelopment as investors and developers may hesitate to invest in perceived high-risk locations.

Future development plans might incorporate enhanced security measures, such as designing buildings with blast-resistant materials, improving surveillance systems, and incorporating safer public spaces to mitigate the risk of future incidents. Zoning regulations could also be adjusted to address vulnerabilities, such as increasing buffer zones around critical infrastructure or requiring stricter safety standards for large venues and public gathering spaces.

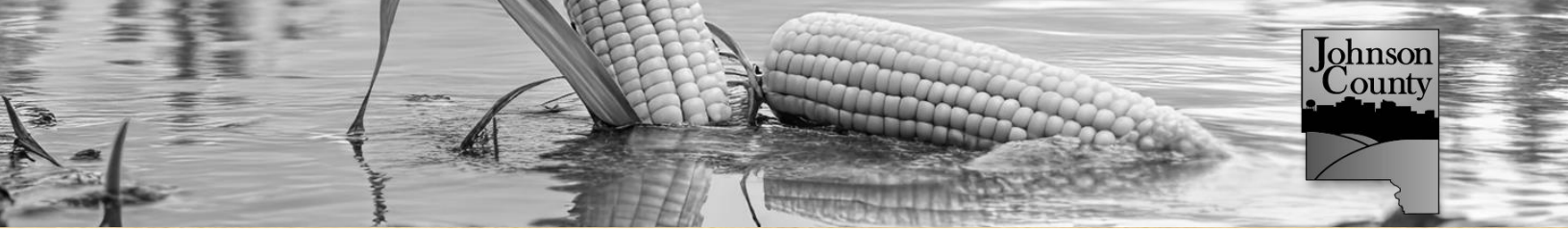
Public demand for safer, lower-density residential or commercial areas could shift development patterns, potentially increasing growth in suburban or rural parts of the county. Conversely, high-traffic urban areas like Iowa City may see more targeted investment in resilience measures to reassure residents, businesses, and visitors of their safety.

3.4.18.8 Consequence Summary

If terrorism or mass violence were to occur in Johnson County, the consequences could be far-reaching, affecting public safety, the economy, and community cohesion. Immediate impacts would include loss of life, physical injuries, and psychological trauma, straining healthcare systems and emergency response resources. Businesses and public institutions near the incident site could face operational disruptions, property damage, and lost revenue, while the broader community might experience heightened fear and

anxiety, disrupting daily life and eroding public confidence. Critical infrastructure, such as transportation networks, utilities, and communication systems, could be damaged or overwhelmed, further complicating response and recovery efforts. Long-term effects might include changes in land use and development patterns, increased security costs, and shifts in community identity, particularly if the incident impacts historical or cultural landmarks. These consequences underscore the importance of proactive preparedness, effective response measures, and sustained recovery efforts to mitigate the impact on Johnson County.

Category	Narrative
Impact on the Public	• Loss of life, physical injuries, and psychological trauma. • Disruption of daily life and increased fear or anxiety in the community. • Long-term mental health challenges for survivors and witnesses.
Impact on the Economic Condition of the Planning Area	• Lost revenue and operational disruptions for businesses. • Increased costs for security, repairs, and recovery efforts. • Potential decline in tourism or visitor spending due to reputational damage.
Impact on the Historical, Cultural, and Natural Environment	• Damage to historical landmarks and cultural institutions. • Disruption or cancellation of cultural events and public gatherings. • Potential harm to parks, green spaces, and local ecosystems.
Impact on Built Environment, General Property, and Critical Infrastructure	• Temporary or prolonged decline in property values near the incident site. • Damage to critical infrastructure like transportation, utilities, or communication networks. • Increased costs for security upgrades and infrastructure resilience.
Impact on the Public Confidence in Government	• Potential erosion of trust if the response is perceived as inadequate or delayed. • Heightened scrutiny of public safety and emergency preparedness measures.
Impact on Responders	• Strain on emergency personnel due to high casualty rates and resource demands. • Increased stress and potential trauma among first responders.
Impact on continuity of operations, including continued delivery of government services	• Disruption of essential public services and emergency operations. • Delays in restoring normal government functions in affected areas.



Category	Narrative
Cascading hazards	• Economic downturns due to prolonged recovery periods. • Increased social tensions or unrest stemming from the incident. • Strain on healthcare systems, utilities, and public safety resources during concurrent emergencies.

3.4.19 Tornadoes

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
2.75	2.75	2.50	2.42	21.09

3.4.19.1 Description

A tornado is a rapidly rotating column of air extending from a thunderstorm to the ground, often visible as a funnel cloud. Tornadoes can cause extreme damage with winds that can exceed 200 miles per hour, uprooting trees, destroying buildings, and hurling debris with lethal force. They vary in size, intensity, and duration, with some lasting only a few minutes while others can travel significant distances, causing widespread destruction. Tornadoes typically form during severe thunderstorms, particularly in regions prone to strong weather systems, such as the Midwest, where warm and cold air masses frequently collide.

Understanding tornadoes is crucial because they pose a significant threat to life, property, and infrastructure. Their unpredictable nature and high wind speeds make them especially dangerous, often causing severe damage within minutes of formation. For Johnson County, Iowa, which lies within a region of the Midwest susceptible to tornado activity, preparedness is vital. Emergency plans, early warning systems, and accessible safe shelters are essential to minimize risks. Local efforts to educate residents and improve response capabilities further enhance the county's resilience to this powerful natural hazard.

3.4.19.2 Location

In Johnson County, tornadoes have the potential to impact all areas of the county due to their unpredictable nature and ability to travel significant distances across varied landscapes. However, certain characteristics of the county make some areas more vulnerable to specific impacts. Rural areas, which make up a significant portion of the county, may be particularly susceptible to tornado damage due to the prevalence of

agricultural structures, such as barns and grain silos, which are often less resistant to high winds compared to urban buildings. Farms and fields also have less natural or built shelter, leaving these areas exposed to the full force of tornado winds.

Urban and suburban areas, such as Iowa City and Coralville, while benefiting from more robust building codes and infrastructure, face heightened risks due to population density. Tornadoes striking these areas can result in higher casualties and greater economic losses because of the concentration of people, businesses, and critical infrastructure. Additionally, damage to public facilities like schools, hospitals, and transportation hubs in urban areas can have cascading effects on the broader community by disrupting essential services.

Low-lying areas, which may be prone to flooding during the heavy rainfall that often accompanies tornadoes, face a compounded risk when combined with tornado damage. Mobile home parks, which are more vulnerable to destruction from high winds, are also at elevated risk within the county.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

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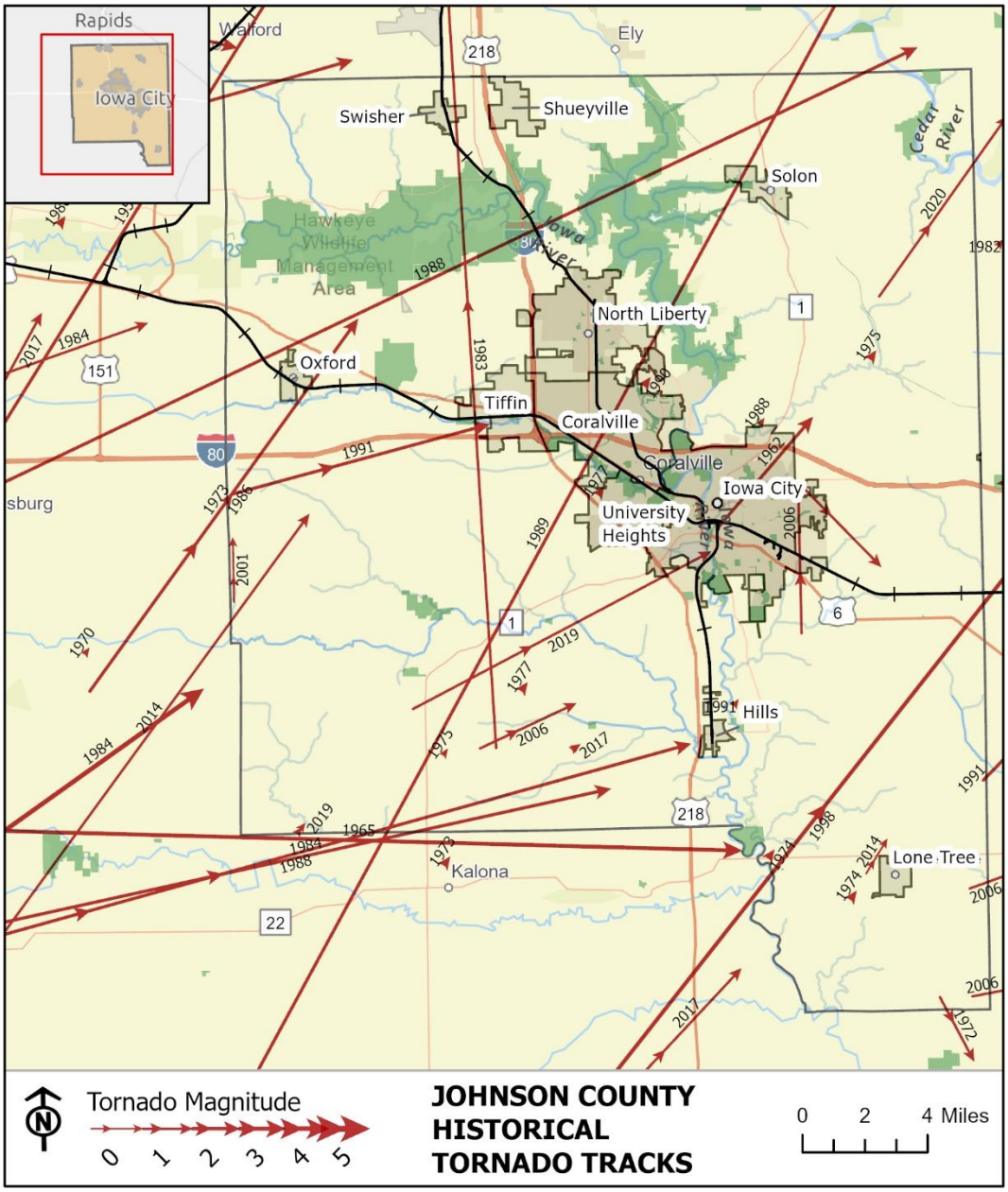

Figure 3-13: Johnson Tornado Tracks Map

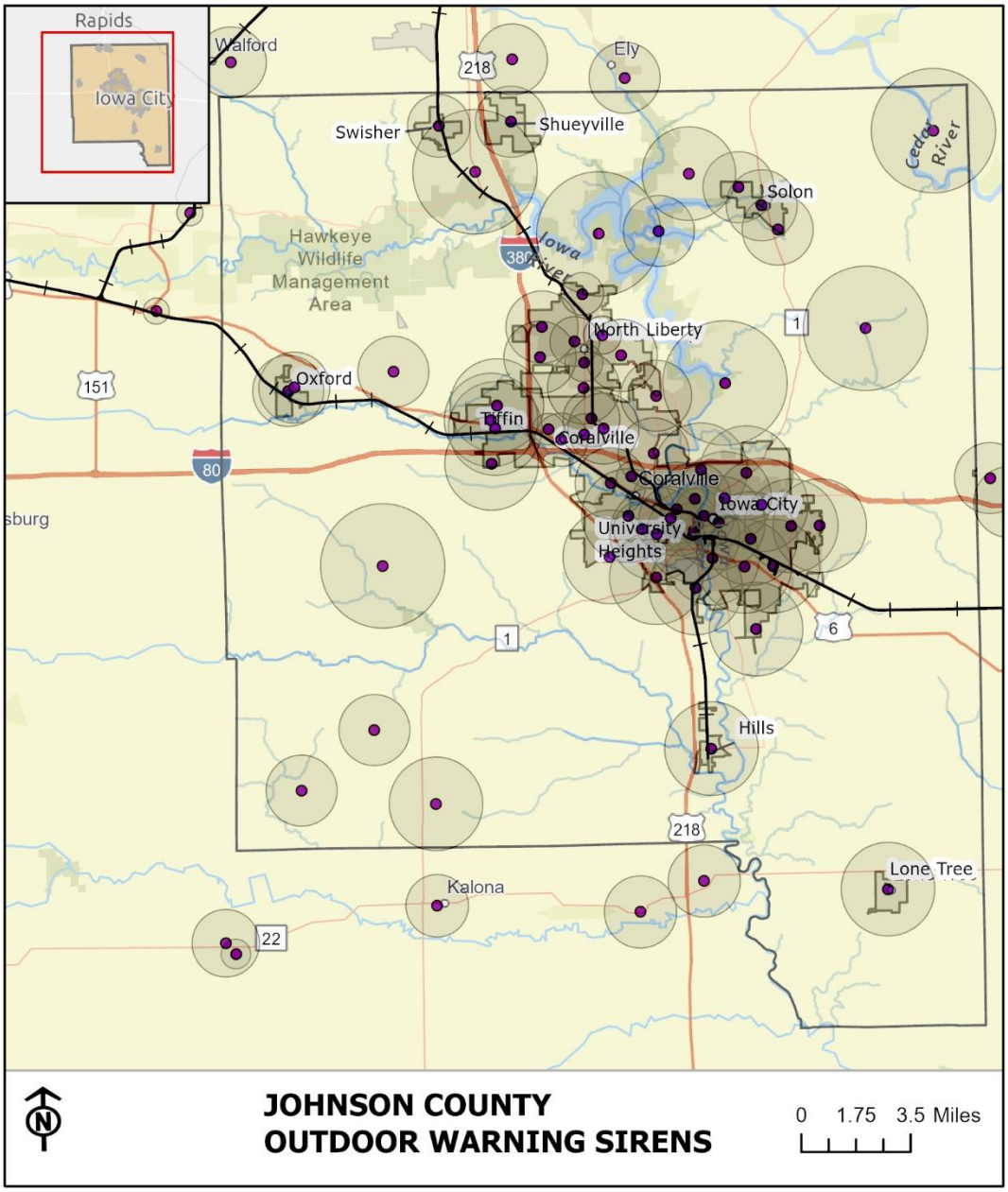

Figure 3-14: Johnson County Outdoor Warning Sirens Map

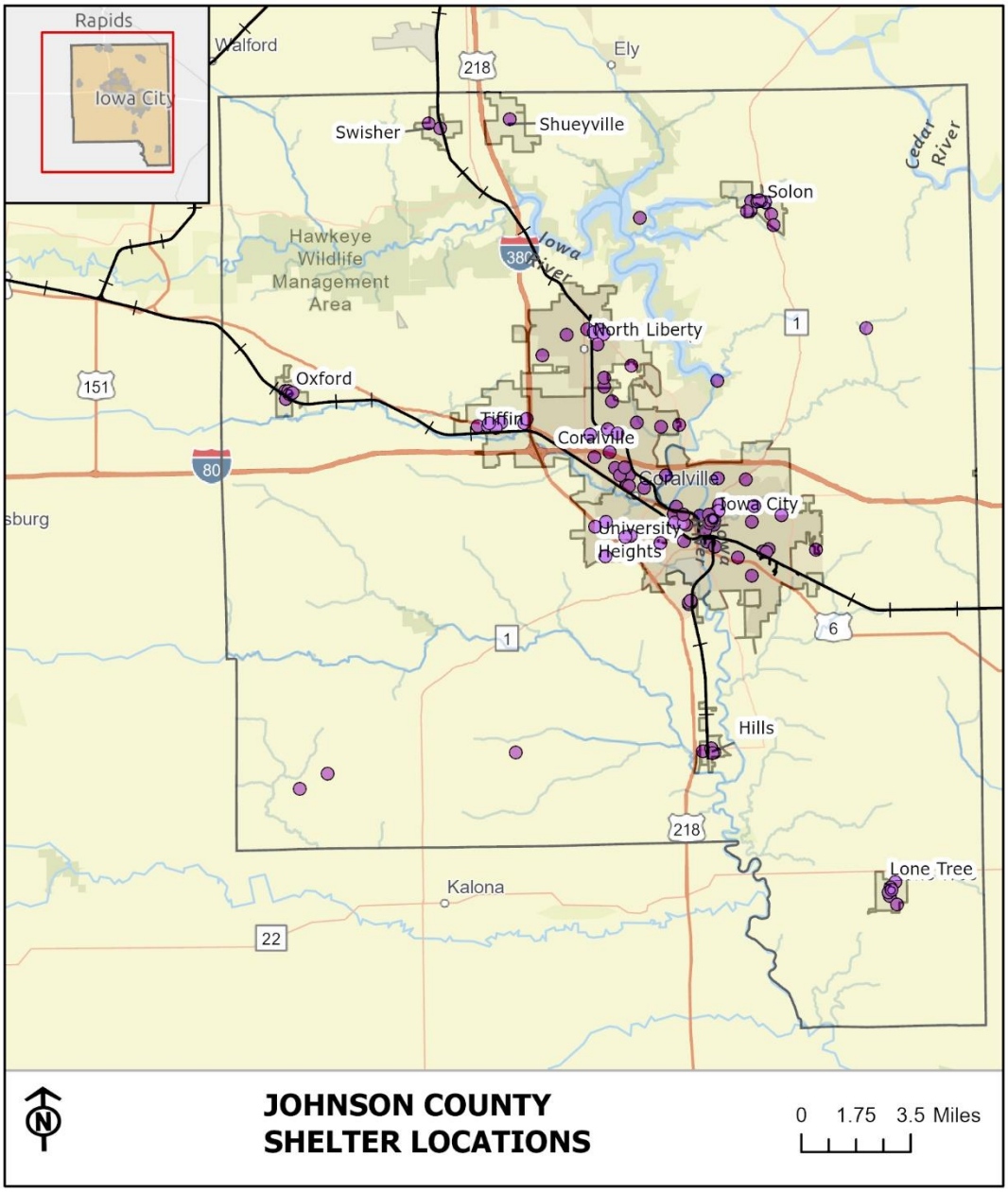

Figure 3-15: Johnson County Shelter Locations Map

3.4.19.3 Magnitude/Severity

The magnitude and severity of tornadoes are measured using the Enhanced Fujita (EF) Scale, which categorizes tornadoes based on the damage they cause to buildings, infrastructure, and vegetation. The scale ranges from EF0 to EF5, with higher numbers

indicating more destructive tornadoes. An EF0 tornado, for example, has winds of 65 to 85 mph and causes light damage, such as broken tree branches or minor damage to roofs. At the highest level, an EF5 tornado has winds exceeding 200 mph and can cause catastrophic damage, including the complete destruction of well-built structures and the uprooting of trees.

The path length and width of the tornado also contribute to its severity. A wider tornado or one that stays on the ground for an extended period will generally cause more widespread damage. In addition to the physical damage, the number of casualties, injuries, and economic losses from a tornado also play a role in determining the overall severity of the event. Tornado warnings issued by the National Weather Service (NWS) are based on radar detections, observations, and storm conditions, helping communities gauge the potential severity and respond accordingly. By measuring both wind speeds and the extent of damage, the EF scale provides a standardized way to assess and compare the severity of tornadoes.

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

3.4.19.4 Past Occurrences

Johnson County, Iowa, has experienced several significant tornado events, reflecting the broader tornado activity in the Midwest. Notable incidents include:

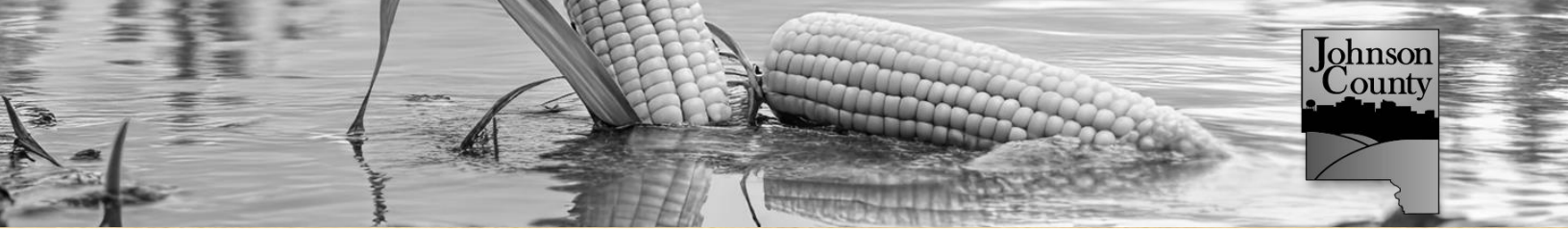
- May 22, 1962: A tornado struck Johnson County, causing damage to structures and agricultural areas. Specific details on casualties or the extent of damage are limited.
- April 27, 2014: An EF1 tornado touched down in Keokuk County and moved into Johnson County, resulting in two fatalities and causing damage to homes and infrastructure.
- May 15, 1968 – Charles City and Oelwein Tornadoes: Two F5 tornadoes struck Charles City and Oelwein, causing extensive damage to homes, businesses, and infrastructure, and resulting in multiple fatalities and injuries.
- June 13, 1976 – Jordan Tornado: An F5 tornado impacted the town of Jordan, causing severe destruction to buildings and infrastructure, with several fatalities reported.
- May 25, 2008 – Parkersburg Tornado: An EF5 tornado devastated Parkersburg, leading to significant loss of life and widespread destruction of property.

Examining past tornado occurrences, both within Johnson County and across Iowa, provides critical insights into the potential risks and impacts of this hazard. These events highlight patterns in tornado activity, such as their frequency, intensity, and areas most affected, enabling the planning area to identify vulnerabilities and enhance preparedness efforts. Even if some events occurred outside the planning area, understanding their effects on communities, infrastructure, and emergency response systems helps inform strategies to minimize future risks. Lessons learned from previous tornadoes, such as the importance of robust warning systems, accessible shelters, and resilient building practices, ensure that the planning area is better equipped to protect lives, property, and critical infrastructure during future incidents.

3.4.19.5 Likelihood of Future Occurrence

The likelihood of tornadoes occurring in Johnson County is moderate to high, consistent with its location in the Midwest, a region prone to severe weather conditions that frequently produce tornadoes. Iowa averages approximately 50 tornadoes annually, with most occurring during the late spring and early summer months when warm, moist air from the Gulf of Mexico interacts with cooler, drier air from the north. While tornadoes can form at any time of year, their frequency and intensity peak during these months.

Johnson County has experienced several tornadoes historically, indicating that the hazard is a recurring threat. The county's mix of urban, suburban, and rural landscapes makes it susceptible to tornado impacts, though the specific location and path of tornadoes are unpredictable. Advances in meteorological technology and warning



systems have improved detection and response capabilities, but the unpredictability of tornado formation and movement means the risk remains significant.

3.4.19.6 Climate Change Considerations

Tornadoes are natural hazards, and while their occurrence is primarily driven by atmospheric conditions rather than climate change, there is ongoing research into how changing climate patterns might influence tornado activity. Climate change may affect the conditions that lead to tornado formation, such as shifts in temperature, humidity, and storm dynamics. Some studies suggest that while the total number of tornadoes may not increase significantly, the frequency of tornado outbreaks—when multiple tornadoes occur in a concentrated time and area—could rise.

In Johnson County, these potential changes could mean a higher likelihood of severe weather patterns conducive to tornado formation. Additionally, climate change could lead to more intense thunderstorms, which are precursors to tornadoes. However, scientific consensus is not yet clear on the direct relationship between climate change and tornado activity, making it difficult to attribute specific changes to this hazard.

3.4.19.7 Vulnerability

People

If a tornado were to occur in Johnson County, the impact on people could be severe, with vulnerable and underserved populations facing the greatest risks. Residents in the direct path of the tornado could experience injuries or fatalities due to flying debris, collapsing structures, or being caught without adequate shelter. Older adults (9.6%), individuals with mobility challenges (7.1%), and those without access to safe shelter—such as renters or low-income households (16.9%) living in mobile homes or substandard housing—would face heightened risks during such an event. Individuals without reliable transportation (6.1%) may have difficulty evacuating or reaching emergency shelters in time.

Beyond physical harm, tornadoes can cause significant psychological distress, including anxiety and trauma, particularly for those who experience personal loss or witness widespread destruction. Displacement from damaged homes would disproportionately impact low-income families, who may struggle to secure temporary housing or rebuild their lives. The loss of essential services, such as electricity and water, could further strain affected individuals, particularly those reliant on powered medical devices or refrigerated medications. Schools and workplaces may be forced to close temporarily,

disrupting education and employment, with long-term financial consequences for hourly and low-wage workers.

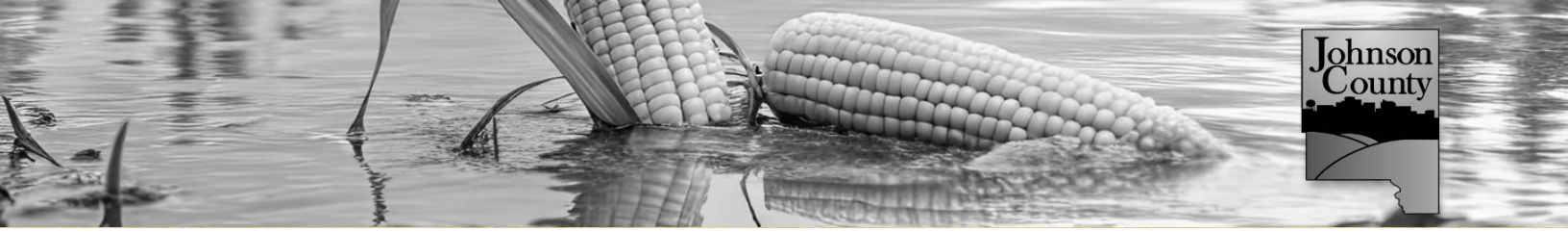
The aftermath of a tornado could create prolonged recovery challenges, as residents work to rebuild homes, replace belongings, and access necessary resources. Non-English-speaking populations (4.4%) may encounter difficulties in navigating disaster assistance programs, delaying their recovery process. Emergency response and support services would play a critical role in mitigating these impacts, but widespread destruction could overwhelm local resources, leaving underserved populations particularly vulnerable to extended hardship.

Economy

If a tornado were to impact Johnson County, the economic consequences could be significant, affecting multiple sectors. Damage to homes, businesses, and public infrastructure would impose substantial repair and reconstruction costs, which could strain local government budgets and insurance systems. Businesses in the tornado's path might experience prolonged closures due to damage or disrupted utilities, leading to lost revenue and potential layoffs. Smaller businesses without the financial resilience to recover quickly could face permanent closure, compounding the economic impact on the local economy.

The agricultural sector, which is an important component of Johnson County's economy, could also be severely affected. Tornadoes can destroy crops, damage equipment, and harm livestock, resulting in immediate financial losses and longer-term impacts on productivity. Disruption of transportation routes or supply chains could further complicate recovery efforts for agricultural and other industries.

Tourism and events, particularly in areas like Iowa City, could suffer if infrastructure or venues are damaged, reducing revenue from visitors. Additionally, the cost of emergency response, debris removal, and temporary housing for displaced residents would place further financial demands on the county. While federal and state disaster assistance could help alleviate some of these burdens, the overall economic impact would depend on the scale of the tornado and the speed of recovery efforts.



Built Environment

General Property

If a tornado were to impact Johnson County, property values in affected areas could experience a temporary decline, particularly in neighborhoods or regions that suffer significant damage. Homes and businesses directly in the tornado's path might see a drop in market value due to their damaged condition, the costs associated with rebuilding, and potential buyers' concerns about future vulnerability to similar events.

Areas with extensive destruction may also experience a slower recovery in property values if rebuilding efforts are delayed or if the tornado leaves a lasting stigma on the location. Conversely, areas that demonstrate resilience and rapid recovery may recover their property values more quickly, especially if community-wide rebuilding efforts improve infrastructure and safety features.

Properties near tornado-damaged areas but not directly affected might see an increase in value due to demand from displaced residents seeking undamaged housing. Over time, as reconstruction progresses and safety measures such as storm shelters and improved building codes are implemented, property values in the county could stabilize.

Critical Infrastructure

If a tornado were to impact Johnson County, critical infrastructure could sustain significant damage, disrupting essential services and daily operations. Power lines and substations are particularly vulnerable to high winds and flying debris, leading to widespread electricity outages that could last for days or weeks, depending on the severity of the damage. This would affect homes, businesses, healthcare facilities, and emergency response systems.

Transportation infrastructure, such as roads, bridges, and railways, might also be damaged or blocked by debris, hindering movement and delaying emergency response and recovery efforts. Communication networks, including cellular towers and data centers, could be impaired, disrupting public communication and coordination efforts among emergency services.

Healthcare facilities, such as hospitals and clinics, could face challenges if directly damaged or overwhelmed by an influx of injured individuals. Water and wastewater treatment plants could also be at risk, potentially leading to interruptions in water supply or contamination of local water sources. Schools, government buildings, and public

shelters might sustain damage, reducing their capacity to serve the community during and after the event.

Overall, the impact on critical infrastructure would depend on the intensity and path of the tornado, but disruptions could have cascading effects, delaying recovery efforts and straining local resources.

Historical, Cultural, and Natural Environment

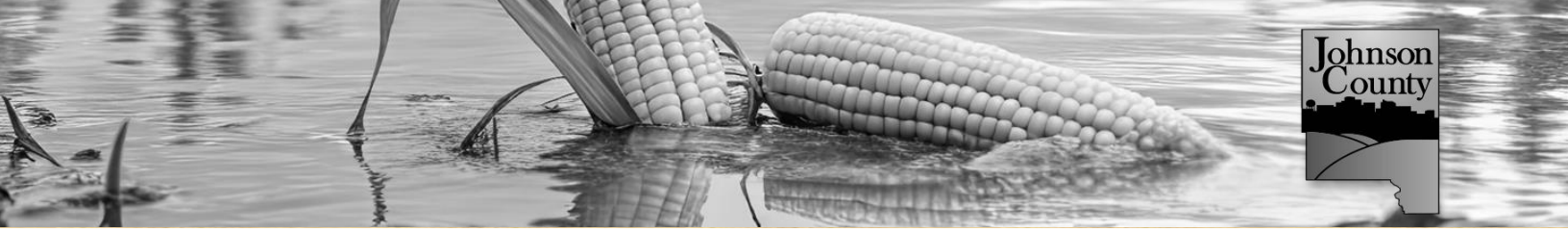
If a tornado were to impact Johnson County, it could have significant consequences for the historical, cultural, and natural environment. Historical landmarks, such as the Old Capitol Museum, Plum Grove Historic Home, and Johnson County Historic Poor Farm, are particularly vulnerable to tornado damage due to their age and construction methods. Structural damage or destruction of these sites could result in the loss of irreplaceable cultural heritage, diminishing the county's historical identity and potentially affecting tourism and community pride. Restoration efforts could be costly and require specialized materials and expertise to maintain historical authenticity.

Cultural institutions, such as Hancher Auditorium, Englert Theatre, and the Iowa City Public Library, could also be severely affected if they are within the tornado's path. Artifacts, documents, and exhibits at institutions like the University of Iowa Museum of Natural History may be destroyed or damaged beyond repair, disrupting operations and reducing access to cultural resources. Tornadoes striking venues used for community events or performances, such as the Iowa City Pedestrian Mall (Ped Mall), could delay or cancel activities, impacting cultural engagement and revenue streams.

The natural environment might also suffer from the effects of a tornado. Parks and recreational areas like Hickory Hill Park, Kent Park, and Macbride Nature Recreation Area could experience widespread damage, including uprooted trees, soil erosion, and habitat destruction. Recovery in heavily affected areas could take years, as reforestation and habitat restoration efforts would be necessary to rebuild ecosystems. Wildlife could be displaced or injured, disrupting local biodiversity. Additionally, tornado debris could contaminate water sources such as the Iowa River and Clear Creek, requiring extensive cleanup efforts to restore water quality and prevent ecological damage.

Future Land Use and Development

If a tornado were to impact Johnson County, it could influence future land use and development by reshaping priorities and practices to mitigate risks and enhance resilience. Areas severely damaged by the tornado might require redevelopment,



prompting updated building codes and zoning regulations to ensure structures are better equipped to withstand high winds. For example, new developments may incorporate storm-resistant materials, reinforced foundations, and designated storm shelters.

In heavily affected areas, land use planning could prioritize creating open spaces or greenbelts to act as buffers and reduce potential future damage in high-risk zones. Properties that were extensively damaged and deemed unsuitable for rebuilding might be repurposed for community-use spaces, parks, or flood mitigation projects.

Commercial and residential developers might shift focus toward areas perceived as safer or less vulnerable to severe weather, potentially affecting growth patterns across the county. Conversely, communities that demonstrate effective recovery and resilience measures could see increased demand for redevelopment, as residents and businesses seek secure and well-prepared locations.

3.4.19.8 Consequence Summary

If a tornado were to occur in Johnson County, the consequences could be significant, affecting people, property, and critical systems. Residents could face injuries, fatalities, and psychological trauma, particularly if the tornado impacts densely populated areas. Homes, businesses, and public infrastructure may sustain severe damage, leading to costly repairs and prolonged recovery efforts. Critical infrastructure, including power, transportation, and communication systems, could be disrupted, delaying emergency response and hindering daily operations. The county's historical landmarks and cultural institutions might suffer irreparable damage, while parks and natural areas could experience habitat destruction and debris contamination. Economically, businesses could face closures and revenue losses, with long-term impacts on property values and development patterns. These cascading effects emphasize the importance of robust preparedness, response, and recovery planning to mitigate the impacts of such an event.

Category	Narrative
Impact on the Public	• Injuries, fatalities, and psychological trauma. • Displacement due to damaged or destroyed homes. • Disruption to daily life and access to essential services.
Impact on the Economic Condition of the Planning Area	• Revenue losses for businesses due to closures and damage. • Costs of repairing infrastructure and rebuilding communities.

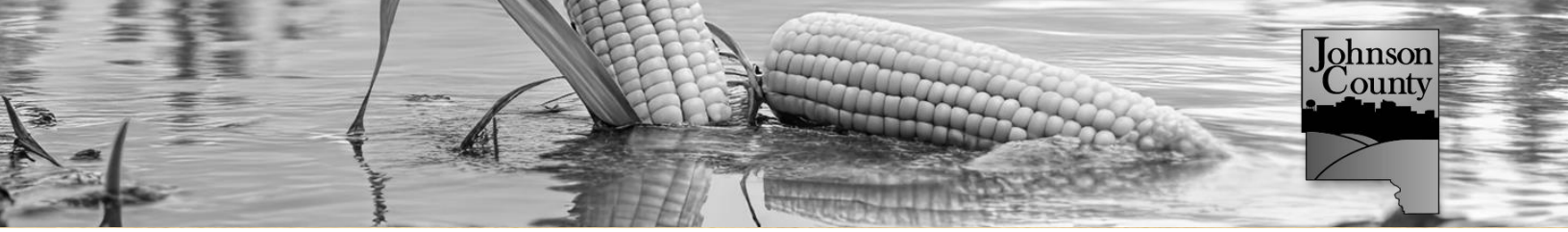
Category	Narrative
	• Impacts on agriculture, including crop destruction and equipment losses.
Impact on the Historical, Cultural, and Natural Environment	• Damage or loss of historical landmarks and cultural institutions. • Disruption of cultural events and public access to resources. • Destruction of parks, forests, and wildlife habitats.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values in heavily damaged areas. • Widespread damage to power, transportation, and communication systems. • Increased costs for infrastructure repairs and storm resilience upgrades.
Impact on the Public Confidence in Government	• Potential erosion of trust if response and recovery are perceived as inadequate. • Heightened scrutiny of emergency preparedness and resource allocation.
Impact on Responders	• Strain on emergency personnel due to high demand for response and recovery. • Increased risk of injury and stress among responders.
Impact on continuity of operations, including continued delivery of government services	• Disruption of essential public services and emergency operations. • Delayed restoration of normal government functions.
Cascading hazards	• Long-term economic impacts due to prolonged recovery periods. • Increased vulnerability to subsequent hazards, such as flooding. • Strained healthcare and social support systems during recovery.

3.4.20 Wildfire

Probability	Population Impact	Property Impact	Economy Impact	Overall Hazard Ranking
1.42	1.50	1.25	1.17	5.57

3.4.20.1 Description

A wildfire is an uncontrolled fire that rapidly spreads through vegetation such as grasslands, forests, or agricultural fields. In the Midwest, wildfires are more likely to affect grasslands, prairies, and agricultural areas, particularly during dry seasons or drought



conditions. These fires are often fueled by dry vegetation, strong winds, and low humidity, which can make them challenging to control. Wildfires can ignite from natural causes, such as lightning strikes, or from human activities, including burning debris, unattended campfires, and discarded cigarettes.

Wildfires are a critical hazard because they can cause widespread destruction in a short time. In addition to the loss of life and property, wildfires threaten agricultural productivity, damage critical infrastructure, and disrupt local ecosystems. They can also lead to secondary effects such as soil erosion, water contamination, and long-term harm to wildlife habitats. Even small-scale grass or field fires can produce significant smoke, reducing air quality and causing health issues for residents, including those with respiratory conditions. Understanding the risks of wildfires and implementing preparedness measures is essential to protect Johnson County's people, property, and natural resources.

3.4.20.2 Location

In Johnson County, areas most susceptible to wildfires include grasslands, agricultural fields, and regions with dense vegetation, particularly during periods of drought or low humidity. Rural zones with expansive farmlands and unmanaged prairies are at heightened risk, as dry crops and grasses can serve as fuel for fires. Additionally, regions with significant tree cover, such as local parks and nature reserves, may be vulnerable, especially if underbrush is not regularly cleared. Urban-rural interfaces, where residential developments border natural landscapes, also face increased risk due to the proximity of homes to potential fire sources. Human activities, including agricultural burning, equipment use, and recreational fires, can inadvertently ignite wildfires, making areas with higher human activity more susceptible. Implementing fire management practices and public education in these vulnerable zones is crucial to mitigate wildfire risks.

Applicable Jurisdictions	
Unincorporated Johnson County	City of Swisher
City of Coralville	City of Tiffin
City of Hills	City of University Heights
City of Iowa City	Clear Creek Amana CSD
City of Lone Tree	Iowa City CSD
City of North Liberty	Lone Tree CSD
City of Oxford	Solon CSD
City of Shueyville	University of Iowa
City of Solon	

Applicable Not Applicable

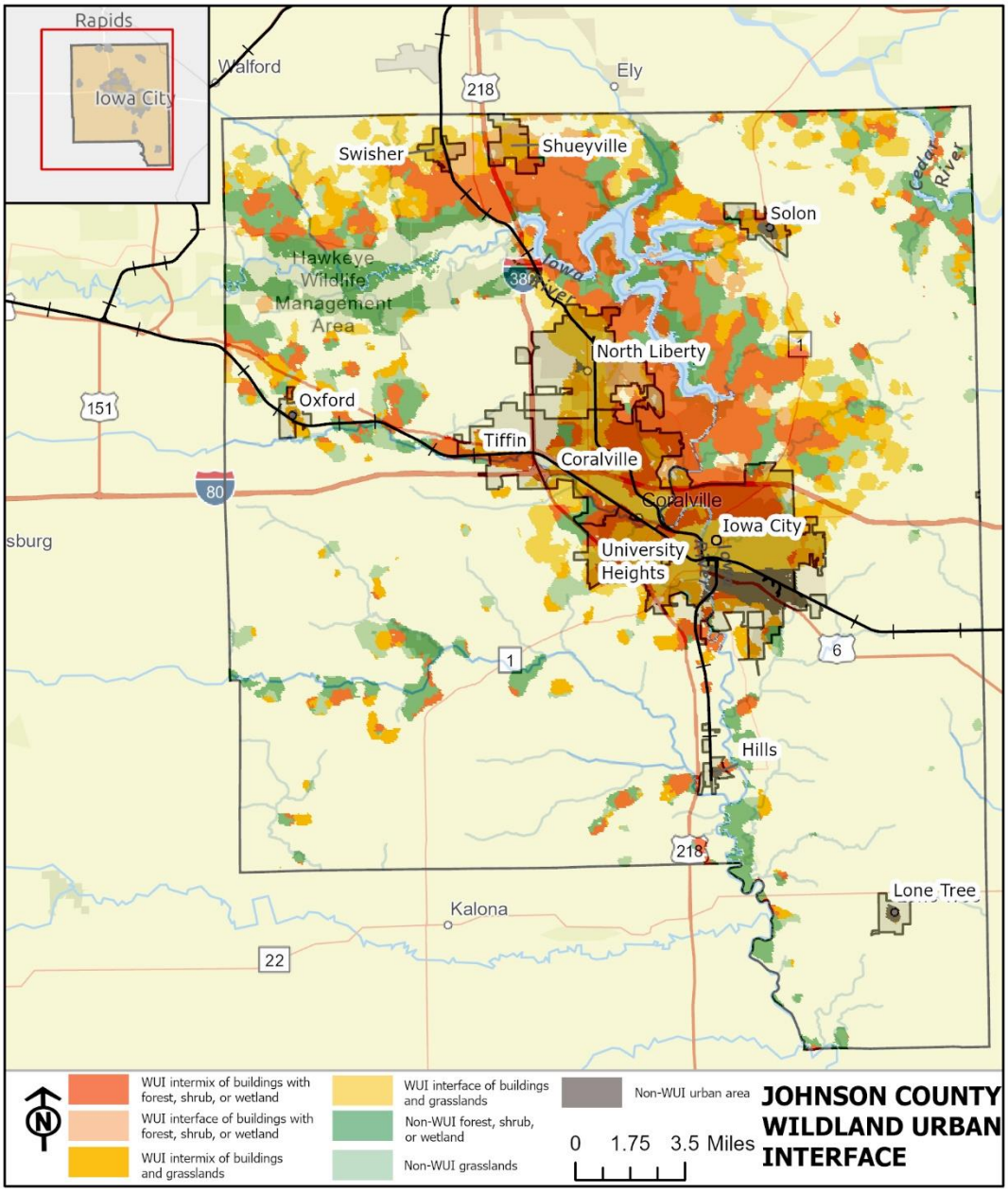


Figure 3-16: Johnson County WUI Map

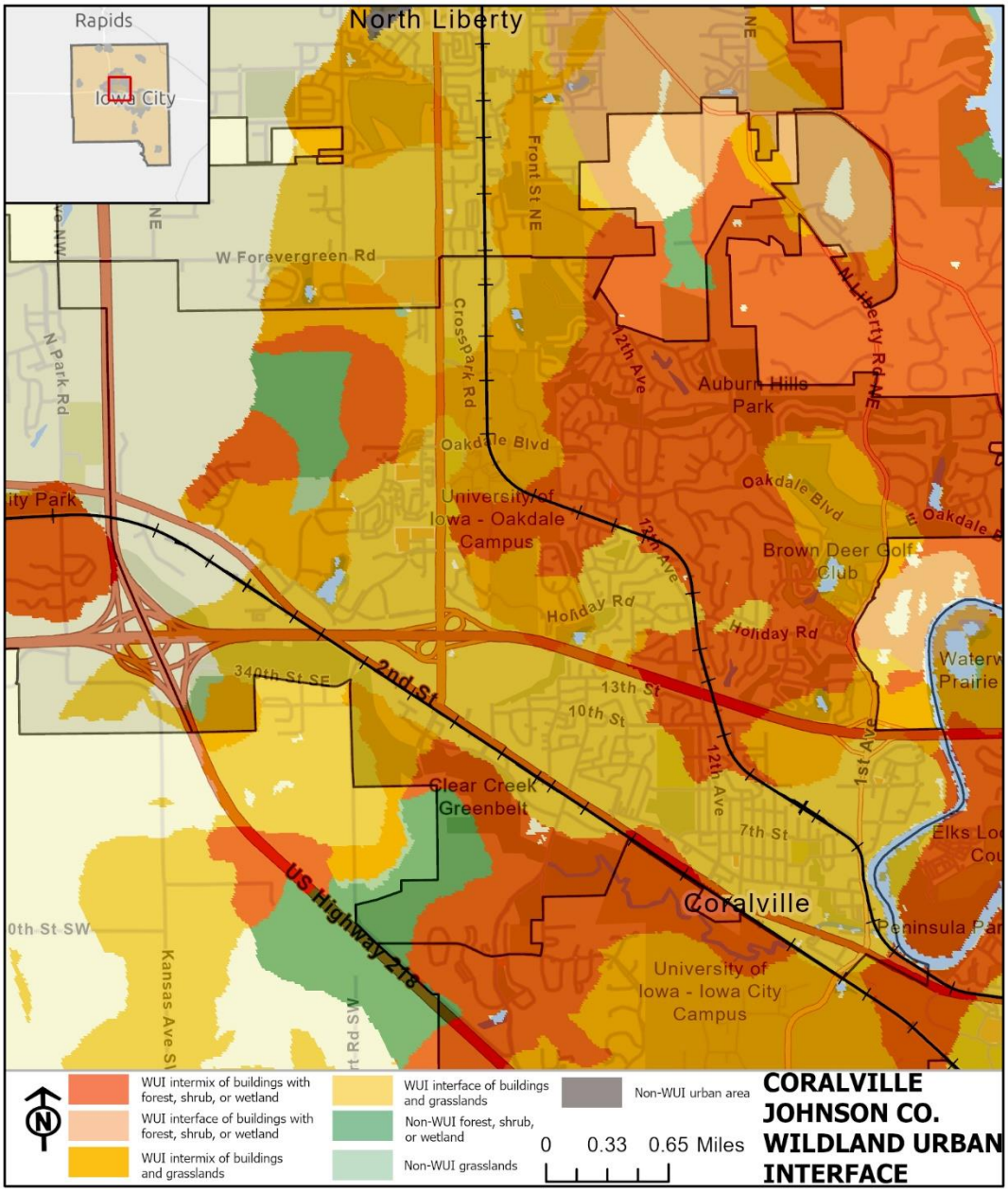


Figure 3-17: Coralville WUI Map

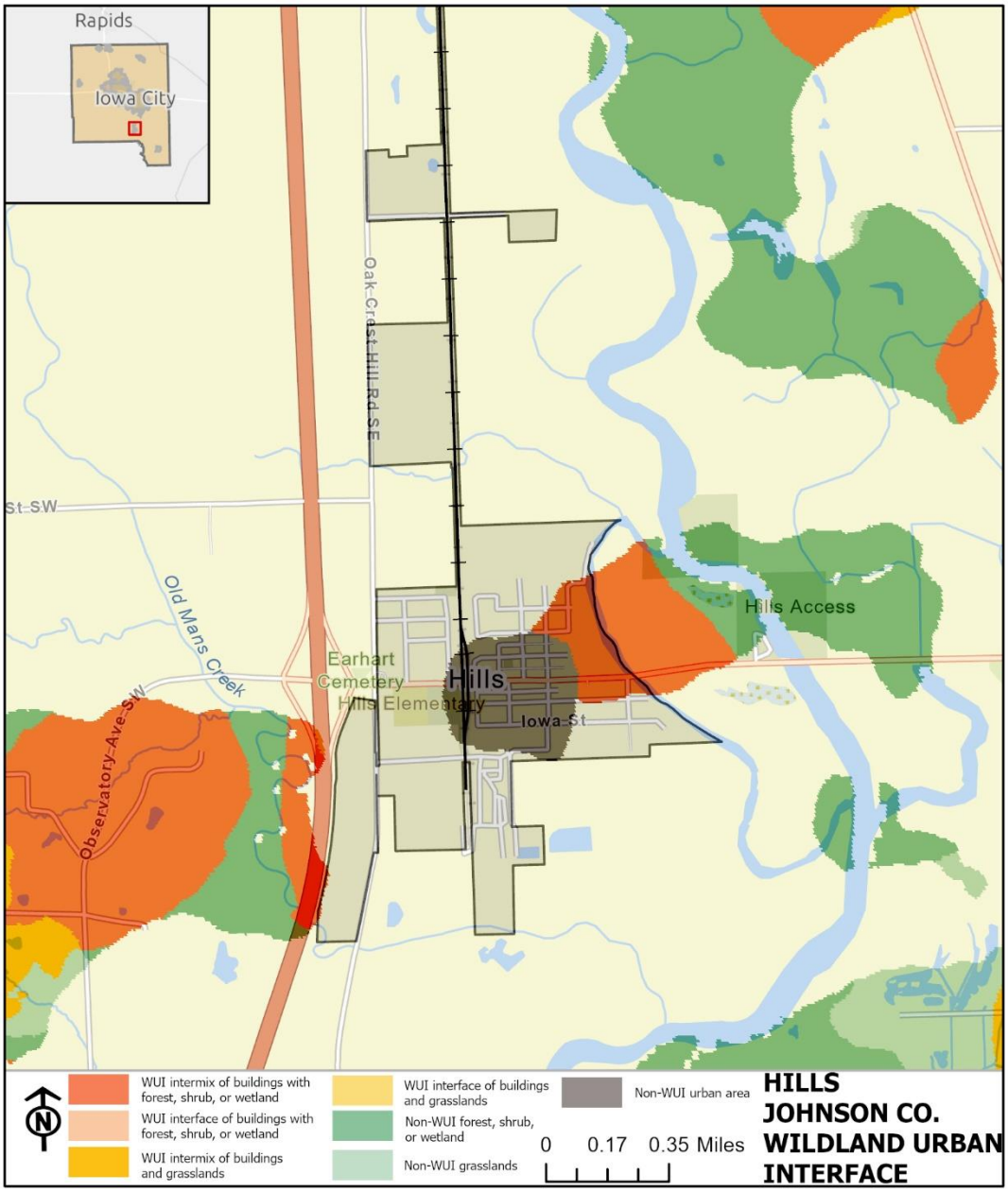


Figure 3-18: Hills WUI Map

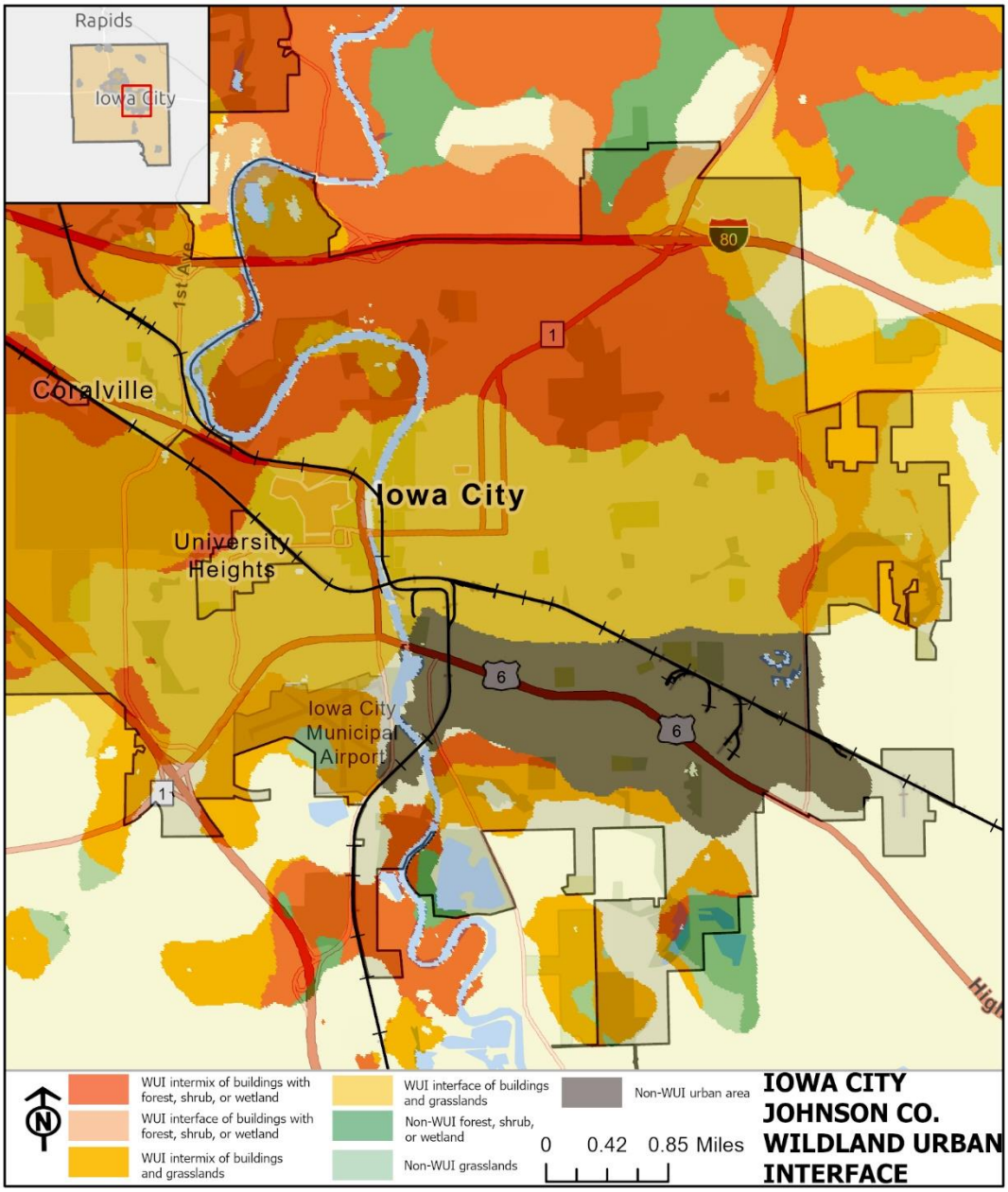


Figure 3-19: Iowa City WUI Map

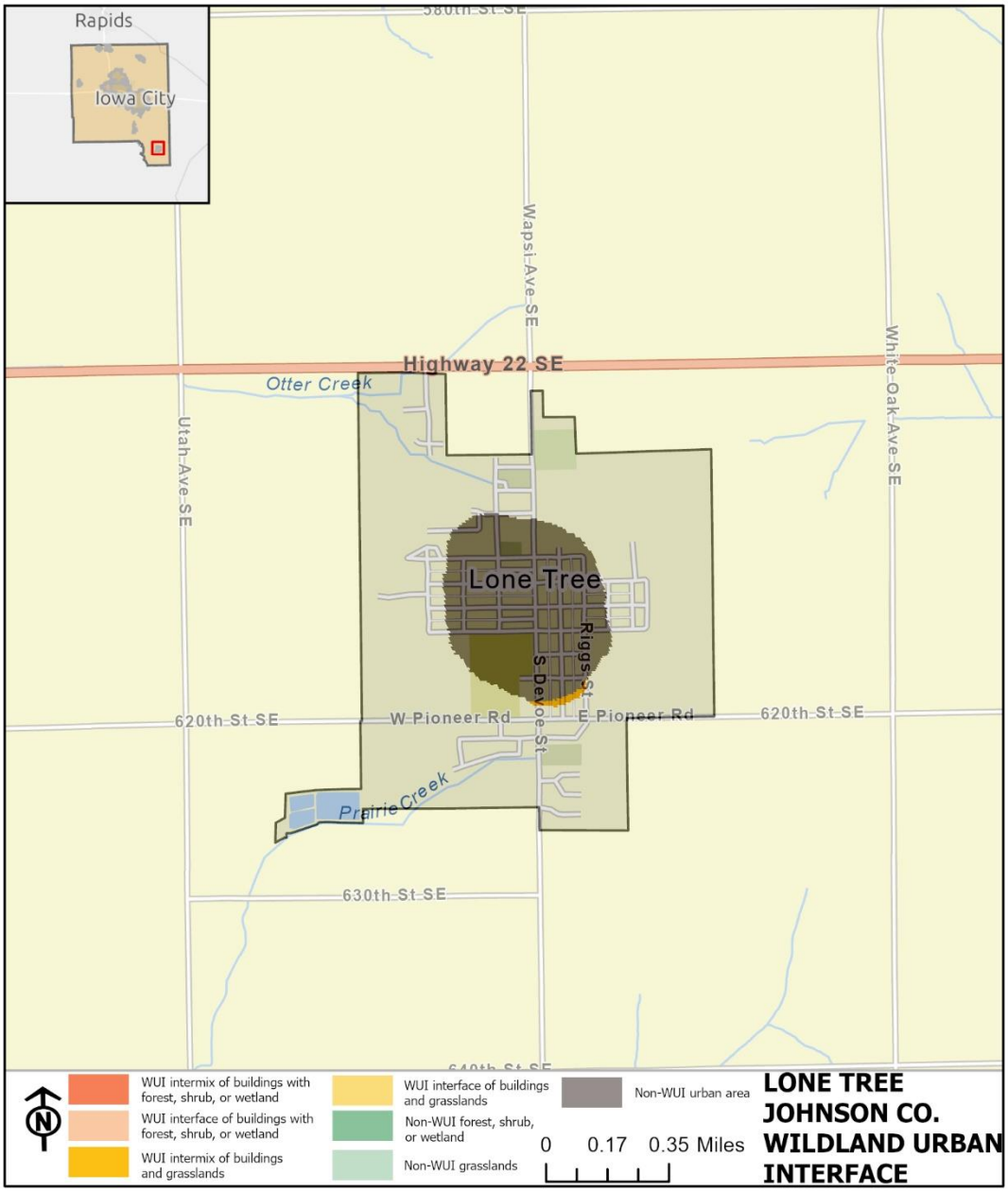


Figure 3-20: Lone Tree WUI Map

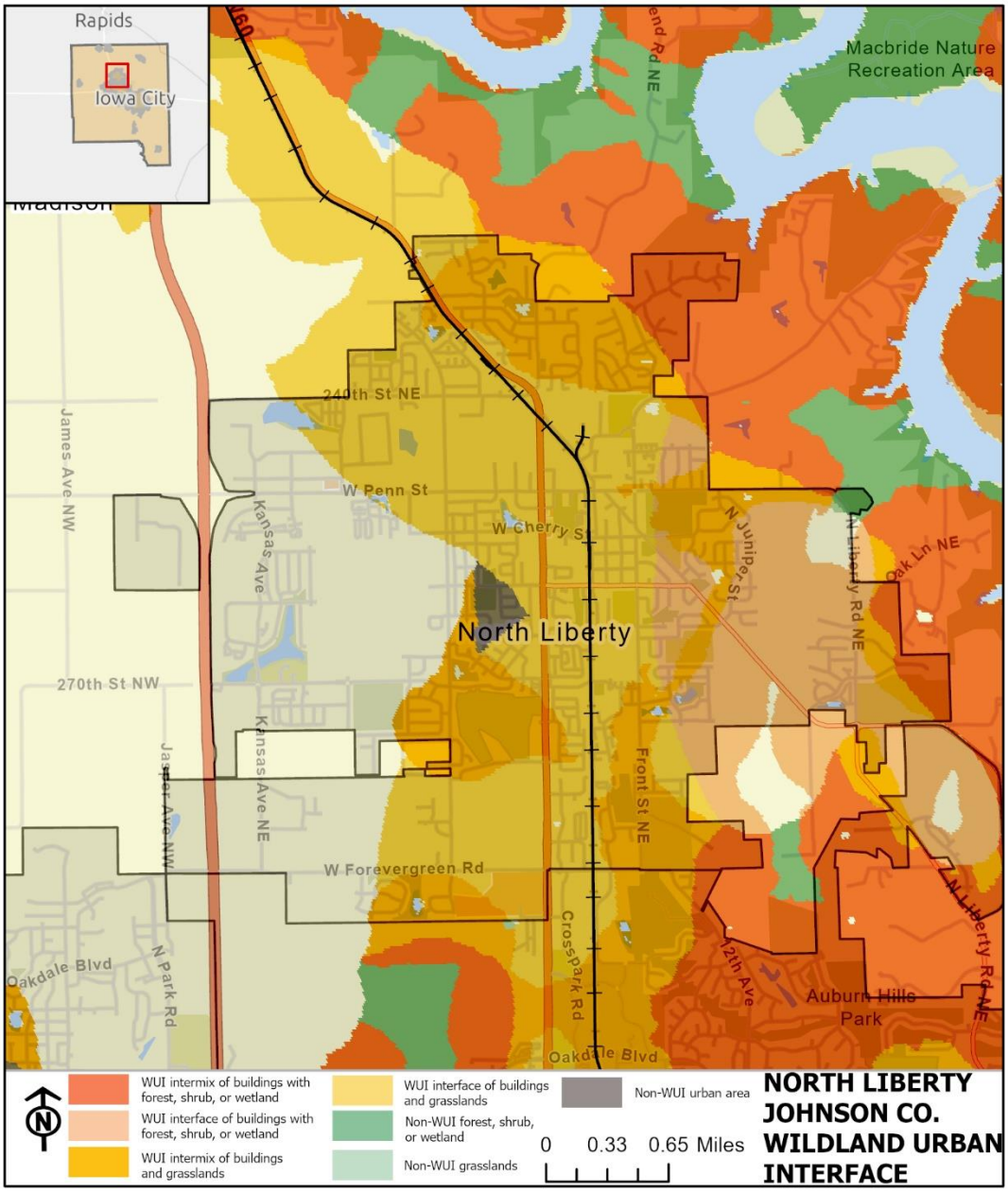


Figure 3-21: North Liberty WUI Map

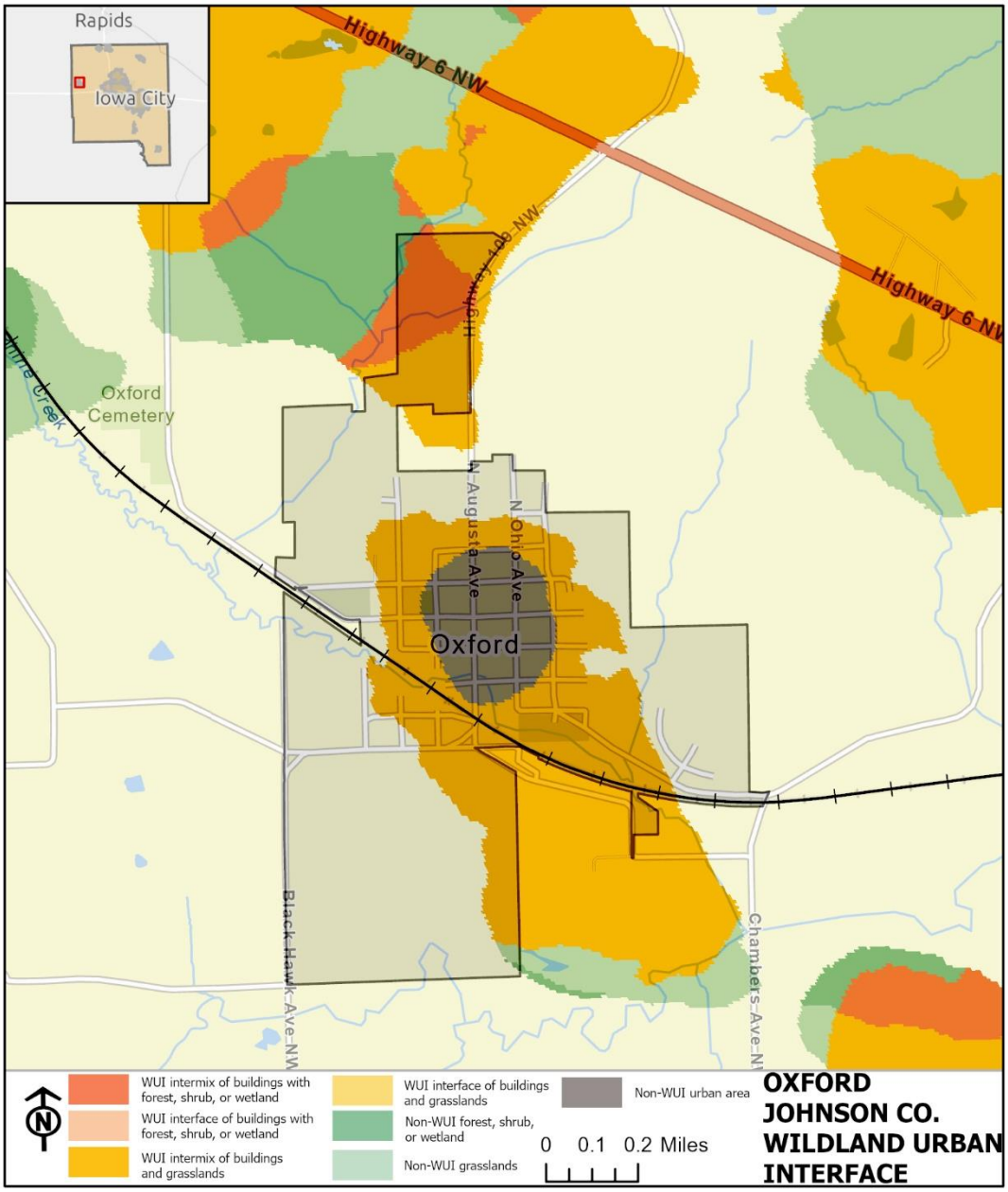


Figure 3-22: Oxford WUI Map

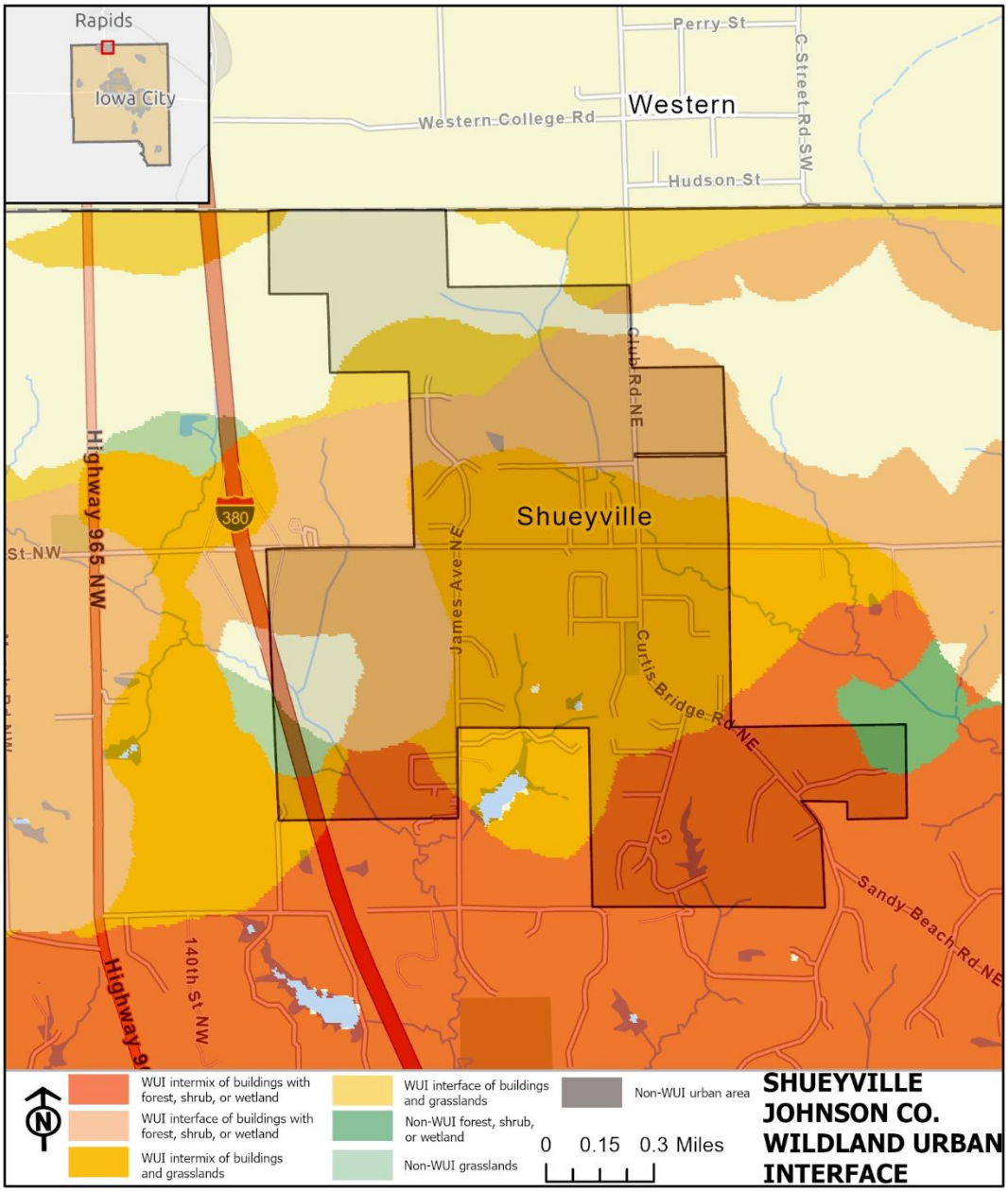


Figure 3-23: Shueyville WUI Map

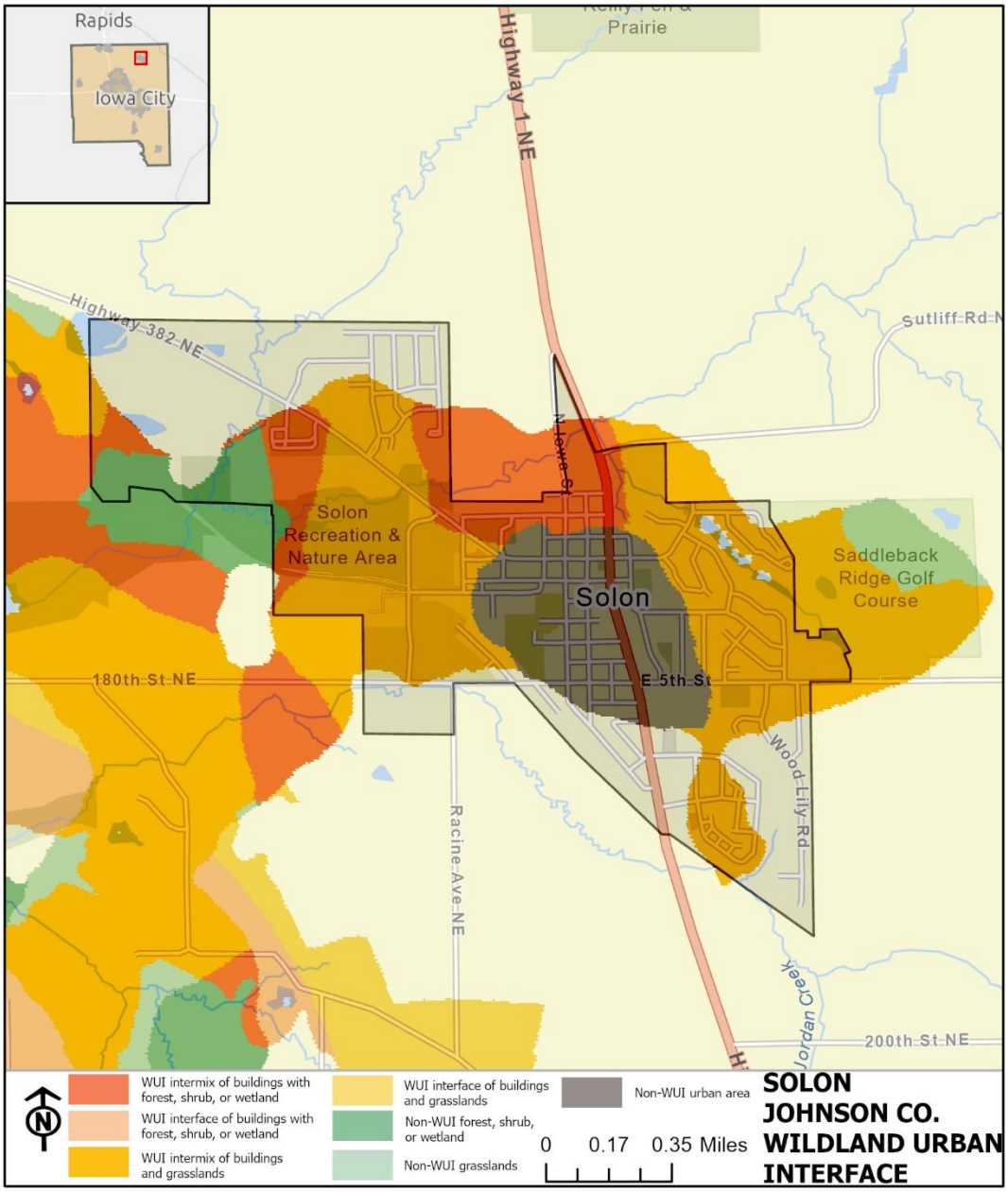


Figure 3-24: Solon WUI Map

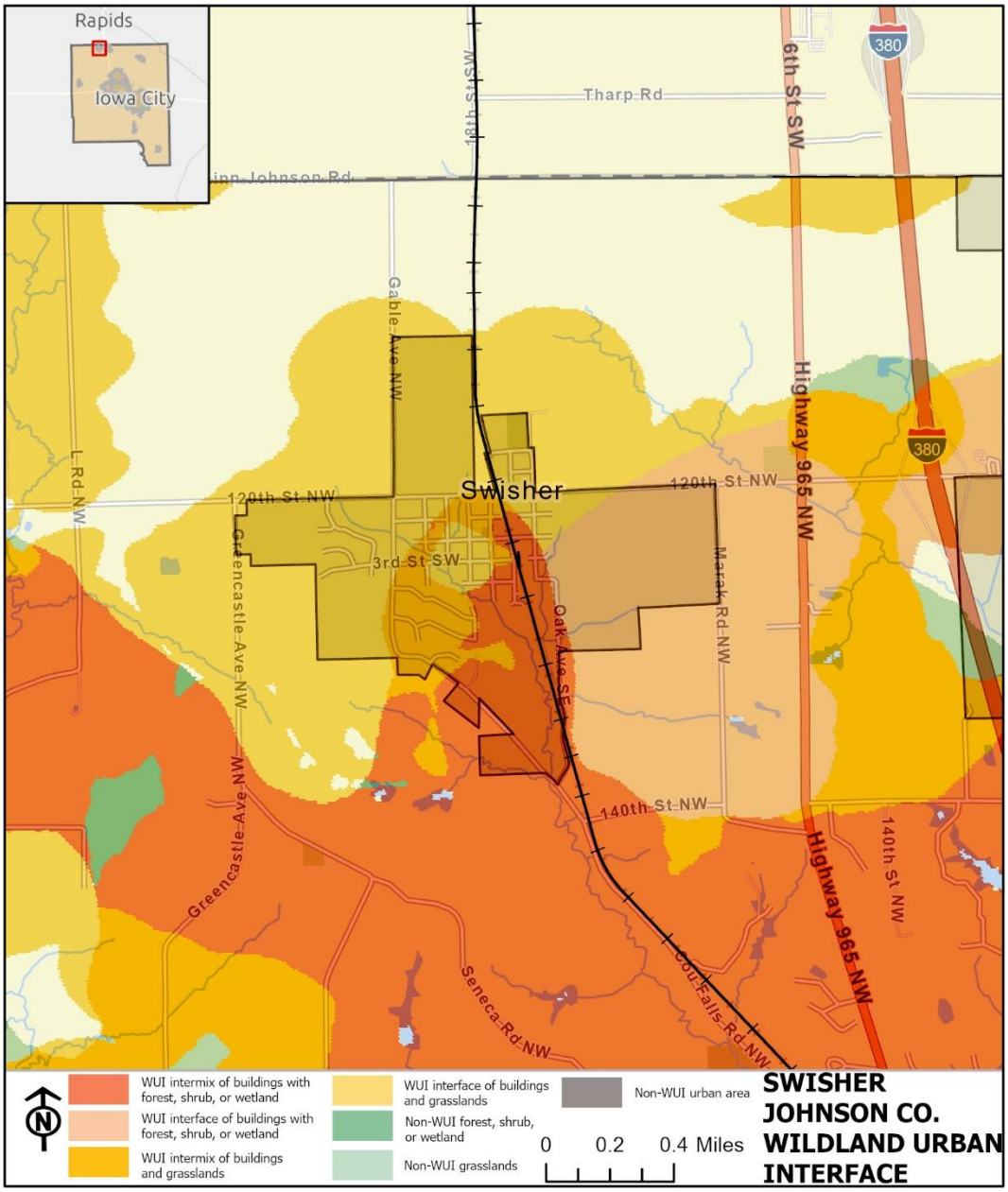


Figure 3-25: Swisher WUI Map

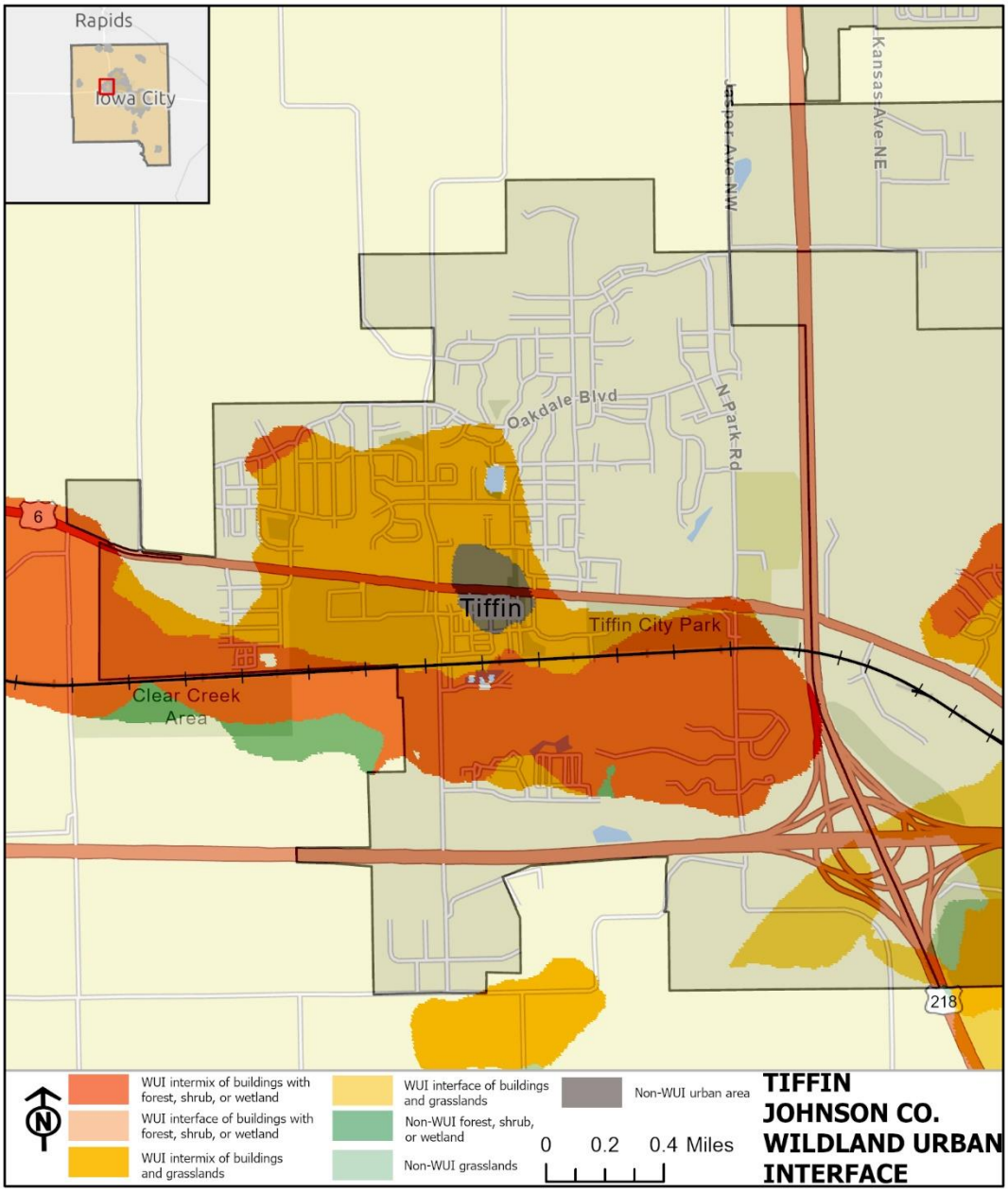


Figure 3-27: Tiffin WUI Map

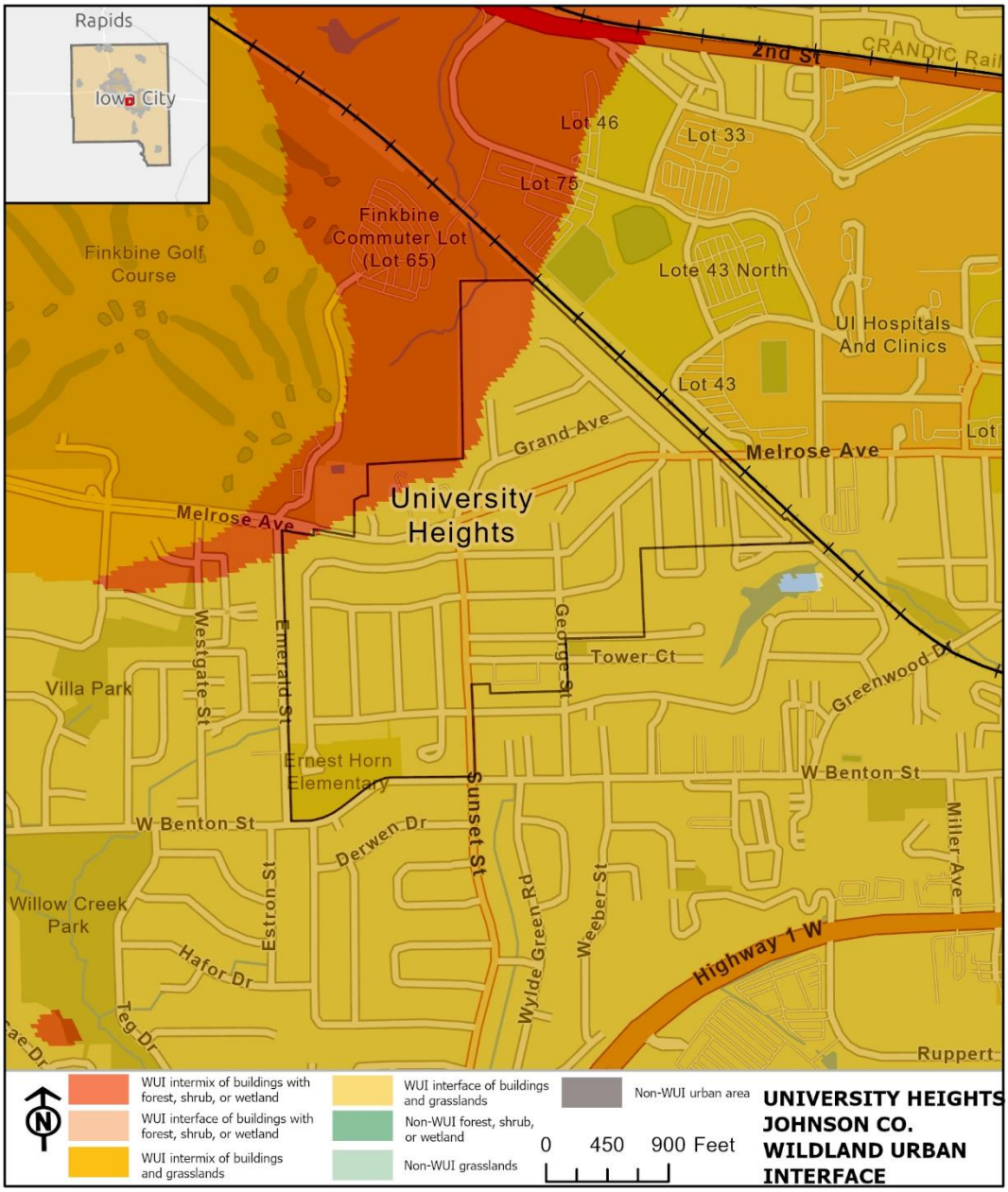


Figure 3-28: University Heights WUI Map

3.4.20.3 Magnitude/Severity

The magnitude and severity of a wildfire are typically measured based on several key factors, including size, intensity, rate of spread, and potential damage. One of the

primary measurements is the burned area, often quantified in acres, which indicates the total land affected by the fire. The intensity of the fire, determined by the energy released from burning vegetation, is another crucial factor and is assessed using flame length and heat output. Fires can be classified as low, moderate, or high intensity based on the severity of the flames and their potential for damage.

Rate of spread refers to how quickly the fire moves across the landscape, typically influenced by factors like wind speed, terrain, and fuel availability (vegetation). Wildfires that spread rapidly are generally more dangerous and difficult to control. The Fire Danger Rating System (FDRS) is often used to assess the likelihood of a fire starting and its potential severity, incorporating weather conditions, fuel moisture levels, and current fire behavior.

Additionally, the National Fire Danger Rating System (NFDRS) provides a more comprehensive measure by considering the environmental factors that contribute to fire behavior, such as temperature, humidity, and wind. Lastly, the potential for damage to human life, property, and critical infrastructure is also considered when evaluating the severity of a wildfire, as fires near populated or highly valued areas present a greater threat. Together, these factors help firefighters, emergency managers, and local authorities assess and respond to wildfires effectively.

The National Fire Danger Rating System (NFDRS) classifies fire danger levels into five categories, which help communicate the potential risk of wildfires based on current environmental conditions. These levels are determined by factors such as weather, vegetation dryness, fuel types, and wind. The five categories are listed in the following chart:

AREA INTENTIONALLY LEFT BLANK

BURN SEVERITY	RANK	DESCRIPTION	CHARACTERISTICS
 Unburned	RANK 0	Fire extinguished before reaching microsite	• Leaf litter from previous years intact and uncharted • No evidence of char around base of trees and shrubs • Pre-burn seedlings and herbaceous vegetation present
 Low Severity Burn	RANK 1	Surface fire which consumes litter yet has little effect on trees and understory vegetation	• Burned with partially consumed litter present • Evidence of low flame heights around base of trees and shrubs (<0.5 m) • No significant decreases in overstory & understory basal area, diversity or species richness from pre-burn assessments • Usually burning below 80 degrees Celcius
 Medium-Low Severity Burn	RANK 2	No significant differences in overstory density and basal area, & no significant differences in species richness. However, understory density, basal area, and species richness declined.	• No litter present and 100% of the area covered by duff • Flame lengths < 2 m • Understory mortality present, little or no overstory mortality
 Medium-High Severity Burn	RANK 3	Flames that were slightly taller than those of Medium-low intensity fires, but these fires had occasional hot spots that killed large trees, with a significant reduction in the understory.	• Soil exposure on 1-50% of the area • Flame lengths < 6 m • High understory mortality with some overstory trees impacted
 High Severity Burn	RANK 4	Crown fires, usually a stand-replacing burn with relatively high overstory mortality.	• Soil exposure > 50% • Flame lengths > 6m • Higher overstory mortality 20% • Usually burning above 800 degrees Celcius

3.4.20.4 Past Occurrences

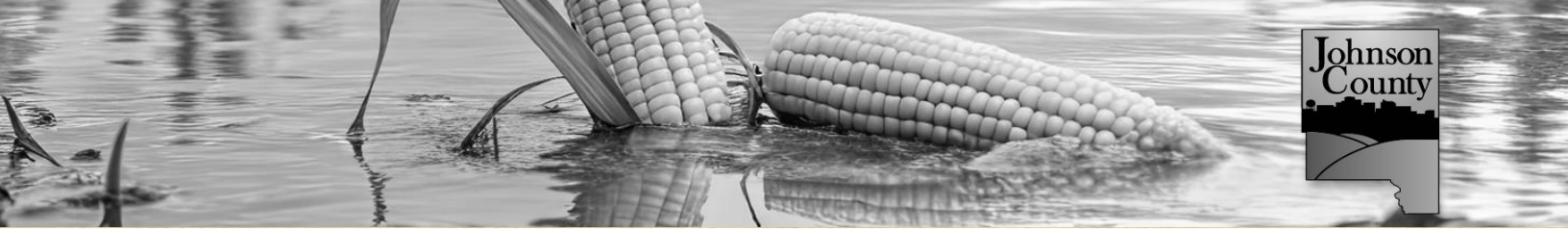
While Johnson County, Iowa, has not experienced significant wildfire incidents in recent history, the state and the broader Midwest region have faced notable events:

- October 5, 1871 – Burlington, Iowa: A significant fire in Burlington caused widespread damage to the city. Though not a wildfire in the traditional sense, it is part of the region's history of destructive fires.
- October 8-14, 1871 – Peshtigo Fire, Wisconsin: The deadliest wildfire in U.S. history destroyed the town of Peshtigo and surrounding areas, resulting in over 1,200 deaths and burning approximately 1.2 million acres. While this did not directly impact Iowa, it highlights the severe risks of wildfires in the Midwest.
- April 9, 2014 – Wayne County, Iowa: A wildfire consumed over 1,000 acres of grassland and timber, leading to temporary evacuations and property damage. This event underscores Iowa's susceptibility to rural wildfires.
- April 6, 2020 – Guthrie County, Iowa: A controlled burn got out of control, spreading rapidly due to high winds and dry conditions, burning approximately 200 acres. Firefighters worked to protect nearby structures, highlighting the dangers of agricultural and controlled burns.
- March 5, 2021 – Crawford County, Iowa: A wildfire burned approximately 300 acres of farmland and grassland. High winds contributed to the fire's rapid spread, causing damage to fencing and agricultural equipment.
- July 7, 2012 – Eastern Nebraska Grassfires: A series of wildfires burned over 20,000 acres near Omaha, Nebraska, fueled by extreme drought and high temperatures. The fires caused air quality issues that extended into neighboring Iowa.
- October 24, 2019 – Loess Hills, Iowa: A wildfire burned several hundred acres of prairie land in western Iowa. The fire threatened homes and infrastructure but was contained with coordinated firefighting efforts.

Reviewing past wildfire incidents, both within Iowa and across the Midwest, provides valuable insights into the risks and vulnerabilities associated with this hazard. These events highlight the conditions that contribute to wildfires, such as drought, high winds, and human activities, enabling the planning area to identify factors that increase local susceptibility. By analyzing the impacts of past incidents, including property damage, evacuations, and firefighting challenges, the planning area can develop more effective mitigation strategies, such as controlled burns, public education, and enhanced fire response capabilities. Even if specific events did not occur in Johnson County, they offer lessons that can inform preparedness measures and improve resilience to future wildfires.

3.4.20.5 Likelihood of Future Occurrence

The likelihood of wildfires occurring in Johnson County, Iowa, is considered low to moderate. While the county does not have extensive forested areas, it features



grasslands, agricultural fields, and urban-rural interfaces that can be susceptible to fire under certain conditions. Factors such as prolonged drought, high winds, and human activities like open burning or equipment use can increase the risk of wildfires. Historical data indicates that significant wildfire events in the county are infrequent; however, smaller-scale fires have occurred, particularly during dry seasons. Climate change projections suggest that the Midwest may experience more extreme weather patterns, including periods of drought, which could elevate the risk of wildfires in the future.

3.4.20.6 Climate Change Considerations

Wildfires are a natural hazard, and climate change is increasingly recognized as a factor that could influence their frequency and intensity. While Johnson County is not traditionally a high-risk area for wildfires, changing climate patterns could exacerbate conditions that contribute to fire hazards, such as prolonged droughts, higher temperatures, and increased wind speeds. These factors can dry out vegetation, making grasslands and agricultural areas more susceptible to ignition.

Additionally, climate change may lead to shifts in precipitation patterns, with more frequent and intense periods of dry weather that heighten wildfire risks. Although Johnson County does not have extensive forests, its grasslands and croplands could become more vulnerable under these conditions. While the direct relationship between climate change and wildfire risk in Johnson County remains moderate compared to western U.S. states, understanding these dynamics is important for long-term planning.

3.4.20.7 Vulnerability

People

If a wildfire were to occur in Johnson County, the impact on people could be significant, particularly for those living in rural areas or near grasslands and agricultural fields. Residents in the immediate vicinity of the fire could face evacuation, property loss, or health risks from exposure to smoke and poor air quality. Older adults (9.6%), individuals with respiratory conditions, and those with limited mobility (7.1%) would be at heightened risk during and after the event, particularly if emergency evacuations are necessary. Households without reliable transportation (6.1%) may struggle to evacuate in time, increasing their vulnerability.

The psychological impact of a wildfire, including stress and anxiety, could also affect residents, especially if the fire results in significant property loss or displacement. Low-income households (16.9%) and renters may have fewer options for temporary housing

or financial resources to recover from damages. Non-English-speaking populations (4.4%) may face challenges in receiving timely evacuation orders or accessing relief assistance, further complicating their ability to recover. Disruptions to essential services such as healthcare, grocery stores, and transportation could disproportionately impact vulnerable and underserved populations, making it harder for them to access necessary medical care and daily essentials.

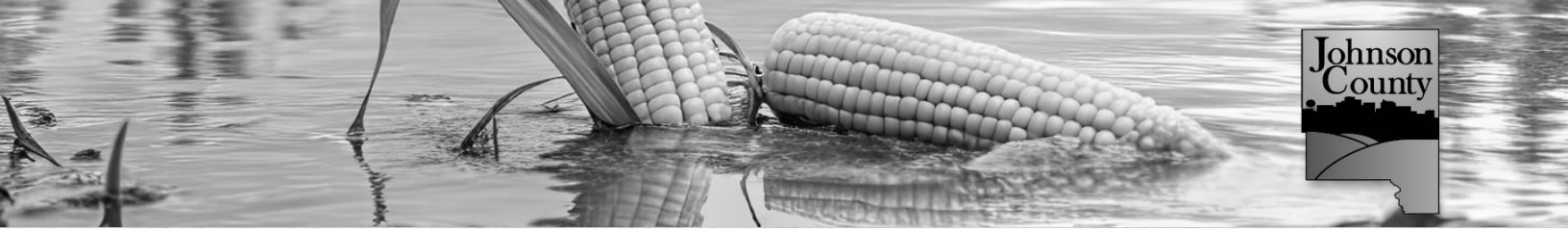
Additionally, smoke from the fire could reduce air quality across a larger area, impacting communities far from the fire itself. Individuals with asthma or other respiratory conditions would be particularly affected, and lower-income households may have limited access to air filtration systems or the ability to relocate temporarily to areas with better air quality. Schools and workplaces may also face closures due to smoke exposure, further disrupting daily life. Overall, wildfires in Johnson County would have widespread health, economic, and social impacts, with underserved populations experiencing the greatest difficulties in evacuation, recovery, and long-term stability.

Economy

If a wildfire were to occur in Johnson County, the economic impact could be significant, particularly in rural and agricultural areas. Damage to farmland, including crops and equipment, could result in substantial financial losses for farmers and disrupt the local agricultural economy, a vital component of the county's economic structure. Infrastructure repairs, such as replacing fencing, power lines, or roads damaged by fire, would impose additional costs on local governments and utilities.

Businesses in affected areas might face temporary closures or operational disruptions, leading to lost revenue and potential layoffs. Smaller businesses, which often lack the financial resilience to recover quickly, could be disproportionately impacted. Additionally, costs associated with emergency response efforts, including firefighting resources, evacuation logistics, and temporary housing for displaced residents, would place strain on the county's financial resources.

Smoke and air quality issues caused by the wildfire could also deter visitors and tourism in areas like Iowa City, affecting local businesses that rely on event traffic or recreational visitors. Long-term economic consequences might include increased insurance premiums for property owners in wildfire-prone areas and the need for investment in fire mitigation and prevention measures. While wildfires in Johnson County are less frequent compared to other regions, even a localized event could disrupt key economic activities and require significant resources for recovery.



Built Environment

General Property

If a wildfire were to occur in Johnson County, the impact on property values could vary depending on the severity and location of the fire. Properties directly affected by the wildfire, particularly those that experience significant damage or destruction, would likely see a temporary decline in value due to repair or rebuilding needs and potential buyer concerns about future risks. Nearby properties, even if not directly damaged, might also experience a decrease in value due to perceived vulnerability or the lingering effects of the fire, such as smoke damage or changes in the landscape.

In rural areas, where wildfires could affect agricultural land, the value of farmland might decline temporarily if the fire damages soil, fencing, or other essential infrastructure. Conversely, properties in areas perceived as safer or further removed from wildfire-prone zones might see increased demand, potentially stabilizing or even increasing their value.

Over time, property values in the affected areas could recover, particularly if mitigation efforts, such as improved fire prevention and community rebuilding initiatives, are implemented effectively. However, repeated wildfire events or inadequate recovery efforts could lead to longer-term impacts on the local real estate market.

Critical Infrastructure

If a wildfire were to occur in Johnson County, critical infrastructure could be significantly affected, particularly in rural areas and at the urban-rural interface. Power lines and utility poles, which are often exposed and vulnerable to fire, could be damaged or destroyed, leading to power outages that impact homes, businesses, and essential services. Repairs to electrical infrastructure would require time and resources, prolonging the disruption.

Transportation infrastructure, such as roads and bridges, could be blocked or damaged by the fire itself or by debris from burned vegetation, hindering evacuation efforts and delaying emergency response. Communication networks, including cellular towers and internet services, might also be disrupted if equipment is damaged or power supply to these systems is interrupted.

Water systems, including irrigation for agriculture and water treatment facilities, could face contamination from fire debris or direct damage, affecting water quality and availability. Hospitals and emergency shelters might experience surges in demand from injured or displaced residents, straining resources and operational capacity. Critical

infrastructure near wildfire-prone areas, such as farms, schools, and industrial facilities, could also be at risk of damage or operational disruption.

Historical, Cultural, and Natural Environment

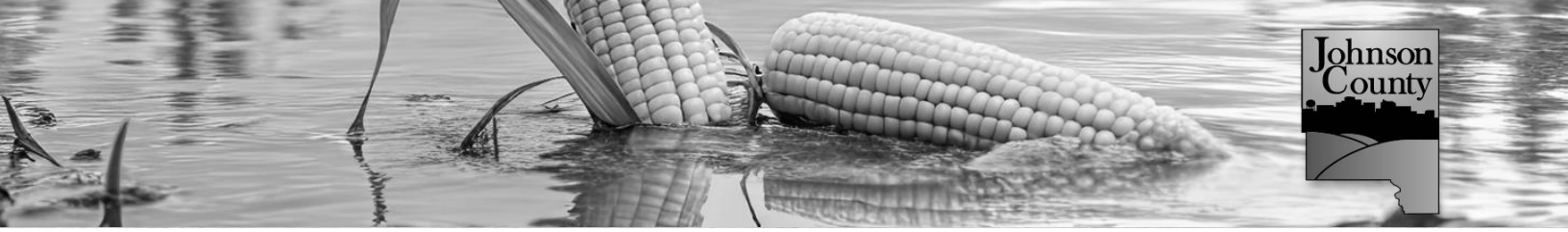
If a wildfire were to occur in Johnson County, it could have significant impacts on the historical, cultural, and natural environment. Historical landmarks and cultural sites located near forested areas are particularly vulnerable to fire damage due to their proximity to vegetation that could fuel a wildfire. Plum Grove Historic Home, situated near wooded land, could be at risk of fire spreading from nearby grasslands or trees. Similarly, the Johnson County Historic Poor Farm, which is located near open fields, could face wildfire threats, particularly if dry conditions increase fire spread potential. Loss or damage to these sites would not only destroy irreplaceable artifacts and records but could also diminish the community's connection to its heritage.

Cultural institutions near forested or grassland areas, such as Hancher Auditorium, which is located near the Iowa River and tree-lined areas, might face operational disruptions or physical damage if a wildfire spreads to its vicinity. Outdoor cultural spaces, such as Kent Park, could be impacted if wildfires spread through its forested trails and natural areas, leading to temporary closures and loss of recreational use. These disruptions could delay or cancel public events, reduce community engagement, and impact local economic activity tied to arts and recreation.

The natural environment would likely face the most direct impact from a wildfire. Parks, grasslands, and natural reserves like Hickory Hill Park, Macbride Nature Recreation Area, and F.W. Kent Park are at high risk due to their extensive tree cover and dry undergrowth. Wildfires in these areas could result in habitat destruction, loss of vegetation, and significant wildlife displacement. Additionally, the fire could lead to soil erosion, increased runoff, and sedimentation in water sources such as the Iowa River, Clear Creek, and Lake Macbride, impacting water quality and aquatic ecosystems. The loss of these natural areas would not only reduce biodiversity but also limit recreational opportunities for residents and visitors, altering the landscape and disrupting tourism and outdoor activities.

Future Land Use and Development

If a wildfire were to occur in Johnson County, it could influence future land use and development by prompting changes in planning priorities and zoning regulations to reduce fire risks and enhance community resilience. Areas heavily damaged by the wildfire might be repurposed or face restrictions on redevelopment, particularly if they



are identified as high-risk zones for future fires. For example, agricultural land affected by fire might see a shift in land management practices, such as implementing firebreaks or limiting certain types of vegetation that contribute to fire spread.

Development patterns might prioritize fire-resistant construction methods and materials, particularly in rural areas or urban-rural interfaces. New residential or commercial developments could be required to incorporate defensible spaces—buffer zones between structures and flammable vegetation—into their designs. These measures could impact the cost and feasibility of new projects.

Wildfire-prone areas may experience slower growth or reduced demand, as potential residents and businesses consider safety concerns. Conversely, areas further from high-risk zones might see increased development pressure as people seek locations perceived as safer. Local governments might also prioritize the creation or preservation of open spaces, such as parks or greenbelts, to act as natural buffers against future wildfires.

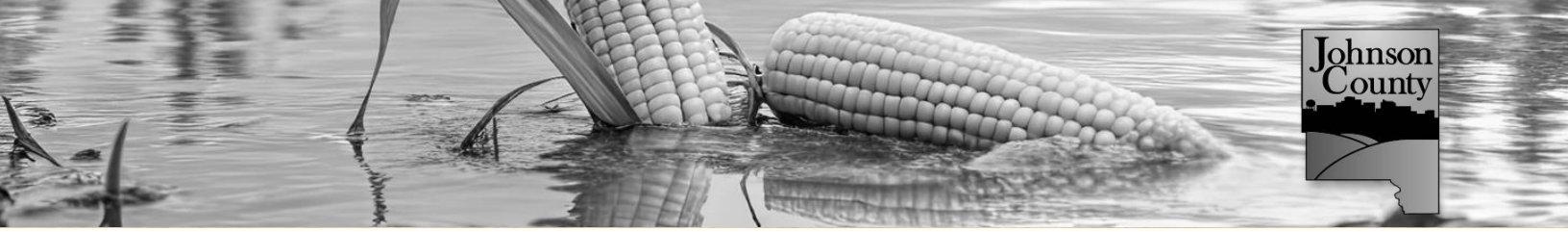
3.4.20.8 Consequence Summary

If a wildfire were to occur in Johnson County, the consequences could be significant, affecting people, property, and the environment. Residents in impacted areas might face displacement, property loss, and health risks from smoke and poor air quality, particularly those with respiratory conditions. Damage to critical infrastructure, including power lines, roads, and communication networks, could disrupt essential services and delay emergency response efforts. The county's agricultural sector could suffer losses from burned crops and equipment, while natural areas, parks, and wildlife habitats might experience long-term ecological damage. Cultural and historical landmarks near the fire could also be at risk, resulting in the loss of irreplaceable resources. Economically, businesses and farms may face revenue losses, and recovery efforts would require substantial investment. These cascading impacts highlight the importance of wildfire preparedness and mitigation strategies to minimize risks and support recovery.

Category	Narrative
Impact on the Public	• Displacement of residents and potential property loss. • Health risks from smoke and poor air quality. • Increased stress and psychological impacts, particularly for vulnerable populations.
Impact on the Economic Condition of the Planning Area	• Losses in agriculture, including damaged crops and equipment.

Category	Narrative
	• Revenue loss for businesses due to operational disruptions. • Costs for firefighting, recovery, and rebuilding efforts.
Impact on the Historical, Cultural, and Natural Environment	• Damage to or destruction of historical landmarks and cultural institutions. • Loss of vegetation, wildlife habitats, and recreational areas. • Long-term ecological impacts, including soil erosion and water contamination.
Impact on Built Environment, General Property, and Critical Infrastructure	• Decline in property values in affected areas. • Damage to power lines, roads, and communication systems, disrupting services. • Increased costs for repairs and fire-resistant infrastructure upgrades.
Impact on the Public Confidence in Government	• Potential erosion of trust if response is perceived as slow or ineffective. • Increased public demand for wildfire prevention and mitigation measures.
Impact on Responders	• Strain on firefighting resources and personnel. • Safety risks and physical exhaustion for emergency responders.
Impact on continuity of operations, including continued delivery of government services	• Temporary disruption of essential public services and emergency coordination. • Delays in restoring normal operations in fire-affected areas.
Cascading hazards	• Soil erosion and water quality issues from fire debris. • Increased risk of flooding in burned areas with reduced vegetation. • Potential air quality impacts on neighboring regions.

Section 4: Mitigation Strategy



SECTION 4: MITIGATION STRATEGY

4.1 Overview

Element Addressed in Section
Element C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i)), including requirement **C3-a**.

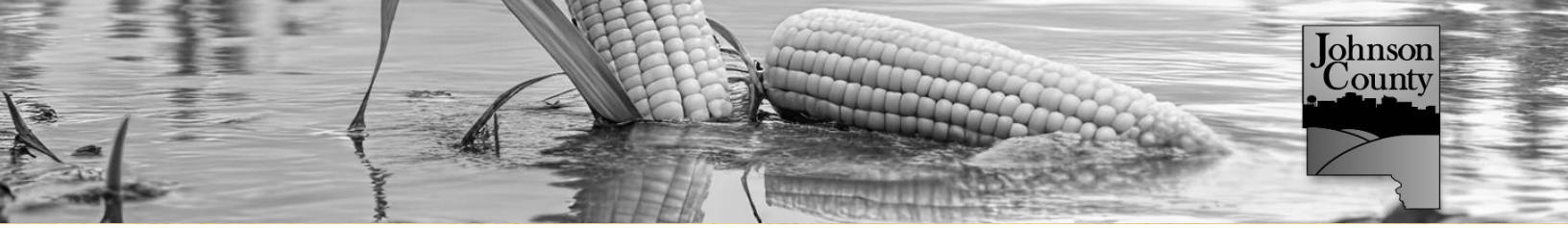
The mitigation strategy is a key component of the local hazard mitigation planning process, focused on identifying actions that will reduce or eliminate long-term risks to people, property, and the environment from hazards. This section outlines the development of a comprehensive approach for mitigating the impacts of natural disasters by setting clear goals, prioritizing actions, and creating an action plan for implementation. The strategy is built on a thorough understanding of the community's risks, capabilities, and vulnerabilities, ensuring that all stakeholders are involved in decision-making and that actions are aligned with broader community goals. The section will cover the formulation of mitigation goals, identification and prioritization of specific actions, and methods for integrating these actions into existing plans and processes to promote long-term resilience and risk reduction.

4.1.1 Goals and Objectives

Element Addressed in Section
Element E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3)), including requirement **E2-a**.

For this plan update, the revised goals have been aligned with the State of Iowa's Hazard Mitigation Plan to ensure consistency and comprehensive hazard reduction across both local and state levels. These goals reflect a proactive, collaborative approach to mitigate risks while enhancing resilience in the planning area:

- Goal 1: Protect critical facilities, infrastructure, and community assets by promoting comprehensive planning and regulatory processes that reduce hazard risks.
- Goal 2: Safeguard the health, safety, and property of residents through the development of resilient infrastructure and community-wide mitigation efforts.
- Goal 3: Enhance public awareness, communication, and education about hazards, risks, and vulnerability reduction to foster a more informed and prepared community.



- Goal 4: Ensure efficient use of public funds in implementing mitigation actions, focusing on long-term risk reduction and cost-effective strategies for hazard preparedness and response.

The updated goals for this Plan align with FEMA's mitigation action types as outlined in the Local Mitigation Planning Handbook (May 2023). Goals one and three directly correspond with two of the key action types: goal one focuses on developing and strengthening local plans and regulations to mitigate hazard impacts, while goal three emphasizes education and awareness programs to enhance public understanding of risks and increase community resilience.

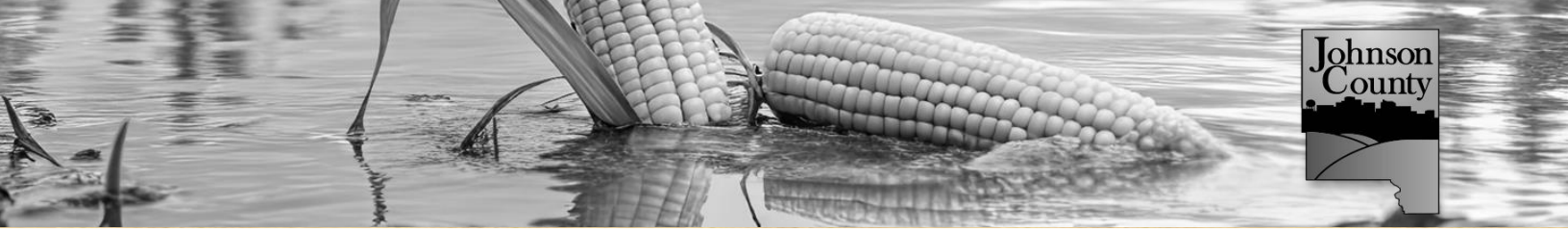
Goal two incorporates both structural and infrastructure projects as well as the protection of natural systems, ensuring that mitigation strategies balance development with environmental sustainability.

Goal four, while not directly aligning with FEMA's standard action types, continues the county's focus on maintaining the continuity of essential services during disasters. This goal was refined to highlight the importance of warning systems and redundancy, with specific actions including the acquisition of generators and backup power systems to ensure critical services can continue functioning during emergencies.

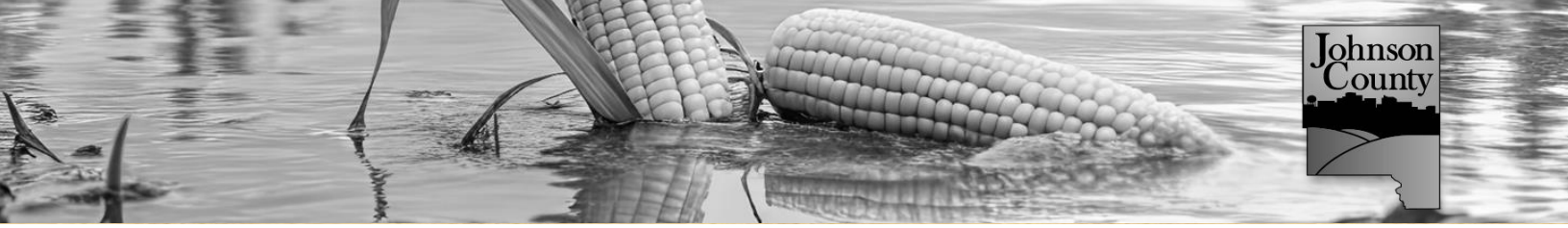
4.2 Progress on Previous Mitigation Actions

Element Addressed in Section
Element E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3)), including requirement **E2-b**.

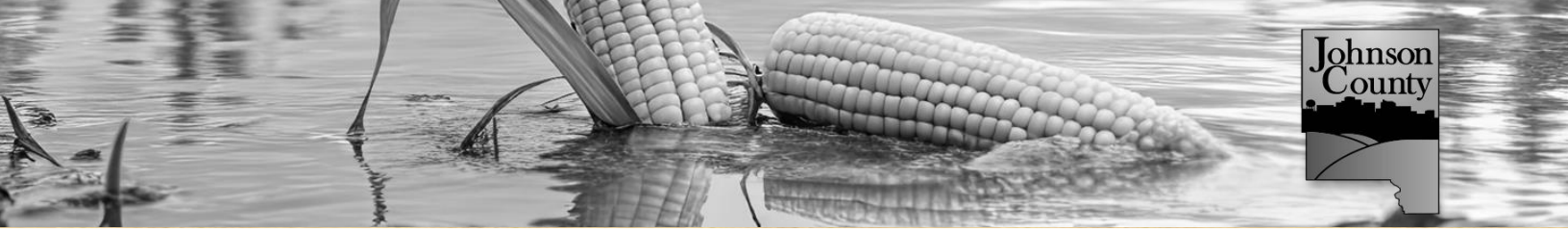
The table below provides a comprehensive review of the 2019 hazard mitigation actions, detailing the status of each action for every jurisdiction. The table specifies whether each action has been completed or remains ongoing. For actions that have not been completed, the table indicates whether these actions are still relevant and will be incorporated into the updated action plan or if they are no longer applicable due to changes in priorities or conditions. This review ensures continuity and relevance in hazard mitigation efforts by transparently assessing past actions and determining their future applicability.



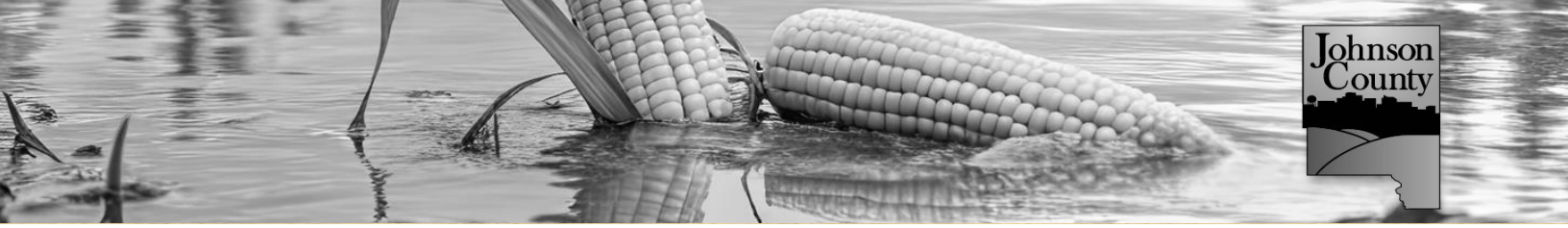
Action #	Project	Jurisdictions	Status
1	Backup Generators	All jurisdictions	Progress varied among jurisdictions. Hills and Iowa City CSD completed this action successfully. Iowa City has partially implemented it, while Coralville and the University of Iowa report ongoing needs and challenges due to funding and evolving infrastructure. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
2	Bury Utility Lines, Pipes, and Tanks	All jurisdictions	Limited progress has been made. Coralville has started with BRIC funding, while Iowa City integrates this effort into ongoing infrastructure projects. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
3	Comprehensive Land Use Planning	All cities	Many jurisdictions report progress or completion. Hills and Shueyville have plans in place. Coralville and Iowa City note this as an ongoing initiative tied to delays in flood map updates. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
4	Dam Failure Evacuation Planning	All jurisdictions	This action remains ongoing in most areas. Hills reports completion, while Iowa City and Coralville note it is underway. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.



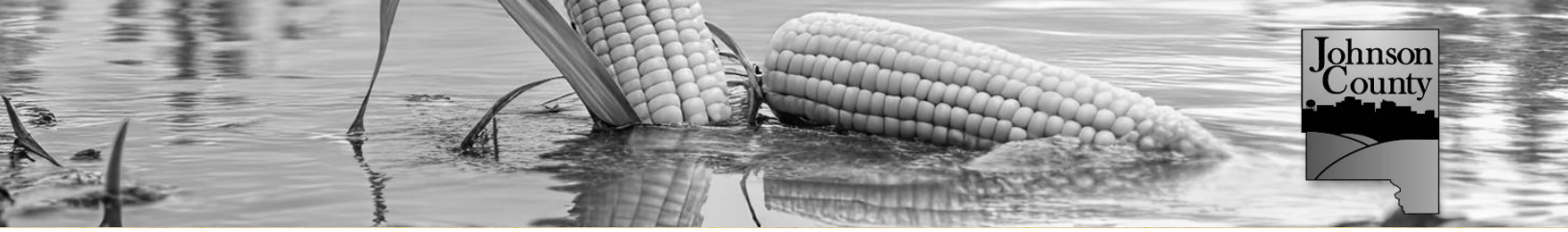
Action #	Project	Jurisdictions	Status
5	Debris & Natural Fuels Reduction	All jurisdictions	Few jurisdictions report progress, as most find this action less applicable due to low risk in their areas. Iowa City, Coralville, and the University of Iowa conduct ongoing maintenance and mitigation practices. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
6	Defensible Spaces & Buffer Zones	All jurisdictions	Minimal progress was reported, with jurisdictions citing low applicability or ongoing maintenance efforts, such as Coralville and the University of Iowa. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
7	Elevate Structures	All jurisdictions	Only minor progress was noted. Coralville and Iowa City reported limited action due to funding, while others found it inapplicable.
8	FEMA Code 361 Safe Rooms	All jurisdictions	This action has seen little completion due to barriers such as funding. Coralville and the University of Iowa report continued evaluations for new projects.
9	Floodproofing	All jurisdictions	Coralville and Iowa City show limited progress on infrastructure-specific actions. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.



Action #	Project	Jurisdictions	Status
10	Insulation & Energy Efficiency	All jurisdictions	Progress was limited to specific facilities in jurisdictions like Coralville and Iowa City. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
11	Levee Construction	All jurisdictions	Some progress was noted in Coralville and Iowa City, with ongoing projects to build or improve flood walls. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
12	Looped Grid Power Systems	All jurisdictions	This action remains largely incomplete due to reliance on private utility initiatives. Limited progress has been made by Iowa City and Coralville.
13	Low Flow Utilities	All jurisdictions	Progress varies, with Coralville and Iowa City implementing limited upgrades. Many smaller jurisdictions lack relevant ordinances or infrastructure. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
14	Public Awareness & Education	All jurisdictions	This action is ongoing across jurisdictions, with Iowa City and Coralville focusing on public outreach. Hills uses newsletters for community engagement.
15	Rainwater Retention Basins	All jurisdictions	Coralville and Iowa City report incorporating retention practices in public projects. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.



Action #	Project	Jurisdictions	Status
16	Raise Transportation Infrastructure	All jurisdictions	Iowa City has made some progress, but Coralville and others cite funding and constraints as barriers.
17	Relocate or Buyout Vulnerable Structures	All jurisdictions	Limited success was noted in Coralville and Iowa City, with efforts hindered by funding and property owner participation. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
18	SKYWARN Storm Spotter Training	All jurisdictions	This action is mostly successful, with counties and jurisdictions continuing to promote training.
19	Snow Fences	All jurisdictions	Minimal progress was noted, with many jurisdictions finding this inapplicable.
20	Storm Water Drainage System Upgrade	All jurisdictions	This remains an ongoing effort in jurisdictions like Coralville and Iowa City, with funding as the primary barrier. All other jurisdictions did not complete this action, either due to lack of staff availability or funding.
21	Storm Water Pump Stations	All jurisdictions	Coralville and Iowa City reported ongoing evaluation and upgrades for pump stations. All other jurisdictions did not complete this action, either due to lack of staff availability or funding
22	Storm Siren Network Expansion	All jurisdictions	Coralville and Iowa City reported ongoing expansions, while smaller jurisdictions faced funding challenges.
23	Structural Integrity Monitoring Instruments	All jurisdictions	This remains largely incomplete, with limited progress reported due to staffing and/or funding challenges.

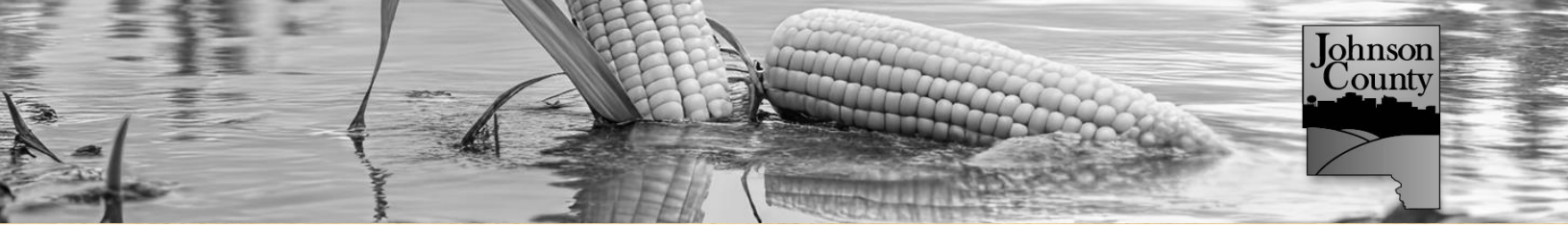


Action #	Project	Jurisdictions	Status
24	Transportation Status & Routing System	Johnson County, Cities, University of Iowa	Progress varies, with some jurisdictions like Coralville integrating traffic systems into broader metro-wide initiatives. All other jurisdictions did not complete this action, either due to lack of staff availability or funding
25	Water Line Insulation	All jurisdictions	Limited action was reported, with Coralville and Iowa City citing ongoing evaluations. All other jurisdictions did not complete this action, either due to lack of staff availability or funding
26	Wildland Fire Structural Retrofit	All jurisdictions	Little progress was made, with many jurisdictions finding this inapplicable.

4.3 Identification and Analysis of Mitigation Actions

Element Addressed in Section
Element C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii)), including requirement **C4-a**. **Element C5**. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii)), including requirement **C5-a**.

The mitigation action plan outlined in this Section was completed with a thorough analysis of a comprehensive range of specific mitigation actions. These actions are tailored to address the vulnerabilities identified in the risk assessment and emphasize reducing risks to both existing and new buildings, infrastructure, and community assets. The strategy considers a variety of mitigation alternatives, including structural improvements, natural systems protection, local regulations, and public education programs. By analyzing these options, the planning area can select actions that best align with its capabilities while ensuring social, technical, and economic feasibility. This

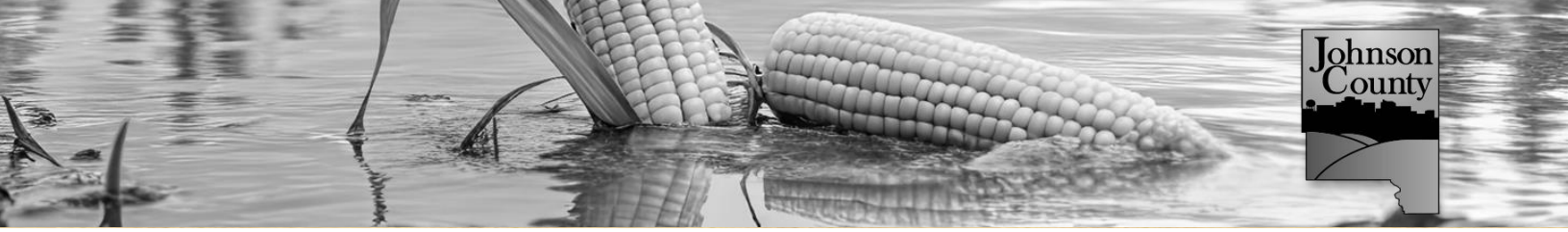


ensures the mitigation strategy targets both current vulnerabilities and long-term risk reduction for future developments.

The mitigation actions selected in **4.4 Mitigation Action Plan** were assessed using the STAPLEE system, a comprehensive evaluation framework. STAPLEE stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental criteria, ensuring that each action was evaluated for its overall feasibility and effectiveness. This system helps determine whether the actions are acceptable to the community, technically sound, administratively feasible, politically supported, legally enforceable, economically viable, and environmentally sustainable. These criteria guided the decision-making process to ensure the chosen mitigation actions meet community and operational standards.

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

The cost-benefit review used in this plan consists of three categories: High, Medium, and Low. As much as possible, the costs and benefits of the project have been weighed to arrive at a final rank.



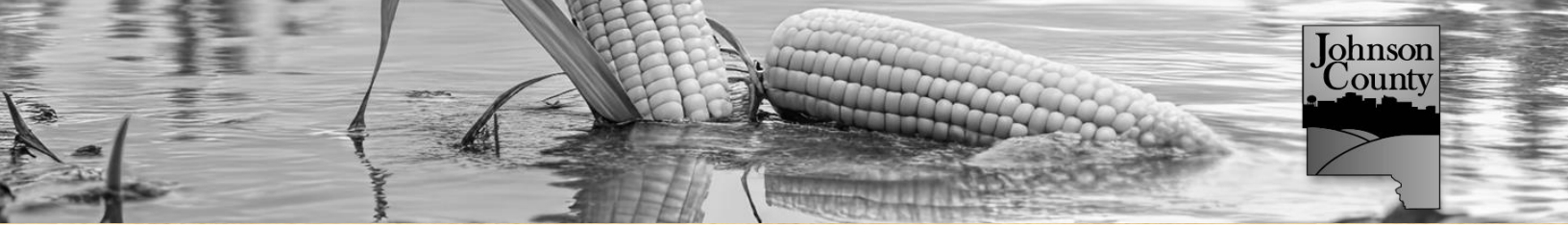
- High Cost: Existing funding levels are not adequate to cover the costs of the proposed project, and in some circumstances, funding may only be available after a presidential disaster declaration. These are items anticipated to cost in excess of $100,000. This amount was selected as it corresponds to a change in procurement policy under 44 CFR.
- Medium Cost: The project could possibly be implemented with existing funding but would require a reapportionment of the budget or budget amendment, or possibly a bond option. These items have an anticipated cost between $10,000 and $100,000.
- Low Cost: The project could be funded immediately under the existing budget, generally at levels under $10,000. Some low-cost options could be funded nearly entirely as volunteer or general office staff time projects.

The benefit analysis examines the short- and long-term impact the mitigation action would have on decreasing risk and increasing the ability to respond to incidents and disasters.

- High Benefit: The action will have an immediate impact on the reduction of risk and exposure to hazards and are generally well supported by the community. These are also actions that are within the respective organization's legal jurisdiction.
- Medium Benefit: The action will have a long-term impact on the reduction of risk and exposure to hazards or the action will have an immediate impact on the above. These actions may require more work to obtain full community support or may impact a smaller percentage of the community than High Benefit actions.
- Low Benefit: Benefits of the action may be difficult to quantify, or the project may not result in a significant improvement over existing conditions. The action may involve private/governmental property rights issues or other aspects that are generally outside of the jurisdiction's control, or improvement of coordination with agencies where existing levels of cooperation are acceptable.

Future mitigation actions were also analyzed in correlation with the National Flood Insurance Program (NFIP) Community Rating System (CRS):

- Prevention: Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- Property protection: Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- Structural: Actions that involve the construction of structures to reduce the impact of a hazard.

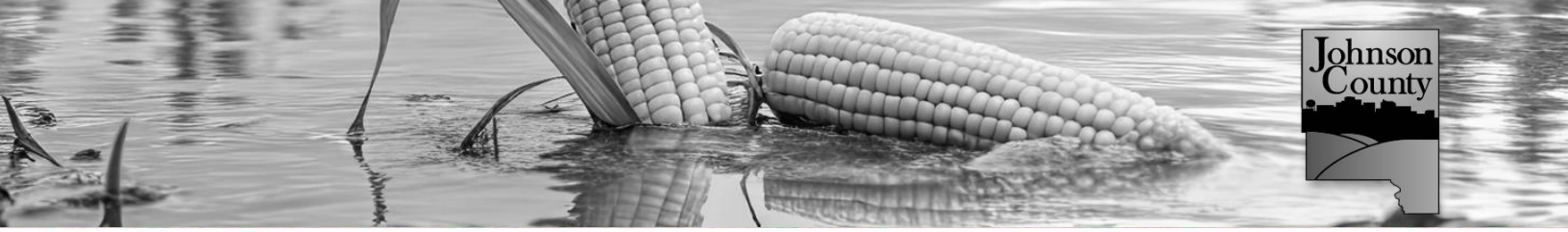


- Natural resource protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- Emergency services: Actions that protect people and property during and immediately after a disaster or hazard event.
- Public information/education and awareness: Actions to inform and educate individuals, elected officials, and property owners about the hazards and potential ways to mitigate them.

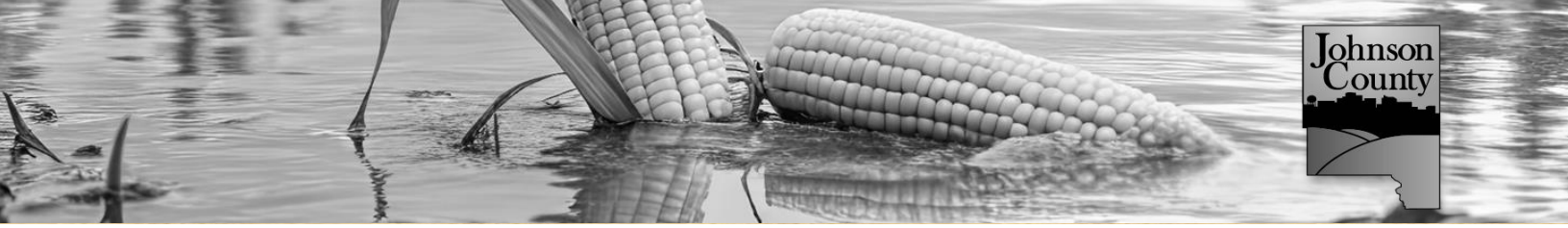
The planning stakeholders were provided with potential mitigation actions for each of the hazards identified in the risk assessment. Considering mitigation actions from the previous plan, the State of Iowa's plan, FEMA mitigation ideas, and other mitigation plans, mitigation actions were provided to the stakeholders for input and approval through the draft review process.

The following potential mitigation actions were considered for this plan's update:

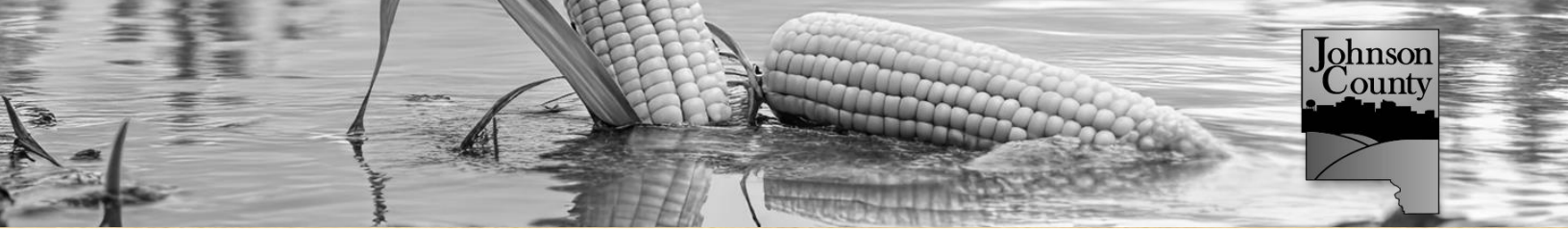
Hazard	Potential Mitigation Actions Considered
Animal/Plant/Crop Disease	• Prevention: Implement biosecurity measures on farms and enforce zoning laws for disease control. • Public Information/Education: Educate farmers and the public about disease prevention and detection. • Emergency Services: Set up rapid response teams for containment.
Communicable Disease Outbreak	• Prevention: Strengthen health codes and improve sanitation regulations. • Property Protection: Establish quarantine zones to reduce spread. • Emergency Services: Develop mass vaccination protocols and stockpile medical supplies. • Emergency Services: Maintain adequate healthcare and emergency response personnel to manage disease outbreaks, including staffing for quarantine centers, hospitals, and emergency medical services. • Public Information/Education: Launch public awareness campaigns about hygiene and disease prevention.



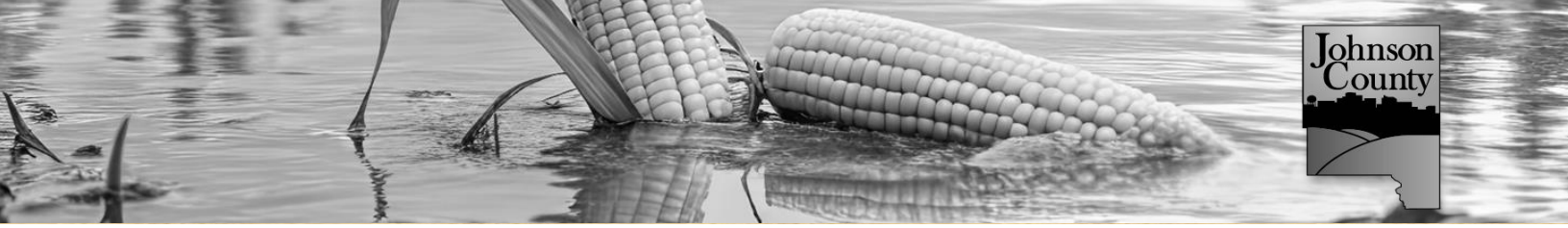
Hazard	Potential Mitigation Actions Considered
Critical Infrastructure Failure	• Prevention: Strengthen infrastructure codes to ensure resilience. • Property Protection: Retrofit critical infrastructure for improved durability. • Structural: Install backup power systems. • Structural: Bury or harden power lines as part of an effort to protect essential infrastructure and improve resilience against multiple hazards. • Structural: Improve the resilience of sewer and wastewater systems to prevent failures during infrastructure disruptions, ensuring continued service during emergencies. • Emergency Services: Implement emergency response plans for infrastructure failures. • Emergency Services: Strengthen E911 capabilities and implement cell phone triangulation to improve emergency response during infrastructure failures, ensuring more accurate location services and quicker dispatch of resources. • Emergency Services: Develop and update Emergency Operations Plans (EOPs) to ensure rapid response and continuity of operations during critical infrastructure failures, including power outages, water system failures, and transportation disruptions. • Emergency Services: Enhance the interoperability of communications systems to ensure seamless coordination between emergency responders during infrastructure failures, such as power outages or transportation disruptions. • Public Information/Education: Inform the public about infrastructure vulnerabilities and response plans.
Cyber Incident	• Prevention: Enforce cybersecurity regulations and data protection laws. • Emergency Services: Develop a rapid-response cyber team. • Public Information/Education: Provide training on cybersecurity best practices for the public.



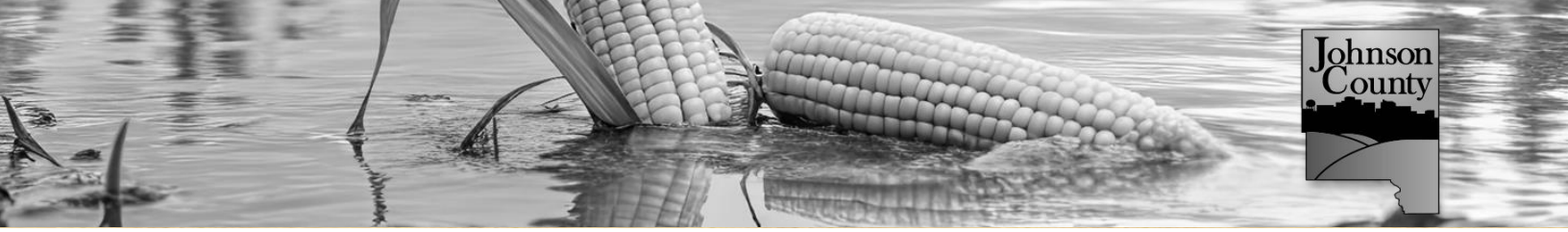
Hazard	Potential Mitigation Actions Considered
Dam Failure	• Prevention: Implement land use controls around dams. • Property Protection: Elevate structures in flood-prone areas downstream from dams. • Structural: Retrofit dams to meet modern safety standards. • Structural: Regularly study and maintain dams and other related infrastructure to reduce the risk of failure and ensure continued protection for downstream communities. • Natural Resource Protection: Restore wetlands downstream to absorb potential flooding. • Emergency Services: Develop evacuation plans and warning systems. • Public Information/Education: Educate the public about dam risks and evacuation routes. • Public Information/Education: Install dam warning signage to inform the public about potential risks and safe zones near dams, and promote awareness of flood risks in the event of dam failure.
Drought	• Prevention: Implement water usage regulations and drought contingency planning. • Property Protection: Promote water conservation measures in homes and businesses. • Natural Resource Protection: Preserve and restore watersheds to improve water supply. • Public Information/Education: Run campaigns on water conservation and drought resilience.
Earthquake	• Prevention: Enforce seismic building codes. • Property Protection: Retrofit vulnerable buildings. • Structural: Install earthquake-resistant infrastructure. • Emergency Services: Develop early warning systems and evacuation plans. • Public Information/Education: Provide public education on earthquake preparedness.
Extreme Temperatures	• Prevention: Promote tree planting and urban planning that mitigates heat islands. • Property Protection: Retrofit homes with better insulation and heating/cooling systems. • Emergency Services: Set up warming/cooling centers. • Public Information/Education: Educate residents on how to stay safe in extreme temperatures.



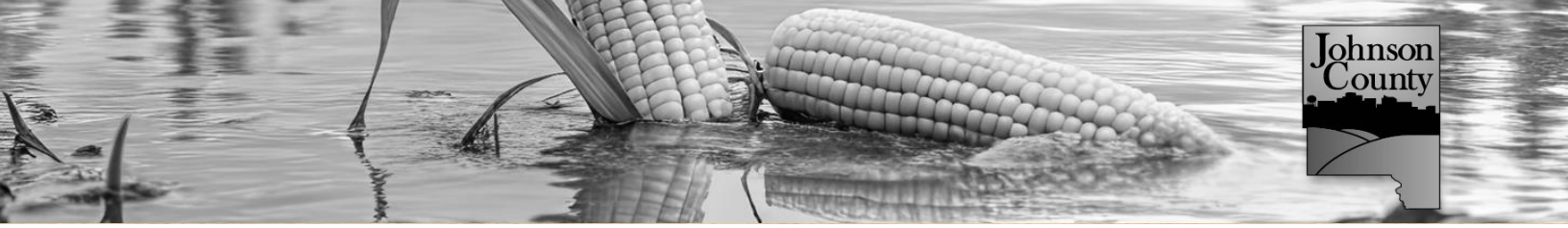
Hazard	Potential Mitigation Actions Considered
Flash Flooding	• Prevention: Enforce floodplain zoning regulations. • Prevention: Implement or amend stormwater management ordinances to ensure that new developments include adequate stormwater infrastructure, reducing runoff and minimizing the risk of flash flooding. • Property Protection: Elevate buildings or relocate those in flood zones. • Property Protection: Install backflow protection devices in homes and buildings to prevent water from entering basements during flash flooding events, reducing property damage and health risks. • Structural: Build levees and stormwater management systems. • Natural Resource Protection: Preserve wetlands to absorb floodwaters. • Emergency Services: Set up early flood warning systems. • Public Information/Education: Inform the public about flood risks and safety measures. • Public Information/Education: Install road signage to warn drivers of flood-prone areas, such as low-water crossings or roads near rivers, and provide real-time updates about road closures or hazards during flood events.
Hazardous Materials (including Radiological)	• Prevention: Enforce stricter hazardous material transport and storage regulations. • Property Protection: Ensure containment systems are in place for hazardous materials. • Emergency Services: Strengthen hazardous materials response capabilities by training first responders, acquiring specialized equipment, and developing detailed response plans for HazMat incidents. • Public Information/Education: Raise awareness of HazMat safety procedures in the community.



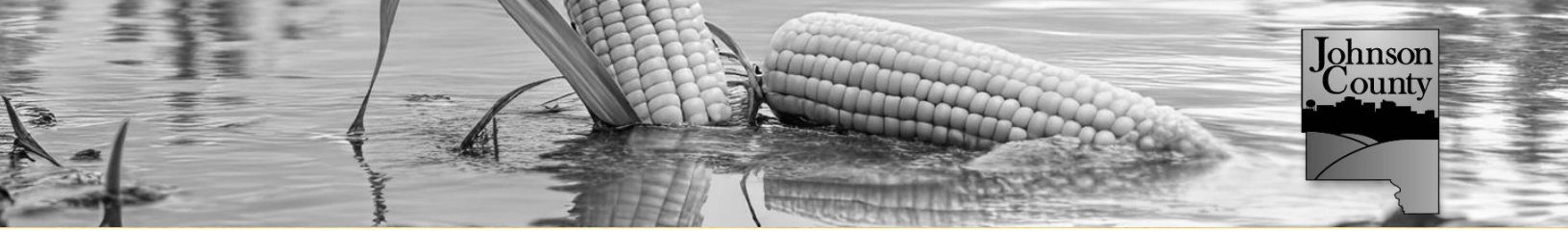
Hazard	Potential Mitigation Actions Considered
River Flooding	• Prevention: Implement riverbank stabilization and zoning around floodplains. • Prevention: Update floodplain mapping and conduct studies to ensure accurate identification of flood-prone areas, helping to guide development decisions and protect at-risk properties. • Property Protection: Buyout properties frequently flooded and relocate structures. • Property Protection: Elevate homes and buildings located in flood-prone areas to reduce the risk of flood damage and ensure structures are above expected flood levels. • Property Protection: Implement flood-proofing measures for infrastructure, such as elevating utilities, sealing buildings, and installing barriers to prevent water infiltration in flood-prone areas. • Structural: Construct levees, floodwalls, and retention basins. • Natural Resource Protection: Promote riverine restoration to mitigate flood impacts. • Natural Resource Protection: Protect and restore wetlands to act as natural buffers that absorb floodwaters, reduce flood peaks, and prevent downstream flooding during river flood events. • Emergency Services: Establish flood early warning systems. • Public Information/Education: Educate the public on flood preparedness and response.
Severe Thunderstorms	• Prevention: Enforce stronger building codes for wind resistance. • Property Protection: Install lightning protection systems on buildings. • Structural: Strengthen drainage systems to prevent flooding. • Natural Resource Protection: Preserve natural barriers that protect against storm impacts. • Emergency Services: Develop real-time thunderstorm warning systems. • Public Information/Education: Inform residents about storm safety practices. • Public Information/Education: Achieve StormReady designations to ensure that cities and counties are well-prepared for severe thunderstorms, with established communication and emergency response systems in place to protect residents.



Hazard	Potential Mitigation Actions Considered
Severe Winter Storms	• Prevention: Improve local infrastructure to be more resilient to ice and snow. • Property Protection: Retrofit homes and facilities with storm-resistant materials. • Structural: Strengthen power grid systems against ice accumulation. • Emergency Services: Implement emergency snow removal and heating shelters. • Public Information/Education: Educate the public on preparedness for winter storms.
Social Unrest	• Prevention: Strengthen community outreach programs to reduce tensions. • Emergency Services: Develop security plans for public spaces during unrest. • Public Information/Education: Educate the community about peaceful conflict resolution.
Space Weather	• Prevention: Implement protective measures for critical infrastructure like power grids. • Structural: Harden infrastructure against electromagnetic storms. • Emergency Services: Establish contingency plans for satellite and power failures. • Public Information/Education: Raise awareness about space weather and its potential impacts.
Supply Chain Disruption	• Prevention: Strengthen logistics networks through diversification. • Emergency Services: Develop emergency supply chain continuity plans. • Public Information/Education: Inform businesses about the importance of supply chain resilience.
Terrorism	• Prevention: Increase surveillance and access control measures. • Prevention: Enhance security measures at Tier II facilities to protect against potential terrorist attacks targeting critical infrastructure and hazardous materials, ensuring that these sites are not exploited for mass violence or sabotage. • Property Protection: Secure critical infrastructure from physical attacks. • Emergency Services: Train responders for mass casualty events. • Public Information/Education: Promote public awareness about identifying suspicious activities.



Hazard	Potential Mitigation Actions Considered
Tornadoes	• Prevention: Enforce zoning to reduce building density in high-risk areas. • Property Protection: Promote construction of safe rooms and shelters. • Structural: Strengthen building designs to withstand high winds. • Emergency Services: Implement tornado warning systems. • Emergency Services: Include mass casualty preparation in tornado response plans, ensuring that emergency medical services and shelters are ready to care for injured individuals after a severe tornado. • Public Information/Education: Educate residents on tornado safety measures.
Wildfire	• Prevention: Implement land use controls in fire-prone areas. • Property Protection: Create defensible space around homes. • Property Protection: Promote the installation of smoke detectors in homes and public buildings near wildfire-prone areas, and enforce fire prevention measures such as clearing brush and maintaining defensible space around structures. • Property Protection: Install outdoor sprinkler systems around homes, businesses, and critical facilities in wildfire-prone areas to help prevent the spread of fire to structures by keeping vegetation and surrounding areas moist. • Structural: Build firebreaks and install fire-resistant materials. • Structural: Improve water supply systems to ensure adequate water availability for firefighting operations in wildfire-prone areas, including the installation of additional hydrants and water storage facilities. • Natural Resource Protection: Conduct controlled burns to reduce fuel loads. • Emergency Services: Set up early wildfire detection and evacuation plans. • Emergency Services: Use emergency assistance registration to track and assist individuals and families needing evacuation support, shelter, or emergency relief during and after wildfires. • Emergency Services: Improve fire response capabilities by increasing the availability of firefighting resources, training, and equipment to more effectively combat wildfires, particularly in high-risk areas. • Public Information/Education: Run public campaigns on wildfire safety and preparedness.



The mitigation actions considered for the planning area align well with the established mitigation goals. These actions were designed to protect critical facilities, infrastructure, and community assets by focusing on strengthening existing structures and improving key systems. Examples of actions considered include constructing floodwalls, retrofitting buildings to withstand hazards like tornadoes and earthquakes, and enhancing drainage systems to prevent flooding. By incorporating redundancy and hardening measures for critical infrastructure, these actions aimed to ensure that essential services remain operational during and after disaster events.

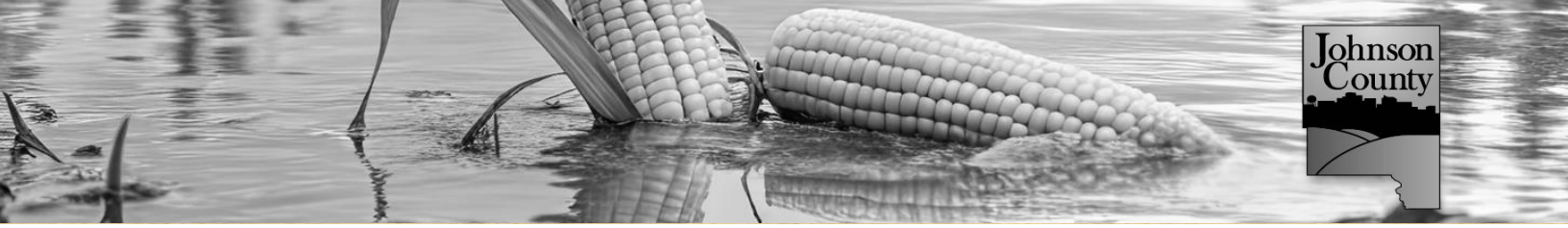
The considered actions also prioritized the protection of residents' health, safety, and property. Measures such as constructing safe rooms, reinforcing homes against high winds, and developing early warning systems were intended to safeguard lives and minimize property damage. Emergency services measures, including establishing cooling and warming centers during extreme temperatures, stockpiling medical supplies for disease outbreaks, and creating evacuation routes, were focused on providing immediate protection during and after hazard events.

A key component of the considered mitigation strategy was improving education and awareness. Each hazard included public information and education programs aimed at enhancing the community's understanding of risks and teaching individuals how to reduce their vulnerability. Programs focused on cybersecurity, wildfire risk, tornado preparedness, and extreme weather safety were considered to contribute to a more informed and resilient community by promoting proactive measures.

Lastly, the considered mitigation actions ensured efficient use of public funds by emphasizing long-term risk reduction through preventative measures, such as zoning regulations, biosecurity efforts, and natural resource protection initiatives. Actions like floodplain restoration and controlled burns were evaluated not only for preserving natural systems but also for reducing future disaster-related costs. Public education campaigns, which enhance preparedness at a relatively low cost, were also considered to extend the impact of public resources by reducing the need for large-scale emergency responses. Overall, these considered actions supported the planning area's goals of reducing hazard risks, enhancing community resilience, improving infrastructure, and expanding public awareness, positioning the area to manage and mitigate future risks effectively.

4.3.1 Mitigation and Preparedness Actions

Preparedness items, even intangible ones like public outreach, can serve as powerful tools for disaster mitigation by proactively addressing vulnerabilities and reducing the

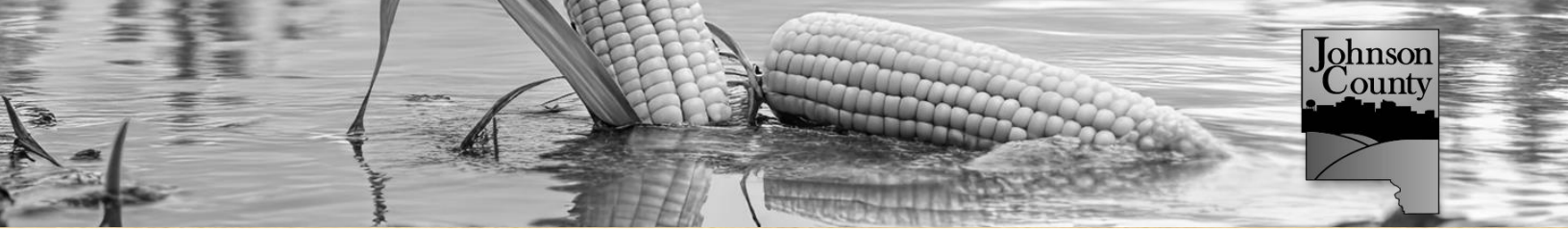


potential impact of future incidents. Public outreach, for instance, contributes to mitigation in the following ways:

- Risk Awareness and Education: Public outreach campaigns inform community members about local hazards, their potential consequences, and the steps they can take to reduce risks. Educated individuals are more likely to support and adopt mitigation measures, such as floodproofing homes or creating defensible space around properties in wildfire-prone areas.
- Behavioral Change: Through targeted messaging, outreach programs can influence behaviors that directly reduce hazard risks. For example, encouraging residents to secure heavy furniture in earthquake-prone areas mitigates the risk of injury and property damage. Promoting proper disposal of hazardous materials minimizes the potential for contamination during a flood or storm.
- Building a Culture of Preparedness: When communities understand the importance of preparedness, they become more engaged in mitigation activities. Public outreach fosters a culture where mitigation actions—such as participating in community planning meetings, installing storm shutters, or supporting the creation of green infrastructure—are normalized and prioritized.
- Strengthening Partnerships: Outreach often involves collaboration with community organizations, businesses, and schools. These partnerships enhance the dissemination of mitigation-related information and resources, ensuring that diverse populations, including vulnerable groups, are reached effectively.
- Promoting Funding and Policy Support: An informed community is more likely to advocate for mitigation funding and support policies that reduce long-term risk. For instance, public outreach campaigns explaining the benefits of zoning regulations in floodplains can lead to stronger community backing for such measures.
- Enhancing Emergency Response and Recovery: By promoting actions such as developing family communication plans or organizing neighborhood response teams, public outreach ensures that individuals and communities are better equipped to handle disasters. These preparedness measures reduce the strain on emergency services and aid in faster recovery, effectively mitigating cascading impacts.

4.4 Mitigation Action Plan

Element Addressed in Section
Element C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii)), including requirement **C4-b**.



Element Addressed in Section
Element C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii)), including requirement **C5-b**.

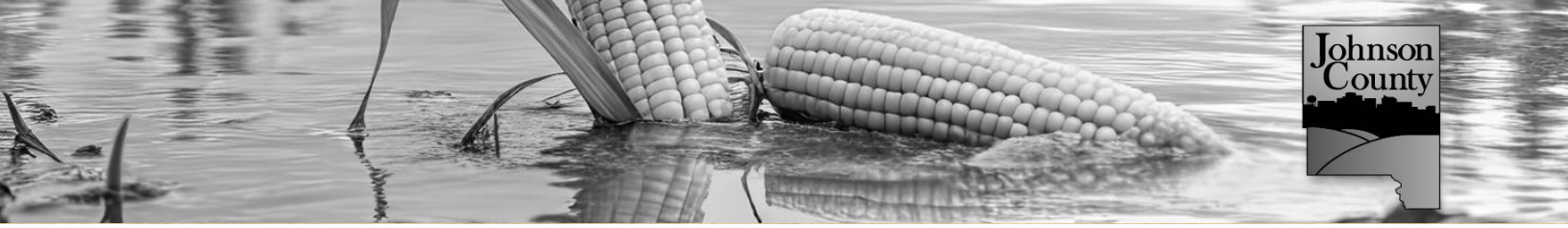
This section outlines the development of the final mitigation action plan, which includes the specific actions designed to achieve the plan's goals. Progress on the implementation of these actions will be tracked over time to measure the plan's effectiveness in meeting its objectives. Some actions are not applicable to jurisdictions that are not impacted by the hazard, such as river flooding traditionally only impacts jurisdictions with rivers or streams running through them.

The mitigation actions in this section were developed by reviewing the previous plan's actions and evaluating progress, alongside the information in **Section 2: Whole Community Profile**. The STAPLEE assessment process was applied, with a focus on both new and existing buildings and infrastructure. These actions were then shared with planning stakeholders for review and approval during the draft process.

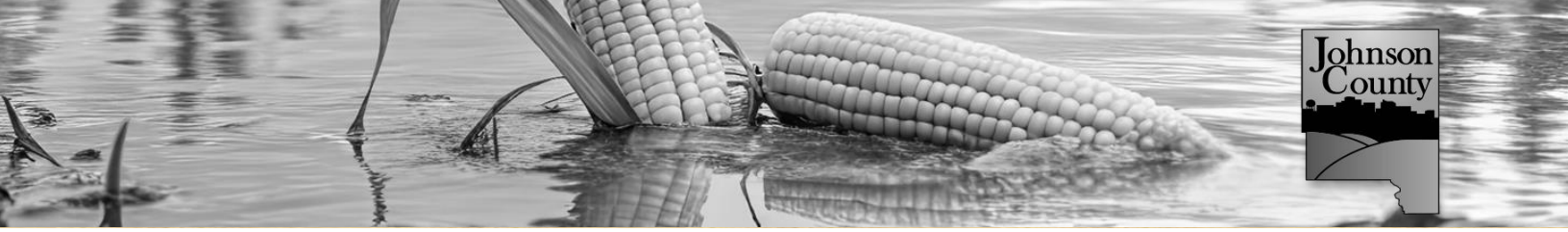
Each mitigation action details specific strategies for reducing future hazard-related losses in the planning area. The actions include estimated costs (if available), potential funding sources, timelines, goals supported, associated hazards, relevant stakeholders, and their assigned priority—high, medium, or low. While many of these actions' projects are managed at the department/office-head level, it is ultimately the responsibility of the jurisdictions chief elected/appointed official to implement the mitigation actions, i.e., Board of Supervisor Chair, Mayor, or Superintendent

The parameters for the timeline are as follows:

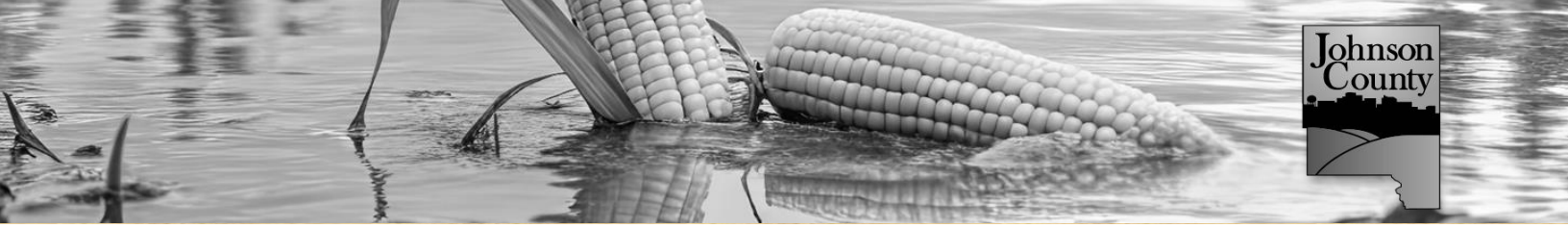
- Short-term: To be completed in one to two years
- Medium-term: To be completed in three to five years
- Long-term: To be completed in greater than five years
- Ongoing: Currently being funded and implemented under existing programs



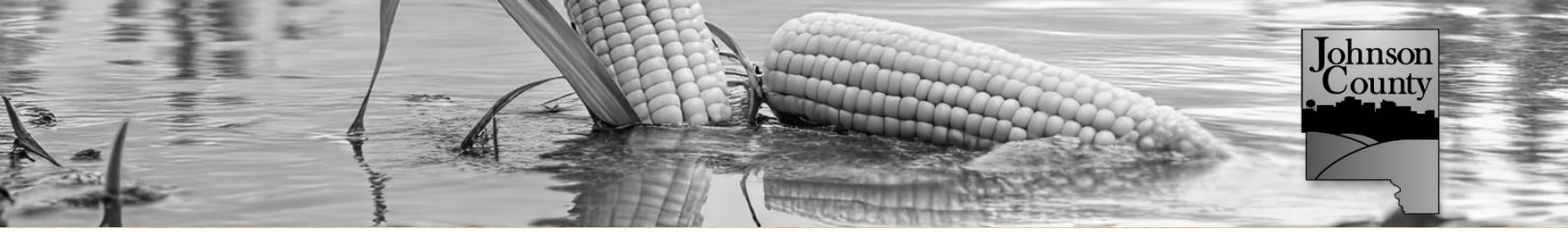
Action:	Backup Generators	**Action #:**	1
Description:	This action involves the purchase, installation, and maintenance of backup generators to ensure that emergency shelters and critical infrastructure can maintain operational continuity during power outages caused by severe storms, winter storms, or other disasters. Critical infrastructure includes facilities such as hospitals, fire and police stations, water treatment plants, and emergency operations centers. The generators will provide reliable power to protect public safety, maintain essential services, and support community resilience.		
Hazard(s) Covered:	Severe Storms, Winter Storms, Flooding, Wildfires, Critical Infrastructure Failure	**Jurisdiction(s) Assigned:**	All jurisdictions, except for University of Iowa
New/Previous Action:	1	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds or public-private partnerships.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially accepted as it directly supports public safety and the welfare of vulnerable populations relying on emergency shelters and critical services. Technically, generator installation is feasible and utilizes proven technology. Administratively, jurisdictions have staff and contractor resources available to complete the work. Politically, it garners strong support from elected officials and stakeholders due to its alignment with disaster preparedness and continuity goals. Legally, it complies with applicable building codes, safety regulations, and emergency planning mandates. Economically, while the initial cost is medium to high, the long-term cost-effectiveness is substantial, given the reduction in service interruptions and associated risks. Environmentally, the action has a minimal footprint, as it involves retrofitting existing structures rather than new construction.		
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



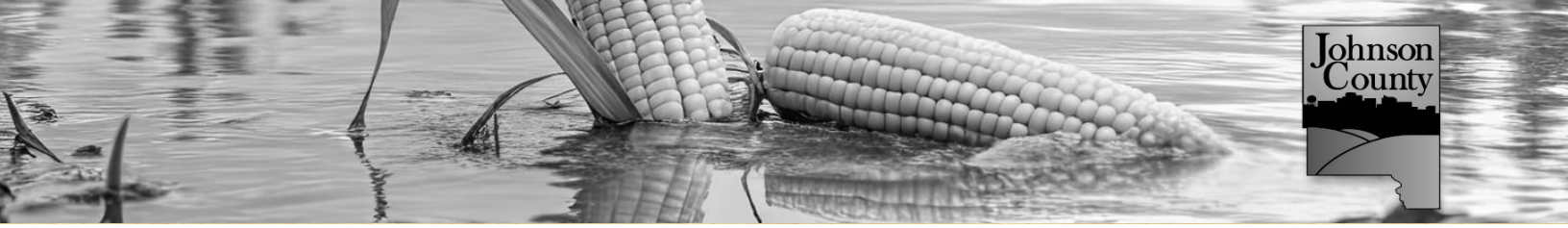
Action:	Bury Utility Lines, Pipes, and Tanks			**Action #:**	2
Description:	This action involves relocating existing utility lines, pipes, and above-ground storage tanks underground to reduce their exposure to hazards such as high winds, severe storms, and ice accumulation. This mitigation measure significantly decreases the likelihood of disruptions to essential services, minimizes property damage, and ensures continued operation of critical infrastructure during and after disaster events.				
Hazard(s) Covered:	Severe Storms, Tornadoes, Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions		
New/Previous Action:	2	**Goal(s) Supported:**	Goal 1 and 2	**Priority:**	Medium
Cost:	High	**Benefit:**	High		
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, utility company investments, or public-private partnerships.	**Timeline:**	Medium-term (3–5 years)		
STAPLEE Assessment:	This action is socially accepted as it reduces the frequency and duration of service interruptions, benefiting both residents and businesses. Technically, the action is feasible and uses established underground utility installation methods. Administratively, the jurisdiction can manage and oversee the projects with existing staff and contractors. Politically, the action is well-supported due to its alignment with resilience and sustainability goals. Legally, it adheres to local and federal utility regulations, including safety and environmental standards. Economically, while the upfront costs are medium to high, the long-term benefits in reduced maintenance, fewer disruptions, and lower repair costs outweigh the initial investment. Environmentally, burying utilities has minimal impact and can be coordinated with other infrastructure projects to reduce overall disruptions to the community.				
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors				



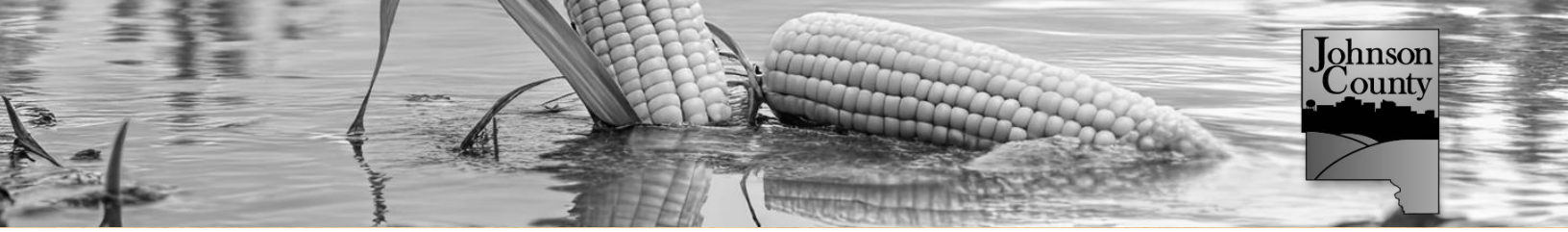
Action:	Comprehensive Land Use Planning	**Action #:**	3
Description:	This action involves the development and implementation of comprehensive land use plans to strengthen zoning regulations, enforce floodplain management policies, and incorporate resilience-building strategies in future development. The planning process will aim to minimize construction in high-risk areas such as floodplains, wildfire-prone zones, or regions susceptible to dam failure, reducing hazard exposure and improving community safety.		
Hazard(s) Covered:	Dam Failure, Droughts, River Flooding, Flash Flooding, Severe Storms, Tornadoes, Wildfires, Winter Storms	**Jurisdiction(s) Assigned:**	All municipalities
New/Previous Action:	3	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, county general funds, city general funds, or partnerships with regional planning organizations.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially acceptable as it proactively reduces risks for future developments and improves community resilience, benefiting all sectors of the population. Technically, comprehensive land use planning is well-documented and supported by best practices in urban and rural planning. Administratively, the jurisdictions have the capacity to coordinate planning efforts and integrate updated zoning policies. Politically, the action is supported by local leaders due to its alignment with sustainable growth and disaster risk reduction goals. Legally, the action complies with state and federal land use regulations, including floodplain management standards. Economically, the initial cost is justified by the substantial long-term savings from avoided hazard impacts. Environmentally, it protects natural systems by discouraging development in environmentally sensitive areas, promoting conservation, and reducing resource strain.		
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors, School District Boards, Iowa City Development Services Division Director		



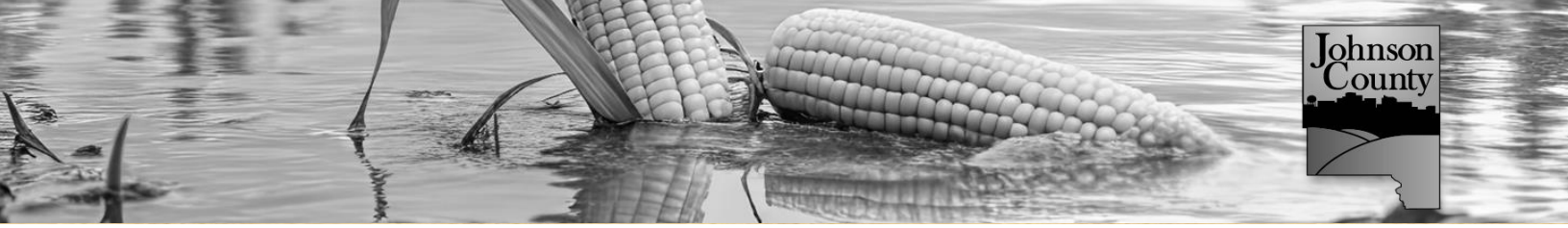
Action:	Dam Failure Evacuation Planning			**Action #:**	4
Description:	This action involves developing and implementing comprehensive evacuation plans to address the catastrophic failure of dams. The plans will include pre-identified evacuation routes, coordination with local jurisdictions, public awareness campaigns, and training exercises for first responders. The goal is to ensure the timely and safe evacuation of at-risk populations, reduce loss of life, and mitigate the impact on downstream communities.				
Hazard(s) Covered:	Dam Failure		**Jurisdiction(s) Assigned:**	All jurisdictions	
New/Previous Action:	4	**Goal(s) Supported:**	Goal 1, 2, and 3	**Priority:**	High
Cost:	Medium		**Benefit:**	High	
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and partnerships with dam owners or regional planning organizations.		**Timeline:**	Short-term (1–2 years)	
STAPLEE Assessment:	This action is socially accepted as it prioritizes public safety and reduces risk to vulnerable downstream populations. Technically, evacuation planning is feasible and supported by GIS mapping tools, hazard modeling, and emergency management expertise. Administratively, local jurisdictions have the capacity to lead coordination efforts with dam owners, emergency services, and neighboring communities. Politically, the action has strong support due to its alignment with public safety objectives and disaster preparedness priorities. Legally, it complies with dam safety and emergency management regulations, including state and federal mandates. Economically, the cost is justified by the potential to prevent loss of life and reduce the need for large-scale emergency responses. Environmentally, this action has minimal direct impact and indirectly supports environmental protection by mitigating uncontrolled water releases and associated hazards.				
Responsible:	Emergency Management Director				



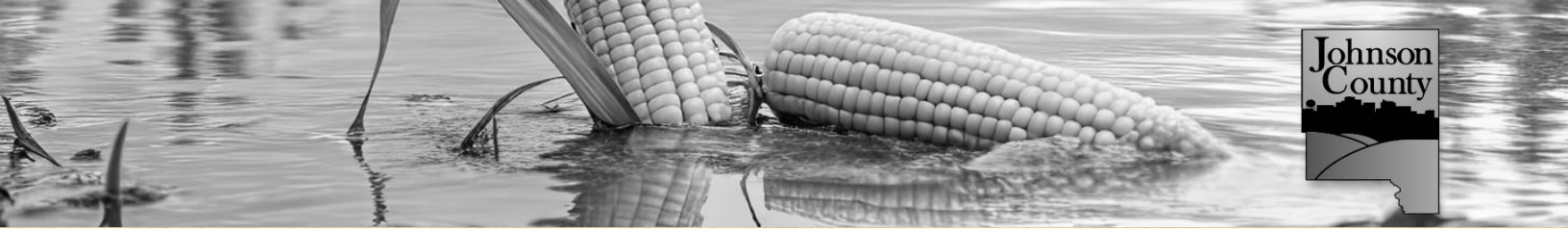
Action:	Debris & Natural Fuels Reduction	**Action #:**	5
Description:	This action involves the removal of excess vegetation, debris, and other natural fuels in wildfire-prone areas to reduce the intensity and spread of wildfires. Activities include creating defensible spaces around structures, implementing community-wide fuel reduction programs, and collaborating with local fire departments and land management agencies to identify high-risk areas. These efforts aim to protect lives, property, and natural resources by minimizing fire risk and improving firefighting efficiency.		
Hazard(s) Covered:	Wildfires	**Jurisdiction(s) Assigned:**	All jurisdictions, except for University Heights, Clear Creek-Amana CSD, and Lone Tree CSD
New/Previous Action:	5	**Goal(s) Supported:**	Goal 1, 2, and 3
Priority:	Low		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, federal grants through the U.S. Forest Service, and partnerships with private landowners or environmental organizations.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially accepted as it improves community safety and aligns with efforts to reduce wildfire risks in high-priority areas. Technically, fuel reduction techniques such as mechanical thinning and controlled burns are proven to be effective in minimizing wildfire spread. Administratively, the action can be managed by local fire departments, emergency management agencies, and land management organizations. Politically, it is well-supported as it aligns with local and regional wildfire prevention goals. Legally, the action complies with environmental regulations, including air quality and land use standards, and includes proper permitting for controlled burns. Economically, the cost is justified by the significant reduction in potential wildfire-related losses and emergency response costs. Environmentally, while debris removal may temporarily disturb ecosystems, the long-term benefits of reduced wildfire risk outweigh short-term impacts, particularly when methods such as mulching or prescribed burns are used sustainably.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



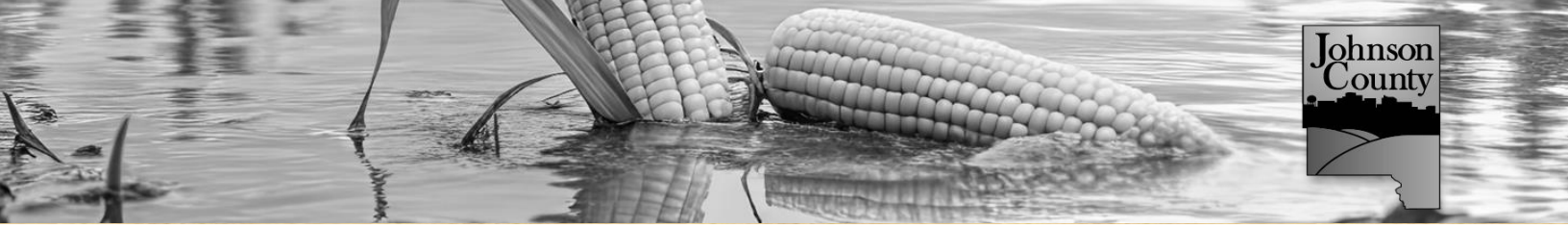
Action:	Defensible Spaces & Buffer Zones	**Action #:**	6
Description:	This action involves creating defensible spaces and buffer zones around properties in wildfire-prone areas to reduce the risk of fire spread and improve firefighting capabilities. These spaces include cleared areas free of vegetation, debris, or other flammable materials, typically extending 30 to 100 feet from structures. Buffer zones may use gravel, fire-resistant landscaping, or open green spaces to further protect communities and critical facilities. This two-pronged approach aims to protect lives, reduce property damage, and enhance emergency response effectiveness during wildfires.		
Hazard(s) Covered:	Wildfires	**Jurisdiction(s) Assigned:**	Coralville, Iowa City, University of Iowa, Johnson County
New/Previous Action:	5	**Goal(s) Supported:**	Goal 1, 2, and 3
Priority:	Low		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, federal grants through the U.S. Forest Service, private homeowner contributions, and partnerships with environmental organizations.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it directly addresses community safety and protects homes and critical infrastructure in wildfire-prone areas. Technically, the creation of defensible spaces and buffer zones is a well-established and effective wildfire risk reduction method. Administratively, local fire departments, emergency management agencies, and community organizations can collaborate to implement and maintain these zones. Politically, it has strong support due to its direct alignment with wildfire prevention goals and public safety priorities. Legally, it complies with local and state fire codes, land use regulations, and environmental standards. Economically, the action is cost-effective when considering the potential savings in wildfire suppression costs and property loss reduction. Environmentally, while initial vegetation clearing may have minor ecosystem impacts, the long-term benefits of wildfire prevention and the use of sustainable landscaping methods offset short-term disturbances.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors		



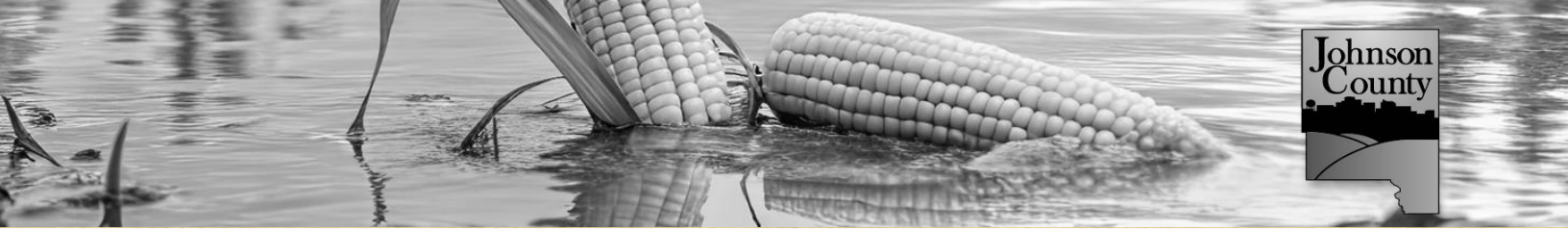
Action:	Elevate Structures		**Action #:** 7
Description:	This action involves elevating structures located within flood-prone areas above the base flood elevation (BFE) or predicted inundation levels. Elevation reduces the risk of flood damage, protects property, and minimizes recovery costs for property owners and the community. The project targets residential, commercial, and critical infrastructure buildings in identified flood zones and leverages best practices in flood-resistant construction.		
Hazard(s) Covered:	River Flooding, Flash Flooding, Dam Failure	**Jurisdiction(s) Assigned:**	Coralville, Iowa City, Solon CSD, Lone Tree CSD, Clear Creek Amana CSD, Johnson County
New/Previous Action:	7	**Goal(s) Supported:** Goal 1, 2, and 4	**Priority:** High
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, National Flood Insurance Program (NFIP) Increased Cost of Compliance funds, and county general funds, city general funds.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it provides visible and tangible benefits to property owners and improves community resilience. Technically, elevating structures is feasible and follows established engineering and construction practices. Administratively, local jurisdictions have the capacity to oversee permitting, inspections, and coordination with contractors. Politically, the action garners support as it aligns with public safety goals and flood risk reduction strategies. Legally, it complies with NFIP requirements, state building codes, and local floodplain ordinances. Economically, while the upfront cost is high, the long-term savings from avoided flood damage and reduced insurance premiums make this a cost-effective investment. Environmentally, the action minimizes future flood impacts on structures, reducing contamination risks and preserving floodplain ecosystems.		
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



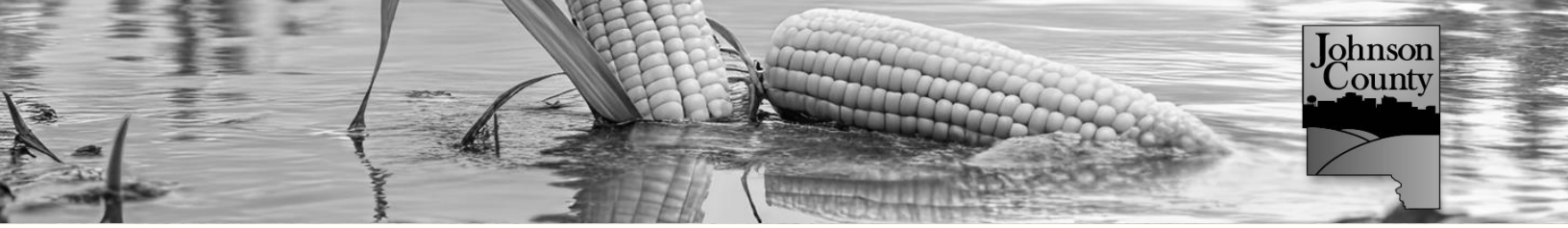
Action:	FEMA Code 361 Safe Rooms	**Action #:**	8
Description:	This action involves constructing or retrofitting safe rooms that meet FEMA Code 361 standards to provide protection from extreme wind events, including tornadoes and severe storms. These safe rooms are designed to withstand wind speeds exceeding 200 miles per hour and protect occupants from flying debris, hail, and other storm-related hazards. The safe rooms can be integrated into public buildings, schools, or critical facilities and are intended to safeguard lives during extreme weather events.		
Hazard(s) Covered:	Tornadoes, Severe Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	8	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, Pre-Disaster Mitigation (PDM) grant program, school district funds, and county general funds, city general funds.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it directly protects lives, particularly for vulnerable populations in schools, public facilities, and critical infrastructure. Technically, FEMA Code 361 safe rooms are highly effective and follow rigorously tested engineering standards. Administratively, jurisdictions can manage design and construction processes with support from state emergency management agencies and FEMA. Politically, the action garners strong support due to its alignment with life safety goals and community preparedness priorities. Legally, it complies with FEMA guidelines, state building codes, and local regulations. Economically, while the initial cost is high, the potential to save lives and avoid injury-related costs during severe events justifies the investment. Environmentally, the action has minimal environmental impact, as construction typically occurs within or adjacent to existing structures.		
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



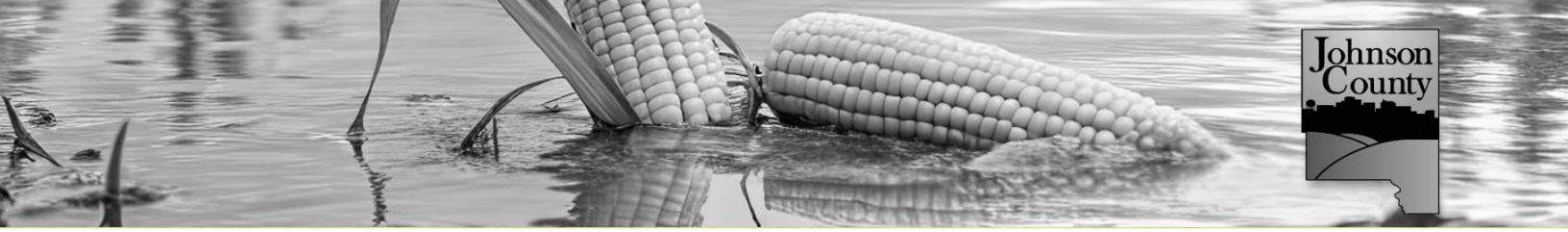
Action:	Floodproofing	**Action #:**	9
Description:	This action involves implementing floodproofing measures to protect structures in flood-prone areas. Floodproofing includes both wet and dry methods, such as sealing building foundations, installing flood barriers, raising utilities above expected flood levels, and using water-resistant materials. These measures aim to minimize flood damage, protect property, and reduce long-term recovery costs for residential, commercial, and critical infrastructure buildings. Floodproofing is particularly effective for historic or non-relocatable structures.		
Hazard(s) Covered:	River Flooding, Flash Flooding, Dam Failure	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	9	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	Medium		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and property owner investments.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially accepted as it helps property owners protect their investments and reduces community-wide flood risks. Technically, floodproofing methods are well-documented and proven effective for mitigating flood damage. Administratively, local jurisdictions can support property owners with technical assistance, permitting, and inspections. Politically, the action is supported as it aligns with risk reduction and cost-saving goals. Legally, floodproofing measures comply with FEMA floodplain management standards, NFIP guidelines, and local building codes. Economically, the upfront costs are offset by long-term savings from avoided flood damage and reduced insurance premiums. Environmentally, floodproofing has minimal impact, as it primarily involves structural modifications and does not significantly alter natural floodplain dynamics.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



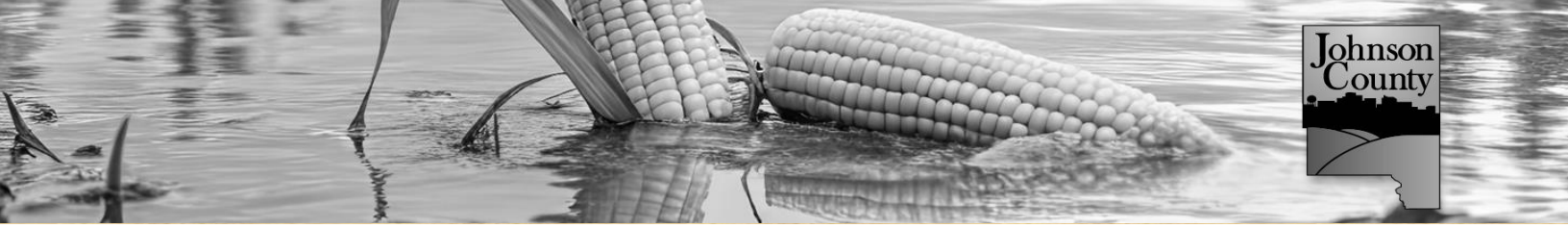
Action:	Insulation & Energy Efficiency	**Action #:**	10
Description:	This action involves retrofitting critical facilities, residential, and commercial structures with enhanced insulation, energy-efficient windows, and roofing materials. These upgrades aim to improve temperature regulation during extreme heat or cold events, reduce the strain on energy grids, and decrease energy costs. Additionally, these measures enhance occupant safety and comfort during prolonged extreme weather conditions.		
Hazard(s) Covered:	Extreme Temperatures, Severe Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	10	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	Medium		
Cost:	Medium	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Energy Efficiency and Conservation Block Grant (EECBG) program, county general funds, city general funds, utility rebate programs, and private property owner investments.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it improves the energy efficiency and safety of buildings while reducing utility costs for property owners. Technically, insulation and energy efficiency upgrades are well-documented and use widely available materials and expertise. Administratively, local jurisdictions can provide guidance and permitting for retrofitting projects and coordinate with utility companies to promote rebate programs. Politically, the action is supported as it aligns with sustainability goals and disaster resilience priorities. Legally, it complies with local and state building codes and energy efficiency standards. Economically, while the initial cost is medium, long-term savings from reduced energy use and lower maintenance costs provide substantial value. Environmentally, these upgrades reduce energy consumption and greenhouse gas emissions, supporting environmental sustainability goals.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



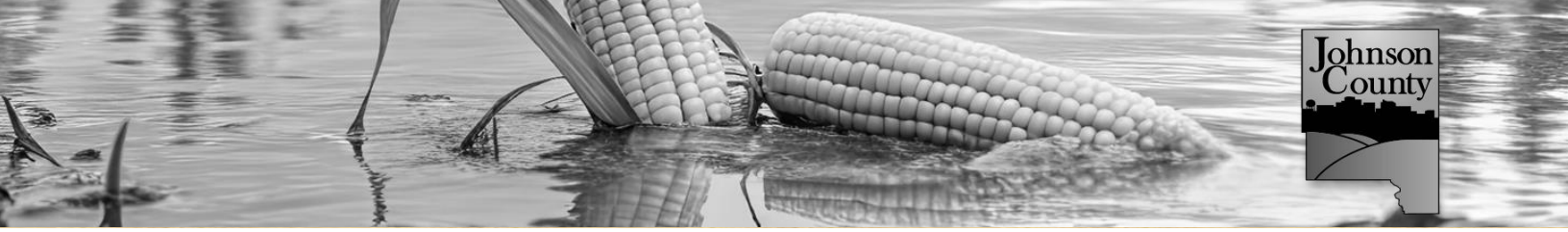
Action:	Levee Construction	**Action #:**	11
Description:	This action involves constructing levees to regulate water levels, prevent flooding, and protect critical infrastructure, residential areas, and agricultural lands. Levees are engineered embankments designed to redirect water flow and reduce the risk of riverine and flash flooding. This action includes site assessment, design, construction, and integration with existing flood management systems to maximize effectiveness.		
Hazard(s) Covered:	River Flooding, Flash Flooding, Dam Failures	**Jurisdiction(s) Assigned:**	Coralville, Iowa City, Hills, Solon, Johnson County
New/Previous Action:	11	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, U.S. Army Corps of Engineers funding, county general funds, city general funds, and public-private partnerships.	**Timeline:**	Long-term (Greater than 5 years)
STAPLEE Assessment:	This action is socially supported as it provides direct protection to at-risk communities and critical facilities. Technically, levee construction is a proven method of flood mitigation, supported by decades of engineering best practices. Administratively, jurisdictions can manage levee projects with assistance from state and federal agencies and private contractors. Politically, the action is widely supported due to its alignment with flood risk reduction and economic resilience goals. Legally, the action complies with state and federal floodplain management regulations, including FEMA and U.S. Army Corps of Engineers standards. Economically, while the initial investment is high, the long-term benefits of reduced flood damage, lower insurance costs, and community resilience outweigh the costs. Environmentally, levee construction can be designed to minimize ecological impacts and may include measures such as wetland restoration to offset habitat disruption.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors		



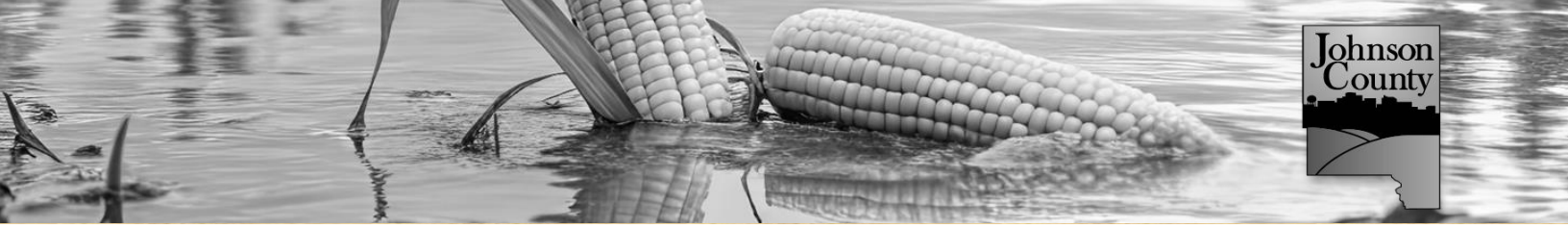
Action:	Looped Grid Power Systems	**Action #:**	12
Description:	This action involves transitioning linear power grid systems to looped grid configurations to enhance the reliability and resilience of power delivery during disasters. Looped grid systems create redundancies by providing alternative power pathways, significantly reducing the likelihood of outages caused by severe storms, wildfires, or other hazards. This action includes system assessments, upgrades to existing infrastructure, and the installation of smart grid technologies for efficient power management and restoration.		
Hazard(s) Covered:	Severe Storms, Tornadoes, Wildfires, Winter Storms, Dam Failures	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	12	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, local utility companies, state energy resilience grants, and public-private partnerships.	**Timeline:**	Long-term (Greater than 5 years)
STAPLEE Assessment:	This action is socially supported as it enhances the reliability of power delivery, benefiting all community sectors. Technically, looped grid systems are a proven solution for reducing single points of failure and improving system redundancy. Administratively, local utility companies, in collaboration with emergency management agencies and energy planners, have the capacity to manage and implement these upgrades. Politically, the action is supported due to its alignment with resilience and sustainability goals and its ability to mitigate economic disruptions caused by power outages. Legally, the action complies with local, state, and federal energy regulations and standards. Economically, while the initial investment is high, the long-term savings in reduced outage costs, improved reliability, and economic continuity justify the expense. Environmentally, the action has minimal impact, as it involves upgrades to existing infrastructure and incorporates smart grid technologies that promote energy efficiency.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



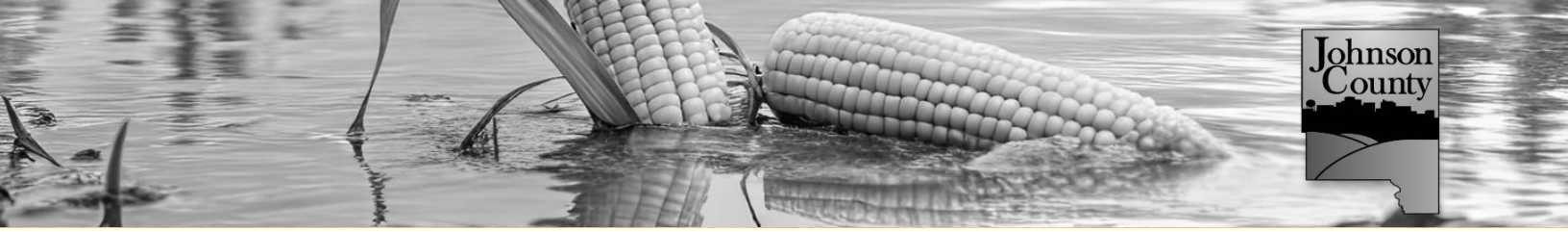
Action:	Low Flow Utilities	**Action #:**	13
Description:	This action involves installing low-flow utilities in critical facilities, residential areas, and public infrastructure to conserve water resources and reduce demand during drought conditions. Low-flow utilities include water-saving faucets, showerheads, toilets, and irrigation systems. These measures help maintain water availability during prolonged dry periods, reduce stress on municipal water systems, and promote sustainable water use practices. This would also include the development of relevant ordinances.		
Hazard(s) Covered:	Droughts	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	13	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	Medium		
Cost:	Medium	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, state water conservation funds, utility rebate programs, and county general funds, city general funds.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially accepted as it promotes water conservation and ensures resource availability during drought conditions. Technically, low-flow utilities are proven, widely available, and simple to install. Administratively, local jurisdictions and water utilities have the capacity to manage installations and provide public education about water-saving measures. Politically, the action is supported due to its alignment with sustainability and resource management goals. Legally, it complies with water use regulations and standards, including efficiency requirements for new construction and retrofits. Economically, the initial cost is low to medium, and the long-term savings in water usage and associated costs provide significant value. Environmentally, the action supports sustainability by reducing water consumption, preserving natural resources, and minimizing the impact on local water supplies.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



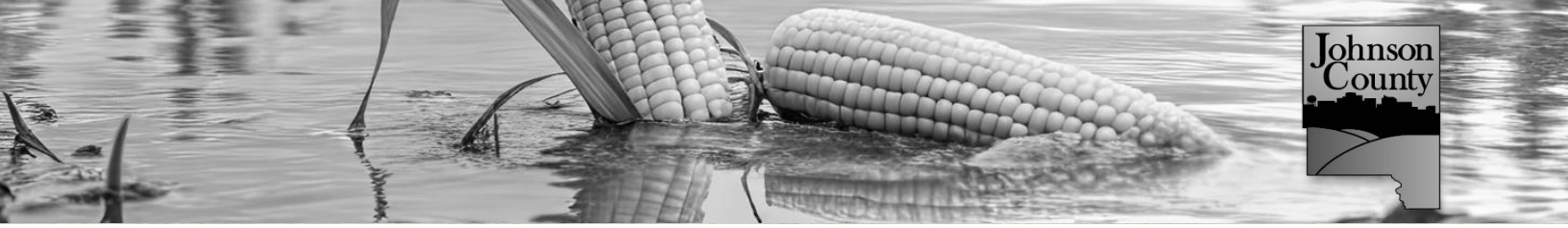
Action:	Public Awareness & Education	**Action #:**	14
Description:	This action involves implementing a comprehensive public education and awareness campaign to inform residents, businesses, and community organizations about local hazards, preparedness measures, and mitigation strategies. The campaign will include a variety of activities tailored to diverse audiences. Workshops and training sessions, both in-person and virtual, will teach residents how to prepare emergency kits, develop evacuation plans, and implement hazard-specific safety measures. Multimedia outreach through local TV, radio, social media, and websites will feature infographics, videos, and step-by-step guides customized to address hazards such as floods, tornadoes, and wildfires. Schools and youth organizations will be engaged through curriculum integration, mock disaster drills, and safety fairs to instill preparedness knowledge early. Community-wide events will be organized annually, offering interactive booths, demonstrations, and expert panels to increase engagement. Printed and digital resources, including brochures, flyers, and online toolkits, will provide accessible information on local hazards and preparedness actions. Public campaigns will also focus on promoting the use of emergency alert systems, educating residents on enrollment and usage to ensure timely notifications. Special attention will be given to vulnerable populations, such as seniors, non-English speakers, and individuals with disabilities, ensuring inclusivity in the outreach efforts.		
Hazard(s) Covered:	Animal/Plant/Crop Disease, River Flooding, Flash Flooding, Wildfires, Severe Storms, Tornadoes, Space Weather, Critical Infrastructure Failure, Cyber Incident, Terrorism & Mass Violence, HazMat & Radiological, Earthquake, and Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	14	**Goal(s) Supported:**	Goal 2 and 3
Priority:	High		
Cost:	Low	**Benefit:**	High



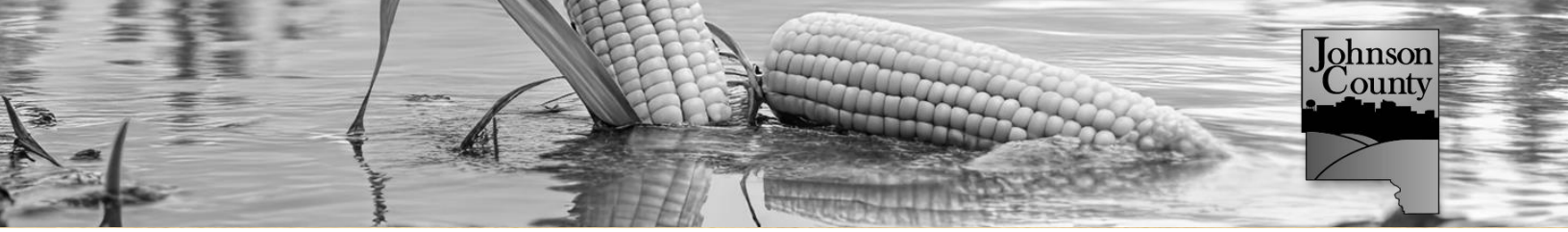
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, private sector sponsorships, and partnerships with community organizations.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it empowers residents with knowledge to protect themselves and their property during hazards. Technically, public education campaigns are feasible and can leverage existing platforms and resources for outreach. Administratively, local emergency management agencies, schools, and community organizations can manage and execute these programs. Politically, the action is well-supported due to its alignment with public safety goals and its ability to build trust with the community. Legally, the action complies with public information and emergency communication standards. Economically, the cost is low to medium and provides significant returns in terms of reduced response and recovery needs. Environmentally, the action has no direct environmental impact and promotes sustainable practices where applicable.		
Responsible:	Emergency Management Director, Fire Chiefs, Municipal Police Chiefs, County Sheriff		



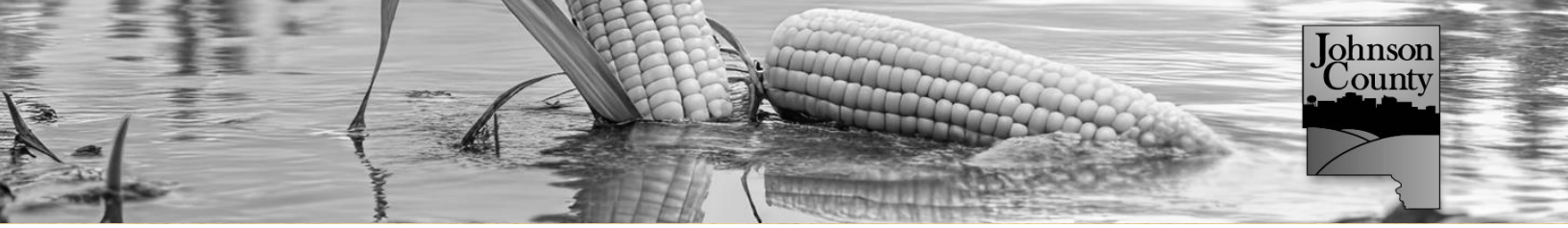
Action:	Rainwater Retention Basins	**Action #:**	15
Description:	This action involves the construction and strategic placement of rainwater retention basins to collect and store excess rainwater during storm events and mitigate the impacts of flooding. These basins also serve as a water resource during drought conditions, supporting agricultural irrigation, urban water supply, and ecosystem health. The project includes identifying high-priority areas, designing basins to meet local hydrological needs, and integrating them with existing stormwater management systems. Retention basins can also reduce the burden on aging drainage infrastructure, mitigate erosion, and improve groundwater recharge, providing a sustainable solution to water management challenges.		
Hazard(s) Covered:	Flash Flooding, River Flooding, Droughts	**Jurisdiction(s) Assigned:**	All municipalities, University of Iowa
New/Previous Action:	15	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	Medium		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, state water management funds, county general funds, city general funds, and partnerships with environmental organizations.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it addresses both flood and drought risks while providing additional community and environmental benefits. Technically, the construction of rainwater retention basins is well-established and customizable to meet local hydrological needs. Administratively, local governments, stormwater management agencies, and environmental organizations have the expertise to oversee design, construction, and maintenance. Politically, the action is well-supported as it aligns with resilience goals and sustainable water management strategies. Legally, the action complies with environmental regulations and water management standards, including permitting requirements for construction. Economically, while the initial costs are high, the long-term savings from reduced flood damage, enhanced water availability, and decreased reliance on external water sources justify the investment. Environmentally, retention basins provide significant co-benefits, including groundwater recharge, improved water quality, and habitat creation, while reducing stormwater runoff and erosion.		



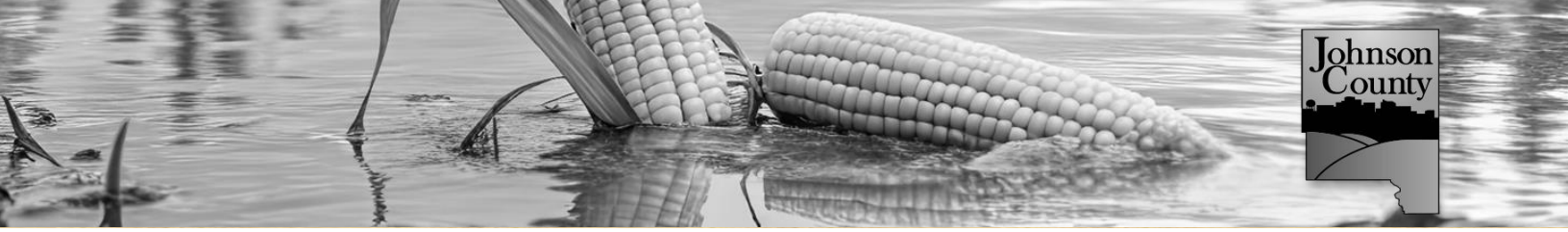
Responsible:	Municipal Public Works Directors, School District Facilities Management Directors



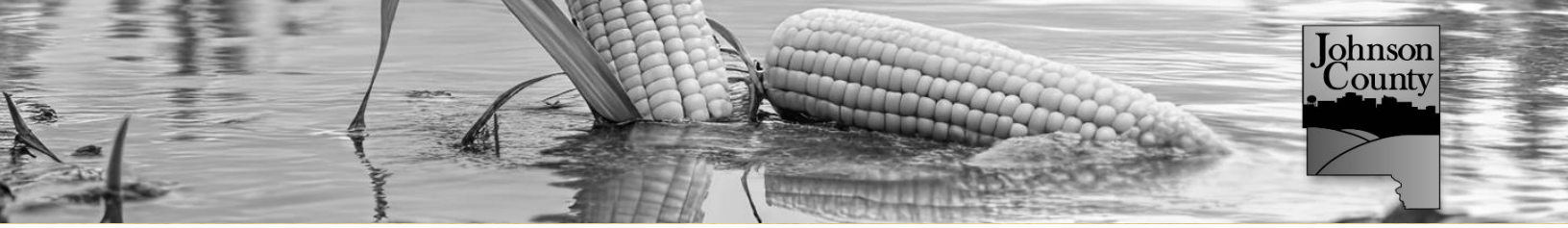
Action:	Raise Transportation Infrastructure	**Action #:**	16
Description:	This action involves elevating transportation infrastructure, such as roads, bridges, and railways, in flood-prone areas to ensure their functionality during and after flood events. By raising the elevation of critical transportation routes above base flood levels, this measure prevents damage from inundation and debris accumulation, enhances connectivity during disasters, and supports emergency response and recovery efforts. The project includes engineering assessments, design, and construction, with a focus on integrating elevated infrastructure with flood control measures like levees or berms. Priority will be given to transportation routes serving emergency services, evacuation needs, and critical supply chains.		
Hazard(s) Covered:	Flash Flooding, River Flooding, Dam Failure	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	16	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Flood Mitigation Assistance (FMA) program, Department of Transportation grants, county general funds, city general funds, and public-private partnerships.	**Timeline:**	Long-term (Greater than 5 years)
STAPLEE Assessment:	This action is socially supported as it directly improves community safety, access, and connectivity during disasters. Technically, raising transportation infrastructure is a proven engineering method to mitigate flood risks and maintain functionality. Administratively, local and state transportation agencies have the capacity to manage such projects with coordination from emergency management and planning departments. Politically, the action is well-supported due to its critical importance for public safety and economic resilience. Legally, the project complies with federal, state, and local regulations, including environmental permitting and transportation standards. Economically, while the initial costs are high, the benefits of reduced flood damage, improved emergency access, and lower maintenance costs outweigh the investment. Environmentally, raising transportation infrastructure can be designed to minimize ecological impacts and may incorporate features such as wildlife crossings or stormwater management systems to enhance environmental co-benefits.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



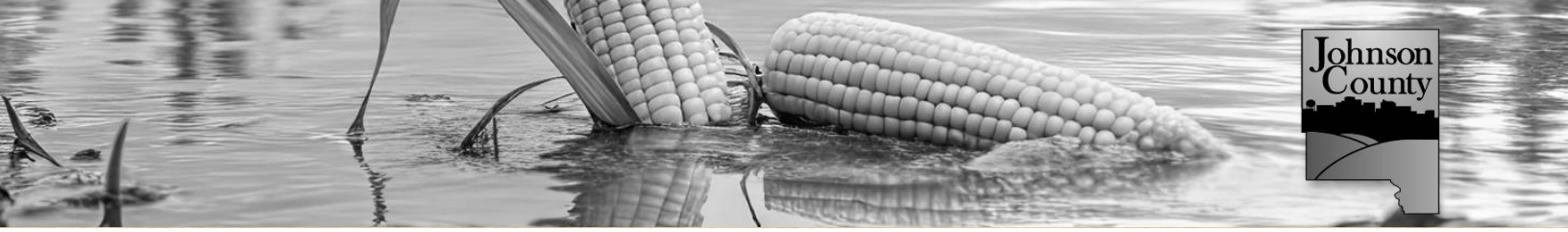
Action:	Relocate or Buyout Vulnerable Structures	**Action #:**	17
Description:	This action involves relocating or purchasing properties located in high-risk flood zones or dam inundation areas to eliminate their exposure to repeated flooding events. Relocation involves moving structures to safer locations outside the hazard area, while buyouts involve purchasing properties and converting the land to open space or floodwater retention areas. This action reduces long-term flood risks, decreases property damage, and minimizes the financial burden on property owners, while also enhancing community safety and resilience. It is particularly beneficial for structures that cannot be effectively protected through other mitigation measures.		
Hazard(s) Covered:	Flash Flooding, River Flooding, Dam Failure	**Jurisdiction(s) Assigned:**	All jurisdictions except University of Iowa
New/Previous Action:	17	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) program, Pre-Disaster Mitigation (PDM) grant program, state hazard mitigation funds, and county general funds, city general funds.	**Timeline:**	Long-term (Greater than 5 years)
STAPLEE Assessment:	This action is socially supported as it directly reduces risk for property owners in flood-prone areas and improves community safety. Technically, the process of relocating or buying out structures is well-documented and feasible with existing expertise and resources. Administratively, local governments, with assistance from state and federal agencies, have the capacity to manage buyout programs, including property acquisition, relocation logistics, and land restoration. Politically, the action is well-supported as it aligns with flood risk reduction goals and demonstrates proactive government efforts to reduce future losses. Legally, the process adheres to property acquisition regulations and ensures fair compensation for affected property owners. Economically, while the initial costs are high, the long-term savings from avoided flood damages, reduced insurance claims, and decreased recovery costs provide significant value. Environmentally, the action restores natural floodplain functions, reduces development pressure in hazard areas, and provides opportunities for habitat preservation and water quality improvement.		
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors		



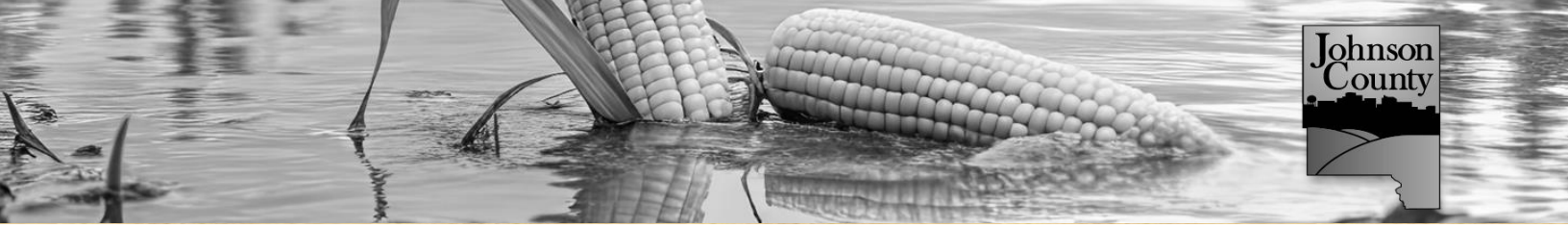
Action:	SKYWARN Storm Spotter Training	**Action #:**	18
Description:	This action involves implementing the National Weather Service (NWS) SKYWARN Storm Spotter program to train community members in identifying, reporting, and responding to severe weather conditions such as tornadoes, thunderstorms, and flash floods. Training sessions, conducted both in-person and virtually, will cover topics including cloud formations, storm movement, and safe observation practices. The program aims to increase local weather awareness, enhance the accuracy of real-time weather data for the NWS, and improve community preparedness and response. Trainees, including first responders, emergency management personnel, and interested residents, will play a critical role in relaying on-the-ground weather information to the NWS and local authorities.		
Hazard(s) Covered:	Severe Storms, Tornadoes, Flash Flooding, Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	18	**Goal(s) Supported:**	Goal 2 and 3
Priority:	Medium		
Cost:	Low	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and partnerships with the National Weather Service (NWS).	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it engages community members in hazard preparedness and enhances public safety during severe weather events. Technically, the SKYWARN program is well-established, uses proven training methods, and leverages the expertise of the NWS. Administratively, emergency management agencies, in collaboration with the NWS, can manage training logistics and community outreach. Politically, the action garners support as it aligns with public safety goals and enhances local disaster response capabilities. Legally, the program complies with training and reporting standards set by the NWS and local emergency management authorities. Economically, the low-cost nature of the program provides high value by improving the accuracy of weather warnings and reducing the risks associated with severe weather. Environmentally, the action has no direct environmental impact but supports better planning and preparedness for weather-related hazards.		
Responsible:	Emergency Management Director, Fire Chiefs, Municipal Police Chiefs, County Sheriff		



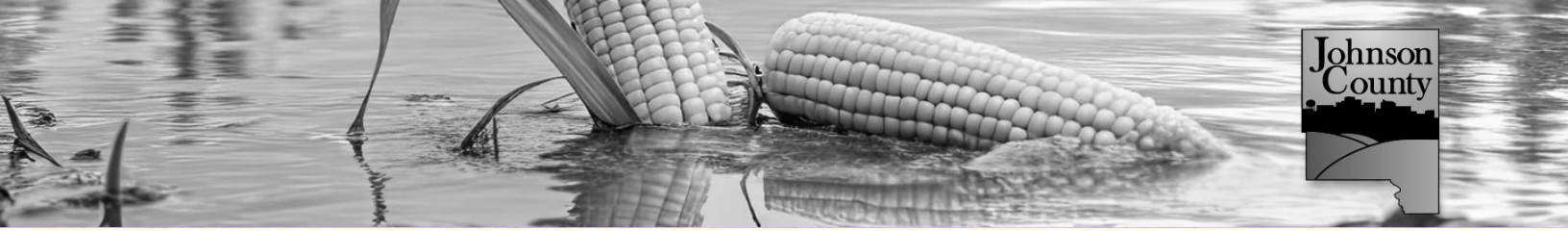
Action:	Snow Fences	**Action #:**	19
Description:	This action involves installing snow fences along major transportation routes and other critical areas prone to heavy snowdrifts during winter storms. Snow fences are designed to control the movement and accumulation of snow by creating windbreaks that reduce blowing and drifting snow, ensuring safer roads and infrastructure during and after snow events. The fences can be constructed from wood, plastic, or natural vegetation and strategically placed based on snow drift patterns and prevailing winds. This action aims to enhance road safety, reduce snow removal costs, and improve accessibility for emergency and essential services during winter storms.		
Hazard(s) Covered:	Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	19	**Goal(s) Supported:**	Goal 1 and 2
Priority:	Medium		
Cost:	Low	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, state transportation budgets, and county general funds, city general funds.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it improves road safety and accessibility during winter storms, benefiting both residents and emergency services. Technically, snow fences are a proven and effective method for controlling snow accumulation and ensuring safer transportation routes. Administratively, public works departments have the expertise to install and maintain snow fences, coordinating with transportation and emergency management agencies. Politically, the action is well-supported as it aligns with public safety and infrastructure protection goals. Legally, it complies with local and state transportation standards and regulations. Economically, the low-cost investment provides significant returns by reducing snow removal expenses, preventing accidents, and ensuring continuity of operations during severe winter conditions. Environmentally, the use of natural vegetation as snow fences can provide additional ecological benefits, such as habitat creation and erosion control.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



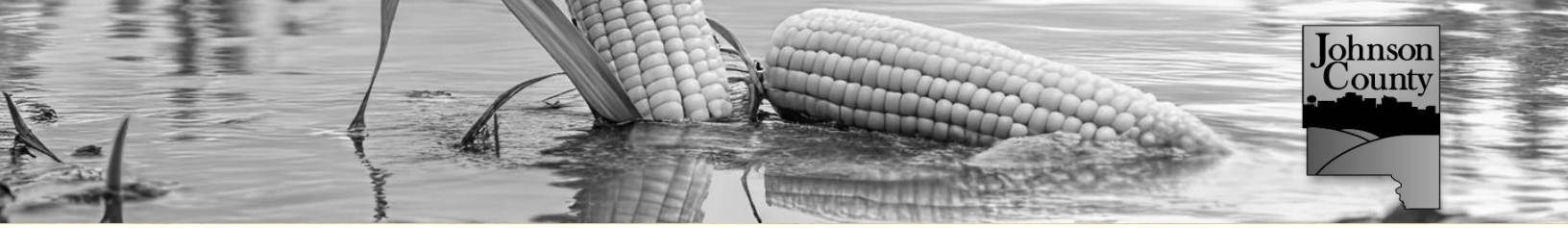
Action:	Storm Water Drainage System Upgrade	**Action #:**	20
Description:	This action involves upgrading existing storm water drainage systems in areas prone to frequent or severe flooding to improve their capacity and efficiency. Upgrades include resizing culverts, installing additional storm drains, constructing detention or retention basins, and replacing aging infrastructure. These improvements aim to mitigate flooding by facilitating faster water drainage during heavy rainfall or storm events, thereby protecting residential, commercial, and critical infrastructure. The project prioritizes areas with outdated or undersized systems and regions experiencing rapid development that increases impermeable surfaces.		
Hazard(s) Covered:	Flash Flooding	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	20	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	High	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Flood Mitigation Assistance (FMA) program, county general funds, city general funds, and infrastructure improvement grants.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it protects properties, reduces flood-related disruptions, and enhances community resilience. Technically, storm water drainage system upgrades are well-documented, using proven engineering solutions tailored to local conditions. Administratively, public works departments, in coordination with stormwater management agencies, have the expertise to design, implement, and maintain the upgrades. Politically, the action garners strong support as it addresses visible community concerns about flooding and aligns with resilience goals. Legally, the action complies with federal, state, and local water management regulations and permitting requirements. Economically, while the initial costs are high, the long-term savings from reduced flood damage, lower recovery expenses, and enhanced community functionality justify the investment. Environmentally, upgraded drainage systems can include green infrastructure elements such as bioswales and permeable pavements, minimizing environmental impacts and enhancing water quality.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



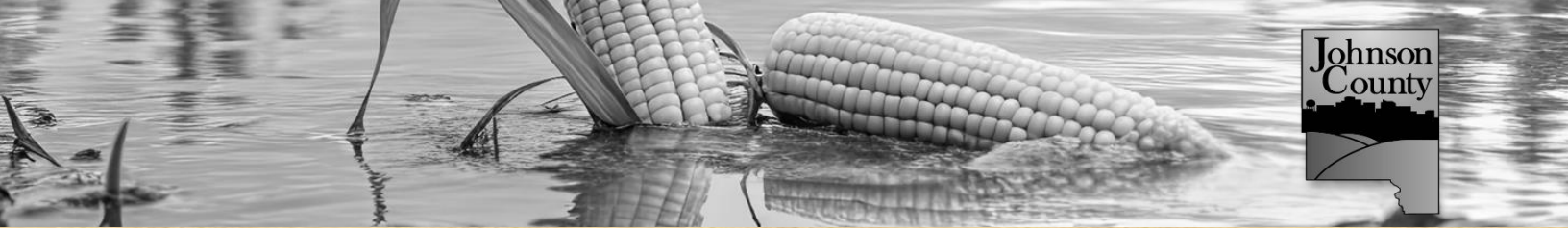
Action:	Storm Water Pump Stations	**Action #:**	21
Description:	This action involves the installation or enhancement of storm water pump stations in flood-prone areas to mitigate the impact of excessive water accumulation during heavy rainfall or storm events. These pump stations work to rapidly remove water from low-lying areas, redirecting it to retention basins, rivers, or other appropriate outlets. The project includes the assessment of high-risk areas, installation of pumps with sufficient capacity, integration with existing stormwater systems, and regular maintenance programs to ensure reliability. Priority will be given to areas where infrastructure or populations are most vulnerable to flooding.		
Hazard(s) Covered:	Flash Flooding	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	21	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	High	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Flood Mitigation Assistance (FMA) program, county general funds, city general funds, and infrastructure improvement grants.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it directly reduces the risk of flooding in vulnerable areas, benefiting residents and businesses. Technically, storm water pump stations are a proven solution for water management, effectively integrated into existing stormwater systems. Administratively, public works departments, in collaboration with stormwater management agencies, can oversee installation and maintenance. Politically, the action is well-supported as it addresses flood mitigation needs and aligns with resilience and public safety goals. Legally, the project complies with all applicable water management regulations and permitting requirements. Economically, while the initial investment is high, the long-term benefits of reduced flood damage and improved community functionality justify the cost. Environmentally, pump stations can be designed to minimize ecological impacts and improve water quality through controlled discharge systems.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



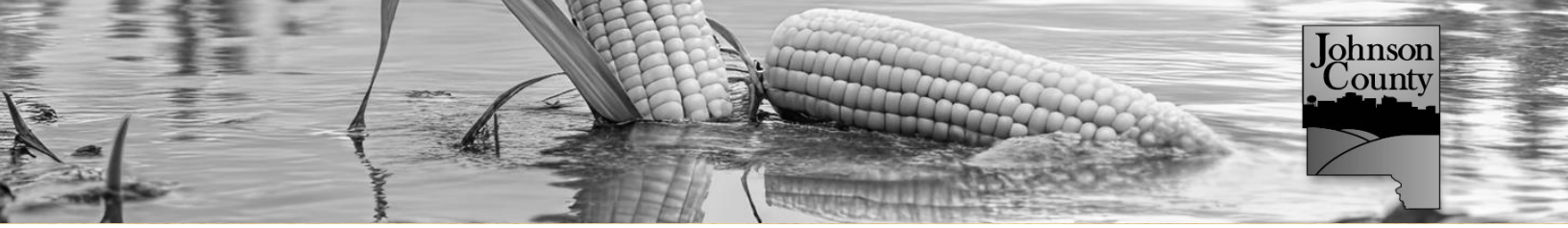
Action:	Storm Siren Network Expansion	**Action #:**	22
Description:	This action involves expanding the existing storm siren network to ensure comprehensive coverage for all populated and high-risk areas within the jurisdiction. Storm sirens provide critical outdoor alerts for severe weather events, including tornadoes, severe storms, and flash flooding. The project includes site assessments to identify gaps in current coverage, installation of new sirens with modern features such as solar power and remote activation, and integration with emergency alert systems. Maintenance programs will ensure long-term functionality. Public education campaigns will accompany the expansion to inform residents about the purpose and limitations of storm sirens, emphasizing that they are outdoor warning systems and encouraging complementary indoor alert systems.		
Hazard(s) Covered:	Severe Storms, Tornadoes, Flash Flooding	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	22	**Goal(s) Supported:**	Goal 2 and 3
Priority:	High		
Cost:	Medium	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and state emergency management grants.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it directly addresses public safety concerns and ensures equitable access to outdoor alerts for severe weather. Technically, storm sirens are reliable and proven tools for outdoor warning systems, and modern upgrades enhance their effectiveness. Administratively, emergency management and public works departments have the capacity to coordinate the expansion and ongoing maintenance. Politically, the action garners strong support due to its alignment with life safety goals and its visible impact on community preparedness. Legally, the project complies with federal, state, and local regulations regarding public safety and infrastructure. Economically, the cost is medium, but the benefits of saving lives, reducing injuries, and enhancing community resilience far outweigh the investment. Environmentally, the installation of storm sirens has minimal impact and may include sustainable features like solar power to reduce energy consumption.		
Responsible:	Emergency Management Director		



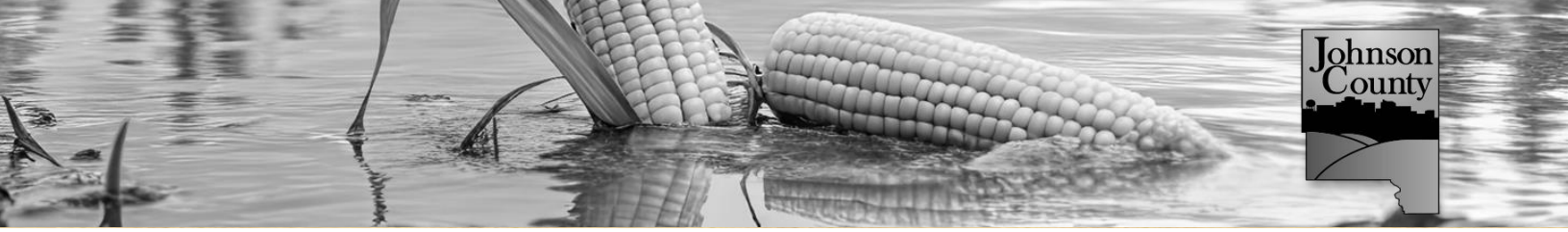
Action:	Structural Integrity Monitoring Instruments	**Action #:**	23
Description:	This action involves installing structural integrity monitoring instruments on critical infrastructure such as bridges, dams, levees, and large buildings to assess their condition and ensure safety during and after hazard events. These instruments include sensors to monitor stress, strain, vibration, temperature, and displacement in real-time. Data collected will help identify potential vulnerabilities, guide maintenance, and enable timely interventions to prevent failures during disasters such as earthquakes, flooding, or severe storms. The project includes conducting risk assessments to prioritize infrastructure, integrating monitoring systems with emergency management platforms, and training personnel on data interpretation and response protocols.		
Hazard(s) Covered:	Earthquakes, River Flooding, Flash Flooding, Dam Failures, Severe Storms	**Jurisdiction(s) Assigned:**	Johnson County, Coralville, Hills, Iowa City, Tiffin, UI, Clear Creek-Amana CSD, Iowa City CSD, Lone Tree CSD
New/Previous Action:	23	**Goal(s) Supported:**	Goal 1, 2, and 4
Priority:	High		
Cost:	High	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Department of Transportation grants, infrastructure improvement grants, county general funds, city general funds.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it directly addresses the safety and reliability of critical infrastructure. Technically, structural integrity monitoring is a well-established solution using proven sensor technologies and data systems. Administratively, infrastructure management agencies have the expertise to oversee the installation, data collection, and maintenance of these systems. Politically, the action garners strong support as it aligns with public safety and resilience priorities. Legally, the action complies with federal, state, and local regulations for infrastructure monitoring and safety standards. Economically, while the initial investment is high, the long-term savings from preventing infrastructure failures and avoiding catastrophic repair costs outweigh the expenses. Environmentally, the action has minimal environmental impact, as it involves adding sensors and monitoring equipment to existing infrastructure without significant physical alterations.		



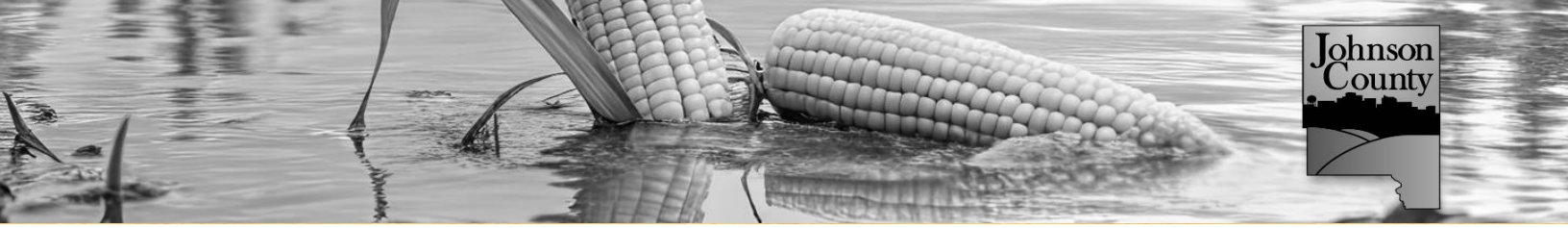
Responsible:	Emergency Management Director, County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors



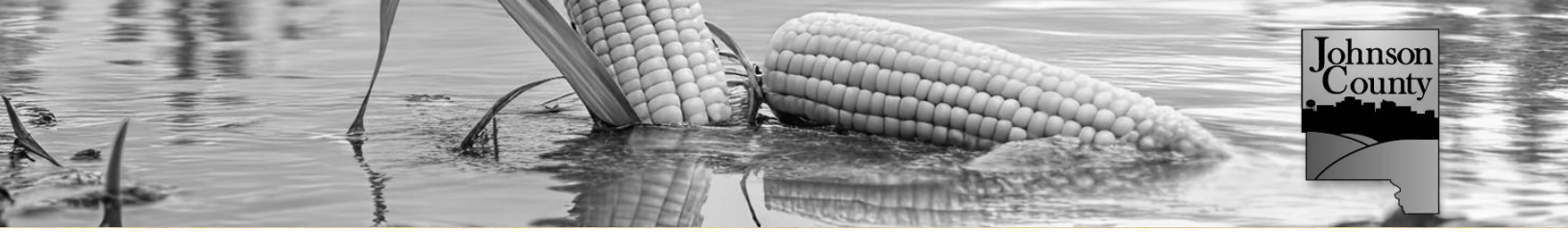
Action:	Transportation Status & Routing System	**Action #:**	24
Description:	This action involves implementing a Transportation Status & Routing System to monitor road conditions, assess transportation infrastructure, and provide real-time routing information during hazard events. The system integrates GPS technology, traffic monitoring, weather data, and road condition updates to optimize evacuation routes, guide emergency responders, and inform the public about safe travel paths. Features include real-time dashboards for emergency management personnel, mobile applications for public use, and integration with state and regional transportation systems. This action prioritizes the safety of critical transportation corridors and ensures efficient mobility during disasters such as severe storms, floods, or winter events.		
Hazard(s) Covered:	River Flooding, Flash Flooding, Severe Storms, Winter Storms, Dam Failures	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	24	**Goal(s) Supported:**	Goal 1, 2, and 3
Priority:	High		
Cost:	Medium	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Department of Transportation grants, county general funds, city general funds, and public-private partnerships.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it enhances the safety and mobility of residents and first responders during emergencies. Technically, transportation status and routing systems are feasible, leveraging proven technologies such as GIS, traffic sensors, and data analytics platforms. Administratively, emergency management agencies can collaborate with transportation departments to oversee the system's implementation and maintenance. Politically, the action garners support as it addresses visible transportation challenges and aligns with public safety and resilience goals. Legally, the project complies with local, state, and federal regulations regarding data privacy, traffic monitoring, and public safety. Economically, the medium initial investment is justified by the long-term benefits of reduced transportation disruptions, improved emergency response times, and enhanced public confidence. Environmentally, the system has minimal physical impact, while its efficiency in routing reduces fuel use and emissions during emergencies.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



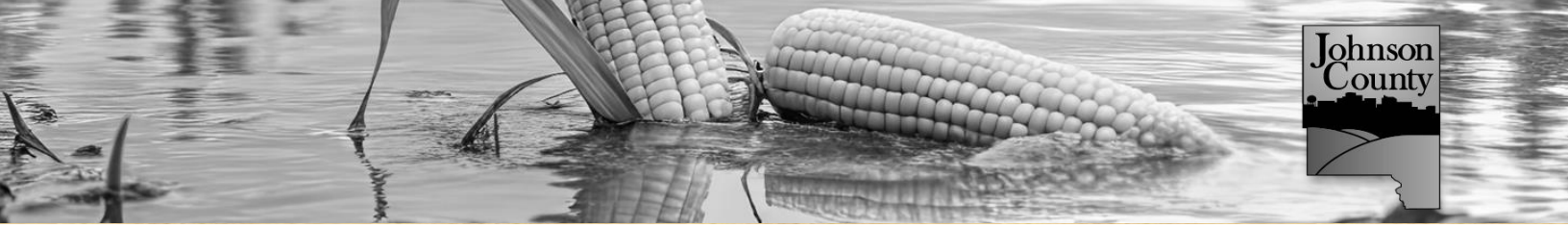
Action:	Water Line Insulation	**Action #:**	25
Description:	This action involves insulating water lines in critical facilities, residential areas, and other vulnerable infrastructure to prevent freezing during extreme cold events. Insulating water lines reduces the risk of pipe bursts, water service interruptions, and associated property damage. The project includes identifying high-risk areas, selecting appropriate insulation materials, and installing pipe insulation for both above-ground and below-ground water lines. Additional measures may include the installation of heat tape or heating systems for high-risk or critical infrastructure. Priority will be given to critical facilities such as hospitals, fire stations, and shelters, as well as areas with older water infrastructure.		
Hazard(s) Covered:	Extreme Temperatures, Severe Winter Storms	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	25	**Goal(s) Supported:**	Goal 1 and 2
Priority:	Medium		
Cost:	Medium	**Benefit:**	Medium
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and property owner contributions for residential installations.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it protects water access for residents and reduces potential property damage, particularly in vulnerable areas. Technically, water line insulation is a straightforward and effective solution that uses proven materials and methods. Administratively, local utility companies and public works departments have the capacity to manage and oversee installation and maintenance efforts. Politically, the action garners support as it aligns with resilience and infrastructure protection goals, particularly for critical facilities. Legally, the project complies with state and local building codes and water utility regulations. Economically, while the upfront costs are medium, the long-term savings from avoided pipe repair and service disruptions justify the investment. Environmentally, the action has minimal impact, as it involves retrofitting existing infrastructure and may include energy-efficient heating systems to further reduce environmental effects.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



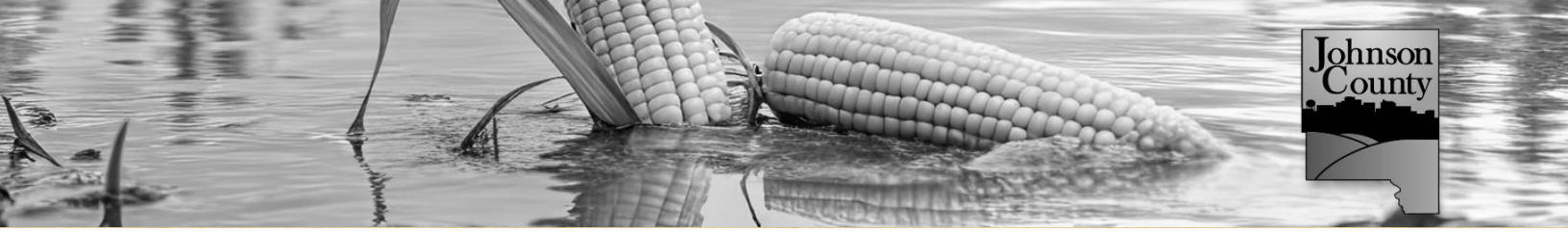
Action:	Wildland Fire Structural Retrofit	**Action #:**	26
Description:	This action involves retrofitting structures in wildland-urban interface (WUI) areas to improve their resistance to wildfires. Retrofitting measures include installing fire-resistant roofing and siding materials, upgrading windows to dual-pane or tempered glass, sealing vents with ember-resistant screens, and enclosing eaves to prevent ember entry. Additional measures may include creating non-combustible zones around structures by removing flammable vegetation and debris and using fire-resistant landscaping. These retrofits reduce the risk of structural ignition during wildfires, enhance occupant safety, and increase the overall resilience of communities in wildfire-prone areas.		
Hazard(s) Covered:	Wildfires	**Jurisdiction(s) Assigned:**	All jurisdictions, except University Heights, Clear Creek-Amana CSD, and Lone Tree CSD
New/Previous Action:	26	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, Pre-Disaster Mitigation (PDM) grant program, state wildfire mitigation funds, and property owner investments.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it protects homes and reduces wildfire risks for vulnerable communities. Technically, wildfire retrofit measures are well-documented and effective, using proven materials and construction techniques. Administratively, local building departments and fire districts have the capacity to manage retrofitting programs and provide technical guidance. Politically, the action garners strong support due to its alignment with wildfire mitigation priorities and community safety goals. Legally, the action complies with state and local building codes, WUI regulations, and fire safety standards. Economically, while initial costs may be medium to high, the long-term benefits in reduced structural losses, lower insurance premiums, and decreased recovery expenses provide significant value. Environmentally, the action supports fire-adaptive communities and minimizes the environmental impacts of post-wildfire recovery, such as debris removal and erosion control.		
Responsible:	County Secondary Roads Engineer, Municipal Public Works Directors, School District Facilities Management Directors		



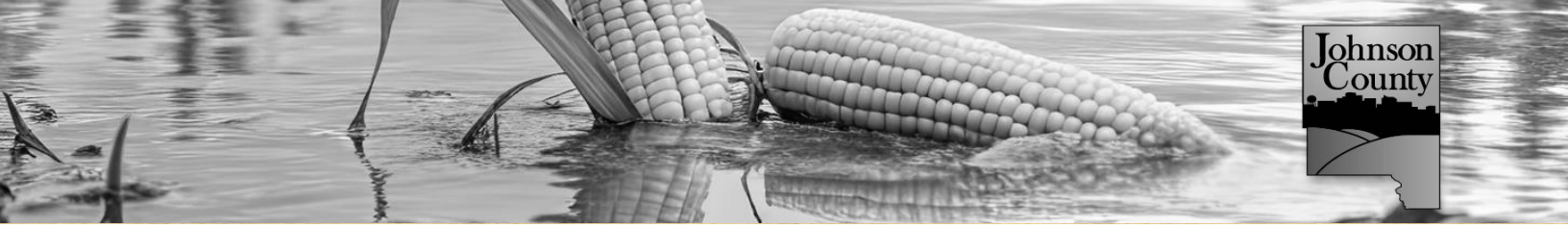
Action:	POD Planning and Exercising	**Action #:**	27
Description:	This action involves developing, updating, and exercising plans for Points of Distribution (POD) to ensure the efficient and safe distribution of medical supplies, vaccines, and other critical resources during communicable disease outbreaks. The planning process includes identifying suitable POD locations, establishing protocols for staffing, logistics, and inventory management, and integrating infection prevention measures such as social distancing, personal protective equipment (PPE), and contactless distribution methods. Regular exercises, including tabletop, functional, and full-scale drills, will test the effectiveness of POD operations, enhance coordination among stakeholders, and identify areas for improvement. Public outreach campaigns will inform residents about POD locations and procedures to increase awareness and participation during emergencies.		
Hazard(s) Covered:	Communicable Disease Outbreak	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 2 and 3
Priority:	High		
Cost:	Low	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Public Health Emergency Preparedness (PHEP) cooperative agreements, county general funds, city general funds, and federal pandemic response funds.	**Timeline:**	Short-term (1–2 years)
STAPLEE Assessment:	This action is socially supported as it addresses the need for equitable access to medical supplies and resources during public health emergencies. Technically, POD operations and exercises are proven methods for effective resource distribution and can incorporate modern logistics tools for efficiency. Administratively, public health departments and emergency management agencies can collaborate to manage planning, implementation, and evaluation. Politically, the action garners support as it aligns with public health priorities and demonstrates proactive measures to address communicable disease risks. Legally, the project complies with federal, state, and local public health regulations and standards. Economically, the medium initial cost is justified by the significant public health benefits, reduced mortality, and decreased healthcare system strain during outbreaks. Environmentally, PODs have minimal environmental impact, with opportunities to integrate sustainable practices such as reusable PPE and energy-efficient operations.		
Responsible:	Emergency Management Director, County Public Health Director		



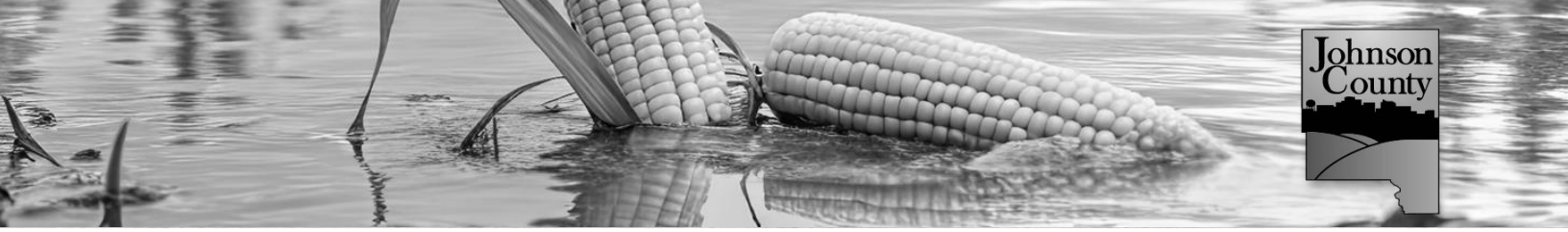
Action:	Hazardous Materials Transportation Routes	**Action #:**	28
Description:	This action involves identifying, designating, and enhancing safety along transportation routes used for the movement of hazardous materials. The project includes mapping existing routes, analyzing risk factors (e.g., proximity to populated areas, critical infrastructure, and environmental resources), and developing alternate routes to reduce risks. Measures include installing appropriate signage, enhancing road and rail infrastructure, creating buffer zones, and implementing safety protocols for incident prevention and response. Training for first responders and public outreach campaigns will complement these efforts, ensuring preparedness for hazardous materials incidents. This action aims to minimize risks to public health, safety, and the environment associated with hazardous materials transportation.		
Hazard(s) Covered:	Hazardous Materials	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	Low	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), U.S. Department of Transportation Hazardous Materials Emergency Preparedness (HMEP) grants, county general funds, city general funds, and partnerships with transportation companies.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it addresses public safety concerns related to hazardous materials transportation and reduces risks to nearby communities. Technically, mapping and designating safe routes, along with infrastructure upgrades, are proven and feasible measures. Administratively, transportation departments, emergency management agencies, and regional planning organizations can collaborate to manage the project. Politically, the action garners strong support as it aligns with public safety and environmental protection goals. Legally, the project complies with federal and state hazardous materials transportation regulations, including standards set by the U.S. Department of Transportation. Economically, while initial costs are high, the long-term benefits of reduced incident response costs, environmental cleanup expenses, and public health impacts justify the investment. Environmentally, the action minimizes risks of spills and contamination, protecting natural resources and reducing long-term environmental recovery needs.		
Responsible:	Emergency Management Director, Fire Chiefs		



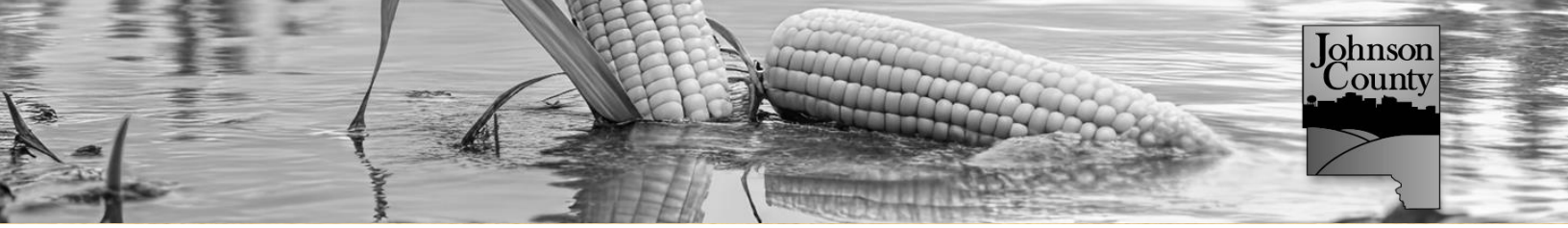
Action:	Social Unrest Security Planning	**Action #:**	29
Description:	This action involves developing comprehensive security plans for public spaces to mitigate risks associated with social unrest. The project focuses on ensuring the safety of the public, protecting critical infrastructure, and maintaining order during protests, demonstrations, or other mass gatherings. Key components include conducting risk assessments to identify vulnerable public spaces, enhancing physical security measures (e.g., barriers, surveillance systems, and lighting), and establishing coordinated response protocols involving law enforcement, emergency management, and local government. Training programs for security personnel and public outreach campaigns to promote safe and peaceful assembly practices are integral to this action. Periodic tabletop and functional exercises will test the effectiveness of plans and improve interagency coordination.		
Hazard(s) Covered:	Social Unrest	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 1, 2, and 3
Priority:	High		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Homeland Security Grant Program (HSGP), county general funds, city general funds, and public-private partnerships with businesses and organizations managing public spaces.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it addresses public safety and ensures the protection of public spaces, particularly during high-tension events. Technically, security planning is well-documented and uses proven methods such as risk assessments and surveillance upgrades. Administratively, law enforcement agencies, emergency management offices, and local governments have the capacity to develop and implement these plans. Politically, the action garners support as it aligns with public safety and emergency preparedness priorities. Legally, the action complies with state and federal guidelines on public safety, surveillance, and the right to peaceful assembly. Economically, the medium costs are outweighed by the long-term benefits of reduced property damage, improved community safety, and decreased recovery costs following social unrest. Environmentally, the action has minimal impact, as it involves upgrading existing infrastructure and systems without significant physical alterations.		
Responsible:	Emergency Management Director, Municipal Police Chiefs, County Sheriff		



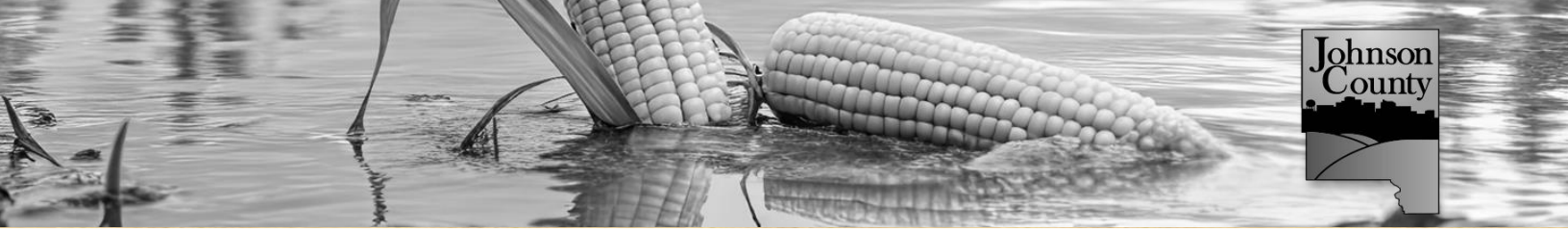
Action:	Critical Infrastructure Electromagnetic Protection	**Action #:**	30
Description:	This action involves implementing measures to protect critical infrastructure, such as power grids, telecommunications systems, and emergency response facilities, from electromagnetic threats, including electromagnetic pulses (EMP) and geomagnetic storms. The project includes the installation of surge protectors, Faraday cages, and electromagnetic shielding around sensitive equipment. Backup systems, such as hardened generators and redundant communications networks, will ensure continuity of operations during an event. The initiative also includes conducting vulnerability assessments, developing response protocols, and training personnel in electromagnetic protection and recovery strategies. These measures aim to safeguard critical infrastructure from disruption, reduce downtime, and enhance community resilience.		
Hazard(s) Covered:	Critical Infrastructure Failure, Space Weather, Cyber Incident	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	High	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) program, Department of Energy grants, utility budgets, and public-private partnerships.	**Timeline:**	Long-term (Greater than 5 years)
STAPLEE Assessment:	This action is socially supported as it ensures the reliability of critical services that communities depend on, such as electricity and communication. Technically, electromagnetic protection measures are well-documented and proven to be effective in shielding critical systems. Administratively, utility companies and emergency management agencies have the capacity to oversee the implementation and maintenance of these protective measures. Politically, the action garners strong support due to its alignment with national and local security goals. Legally, it complies with state and federal regulations related to infrastructure protection and cybersecurity. Economically, while the upfront costs are high, the long-term savings from preventing service interruptions and infrastructure damage far outweigh the investment. Environmentally, the action has minimal impact, as it involves retrofitting existing systems and infrastructure rather than new construction.		
Responsible:	Emergency Management Director		



Action:	Emergency Supply Chain Continuity Planning	**Action #:**	31
Description:	This action involves developing and maintaining supply chain continuity plans to ensure the availability of critical goods and resources during and after disaster events. The planning process includes identifying key supply chain vulnerabilities, mapping critical suppliers and distribution routes, and establishing partnerships with private sector entities. Strategies such as pre-arranged contracts, alternate sourcing options, and stockpiling essential resources (e.g., medical supplies, food, and fuel) will be incorporated. The plan will also address interdependencies among critical infrastructure sectors and prioritize maintaining supply chains for healthcare, utilities, and emergency response operations. Regular exercises and stakeholder engagement will test the plans and improve coordination among public and private entities.		
Hazard(s) Covered:	Supply Chain Disruption, Communicable Disease Outbreaks, Severe Storms, Floods, Cyber Incidents	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 2 and 4
Priority:	High		
Cost:	Low	**Benefit:**	High
Potential Funding Source(s):	Funding may come from sources such as the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, county general funds, city general funds, and partnerships with private sector stakeholders.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it ensures the availability of critical goods and services, reducing the impact of supply chain disruptions on communities. Technically, supply chain continuity planning uses established frameworks and tools to identify vulnerabilities and mitigate risks. Administratively, emergency management agencies, in collaboration with private sector partners and infrastructure operators, can oversee the development and implementation of the plans. Politically, the action garners strong support as it aligns with public safety and economic resilience goals. Legally, the project complies with regulations related to critical infrastructure protection, emergency management, and procurement. Economically, the medium costs are justified by the long-term benefits of uninterrupted supply chains, reduced recovery expenses, and enhanced community resilience. Environmentally, the action has minimal direct environmental impact, though it supports sustainability by promoting efficient resource management during crises.		

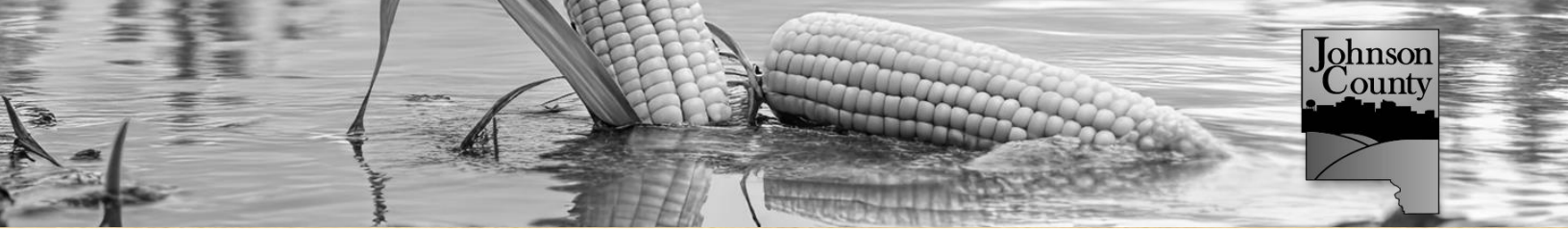


Responsible: Emergency Management Director



Action:	Increase Surveillance and Access Control	**Action #:**	32
Description:	This action involves enhancing surveillance and access control measures at critical infrastructure facilities and public spaces to mitigate risks associated with terrorism, vandalism, unauthorized access, and other security threats. Measures include installing or upgrading security cameras, motion sensors, and access control systems (e.g., keycards, biometric scanners, and gates). Additionally, this action includes establishing centralized monitoring systems for real-time security alerts, conducting regular vulnerability assessments, and implementing staff training on surveillance equipment and protocols. Public education campaigns will promote awareness of suspicious activity reporting, and coordination with law enforcement agencies will ensure timely responses to security breaches.		
Hazard(s) Covered:	Terrorism, Cyber Incidents, Social Unrest	**Jurisdiction(s) Assigned:**	All jurisdictions
New/Previous Action:	N/A	**Goal(s) Supported:**	Goal 1 and 2
Priority:	High		
Cost:	Medium	**Benefit:**	High
Potential Funding Source(s):	Homeland Security Grant Program (HSGP), county general funds, city general funds, and public-private partnerships.	**Timeline:**	Medium-term (3–5 years)
STAPLEE Assessment:	This action is socially supported as it improves security for both critical infrastructure and public spaces, fostering a sense of safety among residents and employees. Technically, surveillance and access control systems are widely available, reliable, and effective, with proven technologies such as CCTV and biometric scanners. Administratively, local governments and facility operators have the expertise to oversee the implementation and maintenance of these systems. Politically, the action garners strong support as it aligns with national and local security goals. Legally, the project complies with privacy regulations, building codes, and security standards. Economically, while initial costs may be medium to high, the long-term benefits of reduced security incidents, avoided damages, and improved public confidence outweigh the investment. Environmentally, the action has minimal environmental impact, as it involves retrofitting existing facilities and leveraging energy-efficient equipment where feasible.		
Responsible:	Emergency Management Director, Municipal Police Chiefs, County Sheriff		

Section 5: Plan Implementation & Maintenance



SECTION 5: PLAN IMPLEMENTATION & MAINTENACE

5.1 Implementation

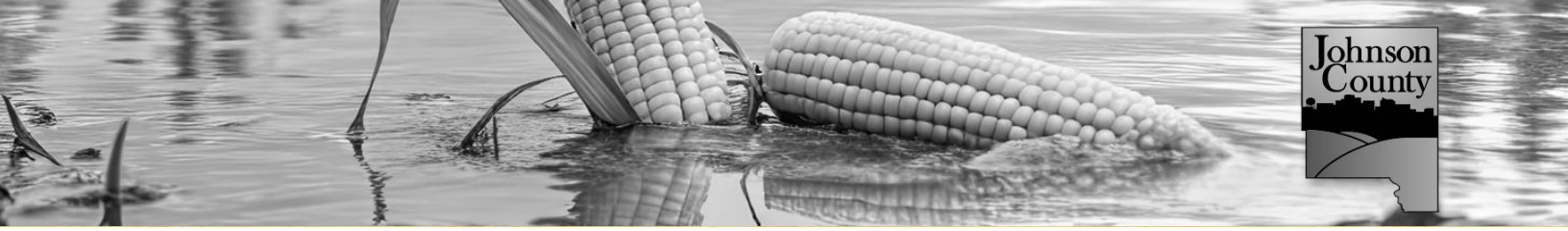
Element Addressed in Section
Element E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3)), including requirement **E2-c.**

The purpose of formally adopting this Plan is to demonstrate buy-in from participating jurisdiction leadership, raise awareness of the Plan, and formalize the Plan's implementation. Through their formal mechanisms, the covered participants formally adopt the 2025 Johnson County Multi-Jurisdictional Hazard Mitigation Plan. Copies of the adoption documents are in **Appendix C**.

Once adopted, the Plan faces the truest test of its worth: implementation. While this Plan contains many worthwhile projects, the planning stakeholders and/or covered jurisdictions must decide which action(s) to undertake first. Two factors will help make that decision: 1) the priority assigned to the actions in the planning process, and 2) funding availability. Low or no-cost projects most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see **4.5 Mitigation Action Plan**) and through constant, pervasive, and energetic efforts to network and highlight each project's multi-objective, win-win benefits to the communities and planning stakeholders. These efforts include monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- Implement the action plan recommendations of this Plan;
- Utilize existing rules, regulations, policies, and procedures already in existence; and
- Communicate the hazard information collected and analyzed through this planning process so that the community better understands what can happen where and what they can do themselves to be better prepared. Also, the "success stories" achieved through the planning stakeholders' ongoing efforts should be publicized.



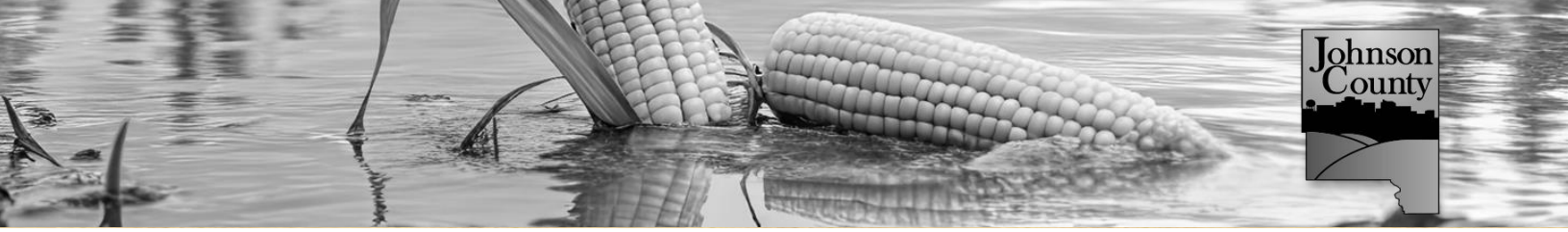
5.1.1 Implementation and Maintenance of Previously Adopted Plan

The implementation and maintenance of the previously adopted plan in the planning area faced significant limitations due to restricted funding, limited staffing, and the need to prioritize responses to ongoing incidents. These constraints prevented the planning area from fully adhering to the established process of monitoring, evaluation, and updates as outlined in the plan. Despite the intent to conduct annual monitoring reports, semi-annual LEPC-triggered evaluations, and regular updates to assess changes in capabilities and hazard risk, these processes were challenging to sustain. With limited resources, the ability to track project progress, budget adherence, and collaboration was constrained, and routine evaluations following hazard events or training exercises often took a secondary priority to immediate response needs. Consequently, while some monitoring and updates were conducted when feasible, the planning area was unable to maintain the comprehensive, cyclical plan maintenance as initially envisioned, highlighting the necessity for additional resources to fully realize and sustain the mitigation plan's goals.

5.1.2 Role of Planning Stakeholders in Implementation and Maintenance

With the adoption of this plan update, the planning stakeholders will implement and maintain the Plan, spearheaded by the Johnson County Emergency Management Agency. The planning stakeholders will act as an advisory body to see the plan successfully carried out and to report to their jurisdiction leadership and the public on the status of plan implementation and mitigation opportunities. The planning stakeholders agree to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of recommended projects;
- Keep the concept of mitigation in the forefront of community decision-making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended projects for which no current funding exists;
- Identify opportunities to integrate the Plan's priorities, information, and actions into new and ongoing initiatives;
- Monitor and assist in implementation and update of this Plan;
- Report on plan progress and recommended changes; and



- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on jurisdiction websites, social media, and local community news publications. The covered jurisdictions will monitor funding opportunities to implement mitigation projects. This will include creating and maintaining a bank of ideas on meeting required local match or participation requirements. When funding does become available, the covered jurisdictions will be positioned to capitalize on the opportunity. The covered jurisdictions should monitor funding opportunities such as special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

5.2 Maintenance Strategy and Schedule

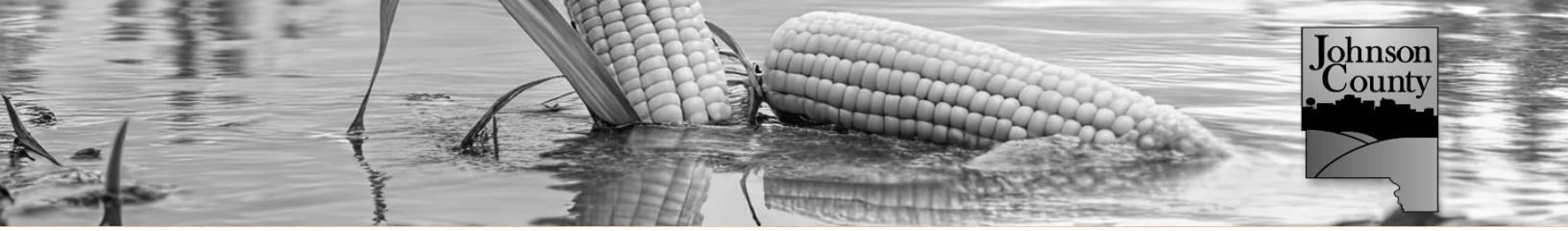
Element Addressed in Section
Element D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating, and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i)), including requirement **D2-a, D2-b, and D2-c.**

This Plan is a living document that may be adjusted or updated as conditions change, actions progress, or new information becomes available. This section describes the method and schedules the participating jurisdictions will follow for monitoring, evaluating, and updating the Plan over the next five years.

5.2.1 Monitoring

Monitoring refers to tracking the implementation of the Plan over time. Johnson County Emergency Management Agency will be responsible for contacting the covered jurisdictions and planning stakeholder members to determine the status of those mitigation actions. The Johnson County Emergency Management Agency will also coordinate with planning stakeholder members throughout the five-year cycle to identify and track significant changes in their organizations' mitigation efforts.

Planning stakeholder members will use the following process to track progress, note changes in hazards, risks, or vulnerabilities, and consider changes in priorities as a result of project implementation:



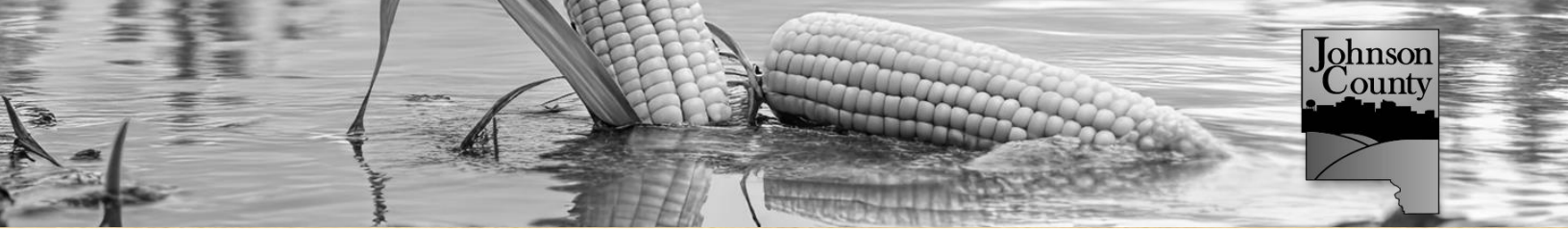
- Each organization identified in the mitigation actions is responsible for maintaining a representative on the planning stakeholders to track and report on the status of listed projects. The representative will provide input on whether the implemented project meets the defined goals and objectives and is likely to reduce vulnerabilities successfully.
- If the project does not meet identified goals and objectives, the planning stakeholders may select alternative projects for implementation or adjust listed projects as deemed appropriate by the planning stakeholders.
- Projects not ranked high priority but identified as potential mitigation strategies will be reviewed periodically to determine the feasibility of future implementation.
- New mitigation projects require a designated responsible organization to define and submit to Johnson County Emergency Management Agency to add to the Plan, implement, and monitor the project's success.
- Mitigation activities not identified as actions in this Plan will also be tracked to ensure a comprehensive hazard mitigation program and to assist with future updates.
- Planning stakeholders participating in new or ongoing mitigation-related initiatives outside of the planning stakeholders should share opportunities for participation and collaboration with the rest of the members and invite subject matter experts to meetings as appropriate.
- Planning stakeholders participating in external mitigation-related initiatives should bring back mitigation ideas, strategies, projects, funding opportunities, and other related information to the planning stakeholders' meetings or share directly with Johnson County Emergency Management Agency to distribute to the planning stakeholders during the months or years between meetings.

As part of this coordination, the Johnson County Emergency Management Agency and planning stakeholders will also monitor repetitive loss properties, evaluate changes in hazards, vulnerabilities, or the distribution of risk across the planning area, and seek to identify new and ongoing mitigation opportunities.

5.2.2 Evaluation

Evaluating refers to assessing the effectiveness of the Plan in achieving its stated purpose and goals. Evaluation of progress will be completed by monitoring changes in vulnerabilities identified in the Plan, such as:

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



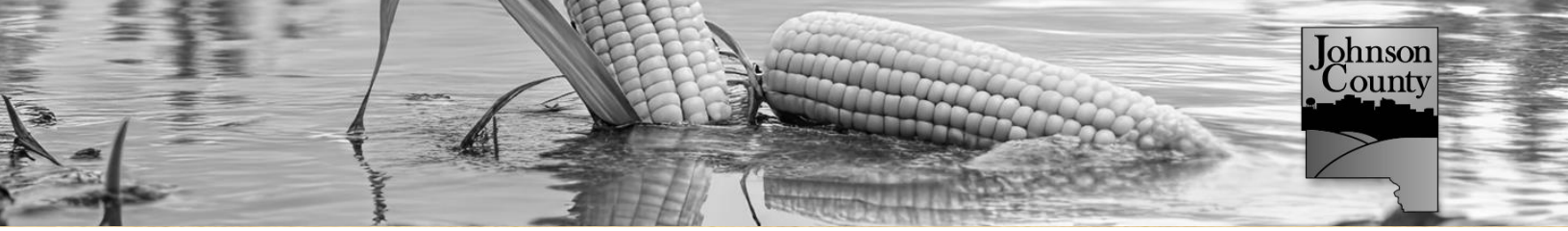
The planning stakeholders may meet on an irregular schedule to evaluate the implementation of the Plan and consider any changes in priorities that may be warranted. This evaluation will include investigating whether mitigation actions were completed and assessing how effective those actions were in mitigating losses. A review of mitigation activities' qualitative and quantitative benefits (or avoided losses) will support this assessment. The evaluation results will then be compared to the goals established in the Plan, and decisions will be made regarding whether actions should be discontinued in the Plan. Decisions will be made regarding whether actions should be discontinued or modified in any way, considering new developments in the community. The planning stakeholders will document progress for use in the next plan update. Finally, the planning stakeholders will monitor and incorporate elements of this Plan into other planning mechanisms, as detailed in **Section 5.4**.

Johnson County Emergency Management Agency will coordinate and facilitate an effective maintenance and implementation process. Completed projects will be evaluated to determine how they have reduced vulnerability. Changes will be made to the Plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

The planning stakeholders will review progress on an irregular basis in an effort to identify issues needing to be addressed by future plan updates. This review will include the following:

- Summary of any hazard incidents that occurred during the performance period and the impact these incidents had on the planning area.
- Review of mitigation success stories.
- Review of continuing public involvement.
- Brief discussion about why targeted strategies were not completed.
- Re-evaluation of the action plan to evaluate whether the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding).
- Recommendations for new projects.
- Changes in or potential for new funding options (grant opportunities).
- Impact of any other planning programs or initiatives that involve hazard mitigation.

Planning stakeholders are responsible for submitting informal mitigation action progress reports to the Johnson County Emergency Management Agency.



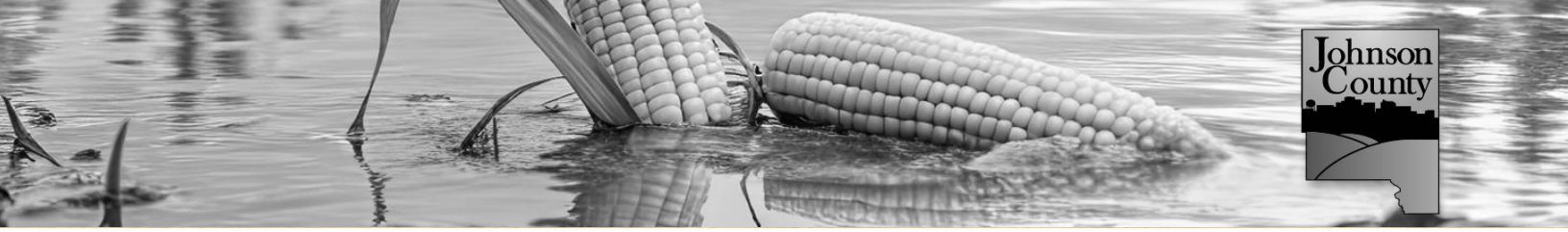
5.2.3 Updates

This Plan will be reviewed and revised at least once every five years following DMA 2000 requirements and the latest FEMA and State of Iowa hazard mitigation planning guidance. The five-year updates to this Plan will consider:

- Has the nature or magnitude of hazards affecting the covered jurisdictions changed?
- Are there new hazards that have the potential to impact the covered area?
- Has growth and development changed the vulnerabilities?
- Has changes to local social vulnerability factors changed the vulnerabilities?
- Do the identified goals and actions still address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the Plan?
- Should additional resources be committed to address identified hazards?

In addition to the five-year revision cycle, the planning stakeholders may meet to update the Plan. Any administrative changes to the Plan may be made by the Johnson County Emergency Management Agency at any time and recorded in the Record of Change Section. Administrative changes do not fundamentally alter significant mitigation goals, objectives, actions, or organizational roles and responsibilities. Substantive updates to the Plan will be brought to the planning stakeholders for consideration and acceptance. Any interested party wishing to receive an update on this plan during the update process should submit their request to the Johnson County Emergency Management Agency. The Johnson County Emergency Management Agency will evaluate all such requests and bring them to the entire planning stakeholders for consideration and discussion if needed.

The Johnson County Emergency Management Agency will reconvene the planning stakeholder members and entities identified in **Section 1** for this process. The updated plan will document which mitigation actions were progressed and areas where mitigation actions were ineffective. It will include re-adoption by all participating entities following State of Iowa/FEMA approval.



5.3 Continued Public Involvement

Element Addressed in Section
Element D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii)), including requirement **D1-a.**

The update provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information about plan reviews will be posted on social media and the websites of covered jurisdictions. When the planning stakeholders reconvene for the update, it will coordinate with all stakeholders participating in the planning process, including those who joined the committee after the initial effort to update and revise the Plan.

The current Plan is available for in-person or digital review requests by contacting the Johnson County Emergency Management Agency.

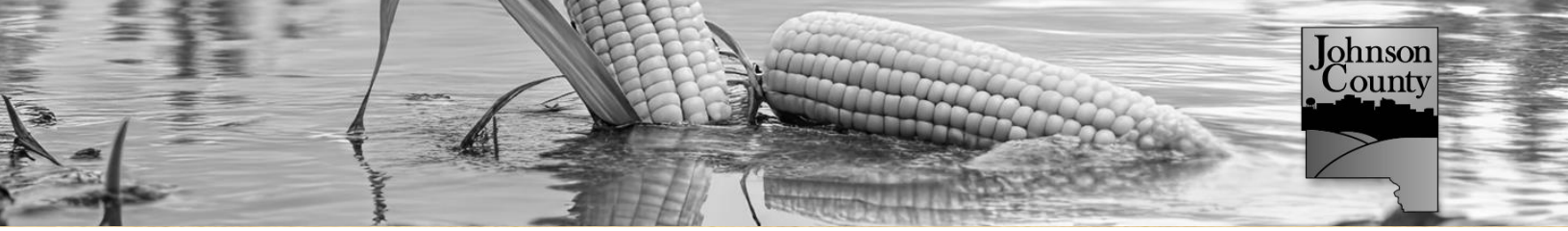
Johnson County Emergency Management Agency conducts and participates in numerous public engagement events and activities throughout the Plan's life cycle. These allow the public to be engaged and ask questions about the mitigation process and how to increase personal and family resilience.

5.4 Incorporation into Existing Planning Mechanisms

Element Addressed in Section
Element D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii)), including requirement **D3-a, D3-b, and D3-c.**

Another essential implementation mechanism that is highly effective and low cost is the incorporation of the Plan's recommendations and their underlying principles into other existing or new jurisdiction plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development.

The planning stakeholders may have existing policies, plans and programs that contribute to reducing losses to life and property from natural hazards. This Plan builds upon the momentum developed through previous and related planning efforts and recommends implementing projects, where possible, through these other program



mechanisms. Planning processes and programs, coordinated with the recommendations of this Plan, may include the following:

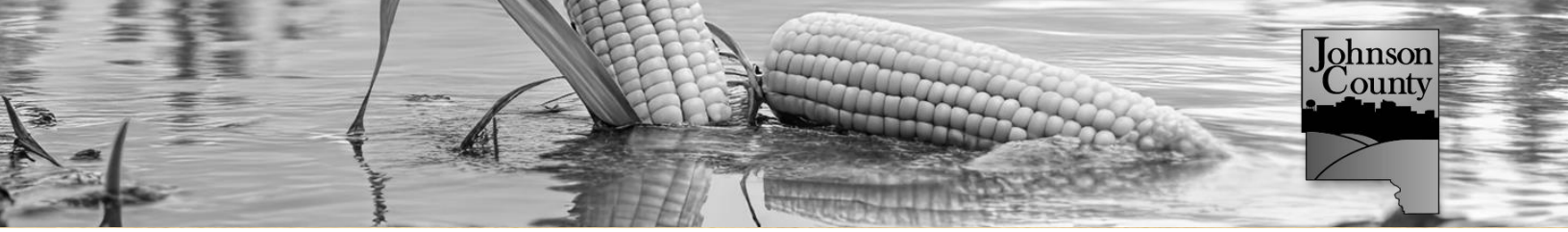
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Community wildland fire protection plans
- Floodplain maps or floodplain regulations
- Comprehensive plan updates
- Ordinances
- Building or fire codes
- Administrative Policies
- Emergency Operations Plans
- School Plans

Additional clarification on which jurisdictions have these are outlined in **Section 2.9**.

Schools can implement local mitigation plans into their own plans by integrating hazard-specific guidance and resilience strategies to address shared risks. For example, incorporating hazard assessments from the local mitigation plan into their Emergency Operations Plan (EOP) allows schools to develop tailored evacuation routes or designate shelter locations outside flood-prone areas. In their Continuity of Operations Plan (COOP), schools can address vulnerabilities identified in the local plan, such as preparing backup power systems for frequent outages. Transportation plans can use data from the local plan to create safer bus routes, avoiding roads and bridges susceptible to hazards like flooding or winter storms. Capital improvement and facility maintenance plans can prioritize structural resilience measures, such as installing tornado-safe rooms or ensuring compliance with seismic standards. Additionally, hazard-specific plans, such as wildfire evacuation protocols, and crisis communication strategies can be aligned with the local emergency management framework for consistent messaging. By embedding these elements into their existing plans, schools can enhance their preparedness, protect students and staff, and contribute to broader community resilience.

Planning stakeholders involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate.

Appendix A: Planning Process Documentation



APPENDIX A: PLANNING PROCESS DOCUMENTATION

Submitted a Stakeholder Agreement

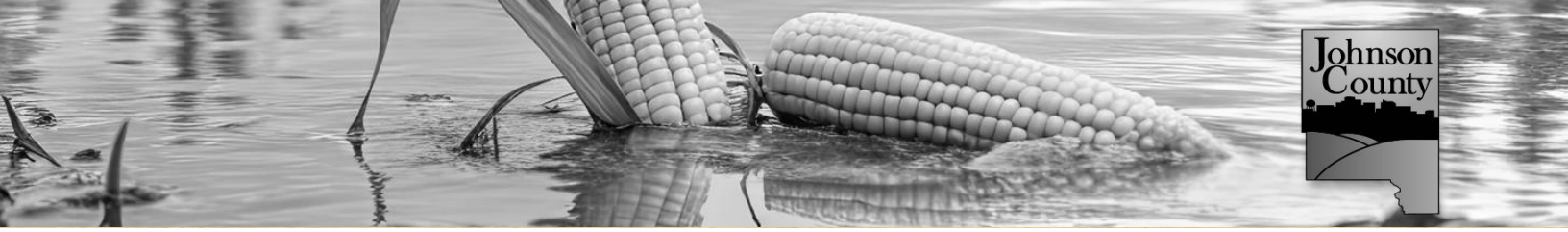
Date submitted	Which jurisdiction do you represent?	Primary Point of Contact Title
2023-12-19 12:50:51	North Liberty	Assistant City Administrator/City Clerk
2023-12-07 18:22:23	Iowa City	Director of Student Services
2023-12-07 09:43:14	North Liberty	Assistant City Administrator/City Clerk
2023-12-01 09:02:58	Iowa City	Transportation Planner
2023-12-01 08:17:26	Iowa City	Associate Planner
2023-11-30 18:53:10	Johnson County	Assistant County Engineer
2023-11-30 14:47:08	Johnson County	Emergency Preparedness Planner
2023-11-29 10:07:17	Johnson County	Johnson County Facilities Director
2023-11-28 15:54:58	Johnson County	Director
2023-11-28 10:59:58	Shueyville	City Clerk
2023-11-27 08:55:32	Coralville	Deputy City Administrator
2023-11-21 17:14:46	University Heights	Mayor
2023-11-21 15:28:08	University Heights	Mayor
2023-11-21 14:31:33	Johnson County	Chairperson Johnson County Board of Supervisors
2023-11-21 11:37:44	Johnson County	Captain
2023-11-21 10:30:36	Johnson County	Fire Chief
2023-11-21 09:52:25	Johnson County	Superintendent

Submitted a Hazard Ranking Assessment

Date submitted	Which jurisdiction do you represent?
2024-03-27 14:10:12	Johnson County
2024-01-26 09:15:03	University Heights
2024-01-22 14:29:37	University of Iowa
2024-01-22 12:40:11	Iowa City
2024-01-22 09:38:05	Johnson County
2024-01-19 12:47:29	Johnson County
2024-01-17 10:59:21	Coralville
2024-01-16 15:51:45	Iowa City
2024-01-16 08:50:00	Johnson County
2024-01-15 14:01:08	Coralville
2024-01-15 08:15:23	Solon
2024-01-14 22:00:06	Solon

Reviewed Previous Mitigation Actions

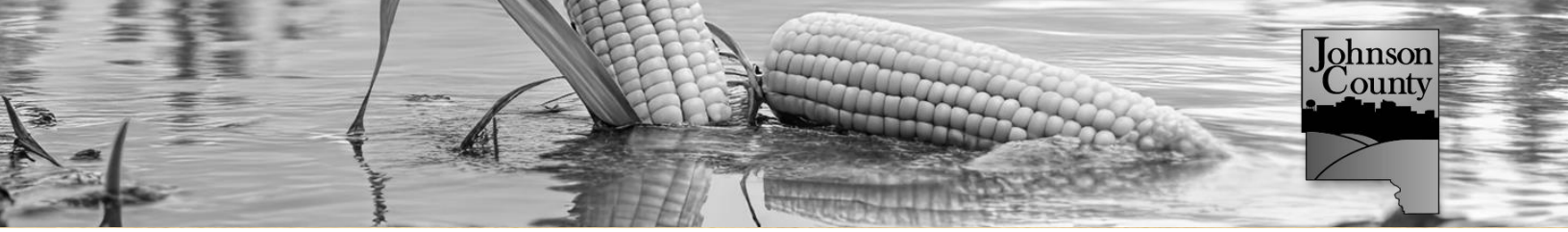
Date submitted	Which jurisdiction do you represent?	Your Title
2024-10-01 16:14:55	Johnson County	Emergency Preparedness Planner
2024-09-23 13:33:22	University Heights	Mayor
2024-09-19 10:13:37	Oxford	City Clerk
2024-09-02 19:29:26	Tiffin	City Administrator
2024-08-25 10:28:48	Clear Creek Amana Community School District	Safety Facilitator
2024-08-05 10:54:13	Lone Tree Community School District	Superintendent
2024-08-05 10:52:43	Solon Community School District	Superintendent
2024-06-14 13:16:27	North Liberty	Fire Chief
2024-06-12 11:33:53	Iowa City Community School District	Director of Student Services
2024-06-06 16:44:16	University of Iowa	Director of Emergency Management
2024-06-03 20:02:29	Hills	Mayor
2024-05-24 16:28:06	Coralville	Deputy City Administrator
2024-05-20 15:58:44	Iowa City	Fire Chief
2024-05-13 16:31:09	Swisher	City Clerk
2024-05-08 13:24:26	Shueyville	City Clerk/Treasurer



Submitted Community Capabilities Assessment

Date submitted	Which jurisdiction do you represent?	Your Title
2024-09-13 10:34:19	Clear Creek Amana Community School District	Safety Facilitator
2024-09-03 15:45:38	Oxford	City Clerk
2024-09-03 14:57:53	Oxford	City Clerk
2024-08-30 16:29:19	Johnson County	Emergency Preparedness Planner
2024-08-29 14:47:51	Iowa City Community School District	Student Services Director
2024-08-28 12:27:45	University Heights	Mayor
2024-08-28 09:55:10	Hills	Mayor
2024-08-27 13:07:09	Shueyville	City Clerk/ Treasurer
2024-08-27 09:24:13	Solon	City Administrator
2024-08-27 08:08:02	Lone Tree	City Clerk
2024-08-26 15:05:43	University of Iowa	Director of Emergency Management
2024-08-26 12:39:45	Swisher	City Clerk
2024-08-23 09:03:43	Tiffin	City Administrator
2024-08-22 11:19:14	Coralville	Deputy City Administrator
2024-08-21 14:32:36	Iowa City	Fire Chief
2024-08-20 14:15:48	North Liberty	Assistant City Administrator/City Clerk

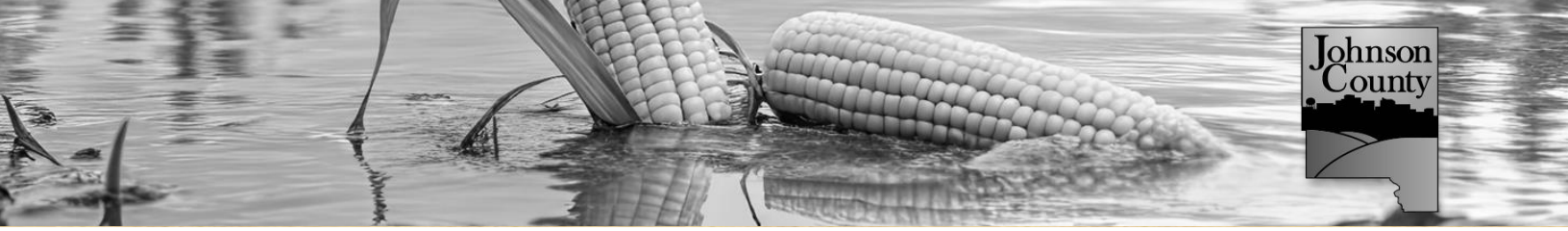
Appendix B: Public Outreach Documentation



APPENDIX B: PUBLIC OUTREACH DOCUMENTATION

Public Survey Responses Received

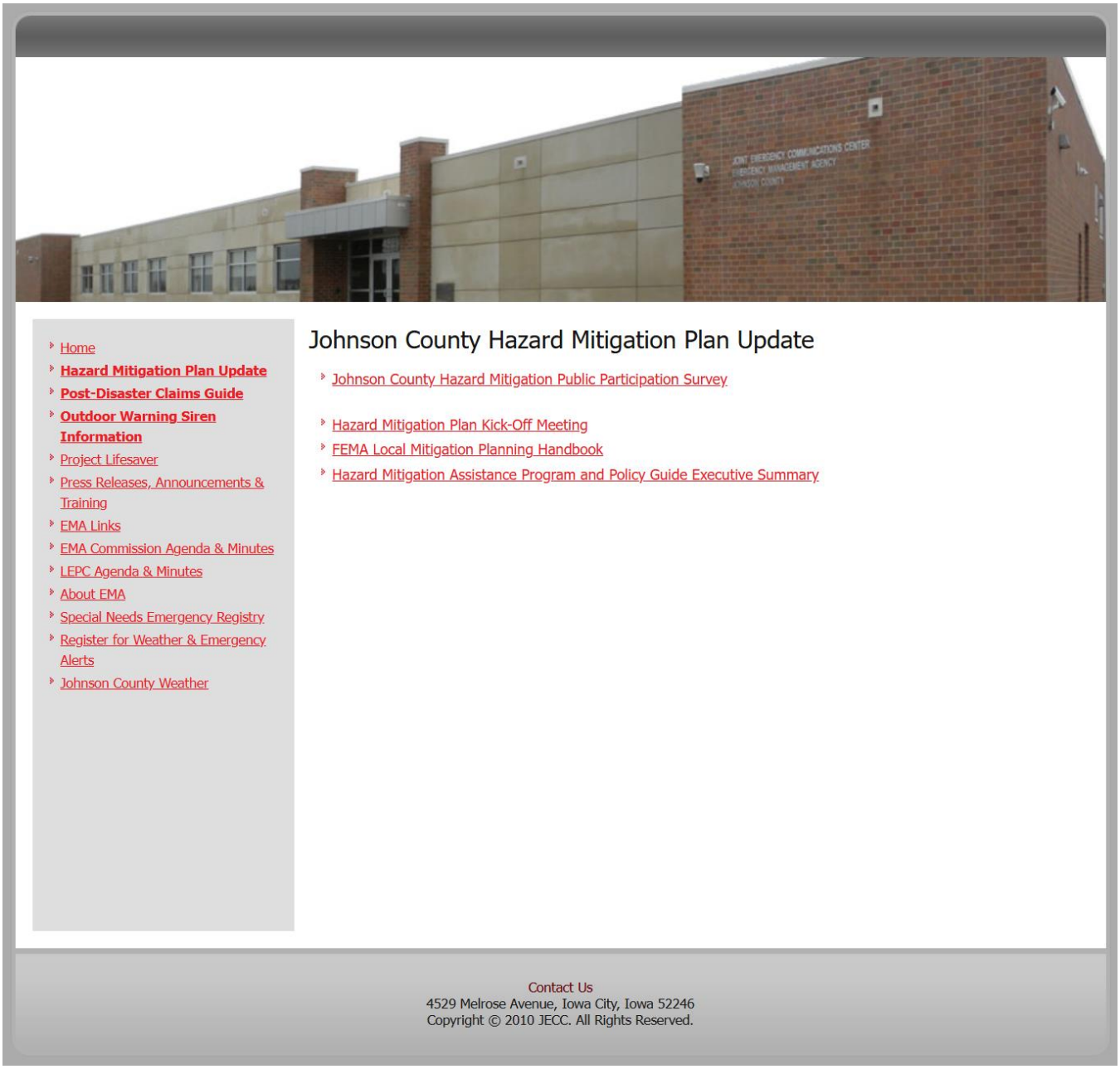
Date submitted	Which part of Johnson County do you live in?
2024-03-23 11:00:31	Iowa City
2024-02-05 15:34:59	Unincorporated Johnson County
2024-02-05 09:59:29	University Heights
2024-02-01 19:59:52	Lone Tree
2024-02-01 14:28:56	University Heights
2024-02-01 10:31:58	Lone Tree
2024-02-01 09:51:27	Unincorporated Johnson County
2024-02-01 09:15:46	Unincorporated Johnson County
2024-02-01 08:28:16	Other: Kalona
2024-02-01 07:55:58	North Liberty
2024-01-31 10:38:44	Lone Tree
2024-01-31 09:23:45	Unincorporated Johnson County
2024-01-31 06:39:56	Lone Tree
2024-01-30 20:51:59	Lone Tree
2024-01-30 20:14:42	Unincorporated Johnson County
2024-01-30 17:42:58	Coralville
2024-01-29 20:24:44	Oxford
2024-01-29 12:28:18	Coralville
2024-01-29 11:35:49	Solon
2024-01-29 11:30:43	Oxford
2024-01-29 11:12:44	Iowa City
2024-01-29 10:49:34	Lone Tree
2024-01-29 09:51:48	Iowa City
2024-01-29 09:40:03	Lone Tree
2024-01-29 09:35:58	Outside of Johnson County



Public Survey Responses Received, Cont.

Date submitted	Which part of Johnson County do you live in?
2024-01-29 09:24:49	Unincorporated Johnson County
2024-01-29 09:04:50	Shueyville
2024-01-29 08:48:54	Iowa City
2024-01-29 08:22:10	Iowa City
2024-01-29 08:19:37	Iowa City
2024-01-29 07:57:37	Unincorporated Johnson County
2024-01-29 07:50:30	Solon
2024-01-29 07:36:38	Tiffin
2024-01-29 07:11:03	Outside of Johnson County
2024-01-28 19:30:23	Unincorporated Johnson County
2024-01-28 14:35:05	Iowa City
2024-01-28 13:09:56	Iowa City
2024-01-27 20:07:52	Solon
2024-01-27 17:12:22	Tiffin
2023-12-19 12:54:23	North Liberty
2023-12-13 13:18:22	Iowa City
2023-12-13 13:14:34	Coralville
2023-12-12 07:50:19	Unincorporated Johnson County
2023-12-12 06:29:17	Solon
2023-12-12 00:25:41	Iowa City
2023-12-12 00:03:52	Iowa City
2023-12-11 19:16:16	Iowa City
2023-12-05 08:10:43	Iowa City
2023-12-04 17:52:45	Hills

Johnson County Website



NEWS WEATHER SPORTS COMMUNITY GAME CENTER WATCH LIVE

Emergency Management begins process to create Johnson County's next five-year hazard mitigation plan

by Valeree Dunn | Mon, December 11th 2023 at 9:26 PM
Updated Tue, December 12th 2023 at 4:51 AM

Johnson County logo

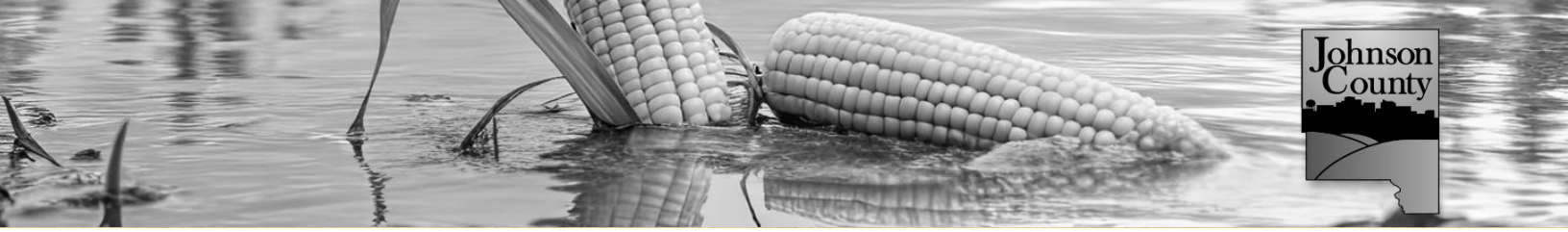
TOPICS: JOHNSON COUNTY EMERGENCY MANAGEMENT HAZARD MITIGATION PLAN

Johnson County Emergency Management kicked off its hazard mitigation planning process Monday evening, getting ready for the next several years of severe weather.

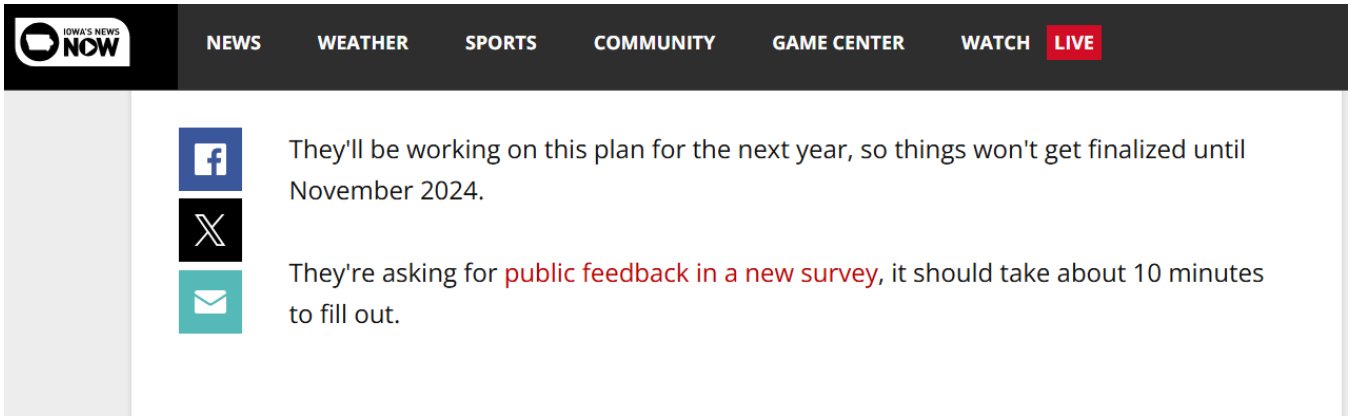
Johnson County Emergency Management and Two Rivers Emergency Management are working together on the next five-year mitigation plan.

Having that plan in place will allow Johnson County to apply for grants through FEMA and help soften the blow of the next weather-maker.

They've also got new requirements to plan for climate change and make sure they're doing equitable outreach across the community.

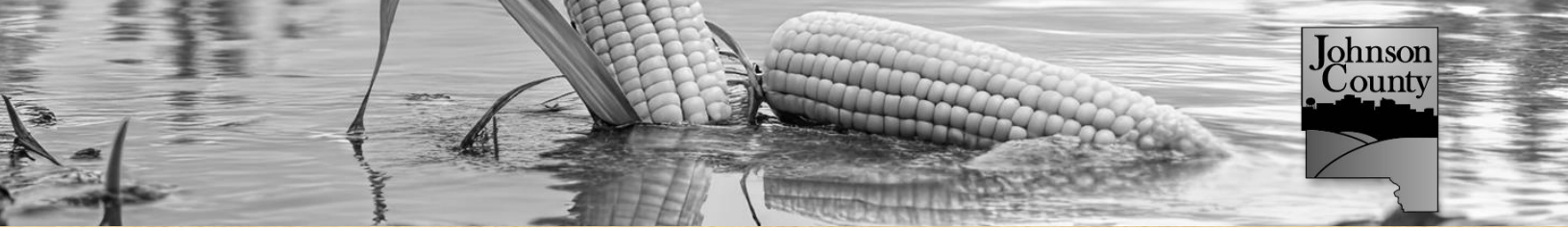


CBS 2 Iowa News Story, Cont.



They'll be working on this plan for the next year, so things won't get finalized until November 2024.

They're asking for public feedback in a new survey, it should take about 10 minutes to fill out.



KCII Radio Story

JOHNSON COUNTY RELEASES HAZARD MITIGATION SURVEY

Posted By: Nick Pett February 1, 2024 @ 6:05 am Today's Local News

As Johnson County officials work to update its Hazard Mitigation Plan, the County recently released a public participation survey.

Johnson County residents are encouraged to fill out the survey, which is anonymous and takes about 10 minutes to complete. In it, they will be able to share their thoughts and experiences related to natural and human-caused hazards. This includes identifying hazards they find to be the most relevant to their community, how prepared they believe their city, schools, and county are with handling these hazards, and how to best stay informed should potential threats arise.

To access the Johnson County Hazard Mitigation Plan Public Survey, click here.