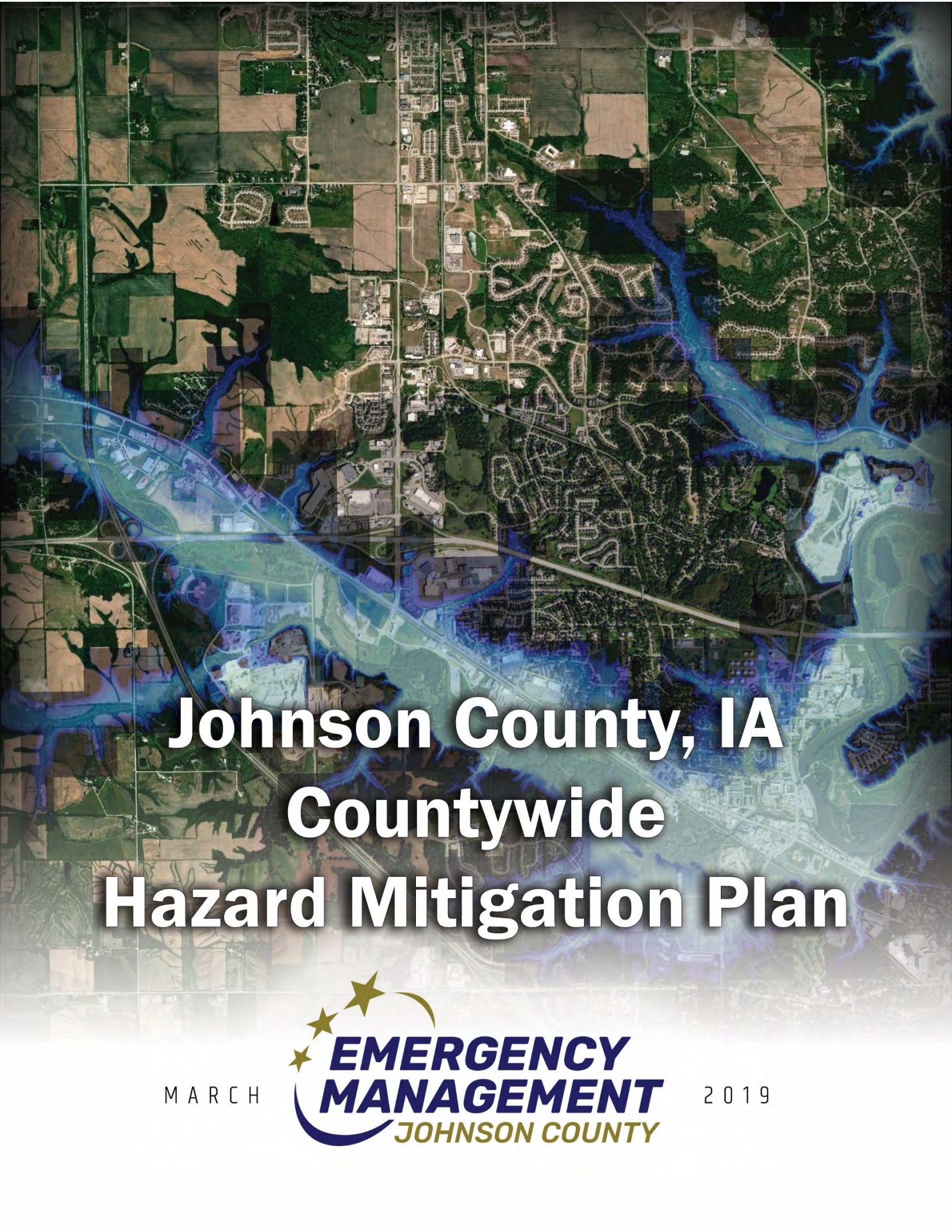


Johnson County, IA Countywide Hazard Mitigation Plan

MARCH

EMERGENCY MANAGEMENT
JOHNSON COUNTY

2019

Glossary

AAR – After Action Report
CDBG – Community Development Block Grant Program
CRS – Community Rating System
CSD – Community School District
DNR – Department of Natural Resources
EOC – Emergency Operations Center
FEMA – Federal Emergency Management Agency
FMA – Flood Mitigation Assistance Grant Program
HMA – Hazard Mitigation Assistance
HMGP – Hazard Mitigation Grant Program
HMP – Hazard Mitigation Plan
IA HSEMD – Iowa Homeland Security and Emergency Management Department
IFC – Iowa Flood Center
JCEMA – Johnson County Emergency Management Agency
JCEMC – Johnson County Emergency Management Commission
NFHL – National Flood Hazard Layer
NFIP – National Floodplain Insurance Program
NOAA – National Oceanic and Atmospheric Administration
NWS – National Weather Service
PDM – Pre-Disaster Mitigation Grant Program
SFHA – Special Flood Hazard Area
TREM – Two Rivers Emergency Management
UI – University of Iowa
USACE – United States Army Corps of Engineers
USCB – United State Census Bureau
USDA – United States Department of Agriculture
WUI – Wildland Urban Interface

Section 1 – Plan Development

Plan Purpose

The 2019 Johnson County Countywide Hazard Mitigation Plan (HMP) revision is threefold in its purpose. Strictly speaking, the Johnson County Countywide Hazard Mitigation Plan provides guidance to substantially and permanently reduce Johnson County and its communities' vulnerability to natural hazards.

This plan revision encompasses the continuation and updating of this original mission by incorporating new GIS technologies, improving its risk assessment methodologies, and recalibrating its mitigation strategies based on an assessment of the previous plan, approved in 2014, and the previous plan's usefulness over the past five years.

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

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

Plan Organization

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

Plan Financing

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

Plan Participation

The Johnson County Countywide Hazard Mitigation Plan was developed as the result of an ongoing collaborative effort between the full range of stakeholders in the planning area, local authorities, school districts, municipal jurisdictions, the University of Iowa (UI), and the State of Iowa. This effort was led by the Johnson County Emergency Management Agency (JCEMA) under the administration of the JCEMC. All municipal governments within the borders of Johnson County fall under the emergency management jurisdiction of the JCEMC and thus the JCEMA, while the Clear Creek Amana Community School District, Iowa City Community School District, Lone Tree Community School District, Solon Community School District, and the University of Iowa are governmentally considered their own entities.

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

Approval & Adoption

The Johnson County Countywide Hazard Mitigation Plan was submitted for review to the IA HSEMD on February 25th, 2019. Following the state's review, the plan was submitted to the FEMA Region VII office for federal review. FEMA Region VII granted "Approval Pending Adoption" on April 18th, 2019.

This plan has officially been adopted by Johnson County and each participating municipality, via the JCEMC, the Clear Creek Amana Community School District, the Iowa City Community School District, the Lone Tree Community School District, the Solon Community School District, and the University of Iowa.

1.1 – Planning Process

Johnson County's revision process began in July of 2017, when Johnson County was awarded an HMGP grant through the IA HSEMD under DR-4289. Johnson County was awarded the grant to begin the process of updating their previously approved hazard mitigation plan. Following the funding commitment, the JCEMC issued a request for proposals and selected Two Rivers Emergency management (TREM) to facilitate the plan's development under a performance contract.

Five planning events were held throughout the planning process. Plan development kicked-off off on 21 February 2018. Two meetings were held during this on-site visit. Stakeholders from every municipality, and public-school district in the county as well as the University of Iowa and members of the public were invited to attend and participate. Additionally, neighboring EMAs were invited. The meetings were advertised for period of two weeks in advance. To further garner public and stakeholder input a second set of three on-site meetings was held on 21 June 2018.

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

Throughout the process the public was given opportunities to review plan drafts, ask questions, and provide input on hazards. They were also invited to provide feedback on mitigation project prioritization, hazard identification, and hazard ranking. This was accomplished through their inclusion in the on-site meetings as well as an extensive online outreach campaign that yielded 149 responses. Details and documentation of the public's participation can be found in Section 1.3 and Appendix A – Plan Participation.

The 2019 Johnson County Countywide Hazard Mitigation Plan encompasses the following 12 municipalities, university, and 4 community school districts:

Johnson County
Coralville
Hills
Iowa City
Lone Tree
North Liberty
Oxford
Shueyville
Solon
Swisher
Tiffin
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

1.2 – Stakeholder Engagement

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

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

Education Entities
This group consists of representatives from the four public school districts serving Johnson County and the University of Iowa. Two private schools serve the area and evaluated as critical facilities.

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

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

Representatives from each group took part in periodic planning meetings, public meetings and events and individual meetings with TREM and JCEMA staff. Their specific involvement included activities such as collection and development of planning information, providing input into the planning process, reviewing draft editions of the plan and providing written documentation demonstrating their commitment to mitigation and intent to adopt the final approved plan. Although the four, neighboring county EMAs, Cedar, Iowa, Linn, and Washington, were invited, none participated.

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

Municipal governments who did not, are still covered under the plan through the participation of the JCEMC. These governments were free to adopt the plan where they saw necessary, but are covered

under the JCEMC's adoption regardless of their municipal adoption. Every municipality directly participated except for Lone Tree, Oxford, Shueyville, and Tiffin.

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

Table 1.1 – Stakeholders

Name	Organization	Position
Dave Wilson	Johnson County Emergency Management Agency	Director
Travis Beckman	Johnson County Emergency Management Agency	Deputy Director
Brandon Siggins	Johnson County Emergency Management Agency	Emergency Communications Coordinator
Dana Aschenbrenner	Johnson County	Finance Director
Gary Boseneiler	Johnson County Veterans Affairs	Director
Tom Brase	Johnson County	Transportation Director
Josh Busard	Johnson County Planning Development & Sustainability	Director
Adam Gebhart	Johnson County	GIS Systems Analyst
Rick Havel	Johnson County	GIS Coordinator
Bill Horning	Johnson County	IT Director
Fiona Johnson	Johnson County Ambulance Service	Director
Dave Koch	Johnson County Public Health	Director
James Lacina	Johnson County Public Health	Environmental Health Coordinator
Kim Painter	Johnson County	Recorder
Clayton Schuneman	Johnson County	Medical Examiner Administrative Director
Becky Soglin	Johnson County Planning Development & Sustainability	Sustainability Coordinator
Travis Weipert	Johnson County	Auditor
Daniel Bissell	City of Coralville	Operations Specialist
Kevin Callahan	City of Coralville Wastewater Department	Water Plant Superintendent
David Clark	City of Coralville Wastewater Department	Wastewater Superintendent
Eric Fisher	City of Coralville Streets Department	Streets and Solid Waste Superintendent
Shane Kron	City of Coralville Police Department	Chief of Police
Mike Funke	City of Coralville	Risk Manager
Ellen Habel	City of Coralville	Assistant City Administrator
Dan Holderness	City of Coralville Engineering Department	City Engineer
Jim Kessler	City of Coralville Building Department	Building and Zoning Official
Scott Larson	City of Coralville Engineering Department	Assistant City Engineer
Orey Schwitzer	City of Coralville Fire Department	Fire Chief
Tim Kemp	City of Hills	Mayor/JCEMC Chairman
Ben Clark	City of Iowa City	Senior Civil Engineer
Liz Ford	City of Iowa City Animal Services	Director
John Grier	City of Iowa City Fire Department	Fire Chief
Zachary Hall	City of Iowa City Parks Department	Superintendent
Ron Knoche	City of Iowa City Public Works	Director
Ashley Monroe	City of Iowa City	Assistant City Manager
Kevin Slutts	City of Iowa City	Water Superintendent
Julie Tallman	City of Iowa City	Development Regulations Specialist
Tracey Mulcahey	City of North Liberty	Assistant City Administrator
Diane Venenga	City of North Liberty Police Department	Police Chief
Scott Kleppe	City of Solon Public Works	Director
Greg Morris	City of Solon	Firefighter
Cami Rasmussen	City of Solon	City Administrator
Lauren Whitehead	City of Solon City Council	Councilor
Tawnia Kakacek	City of Swisher	Finance Officer
Rodney McNeal	City of Swisher Public Works	Superintendent
Chris Taylor	City of Swisher	Mayor
Carol Hopp	Clear Creek Amana Community School District	Superintendent Secretary
Tim Kuehl	Clear Creek Amana Community School District	Superintendent
Lori Robertson	Clear Creek Amana Community School District	Director of Finance
Craig Hansel	Iowa City Community School District	CFO/Board of Education Secretary
Stephen Murley	Iowa City Community School District	Superintendent of Schools

Ken Crawford	Lone Tree Community School District	Superintendent
Carmen Donovan	Lone Tree Community School District	Superintendent Secretary
Dr. Davis Eidahl	Solon Community School District	Superintendent
Josey Bathke	University of Iowa	Risk Manager
Lou Galante	University of Iowa	Assistant Director, Facilities Manager
Floyd Johnson	University of Iowa	Emergency Manager (Former)
Anna Lumpkin	University of Iowa	Emergency Management Director
Bruce McAvoy	University of Iowa Department of Public Safety	Fire Safety Coordinator
Lucy Weiderholt	University of Iowa Police Department	Chief of Police
Michael Tharp	Iowa City Airport	Airport Operations Manager
Ray Carley	Oaknoll Assisted Living	Assistant Director Building & Grounds

1.3 – Public Engagement

The JCEMA provided the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process. The public was notified of open meetings via JCEMA's website, their Facebook page, and a local newspaper, the Press Citizen. Additionally, advertisements for the online public survey were put our on their website, facebook page, and Iowa City's website.

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

At the public on-site meetings, TREM presented and outlined the mitigation plan update process to the public. During the first stakeholder meeting, TREM presented and outlined the mitigation plan update process and discussed stakeholder participation and expectations. In all five meetings, the public and other stakeholders were encouraged to ask questions and provide their input. The final draft of this plan was available for public review via JCEMA's website. Any and all questions asked were answered.

Continued Public Involvement

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

The JCEMA will continue to keep the public informed about its hazard mitigation projects and activities through its website. Additionally, it will provide a "comments/suggestions" option for the public to submit their input through their website.

The public has always and will continue to be invited to attend and participate in Johnson County's Emergency Management Commission meetings. They will also be invited to attend annual Local Emergency Planning Committee (LEPC) meetings where this HMP is an item on the agenda.

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

1.4 – Planning Resources

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

Documentation Resources

Coralville Dam Emergency Action Plan (2012)
Provided by the United States Army Corps of Engineers (USACE), this document provided the impact assessment basis for this plan's assessment of the dam and levee failures section of the risk assessment.

Iowa City Community School District Long Range Facility Master Plan (2017)
The latest approved update to this plan was reviewed for demographic and community projection information.

Iowa Comprehensive Emergency Plan – Part B. Iowa Hazard Mitigation Plan (2018)
The State of Iowa's current hazard mitigation plan was reviewed for general guidance in the cases of their comparative statewide risk assessment, their initial selection of at-risk hazards, and local planning technical assistance and development strategy.

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

Johnson County Comprehensive Plan (2018)
Johnson County's latest comprehensive plan laid part of the groundwork for this plan's mitigation strategy. It did so by providing insight into planning and development direction of the planning area and its local governments.

Johnson County Emergency Management Agency After Action Reports (AAR)
Multiple flood related AARs were reviewed as base research for the development of this plan. These documents outlined the locations and impacts of various floods that have occurred along the Iowa River since the 1990s. They also included recommendations and estimates of potential future impacts. This research provided a detailed and comprehensive level of information to draw from when assessing the planning area's riverine and flash flood risks.

Johnson County Multi-Jurisdictional Hazard Mitigation Plan (2014)
Johnson County is currently covered by a FEMA approved local hazard mitigation plan. The plan was thoroughly reviewed and components have been updated and incorporated throughout.

University of Iowa Flood Emergency Response Plan (FERP)
The first section of this document provided groundwork into the potential impacts of a flood on the University of Iowa and the surrounding areas in the event of a 100-year or 500-year flood. Additionally, it provided numerous mitigation projects for the University of Iowa's mitigation strategy.

University of Iowa Flood Report (2008)
This report provided a detailed look into the historical accounts of important past flooding events. This information was used as the basis for the flood hazard portion of the plan's risk assessment.

Technical Resources

ESRI ArcGIS v10
The principal software used to analyze geographic data and produce maps.

FEMA National Flood Hazard Layer (NFHL)
FEMA's NFHL data was used in mapping floodplain locations and estimating potential flood impacts and loss estimates.

Johnson County Department of Information Technology, GIS Services Division
The Johnson County Department of Information Technologies GIS Services Division providing ongoing support throughout the plan's development in the form of various GIS datasets and GIS dataset updates.

National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC)
Weather data and historical events were primary provided by NOAA's NCDC.

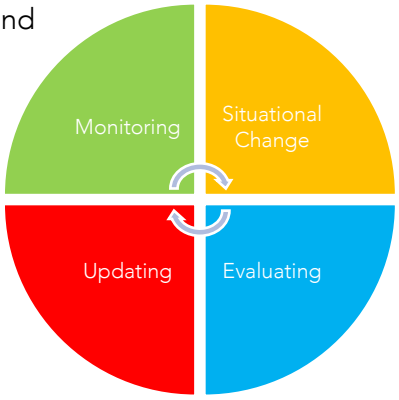
United States Census Bureau (USCB)
The USCB publicly publishes a number of GIS datasets that were used in developing the basemap layers used throughout this plan.

United States Department of Agricultural (USDA) Statistics Service
The USDA provided GIS data that was used in depicting land cover and the agricultural statistics used in developing the planning area's risk to droughts and grass and wildland fires.

University of Iowa Geographic Information Systems Department
The University of Iowa provided its facilities data allowing their owned and operated structures to be overlaid with FEMA identified floodplains found in the plan's risk assessment.

1.5 – Plan Maintenance

The JCEMA has developed a method to ensure monitoring, evaluation, and updating of its HMP. Upon adoption of the Johnson County HMP, the JECEMA will form a subcommittee on mitigation projects comprised of volunteer members from its LEPC. The chair of the subcommittee will be determined by appointment from the JCEMA Director. Additional members may be added based on necessity. The sub-committee will submit an annual report to the Emergency Management Commission.



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

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

Plan Monitoring

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

A monitoring report will be written and submitted to the Emergency Management Commission annually and after the semi-annual LEPC meeting or when triggered by a situation change. The monitoring report will answer the following questions:

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

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

Plan Evaluating

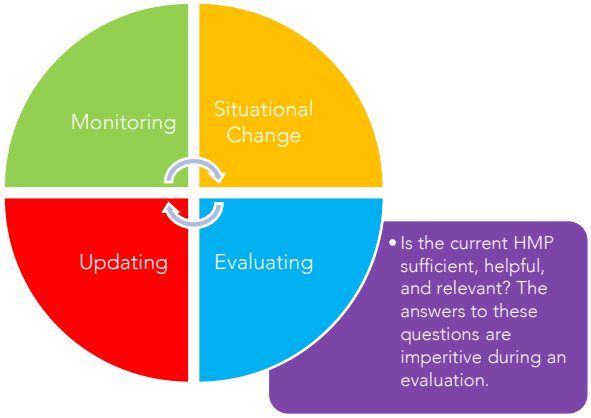
A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making.

An evaluation report will be written and submitted to JCEMA's Director when the situation dictates. The following situations are typical examples of when an evaluation will be necessary:

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

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

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

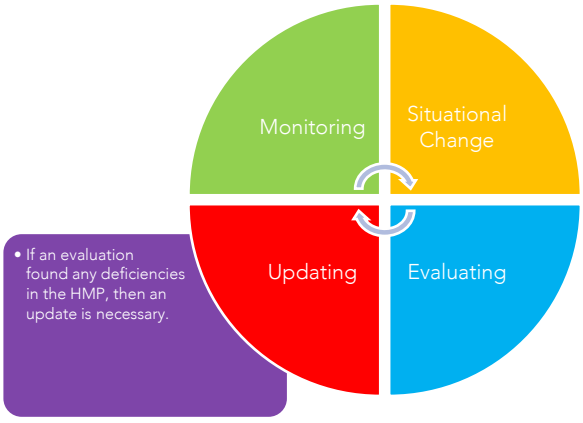


Plan Updating

Typically, a HMP update is initiated upon the completion of a plan evaluation and even then, only when the evaluation determines an update is appropriate. Additionally, when new hazard data becomes available it will be added to the HMP. New data will be confirmed or denied at the semi-annual LEPC meeting.

For whatever reason, a HMP update can be written anytime it is deemed necessary by the JCEMA.

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



Johnson County Local Emergency Planning Committee
Johnson County Countywide Hazard Mitigation Plan
Annual Report

Hazard Mitigation Plan Sub Committee Chair:
Meeting Date:
Plan Approval Date:
Plan Expiration Date:

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

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

Mitigation Projects:

Project Name	Participating Jurisdictions	Proposed/Schedules/In Progress/Completed	Behind/Ahead/ On-Schedule	Estimated Completion Date
Example: Tornado Safe Room	North Liberty	In Progress	On-Schedule	1/1/2016

Miscellaneous Notes:

Section 2 – Community Profiles

Johnson County, Iowa was formed in 1837 while under the government of the Wisconsin Territory. It was originally home to the State of Iowa's first state capital. The county in full has a total land area of 623 square miles.

The U.S. Census Bureau estimates the July 2017 population of the county and its municipal subdivisions totals 149,210 occupying 55,967 residential housing units. 36.62% of its building stock is considered mid-century construction, 28.97% is considered late century construction, and 34.41% is considered modern construction.

Table 2.1 – Construction Age

Jurisdiction	Mid-Century	Late-Century	Modern
Uni-Johnson County	67.28%	17.23%	34.41%
Coralville	11.56%	39.17%	49.27%
Hills	38.37%	43.56%	18.07%
Iowa City	44.12%	34.69%	21.19%
Lone Tree	51.66%	18.88%	29.47%
North Liberty	1.80%	14.00%	84.20%
Oxford	78.05%	3.70%	18.25%
Shueyville	Unknown	34.52%	65.48%
Solon	23.35%	17.24%	59.41%
Swisher	29.33%	40.48%	30.19%
Tiffin	10.35%	4.96%	84.70%
University Heights	77.23%	18.46%	4.32%

**The values are derived from data provided by the U.S. Census Bureau.*

The countywide population has been steadily growing since 2010 and the development of their last plan in 2014. Individually, some municipalities have experienced a decline in population while others have experienced an increase. Whether or not this increase in population significantly increases Johnson County or this plan's participating entities is discusses in Section 3 – Risk Assessment.

Table 2.2 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	130,882	-	-
2013	139,653	6.70%	-
2017	149,210	14.00%	-0.50%

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

The planning area contains an estimated $15,846,495,000 worth of municipal structural inventory broken down into six different structural type classes. The following table shows this breakdown.

Map 2.1 – Johnson County

Table 2.3 – Structural Inventory

Structure Class	Structures	Total Class Value
Agricultural	344	$94,890,000
Commercial	2,696	$3,234,520,000
Government	57	$57,968,000
Industrial	621	$360,220,000
Residential	37,583	$9,170,644,000
Multi-Unit Residential*	1,510	$2,928,253,000
Total =	42,811	$15,846,495,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Johnson County Emergency Management has identified a total of 193 critical faciltiies (164 municipal and 29 university) throughout the planning area. These faciliites are deemed critical either by the nature in which they maintain basic services or that they house a high density of vulnerable populations. A breakdown by facility type of the 193 critical facilities is listed in the table below and shown in the map on the following page.

Table 2.4 – Critical Facilities

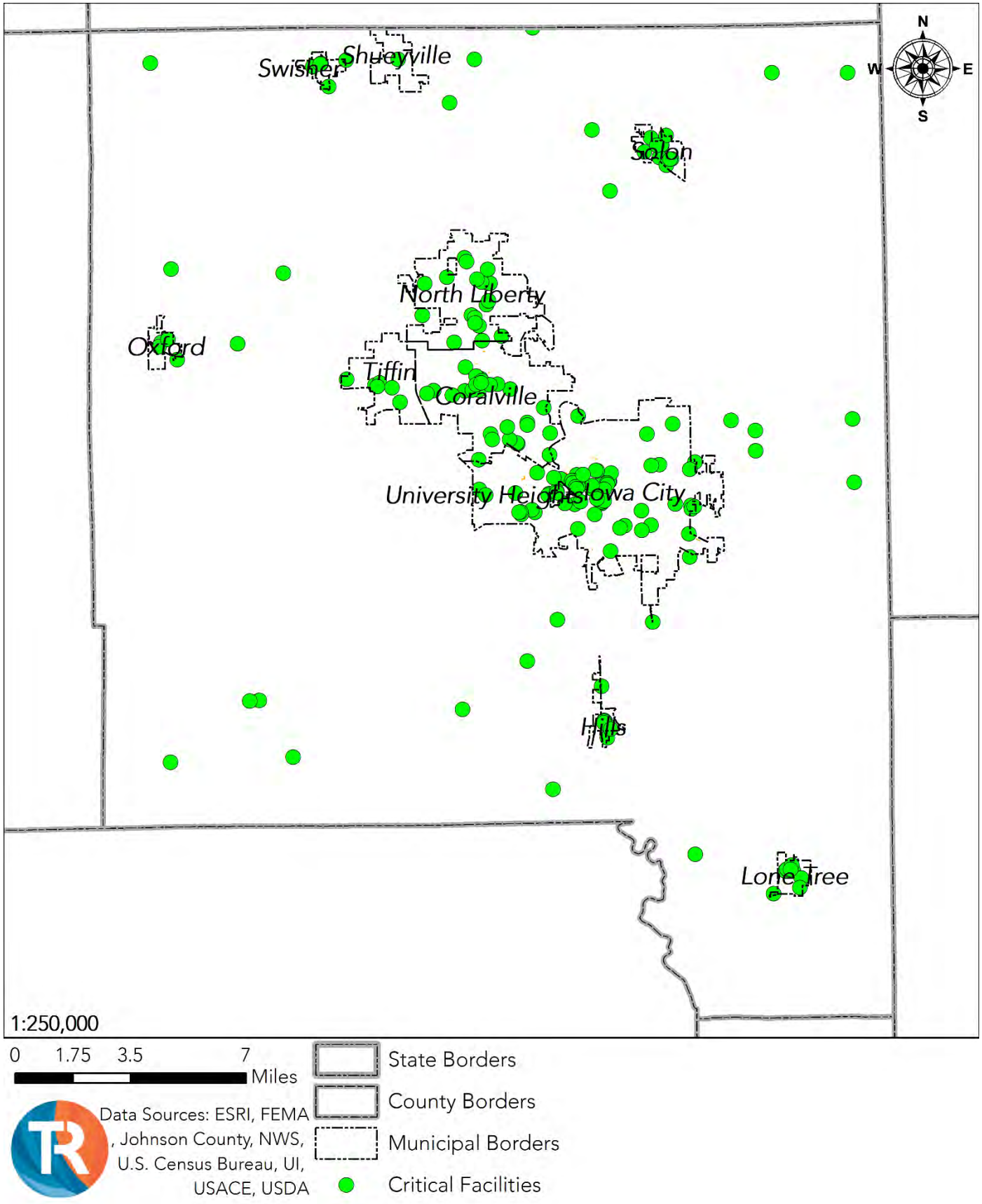
Facility Type	Critical Facilities
Airport	2
Assisted Living	31
Education	4
Fire/Medical Response	14
Hospital	3
IT (University Only)	3
Law Enforcement	6
Local Government	17
Medical/Laboratory (University Only)	9
Public Works	18
Utility	47
Water Treatment	32
Total =	193

**The data are from Johnson County*

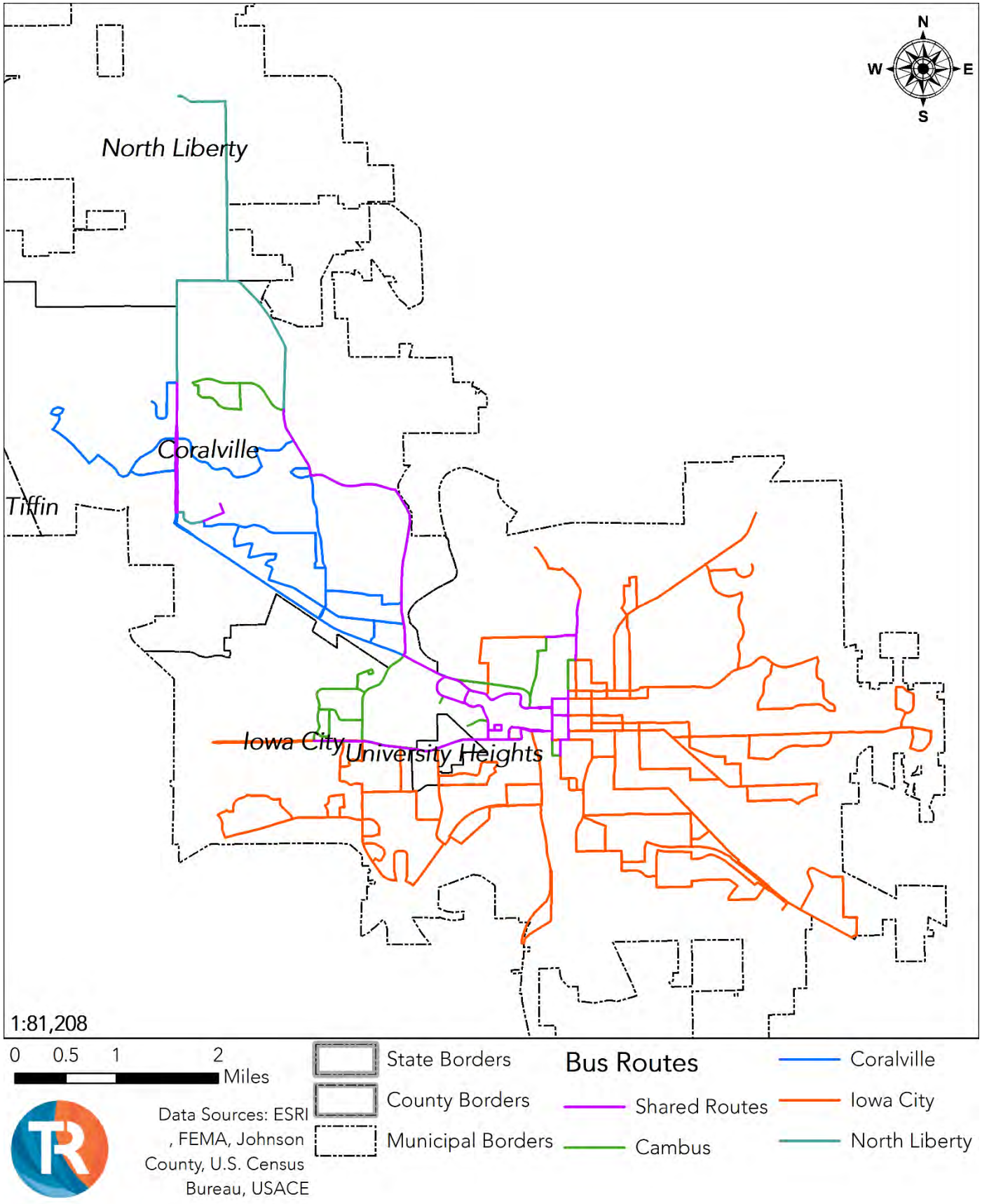
Within Johnson County exists a public transit system that serves Coralville, Iowa City, North Liberty, University Heights, and the University of Iowa. These routes are depicted in Map 2.3 and taken into consideration in the risk assessment portion of this plan under each hazard's "Vulnerability of and Impact on Systems" subsections where applicable.

Although not concretely part of mitigatable efforts on the part of the planning area, yet are related to community resiliency, are the existence of a network of 66 storm warning sirens, 105 established disaster shelters, and a network of 96 communications towers. Their locations are depicted in Maps 2.4, 2.5, 2.6, and Appendix B.

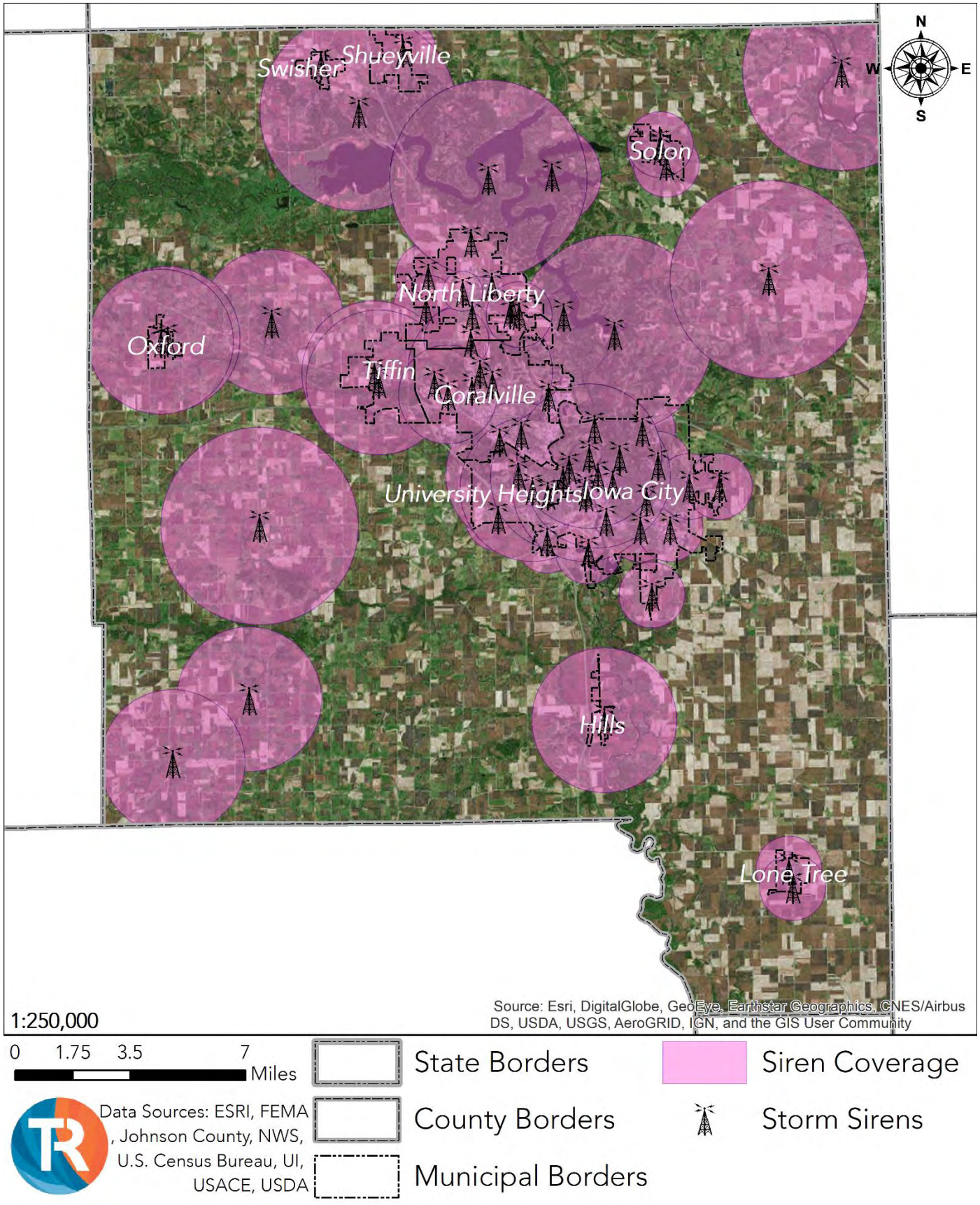
Map 2.2 – Critical Facilities, Johnson County



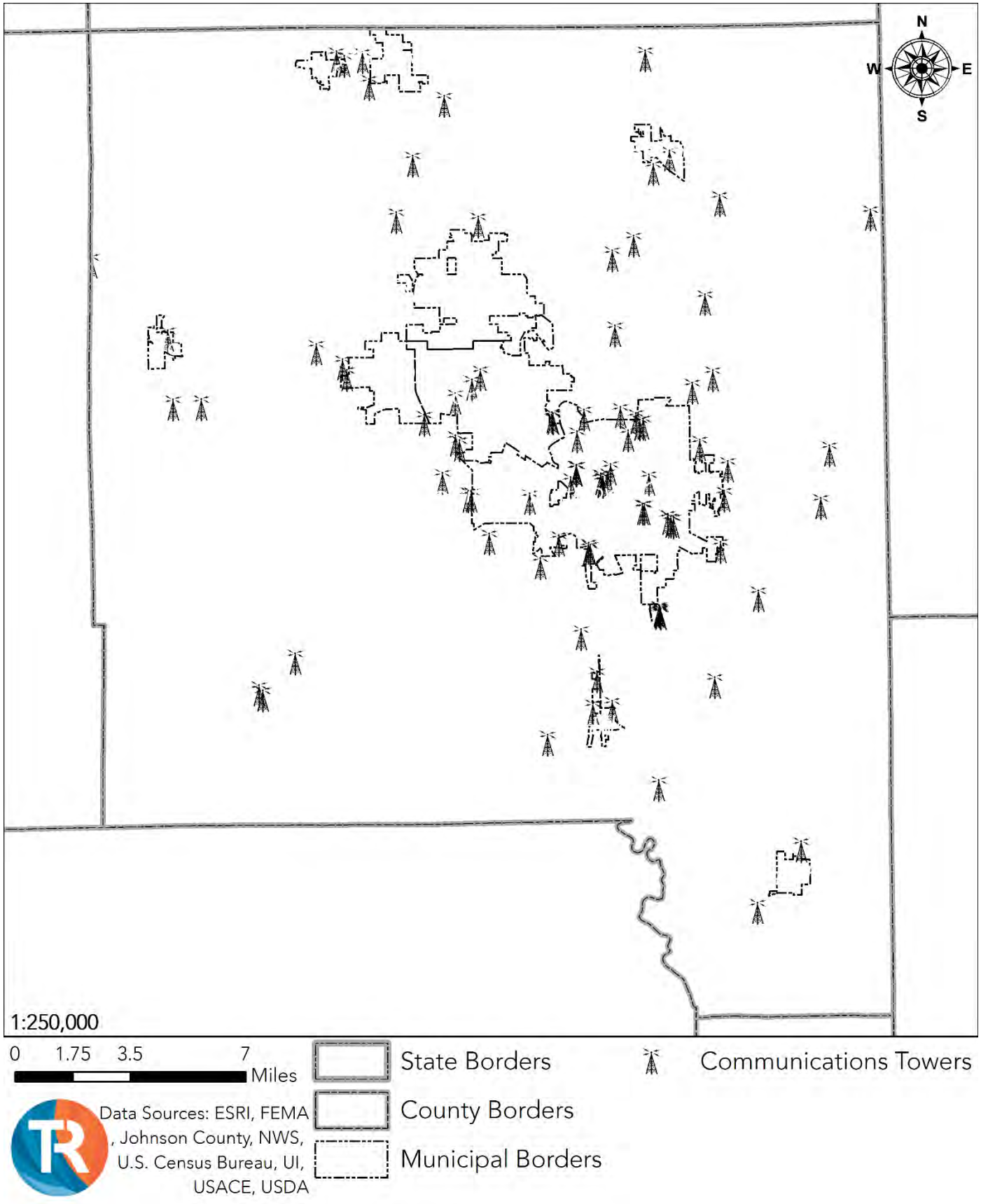
Map 2.3 – Public Transit



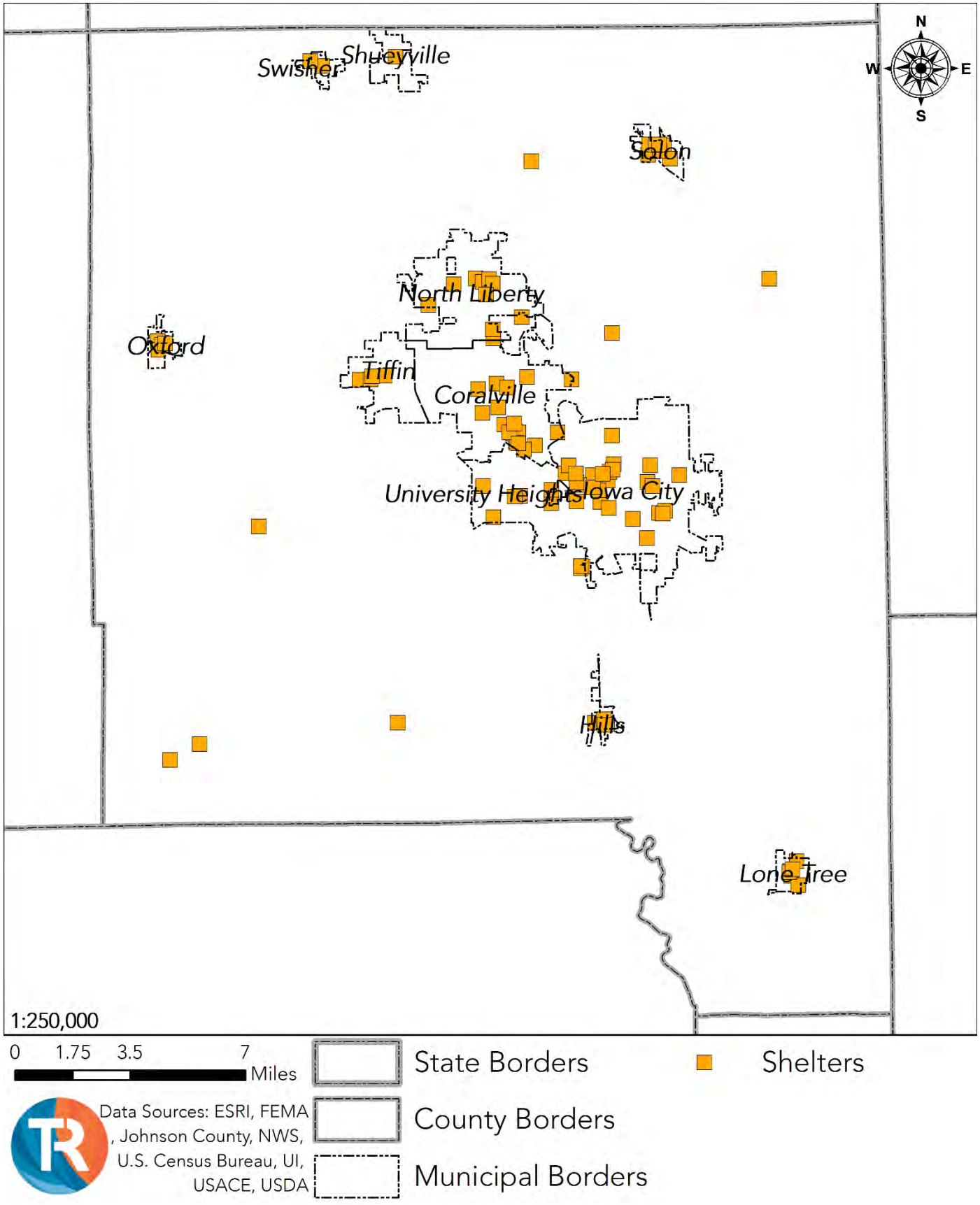
Map 2.4 – Storm Warning Sirens



Map 2.5 – Communication Towers



Map 2.6 – Shelters



2.1 – Johnson County (Unincorporated)

The unincorporated portions of Johnson County have decreased in population by a mild 0.50% since its participation in the 2014 hazard mitigation plan. Although this value is difficult to truly quantify since the areas that have seen the most growth are often annexed into neighboring municipalities. Most of the building stock in unincorporated Johnson County are decentralized throughout the rural parts of the planning area. It's building stock consists of 67.28% mid-century, 17.23% late-century, and 15.49% modern construction.

Table 2.5 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	21,254	-	-
2013	22,146	4.20%	-
2017	22,035	3.67%	- 0.50%

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

Table 2.6 – Structural Inventory, Johnson County (Unincorporated)

Structure Class	Structures	Total Class Value
Agricultural	239	$63,711,000
Commercial	521	$271,596,000
Government	6	$3,789,000
Industrial	194	$70,854,000
Residential	7,850	$2,146,568,000
Multi-Unit Residential*	46	$260,622,000
Total =	8,856	$2,817,140,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.7 – Critical Facilities by Location, Johnson County (Unincorporated)

Name	Type	Owner
Eastern Iowa Light & Power Naples Ave. Substation	Utility	Private
Eastern Iowa Light & Power Sand Road Substation	Utility	Private
Eastern Iowa Light & Power Sioux Ave. Substation	Utility	Private
Enterprise Terminals & Storage Substation	Utility	Private
Farmers Electric Cooperative	Utility	Private
Green Castle Aero Club	Airport	Private
Iowa Mennonite School	Education	Private
ITC Midwest Substation	Utility	Private

ITC Midwest Transmission	Utility	Private
ITC Midwest Transmission	Utility	Private
Jefferson Monroe Fire Station	Fire/Medical Response	Swisher
Linn County Rec Crozier Substation (120th St.)	Utility	Private
Linn County Rec Ely Substation (Seven Sisters Rd.)	Utility	Private
Linn County Rec Ernst Substation - Utah Ave.	Utility	Private
Linn County Rec Kansas Substation (Kansas Ave.)	Utility	Private
Linn County Rec LAKE MACBRIDE Substation (200th St.)	Utility	Private
Linn County Rec Oxford Substation (295th St.)	Utility	Private
Linn County Rec Shueyville Substation (Mohawk Rd.)	Utility	Private
Linn County Rec Sutliff Substation (130th St.)	Utility	Private
Midamerican Energy Hills Substation	Utility	Private
Midamerican Energy Pipeline Station 5459	Utility	Private
Midamerican Energy Substation	Utility	Private
Oneoko North Substation	Utility	Private
Oxford Water Treatment Plant	Water Treatment	Oxford
Private Sewage Lagoon (540th St. SW)	Water Treatment	Private
Private Sewage Lagoon (Rose Dr. NE)	Water Treatment	Private
Secondary Roads - Bayertown	Public Works	Johnson County
Secondary Roads - Frytown	Public Works	Johnson County
Secondary Roads - Iowa City (Utah Ave.)	Public Works	Iowa City
Secondary Roads - Oxford	Public Works	Oxford
Secondary Roads - Shueyville	Public Works	Shueyville
Secondary Roads - Solon	Public Works	Solon

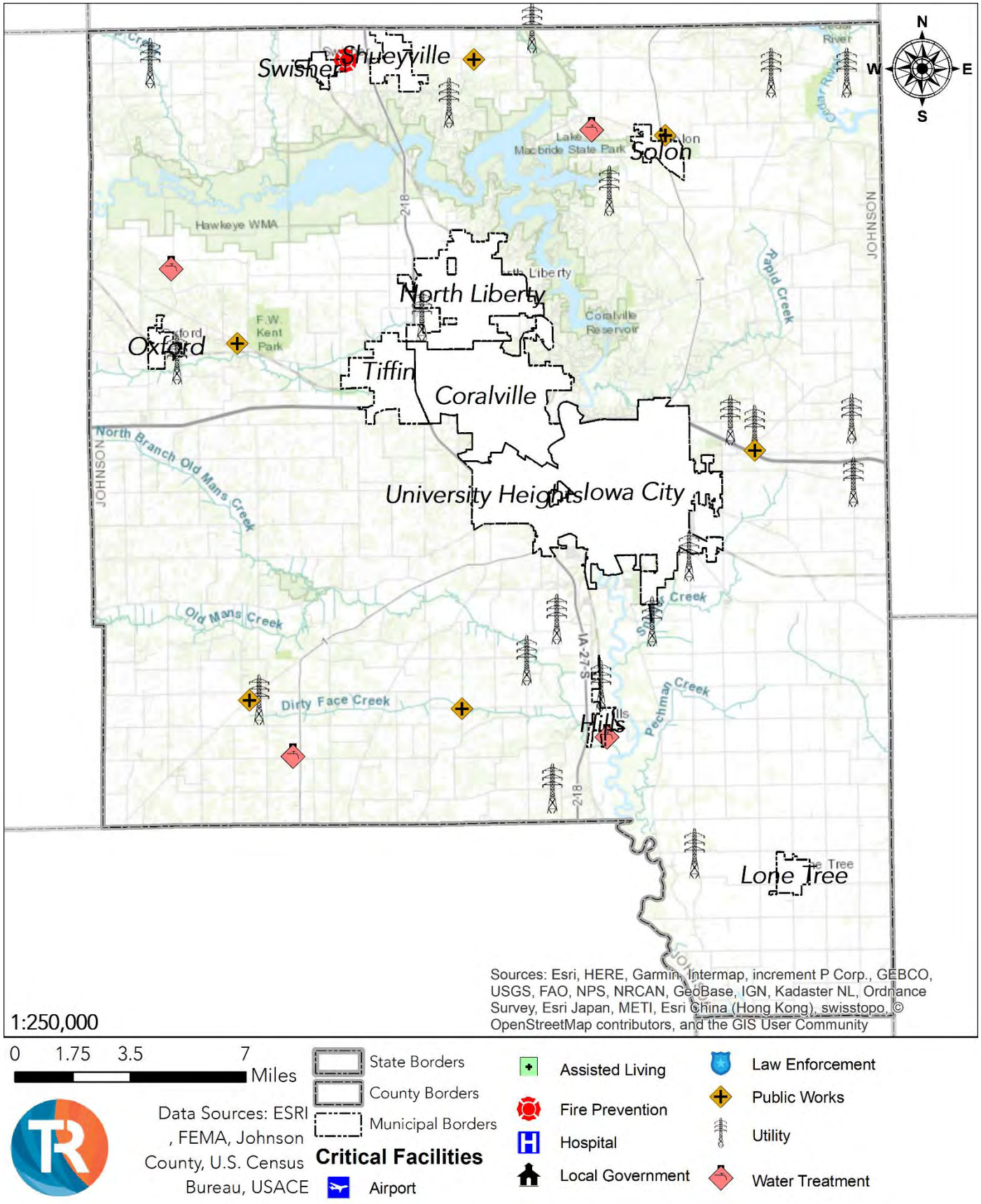
The data are from Johnson County

Table 2.8 – Critical Facilities by Owner, Johnson County (Unincorporated)

Name	Type	Location
Secondary Roads - Bayertown	Public Works	County
Secondary Roads - Frytown	Public Works	County
Johnson County Administration	Local Government	Iowa City
Johnson County Ambulance and Medical Examiner's Office	Fire/Medical Response	Iowa City
Johnson County Health and Human Services	Local Government	Iowa City
Johnson County Sheriff	Law Enforcement	Iowa City
Johnson County Courthouse	Local Government	Iowa City
Joint Emergency Communications Center/EOC	Local Government	Iowa City

The data are from Johnson County

Map 2.7 – Critical Facilities, Johnson County



2.2 – Coralville

Coralville has grown at a steady rate of 4.56% since their last participation in a hazard mitigation plan. Most the city's growth occurred during the 2000s and the last quarter of the 20th century. As a result, the vast majority of its building stock is of newer construction. 11.56% is considered mid-century, 39.17% is considered late-century, and 49.27% is considered modern.

Table 2.9 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	18,907	-	-
2013	19,970	5.62%	-
2017	20,881	10.44%	4.56%

The data are from the U.S. Census Bureau

Table 2.10 – Structural Inventory, Coralville

Structure Class	Structures	Total Class Value
Agricultural	15	$4,949,000
Commercial	416	$426,002,000
Government	5	$4,547,000
Industrial	64	$38,119,000
Residential	4,938	$,1301,606,000
Multi-Unit Residential*	269	$470,555,000
Total =	5,707	$2,245,778,000

Multi-Unit Residential is defined as a structure with 5 or more residential units
The data are from the Federal Emergency Management Agency

Table 2.11 – Critical Facilities by Location, Coralville

Name	Type	Owner
Brown Deer Assisted Living	Assisted Living	Private
Coral Ridge Senior Apartments	Assisted Living	Private
Coralville City Hall	Local Government	Coralville
Coralville Fire Station #1	Fire/Medical Response	Coralville
Coralville Fire Station #2	Fire/Medical Response	Coralville
Coralville Police Station	Law Enforcement	Coralville
Coralville Public Works	Public Works	Coralville
Coralville Senior Residences	Assisted Living	Private
Coralville Water Tower (10th Street)	Water Treatment	Coralville
Coralville Water Tower (Coral Ridge Ave.)	Water Treatment	Coralville
Coralville Water Tower (Heartland Ave.)	Water Treatment	Coralville
Coralville Water Treatment Facility	Water Treatment	Coralville
Lantern Park Specialty Care	Assisted Living	Private
Linn County Rec Coralville North Substation (12th Ave.)	Utility	Private
Linn County Rec Heartland Substation (Hearthland Dr.)	Utility	Private
Linn County Rec Tiffin Substation (2nd St.)	Utility	Private
Midamerican Energy Coral Ridge Substation	Utility	Private
Midamerican Energy Substation P	Utility	Private
Oakdale (IMCC) Water Tower	Water Treatment	Private

Vintage Cooperative of Coralville	Assisted Living	Private
Windmill Manor	Assisted Living	Private

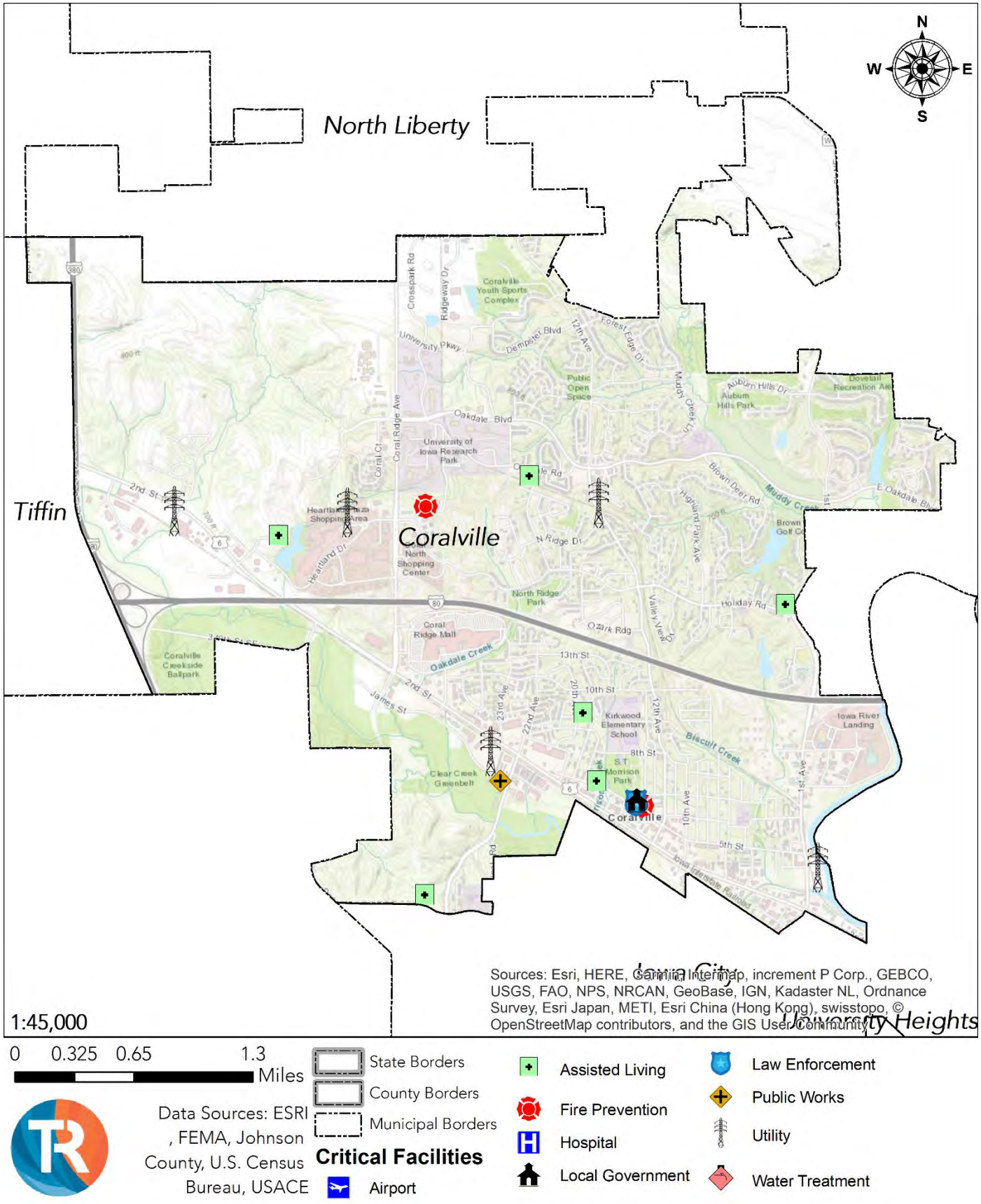
The data are from Johnson County

Table 2.12 – Critical Facilities by Owner, Coralville

Name	Type	Location
Coralville City Hall	Local Government	Coralville
Coralville Fire Station #1	Fire/Medical Response	Coralville
Coralville Fire Station #2	Fire/Medical Response	Coralville
Coralville Police Station	Law Enforcement	Coralville
Coralville Public Works	Public Works	Coralville
Coralville Water Tower (10th Street)	Water Treatment	Coralville
Coralville Water Tower (Coral Ridge Ave.)	Water Treatment	Coralville
Coralville Water Tower (Heartland Ave.)	Water Treatment	Coralville
Coralville Water Treatment Facility	Water Treatment	Coralville

The data are from Johnson County

Map 2.8 – Critical Facilities, Coralville



Map 2.9 – Critical Facilities, Coralville #2

2.3 – Hills

Hills has grown at a low rate of 2.29% since their last participation in a hazard mitigation plan. Hills is a city that grew during the mid and late 20th century, but has since stagnated. As a result, the vast majority of its building stock is of average age construction. 38.37% is considered mid-century, 43.56% is considered late-century, and 18.07% is considered modern.

Table 2.13 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	703	-	-
2013	785	11.66%	-
2017	803	14.22%	2.29%

The data are from the U.S. Census Bureau

Table 2.14 – Structural Inventory, Hills

Structure Class	Structures	Total Class Value
Agricultural	3	$648,000
Commercial	24	$22,101,000
Government	1	$117,000
Industrial	1	$523,000
Residential	350	$92,010,000
Multi-Unit Residential*	4	$8,882,000
Total =	383	$124,281,000

Multi-Unit Residential is defined as a structure with 5 or more residential units
The data are from the Federal Emergency Management Agency

Table 2.15 – Critical Facilities by Location, Hills

Name	Type	Owner
Atrium Village	Assisted Living	Private
Hills City Hall	Local Government	Hills
Hills Community Center	Local Government	Hills
Hills Fire Station	Fire/Medical Response	Hills
Hills Public Works	Public Works	Hills
Hills Sewage Lagoons	Water Treatment	Hills
Hills Water Tower	Water Treatment	Hills

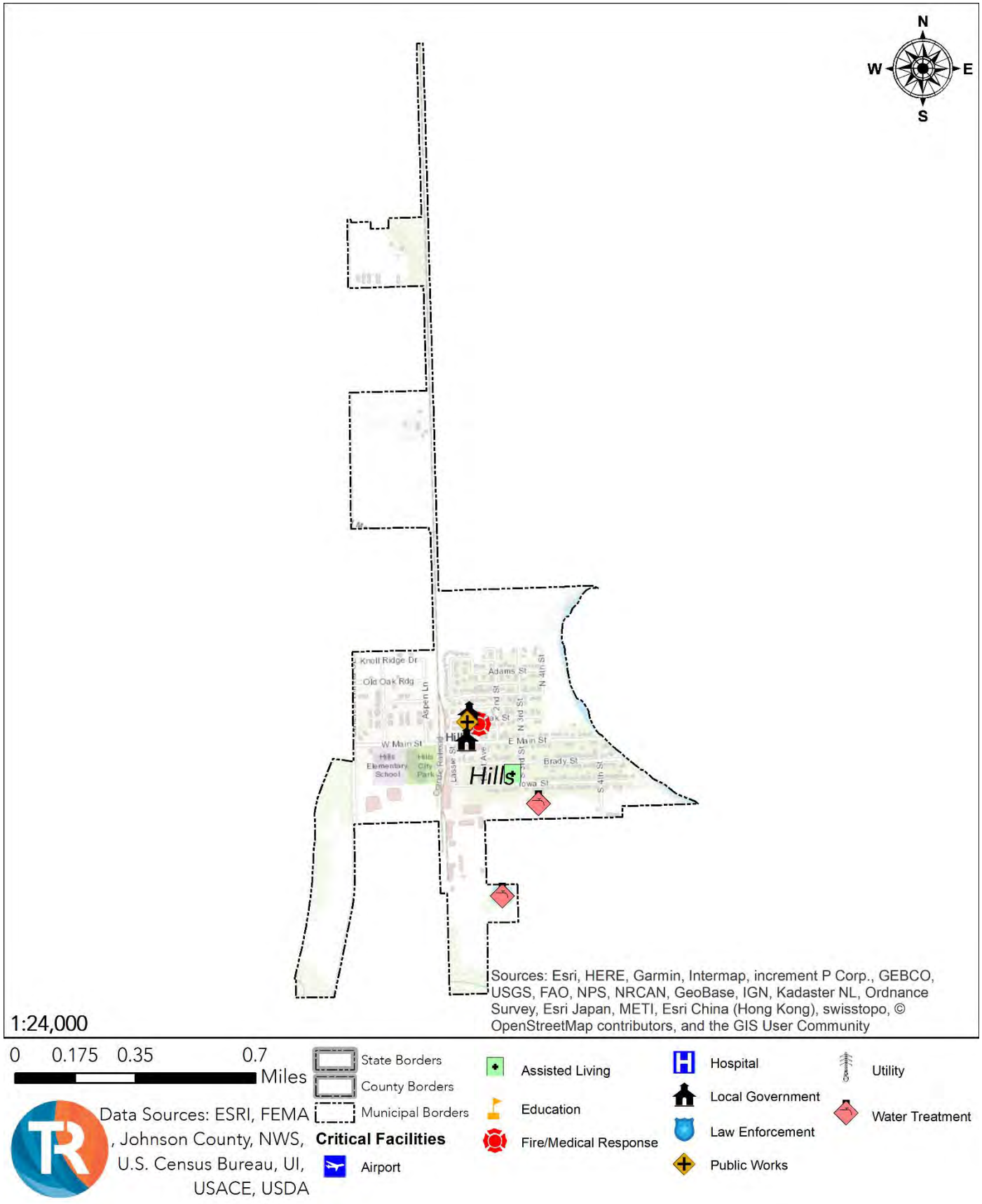
The data are from Johnson County

Table 2.16 – Critical Facilities by Owner, Hills

Name	Type	Location
Hills Fire Station	Fire/Medical Response	Hills
Hills City Hall	Local Government	Hills
Hills Community Center	Local Government	Hills
Hills Public Works	Public Works	Hills
Hills Sewage Lagoons	Water Treatment	Hills
Hills Water Tower	Water Treatment	Hills

The data are from Johnson County

Map 2.10 – Critical Facilities, Hills



2.4 – Iowa City

Iowa City has grown at a steady rate of 6.53% since their last participation in a hazard mitigation plan. Most the city's growth occurred during the mid to late 20th century, but continued robust growth into the 2000s. As a result, its building stock is roughly equal by age of construction. 44.12% is considered mid-century, 34.69% is considered late-century, and 21.19% is considered modern.

Table 2.17 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	67,862	-	-
2013	71,154	4.85%	-
2017	75,798	11.69%	6.53%

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

Table 2.18 – Structural Inventory, Iowa City

Structure Class	Structures	Total Class Value
Agricultural	55	$16,996,000
Commercial	1,415	$2,293,387,000
Government	30	$36,905,000
Industrial	247	$179,972,000
Residential	17,092	$3,765,139,000
Multi-Unit Residential*	1,008	$1,901,494,000
Total =	19,847	$8,193,893,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.19 – Critical Facilities by Location, Iowa City

Name	Type	Owner
Autumn Park Apartments	Assisted Living	Private
Bickford Assisted Living	Assisted Living	Private
Briarwood Health Care Center	Assisted Living	Private
Capitol House Apartments	Assisted Living	Private
Citizen Building Apartments	Assisted Living	Private
Concord Terrace Apartments	Assisted Living	Private
Ecumenical Towers	Assisted Living	Private
Emerson Point	Assisted Living	Private
Iowa City City Hall	Local Government	Iowa City
Iowa City Fire Station #1	Fire/Medical Response	Iowa City
Iowa City Fire Station #2	Fire/Medical Response	Iowa City
Iowa City Fire Station #3	Fire/Medical Response	Iowa City
Iowa City Fire Station #4	Fire/Medical Response	Iowa City
Iowa City Municipal Airport	Airport	Private
Iowa City Police Station	Law Enforcement	Iowa City
Iowa City Police Station - Pepperwood Plaza	Law Enforcement	Iowa City
Iowa City Public Works	Public Works	Iowa City
Iowa City Rehab & Health Care Center	Assisted Living	Private
Iowa City Transit	Public Works	Iowa City

Iowa City Underground Reservoir #1	Water Treatment	Iowa City
Iowa City Underground Reservoir #2	Water Treatment	Iowa City
Iowa City Underground Reservoir #3	Water Treatment	Iowa City
Iowa City Underground Reservoir #4	Water Treatment	Iowa City
Iowa City Water Treatment Plan	Water Treatment	Iowa City
Johnson County Administration	Local Government	Johnson County
Johnson County Ambulance and Medical Examiner's Office	Fire/Medical Response	Johnson County
Johnson County Courthouse	Local Government	Johnson County
Johnson County Health and Human Services	Local Government	Johnson County
Johnson County Sheriff	Law Enforcement	Johnson County
Joint Emergency Communications Center/EOC	Local Government	Johnson County
Legacy Gardens Special Memory	Assisted Living	Private
Legacy Pointe Assisted Living	Assisted Living	Private
Legacy Ridge	Assisted Living	Private
Lexington Place	Assisted Living	Private
Melrose Meadows	Assisted Living	Private
Mercy Hospital	Hospital	Private
Midamerican Energy Northgate Substation	Utility	Private
Midamerican Energy Station TBS53	Utility	Private
Midamerican Energy Substation B	Utility	Private
Midamerican Energy Substation E	Utility	Private
Midamerican Energy Substation J	Utility	Private
Midamerican Energy Substation L	Utility	Private
Midamerican Energy Substation U	Utility	Private
Midamerican Energy Substation Y	Utility	Private
Oaknoll Retirement Condominiums	Assisted Living	Private
Pathways Adult Day Health Center	Assisted Living	Private
Regina Catholic Education Center	Education	Private
Secondary Roads - Iowa City	Public Works	Iowa City
VA Hospital	Hospital	Federal
Walden Place	Assisted Living	Private

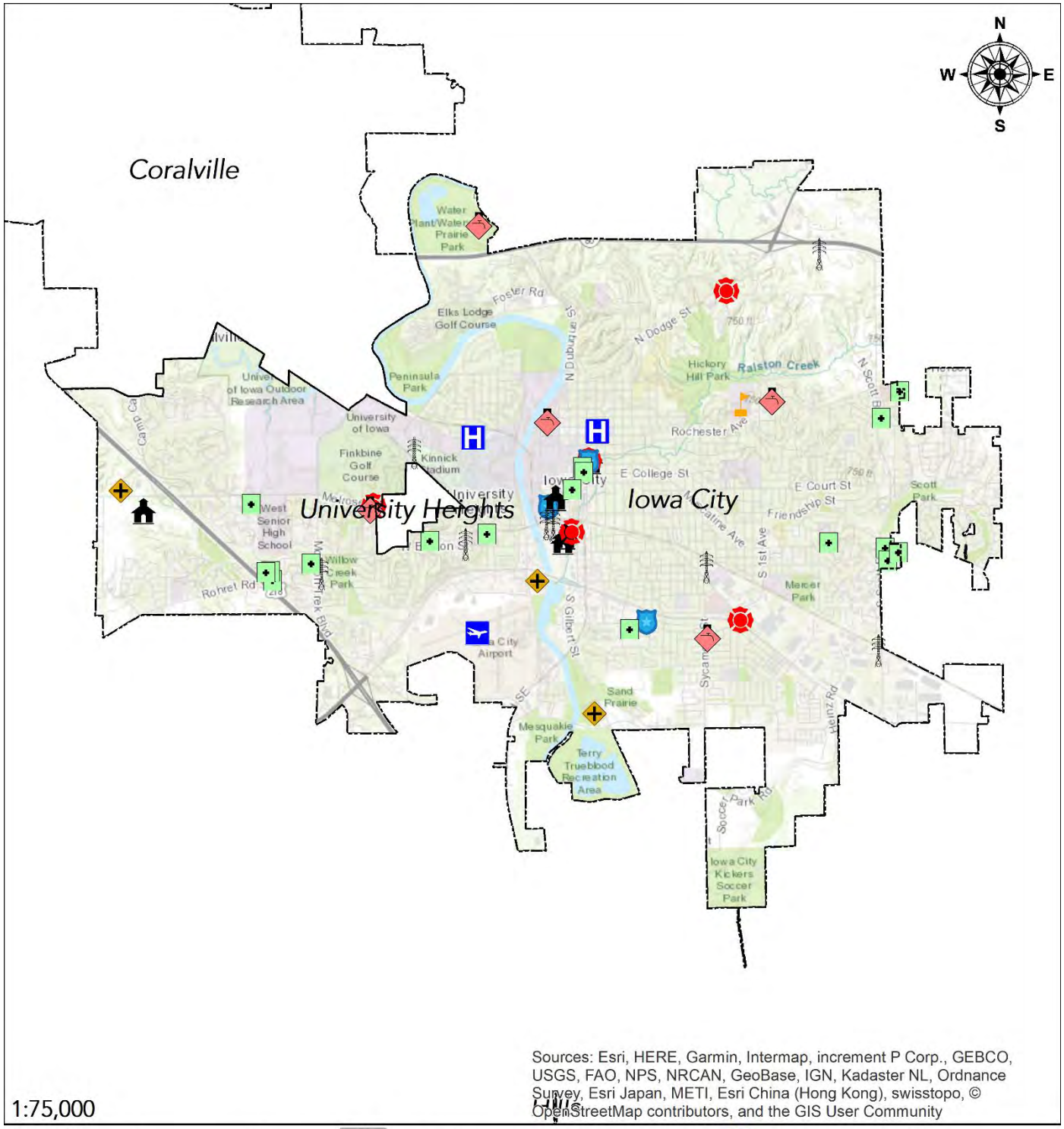
**The data are from Johnson County*

Table 2.20 – Critical Facilities by Owner, Iowa City

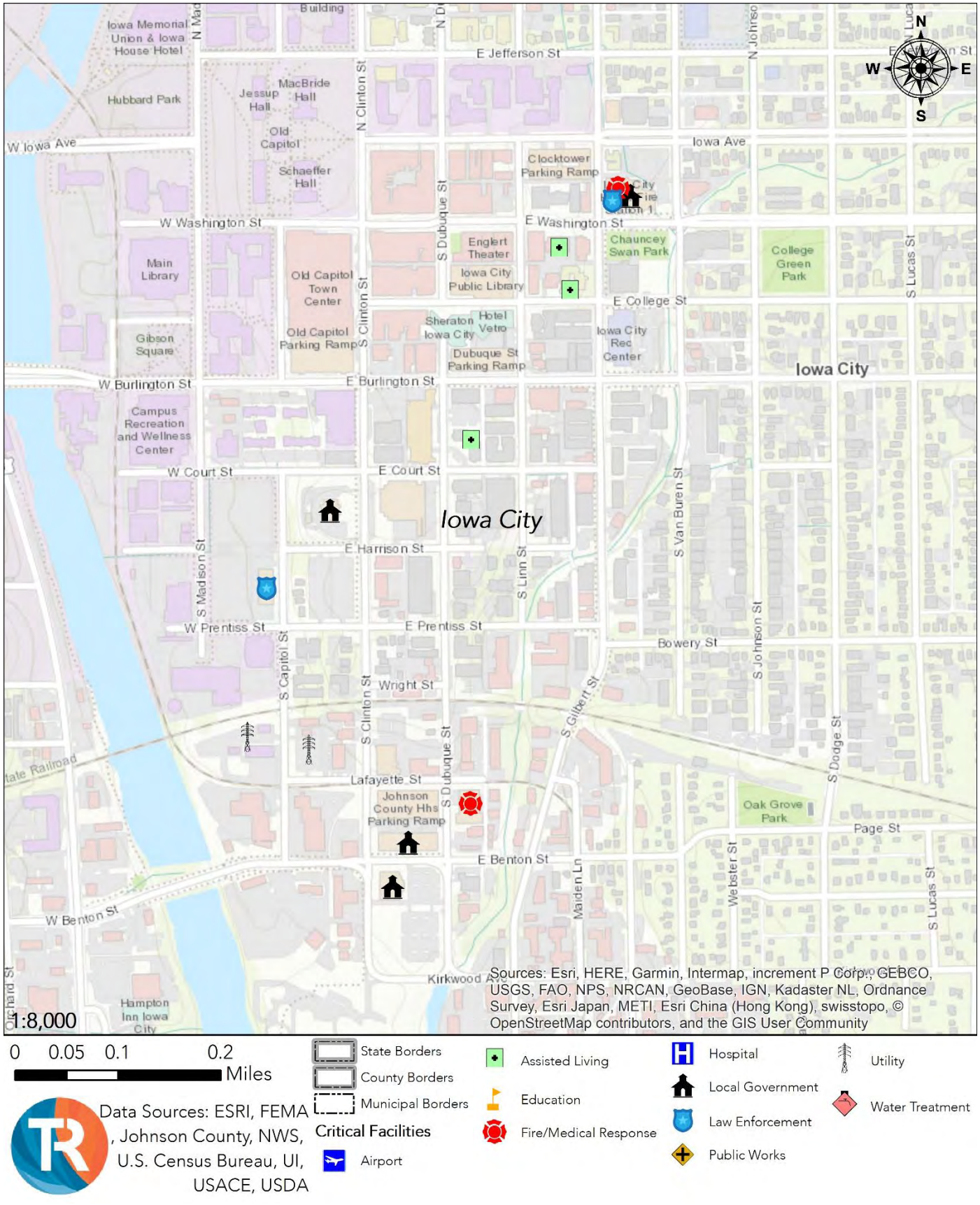
Name	Type	Location
Iowa City City Hall	Local Government	Iowa City
Iowa City Fire Station #1	Fire/Medical Response	Iowa City
Iowa City Fire Station #2	Fire/Medical Response	Iowa City
Iowa City Fire Station #3	Fire/Medical Response	Iowa City
Iowa City Fire Station #4	Fire/Medical Response	Iowa City
Iowa City Police Station	Law Enforcement	Iowa City
Iowa City Police Station - Pepperwood Plaza	Law Enforcement	Iowa City
Iowa City Public Works	Public Works	Iowa City
Iowa City Transit	Public Works	Iowa City
Iowa City Underground Reservoir #1	Water Treatment	Iowa City
Iowa City Underground Reservoir #2	Water Treatment	Iowa City
Iowa City Underground Reservoir #3	Water Treatment	Iowa City
Iowa City Underground Reservoir #4	Water Treatment	Iowa City
Iowa City Water Treatment Plan	Water Treatment	Iowa City
Secondary Roads - Iowa City	Public Works	Iowa City
Secondary Roads - Iowa City (Utah Ave.)	Public Works	County

**The data are from Johnson County*

Map 2.11 – Critical Facilities, Iowa City



Map 2.12 – Critical Facilities, Iowa City #2



2.5 – Lone Tree

Lone Tree has seen periods of sporadic growth and decline over modern history. Since their last participation in a hazard mitigation plan, their population has declined by 0.58%, but a total increase of 5.85% since 2010. It did not grow at any significant rate until after 2010. As a result, it's building stock is largely older with some modern construction. 78.05% is considered mid-century, 3.70% is considered late-century, and 18.25% is considered modern.

Table 2.21 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	1,300	-	-
2013	1,384	6.46%	-
2017	1,376	5.85%	- 0.58%

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

Table 2.22 – Structural Inventory, Lone Tree

Structure Class	Structures	Total Class Value
Agricultural	3	$555,000
Commercial	25	$17,580,000
Government	1	$351,000
Industrial	7	$1,340,000
Residential	486	$116,197,000
Multi-Unit Residential*	6	$8,693,000
Total =	528	$144,716,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.23 – Critical Facilities by Location, Lone Tree

Name	Type	Owner
Lone Tree Fire Station	Fire/Medical Response	Lone Tree
Lone Tree City Hall	Local Government	Lone Tree
Eastern Iowa Light & Power Lone Tree Service Center	Utility	Private
East Side Village	Assisted Living	Private
Pioneer Park - Lone Tree Health Care Center	Assisted Living	Private
Lone Tree Public Works	Public Works	Lone Tree
Secondary Roads - Lone Tree	Public Works	Lone Tree
Lone Tree Water Tower	Water Treatment	Lone Tree
Lone Tree Water Treatment Lagoons	Water Treatment	Lone Tree

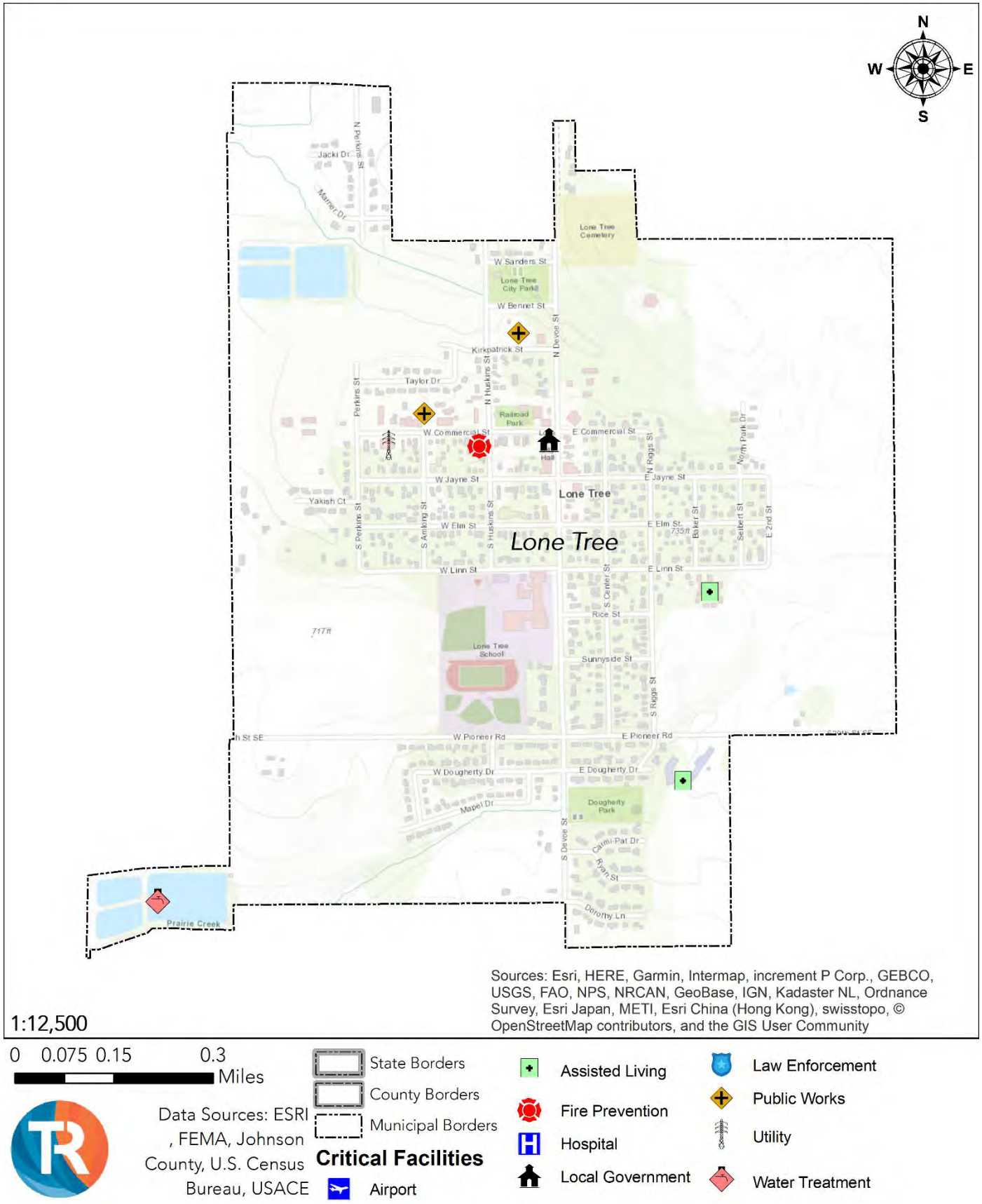
**The data are from Johnson County*

Table 2.24 – Critical Facilities by Owner, Lone Tree

Name	Type	Location
Lone Tree City Hall	Local Government	Lone Tree
Lone Tree Fire Station	Fire/Medical Response	Lone Tree
Lone Tree Public Works	Public Works	Lone Tree
Lone Tree Water Tower	Water Treatment	Lone Tree
Lone Tree Water Treatment Lagoons	Water Treatment	Lone Tree
Secondary Roads - Lone Tree	Public Works	Lone Tree

**The data are from Johnson County*

Map 2.13 – Critical Facilities, Lone Tree



2.6 – North Liberty

North Liberty has seen staggeringly high growth since the late-half of the 20th century. Its population has grown by 16.52% since their last participation in a hazard mitigation plan. As a result, their building stock is much more modern than the rest of the planning area. 1.80% is considered mid-century, 14.00% is late-century, and 84.20% is considered modern.

Table 2.25 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	13,374	-	-
2013	16,146	20.73%	-
2017	18,813	40.67%	16.52%

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

Table 2.26 – Structural Inventory, North Liberty

Structure Class	Structures	Total Class Value
Agricultural	11	$2,724,000
Commercial	149	$109,846,000
Government	3	$3,082,000
Industrial	54	$55,115,000
Residential	4,274	$1,061,301,000
Multi-Unit Residential*	129	$193,183,000
Total =	4,620	$1,425,251,000

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

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

Table 2.27 – Critical Facilities by Location, North Liberty

Name	Type	Owner
North Liberty City Hall	Local Government	North Liberty
North Liberty Community Center	Local Government	North Liberty
North Liberty Fire Station	Fire/Medical Response	North Liberty
North Liberty Police Station	Law Enforcement	North Liberty
Interstate Light & Power Substation	Utility	Private
Linn County Rec Holiday Substation (Forevergreen Rd.)	Utility	Private
Linn County Rec North Liberty Substation (240th St.)	Utility	Private
Keystone at Forevergreen	Assisted Living	Private
Country View Senior Living	Assisted Living	Private
Good Samaritan Society	Assisted Living	Private
North Liberty Living Center	Assisted Living	Private
Jefferson Point	Assisted Living	Private
North Liberty Public Works	Public Works	North Liberty
North Liberty Water Tower (240th Street)	Water Treatment	North Liberty
North Liberty Water Tower (N. Kansas Ave.)	Water Treatment	North Liberty
North Liberty Water Treatment Plant	Water Treatment	North Liberty
North Liberty Water Treatment Plant #2	Water Treatment	North Liberty

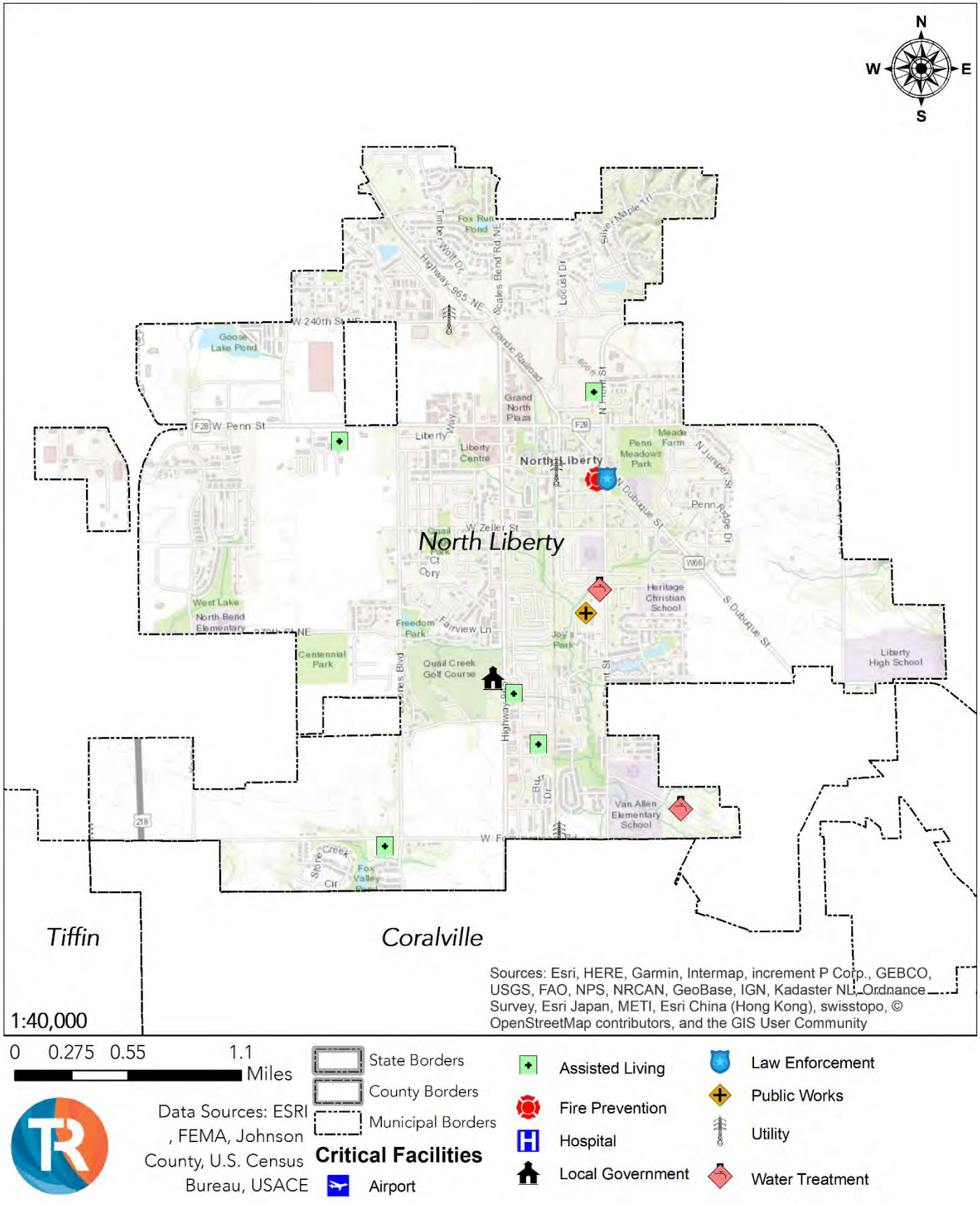
**The data are from Johnson County*

Table 2.28 – Critical Facilities by Owner, North Liberty

Name	Type	Owner
North Liberty City Hall	Local Government	North Liberty
North Liberty Community Center	Local Government	North Liberty
North Liberty Fire Station	Fire/Medical Response	North Liberty
North Liberty Police Station	Law Enforcement	North Liberty
North Liberty Public Works	Public Works	North Liberty
North Liberty Water Tower (240th Street)	Water Treatment	North Liberty
North Liberty Water Tower (N. Kansas Ave.)	Water Treatment	North Liberty
North Liberty Water Treatment Plant	Water Treatment	North Liberty
North Liberty Water Treatment Plant #2	Water Treatment	North Liberty

The data are from Johnson County

Map 2.14 – Critical Facilities, North Liberty



2.7 – Oxford

Oxford has seen stagnant growth throughout the modern history. Its population has decreased by 1.34% since their last participation in a hazard mitigation plan. Its housing stock has not often been replaced by newer construction. As a result, the majority of it is of older construction. 78.05% is considered mid-century, 3.70% is considered late-century, and 18.25% is considered modern.

Table 2.29 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	807	-	-
2013	819	1.49%	-
2017	808	0.12%	- 1.34%

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

Table 2.30 – Structural Inventory, Oxford

Structure Class	Structures	Total Class Value
Agricultural	2	$768,000
Commercial	21	$8,536,000
Government	6	$2,827,000
Industrial	8	$1,485,000
Residential	319	$74,896,000
Multi-Unit Residential*	2	$2,988,000
Total =	358	$91,500,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.31 – Critical Facilities by Location, Oxford

Name	Type	Owner
Oxford City Hall	Local Government	Oxford
Oxford Fire Station	Fire/Medical Response	Oxford
Oxford Public Works	Public Works	Oxford
Oxford Water Tower	Water Treatment	Oxford

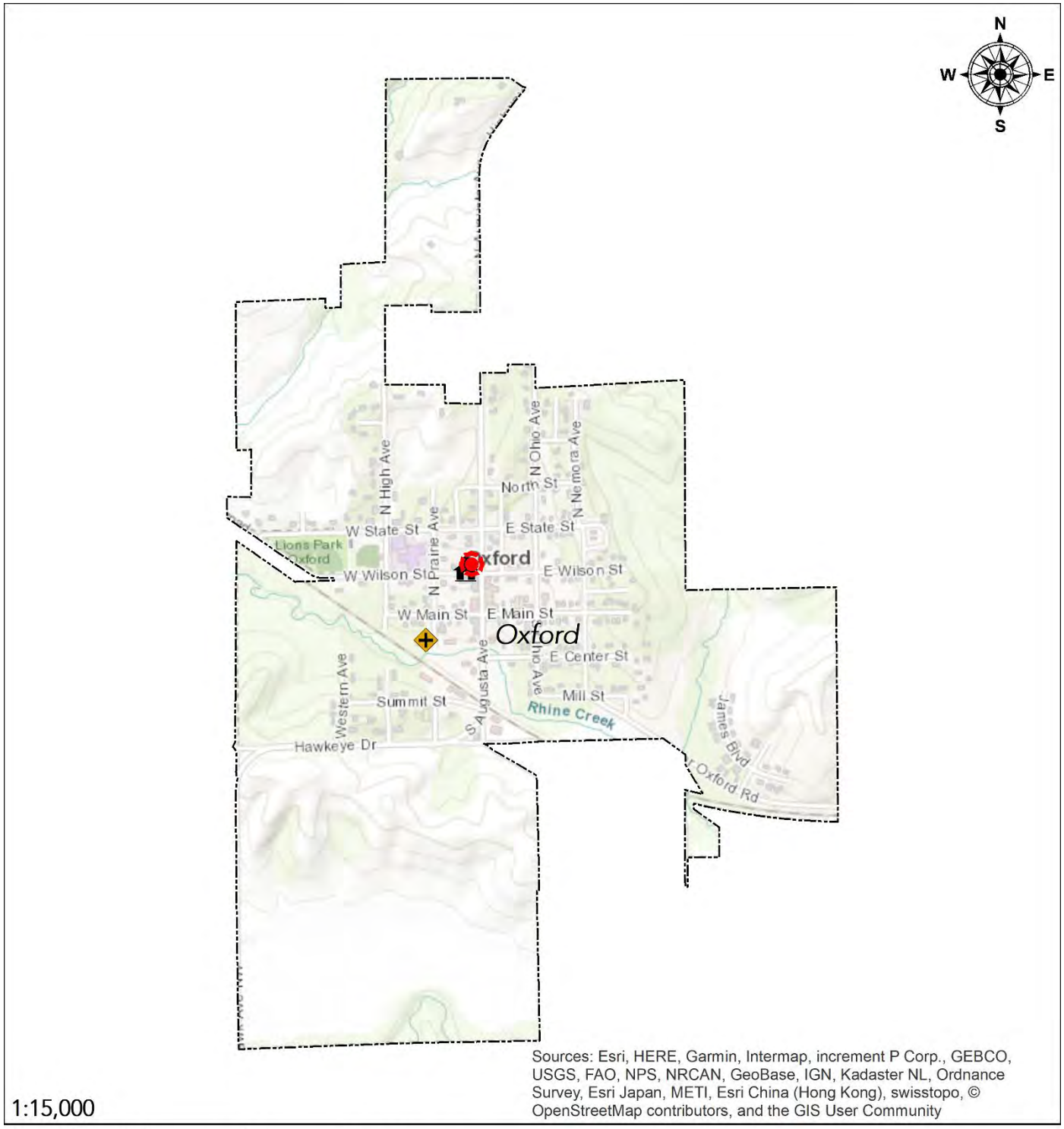
**The data are from Johnson County*

Table 2.32 – Critical Facilities by Location, Oxford

Name	Type	Location
Oxford City Hall	Local Government	Oxford
Oxford Fire Station	Fire/Medical Response	Oxford
Oxford Public Works	Public Works	Oxford
Oxford Water Tower	Water Treatment	Oxford
Oxford Water Treatment Plant	Water Treatment	County
Secondary Roads - Oxford	Public Works	County

**The data are from Johnson County*

Map 2.15 – Critical Facilities, Oxford



2.8 – Shueyville

Shuevyville was a small, rural town, that did not see significant growth until the 2000s. Its population has grown steadily by 6.36% since their last participation in a hazard mitigation plan. As a result of its recent, post 2000, surge in population growth, its building stock is largely of modern construction. 34.52% is considered late-century and 65.48% is considered modern.

Table 2.33 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	577	-	-
2013	629	9.01%	-
2017	669	15.94%	6.36%

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

Table 2.34 – Structural Inventory, Shueyville

Structure Class	Structures	Total Class Value
Agricultural	3	$1,579,000
Commercial	12	$4,391,000
Government	0	$0
Industrial	4	$500,000
Residential	245	$88,146,000
Multi-Unit Residential*	0	$0
Total =	264	$94,616,000

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

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

Table 2.35 – Critical Facilities by Location, Shueyville

Name	Type	Owner
Shueyville Community Building	Local Government	Shueyville

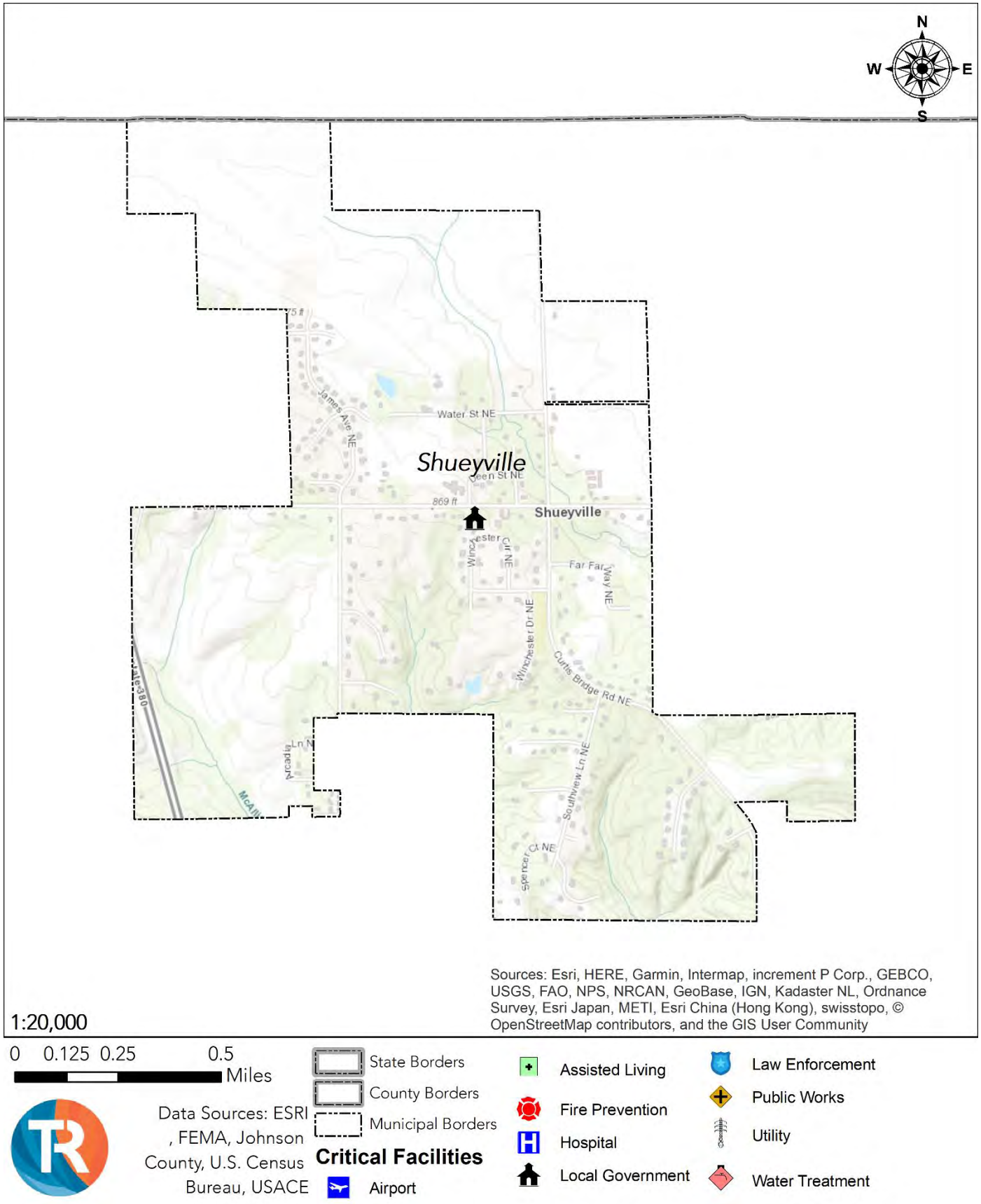
**The data are from Johnson County*

Table 2.36 – Critical Facilities by Location, Shueyville

Name	Type	Owner
Secondary Roads - Shueyville	Public Works	Johnson County
Shueyville Community Building	Local Government	Shueyville

**The data are from Johnson County*

Map 2.16 – Critical Facilities, Shueyville



2.9 – Solon

Solon has grown at high rate of 16.19% since their last participation in a hazard mitigation plan. Solon developed early in the mid-20th century, saw little growth in the late-20th century, then experienced a surge since 2000. As a result, 23.25% of its building stock is of mid-century construction, 17.24% is late-century, and 59.41% is considered modern construction.

Table 2.37 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	2,085	-	-
2013	2,260	8.39%	-
2017	2,626	25.95%	16.19%

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

Table 2.38 – Structural Inventory, Solon

Structure Class	Structures	Total Class Value
Agricultural	5	$811,000
Commercial	58	$43,893,000
Government	2	$3,117,000
Industrial	18	$6,823,000
Residential	691	$169,789,000
Multi-Unit Residential*	18	$33,601,000
Total =	792	$258,034,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.39 – Critical Facilities by Location, Solon

Name	Type	Owner
Solon City Hall	Local Government	Solon
Solon Fire Station	Fire/Medical Response	Solon
Alliant Energy Solon Substation	Utility	Private
Solon Care Center	Assisted Living	Private
Solon Community Housing	Assisted Living	Private
Solon Public Library	Education	Solon
Solon Public Works	Public Works	Solon
Solon Water Tower	Water Treatment	Solon
Solon Water Treatment Facility	Water Treatment	Solon

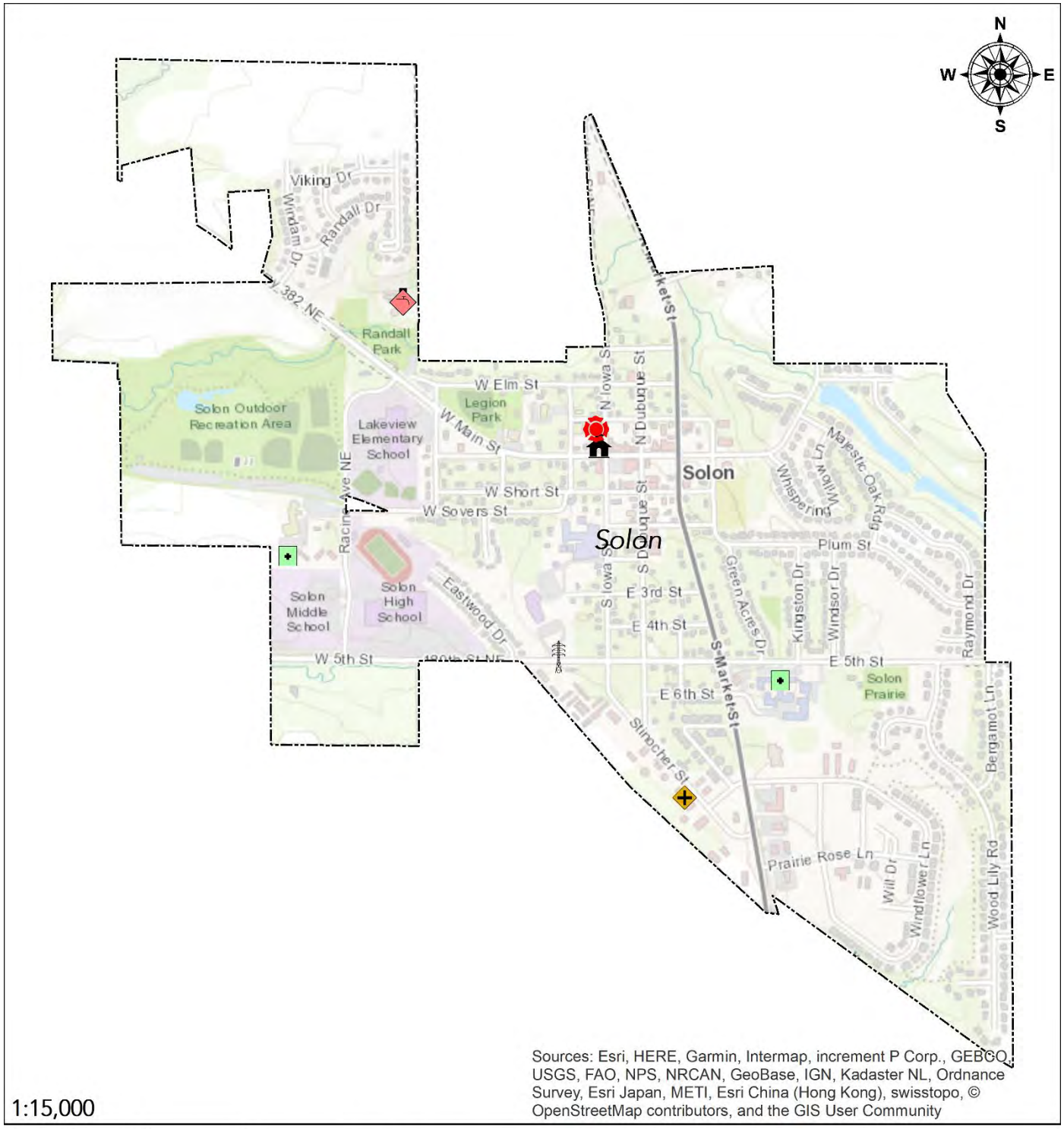
**The data are from Johnson County*

Table 2.40 – Critical Facilities by Owner, Solon

Name	Type	Location
Secondary Roads - Solon	Public Works	County
Solon City Hall	Local Government	Solon
Solon Fire Station	Fire/Medical Response	Solon
Solon Public Library	Education	Solon
Solon Public Works	Public Works	Solon
Solon Water Treatment	Water Treatment	Solon
Solon Water Treatment Facility	Water Treatment	Solon
Secondary Roads - Solon	Public Works	County
Solon City Hall	Local Government	Solon

**The data are from Johnson County*

Map 2.17 – Critical Facilities, Solon



2.10 – Swisher

Swisher has grown at a moderate rate of 6.24% since their last participation in a hazard mitigation plan. Most of the city's growth occurred during the late-20th century, but is fairly evenly disbursed over time. As a result, its building stock is evenly distributed. 29.33% is considered mid-century, 40.48% is considered late-century, and 30.19% is considered modern.

Table 2.41 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	879	-	-
2013	913	3.87%	-
2017	970	10.35%	6.24%

The data are from the U.S. Census Bureau

Table 2.42 – Structural Inventory, Swisher

Structure Class	Structures	Total Class Value
Agricultural	2	$561,000
Commercial	19	$16,224,000
Government	1	$1,104,000
Industrial	8	$1,491,000
Residential	342	$101,897,000
Multi-Unit Residential*	0	$0
Total =	372	$121,277,000

Multi-Unit Residential is defined as a structure with 5 or more residential units
The data are from the Federal Emergency Management Agency

Table 2.43 – Critical Facilities by Location, Swisher

Name	Type	Owner
Swisher City Hall	Local Government	Swisher
Swisher Library	Education	Swisher
Swisher Public Works	Public Works	Swisher
Swisher Public Works #2	Public Works	Swisher
Swisher Water Treatment Facility	Water Treatment	Swisher

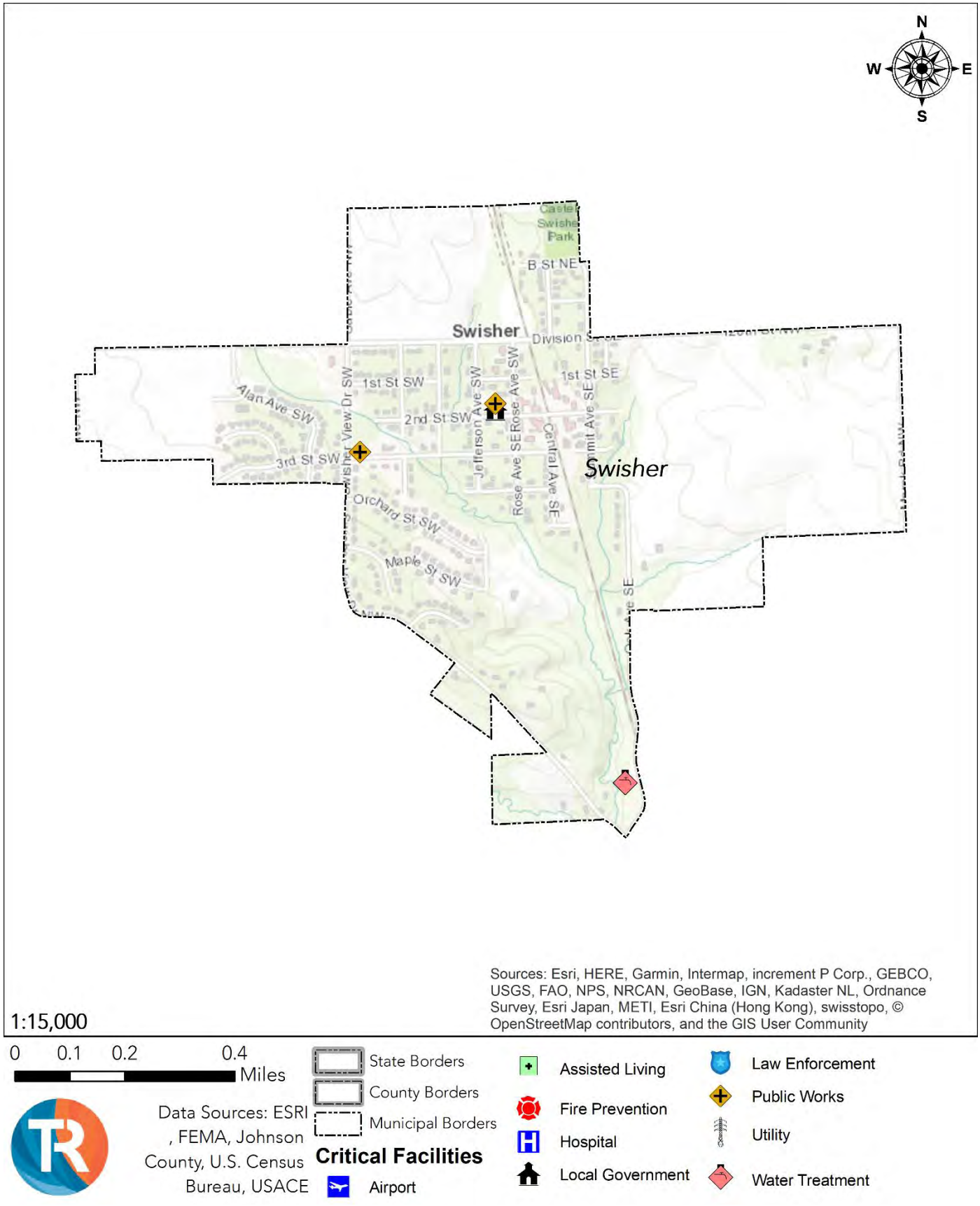
The data are from Johnson County

Table 2.44 – Critical Facilities by Owner, Swisher

Name	Type	Location
Jefferson Monroe Fire Station	Fire/Medical Response	County
Swisher City Hall	Local Government	Swisher
Swisher Library	Education	Swisher
Swisher Public Works	Public Works	Swisher
Swisher Public Works #2	Public Works	Swisher
Swisher Water Treatment Facility	Water Treatment	Swisher

The data are from Johnson County

Map 2.18 – Critical Facilities, Swisher



2.11 – Tiffin

Tiffin has grown at a staggering rate of 43.76% since their last participation in a hazard mitigation plan. The vast majority of its growth occurred since 2000. As a result, the vast majority of building stock is of newer construction. 10.35% is considered mid-century, 4.96% is considered late-century, and 84.70% is considered modern.

Table 2.45 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	1,947	-	-
2013	2,338	20.08%	-
2017	3,361	72.62%	43.76%

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

Table 2.46 – Structural Inventory, Tiffin

Structure Class	Structures	Total Class Value
Agricultural	4	$1,350,000
Commercial	16	$8,873,000
Government	2	$2,129,000
Industrial	11	$3,167,000
Residential	590	$132,403,000
Multi-Unit Residential*	21	$32,726,000
Total =	644	$180,648,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.47 – Critical Facilities by Location, Tiffin

Name	Type	Owner
Tiffin City Hall	Local Government	Tiffin
Tiffin Fire Station	Fire/Medical Response	Tiffin
Midamerican Energy Substation K	Utility	Private
Tiffin Public Works	Public Works	Tiffin
Tiffin Water Tower	Water Treatment	Tiffin
Tiffin Water Treatment Facility	Water Treatment	Tiffin

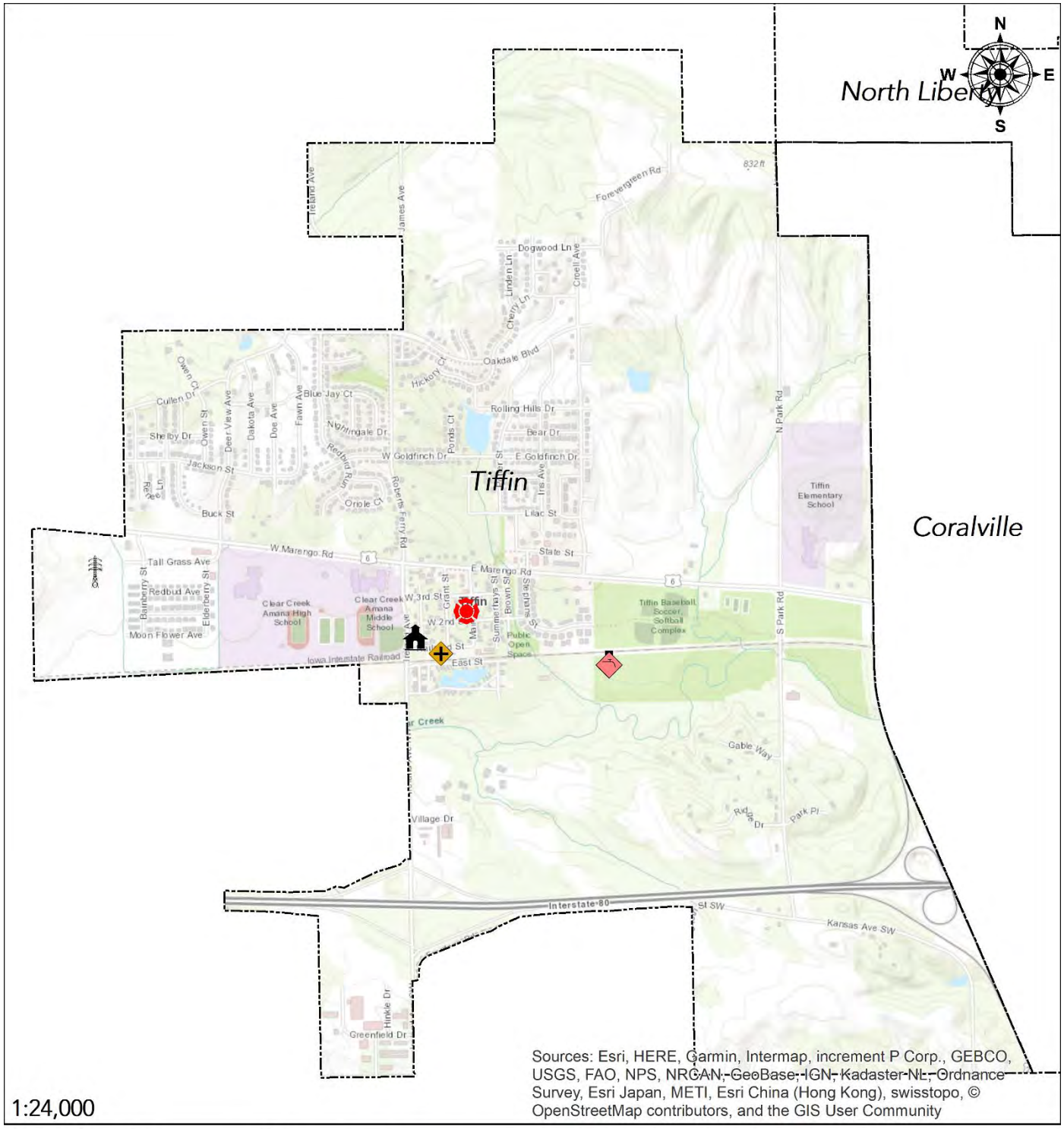
**The data are from Johnson County*

Table 2.48 – Critical Facilities by Owner, Tiffin

Name	Type	Location
Tiffin City Hall	Local Government	Tiffin
Tiffin Fire Station	Fire/Medical Response	Tiffin
Tiffin Public Works	Public Works	Tiffin
Tiffin Water Tower	Water Treatment	Tiffin
Tiffin Water Treatment Facility	Water Treatment	Tiffin

**The data are from Johnson County*

Map 2.19 – Critical Facilities, Tiffin



2.12 – University Heights

University Heights has lost population since the development at a minor rate or 3.52% since their last participation in a hazard mitigation plan. The vast majority of University Heights' population growth occurred in the mid-20th century. As a result, the vast majority of its building stock is of older construction. 77.23% is considered mid-century, 18.46% is considered late-century, and 4.23% is considered modern.

Table 2.49 – Population Change

Year	Estimated Population	Percent Change from 2010	Percent Change from 2013
2010	1,051	-	-
2013	1,109	5.52%	-
2017	1,070	1.81%	- 3.52%

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

Table 2.50 – Structural Inventory, University Heights

Structure Class	Structures	Total Class Value
Agricultural	2	$238,000
Commercial	20	$12,091,000
Government	0	$0
Industrial	5	$831,000
Residential	406	$120,692,000
Multi-Unit Residential*	7	$15,509,000
Total =	440	$149,361,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the Federal Emergency Management Agency*

Table 2.51 – Critical Facilities by Location, University Heights

Name	Type	Owner
University Heights City Hall	Local Government	University Heights
University Heights Police Station	Law Enforcement	University Heights

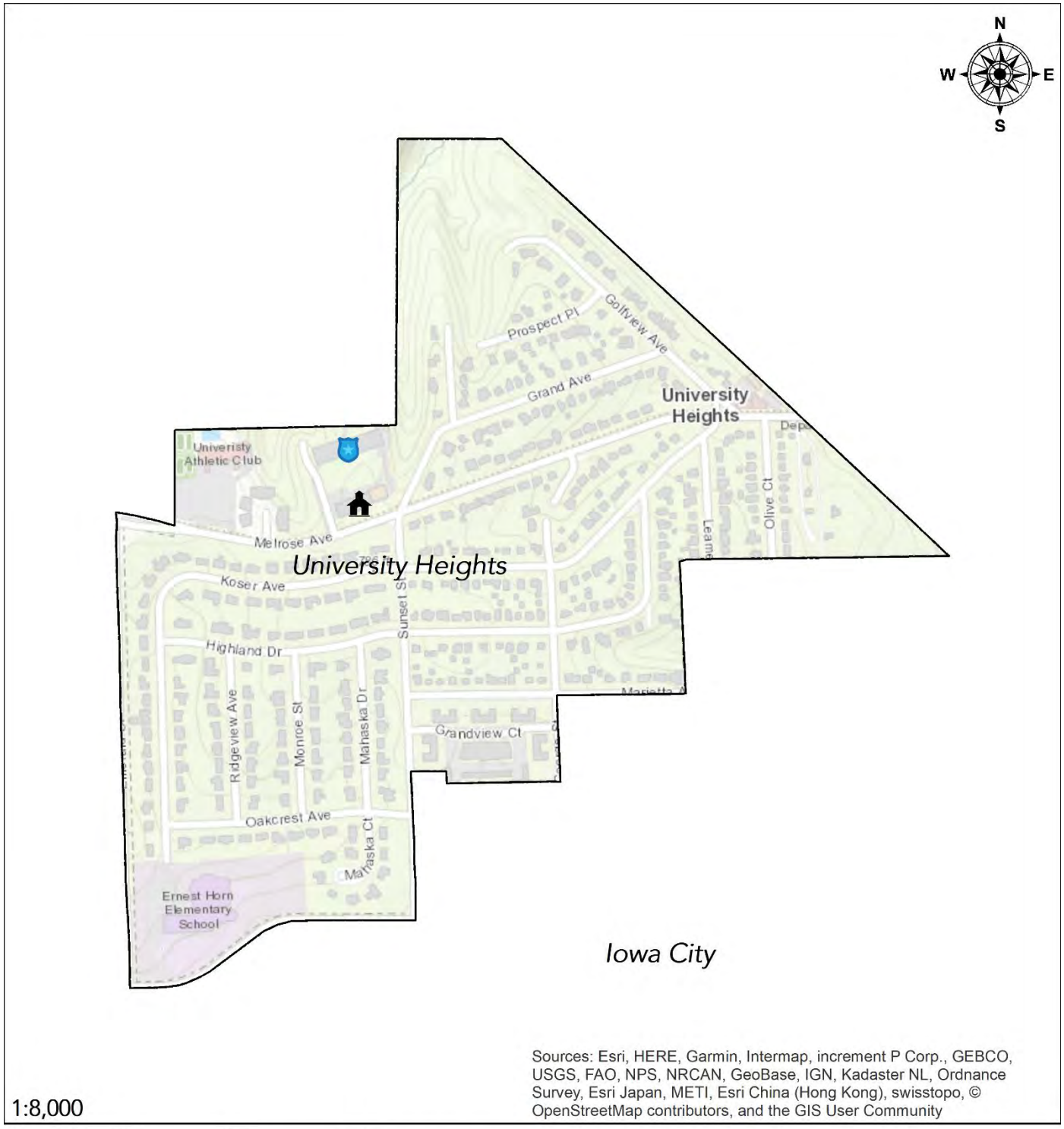
**The data are from Johnson County*

Table 2.52 – Critical Facilities by Owner, University Heights

Name	Type	Location
University Heights City Hall	Local Government	University Heights
University Heights Police Station	Law Enforcement	University Heights

*The data are from Johnson County

Map 2.20 – Critical Facilities, University Heights



2.13 – University of Iowa

Founded in 1847, the University of Iowa is an economic and economic and cultural staple of Johnson County. It is organized into eleven colleges, spans 1,880 acres, operates three research institutes, and operates a hospital campus including numerous clinics throughout the community. This institution is deeply integrated in some way or another into the community.

UI operates under a budget of $739,712,000. 33,564 students attend UI of which 27,339 are full-time and 6,225 are part-time. For the purposes of this plan's risk assessment, it assumes the 6,225 part-time students are commuters. UI employs 2,296 administrative workers and 2,978 faculty members. These students, staff, and faculty study and work across 306 structures that are valued at a total of $4,989,783,521.

Table 2.53 – University of Iowa Facilities

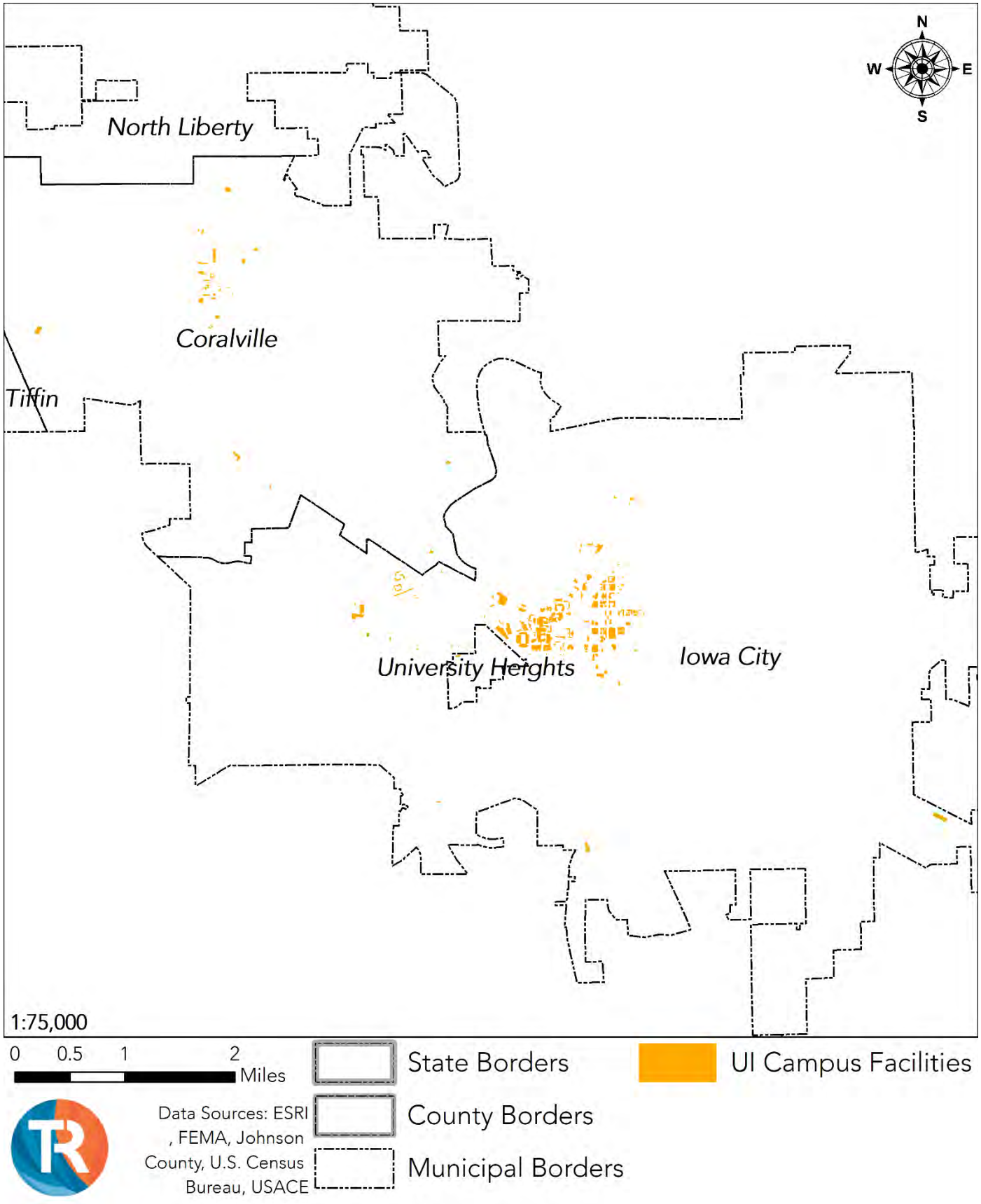
Facility Location	Number	Value
Lake MacBride Nature Recreation Area	9	$3,589,290
Main Campus Districts (Iowa City)	257	$4,483,624,481
Oakdale Research Parks	34	$476,987,211
Off-Site (Johnson County)	2	$6,513,008
Off-Site (North Liberty)	4	$19,069,531
Total =	306	$4,989,783,521

Table 2.54 – Critical Facilities, University of Iowa

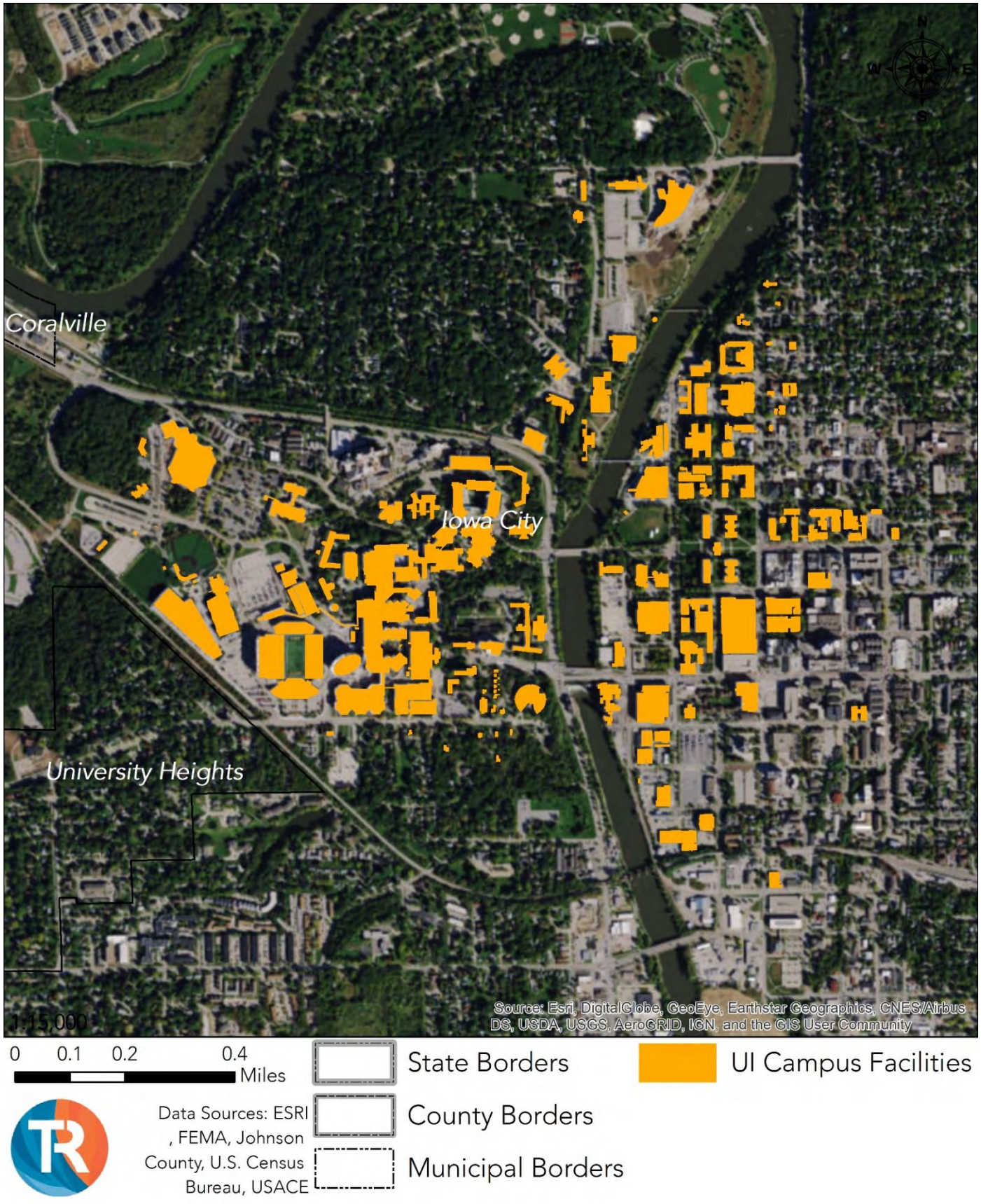
Name	Type	Location
Boyd Tower	Medical/Laboratory	Iowa City
Carver Pavillion	Medical/Laboratory	Iowa City
Children's Hospital	Medical/Laboratory	Iowa City
Chilled Water Plant 1	Water Treatment	Iowa City
Chilled Water Plant 2	Water Treatment	Iowa City
Dialysis Unit	Medical/Laboratory	North Liberty
Emergency Power Facility	Utility	Iowa City
Health Care Logistics Management Center	IT	Coralville
Information Technology Facility	IT	Coralville
Iowa River Landing	Medical/Laboratory	Coralville
ITS Switching Facility	IT	Iowa City
Newton Road Ramp	Water Treatment	Iowa City
North Campus Chilled Water Facility	Water Treatment	Iowa City
Oakdale 69kV Substation	Utility	Coralville
Oakdale Chilled Water Plant	Water Treatment	Coralville
Oakdale Power Plant Substation	Utility	Coralville
Oakdale Utility Power Plant	Utility	Coralville
Oakdale Well House	Water Treatment	Coralville
Pappajohn Pavilion	Medical/Laboratory	Iowa City
Pomerantz Family Pavilion	Medical/Laboratory	Iowa City
South Wing	Medical/Laboratory	Iowa City
State Hygienic Laboratory	Medical/Laboratory	Coralville

Substation L Control Building	Utility	Iowa City
UIHC Centralized Emergency Power Generation Facility	Utility	Iowa City
University of Iowa Hospital	Hospital	Iowa City
University of Iowa Police Station	Police	Iowa City
University of Iowa Power Plant	Utility	Iowa City
University of Iowa Water Plant	Water Treatment	Iowa City
West Campus Steam Plant	Utility	Iowa City

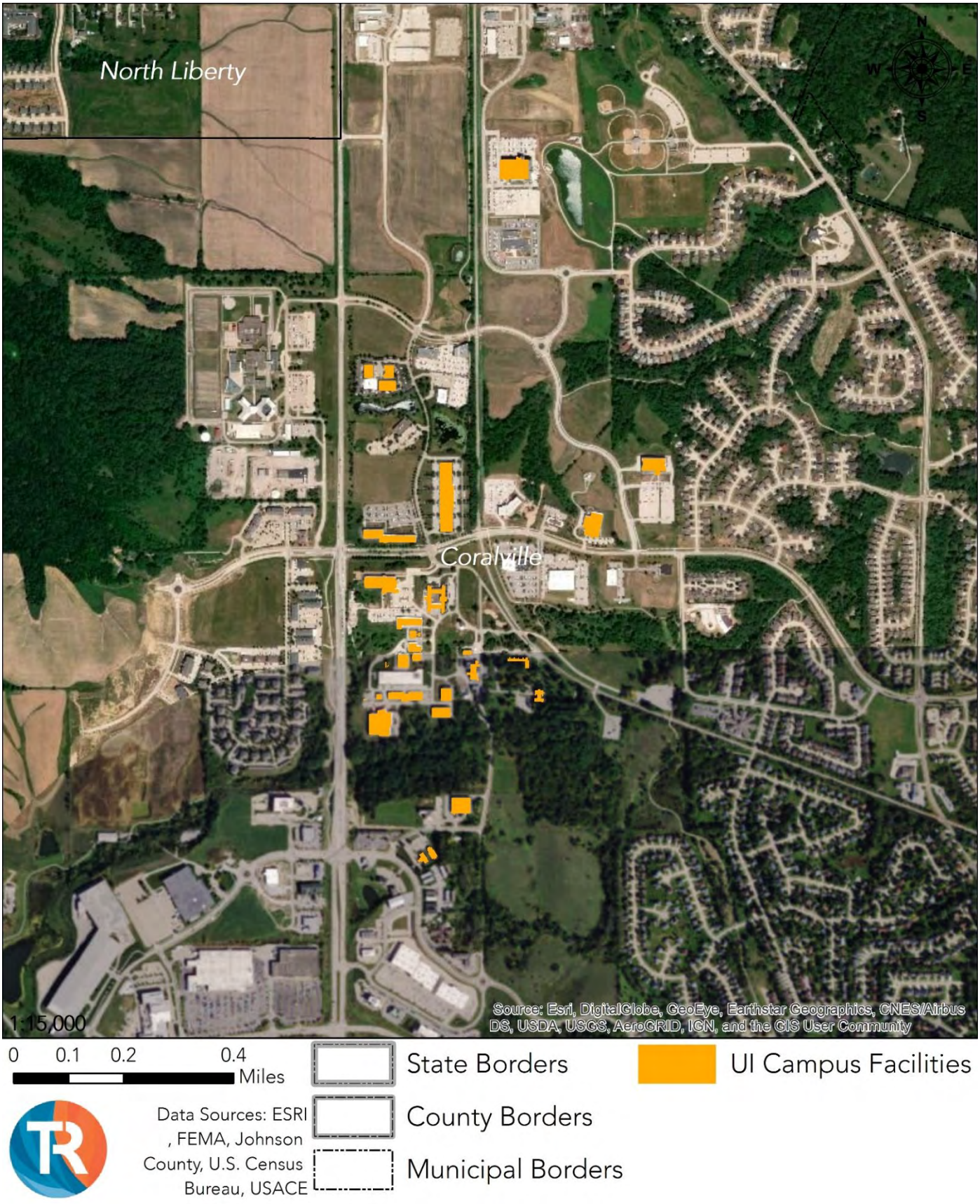
Map 2.20 – Facilities, University of Iowa



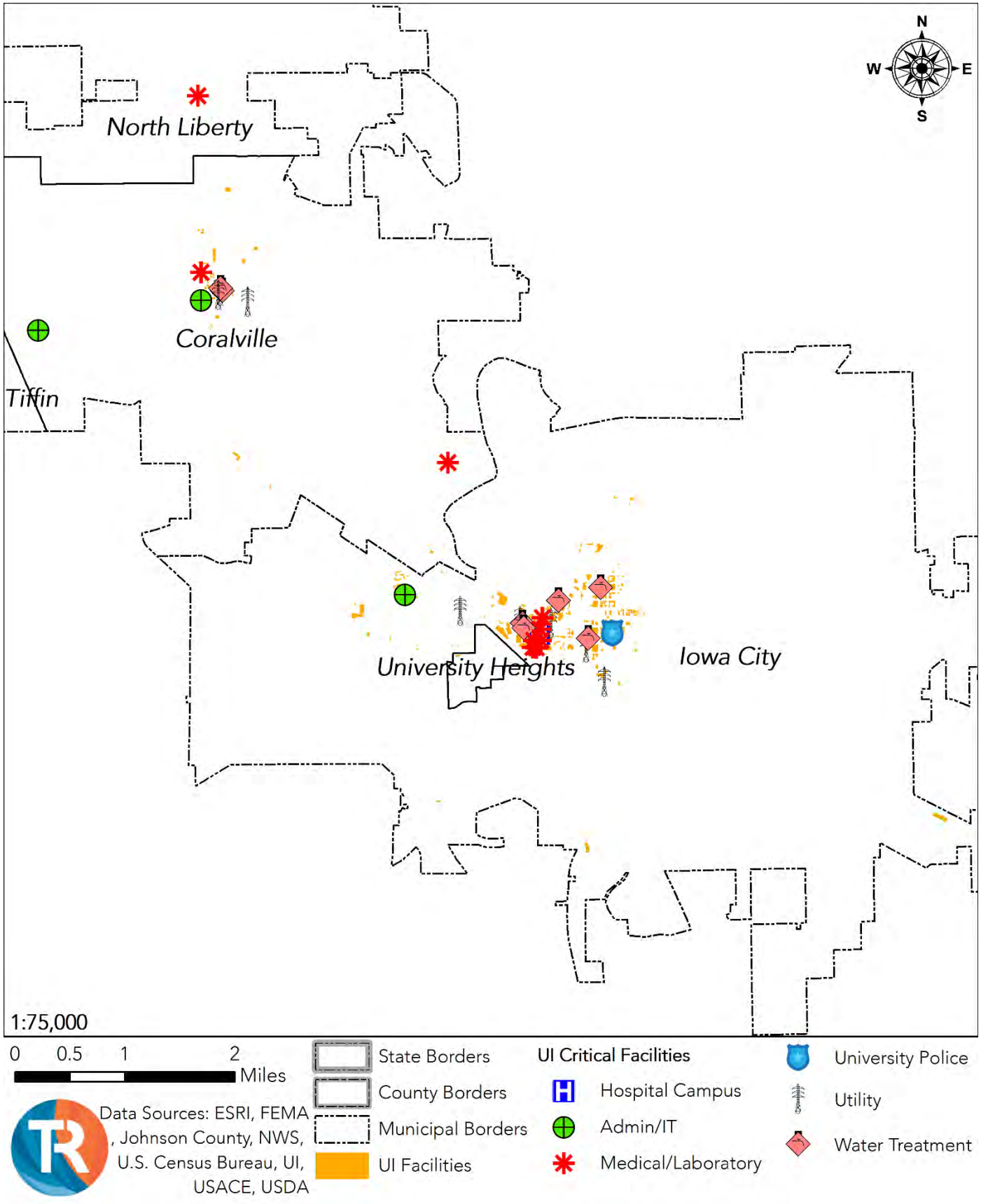
Map 2.21 – Facilities, Main Campus Districts, University of Iowa



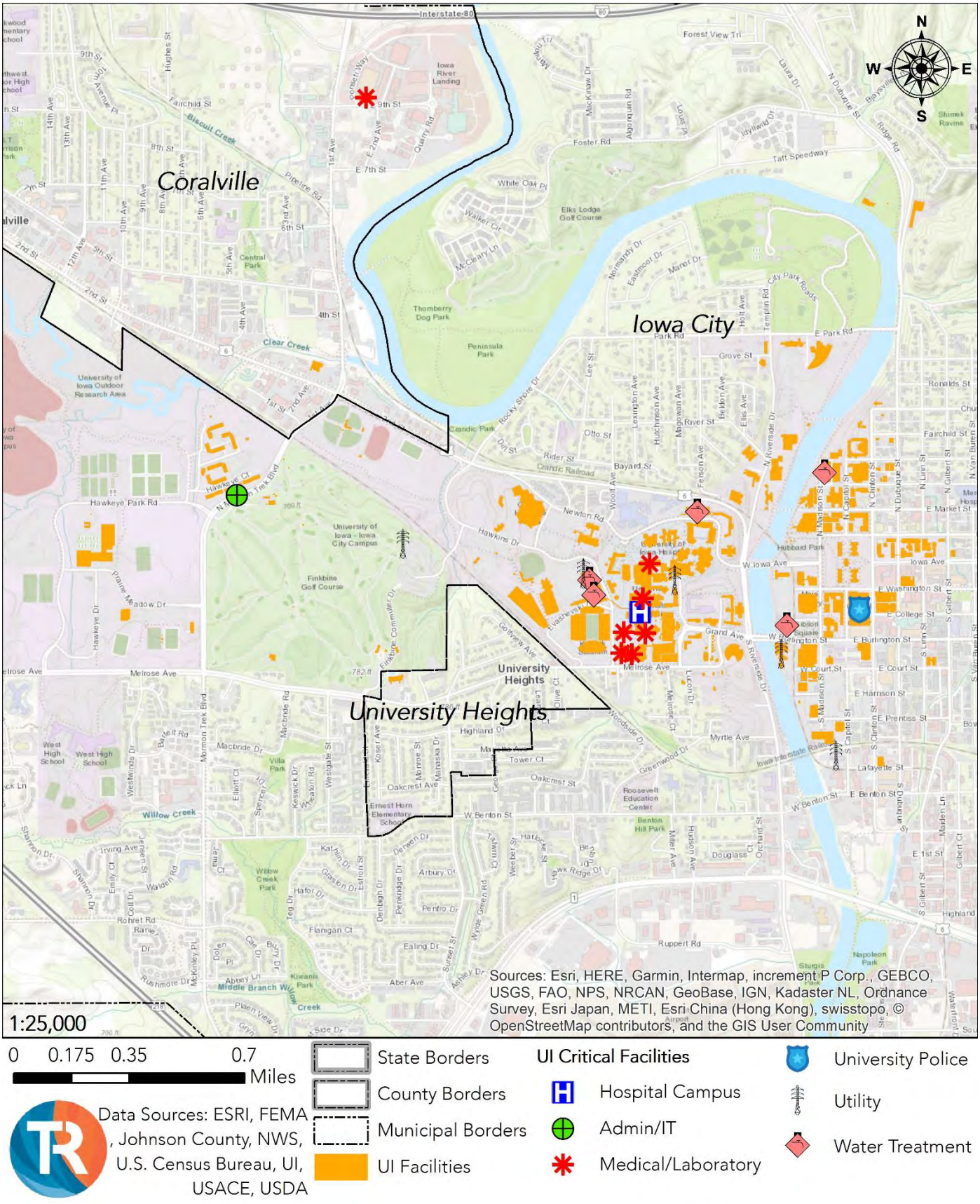
Map 2.22 – Facilities, Research Parks, University of Iowa



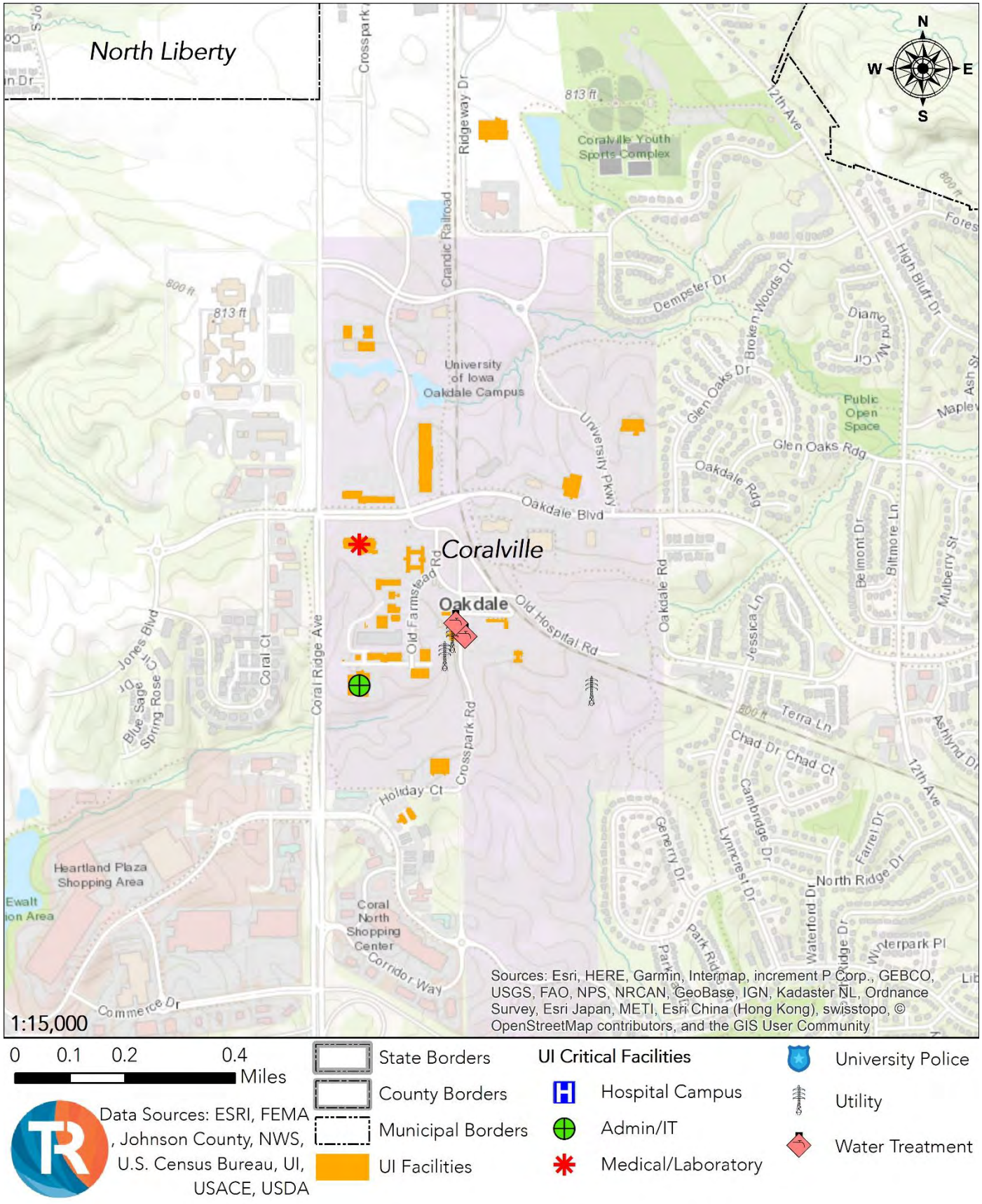
Map 2.23 – Critical Facilities, University of Iowa



Map 2.24 – Critical Facilities, Main Campus Districts, University of Iowa



Map 2.25 – Facilities, Research Parks, University of Iowa



2.14 – Community School Districts

Johnson County is serviced by the four community school districts of Clear Creek Amana, Iowa City, Lone Tree, and Solon. These community school districts provide public education to 18,541 students across 38 campuses located throughout Johnson County. These services are provided by 2,943 teachers, administrators, and support staff.

Table 2.55 – Community School District Structural Summary

Community School District	Campuses	Structural Values
Clear Creek Amana	6(7)*	$135,581,603
Iowa City	27	$611,634,187
Lone Tree	1	$22,205,953
Solon	4	$61,703,105
Total =	38(39)*	$831,124,848

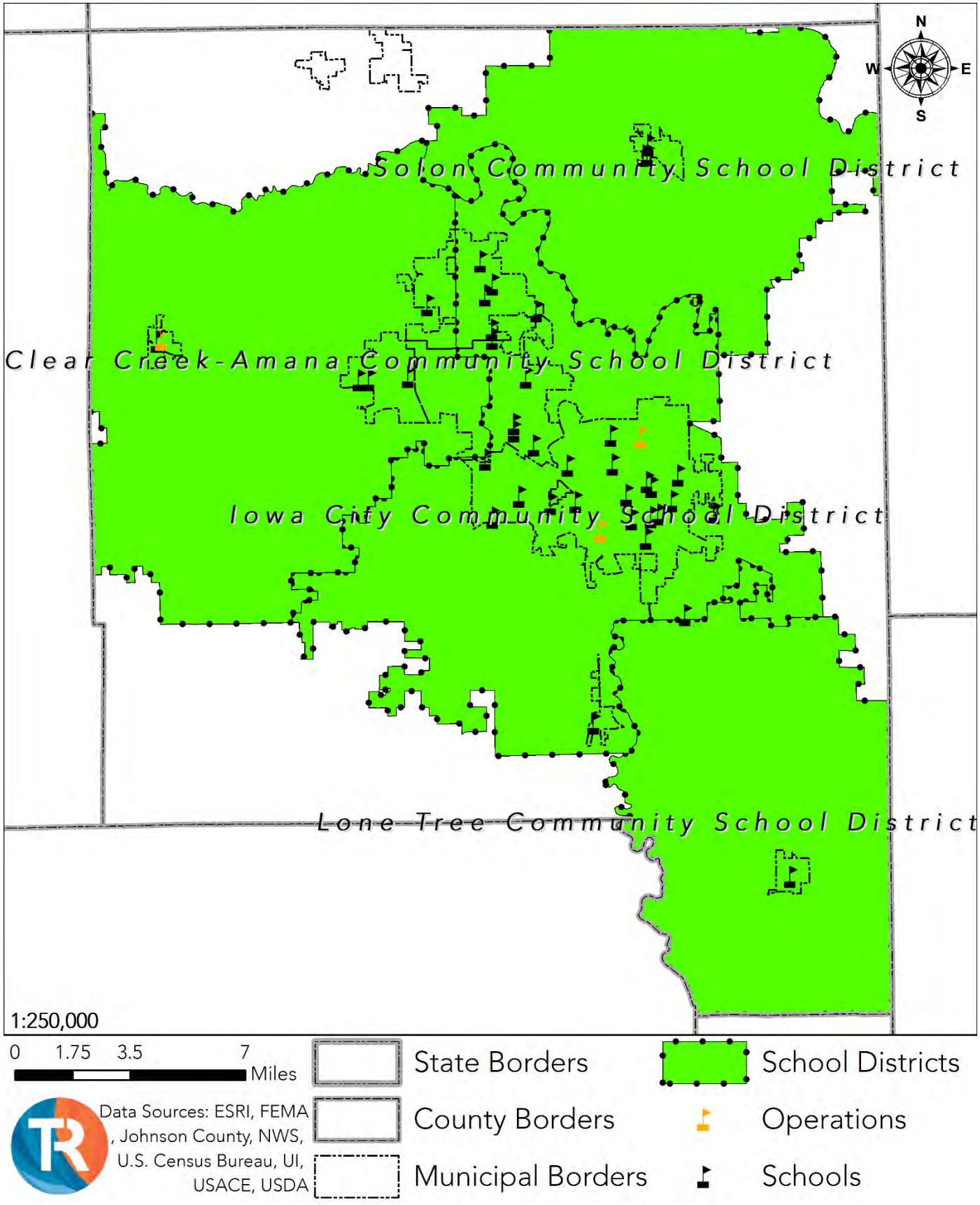
**The Clear Creek Amana operates a sixth elementary campus, but it is outside of Johnson County and is therefore outside the jurisdiction of this plan.*
***The data are from the Community School Districts and the State of Iowa Department of Education.*

Table 2.56 – Community School District Demographics Summary

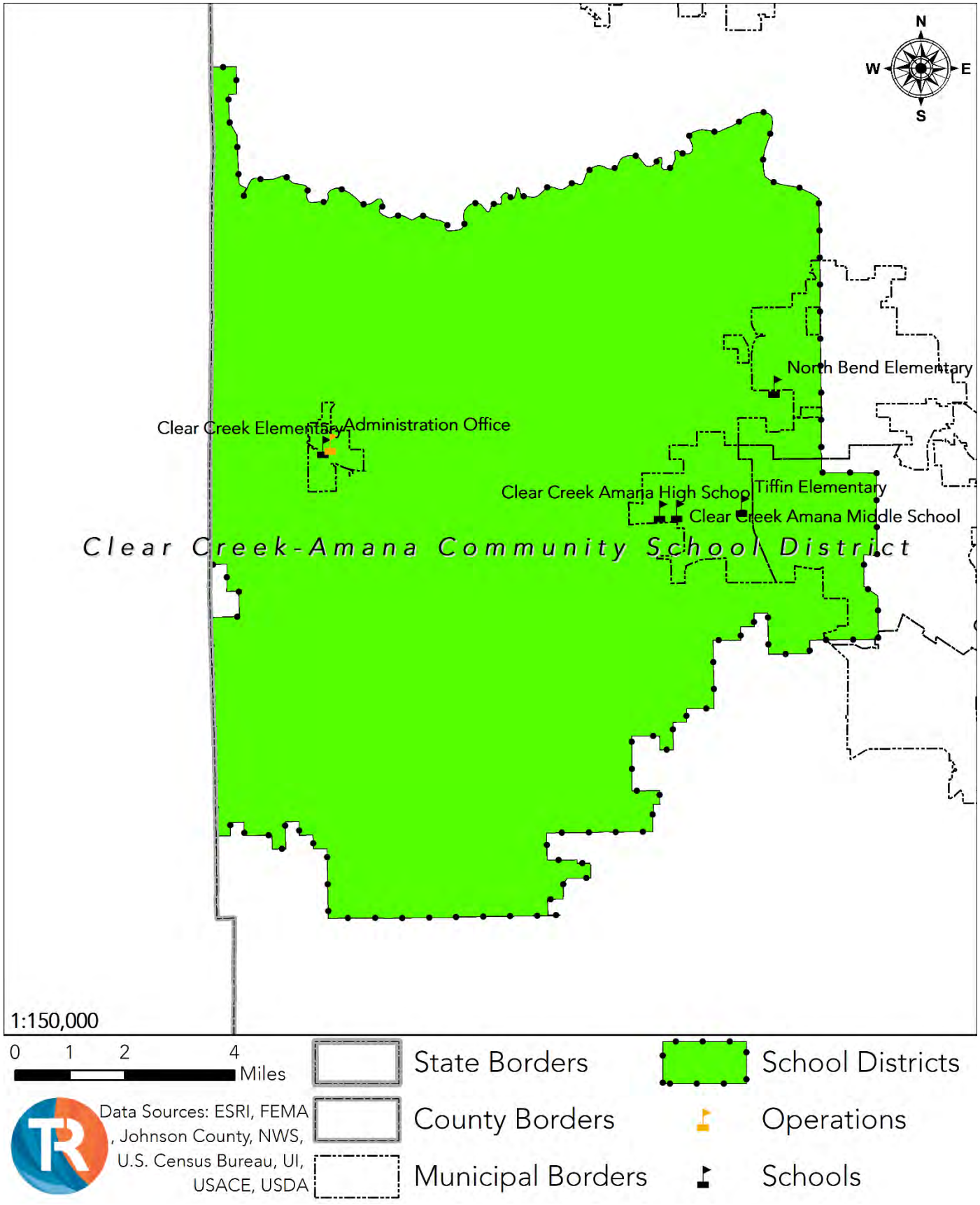
Community School District	Staff	Students	Estimated Student Growth
Clear Creek Amana	450	2,449	8.2%
Iowa City	2,224	14,118	3.7%
Lone Tree	78	453	-
Solon	191	1,521	-
Total =	2,943	18,541	-

**The data are from the Community School Districts and the State of Iowa Department of Education.*

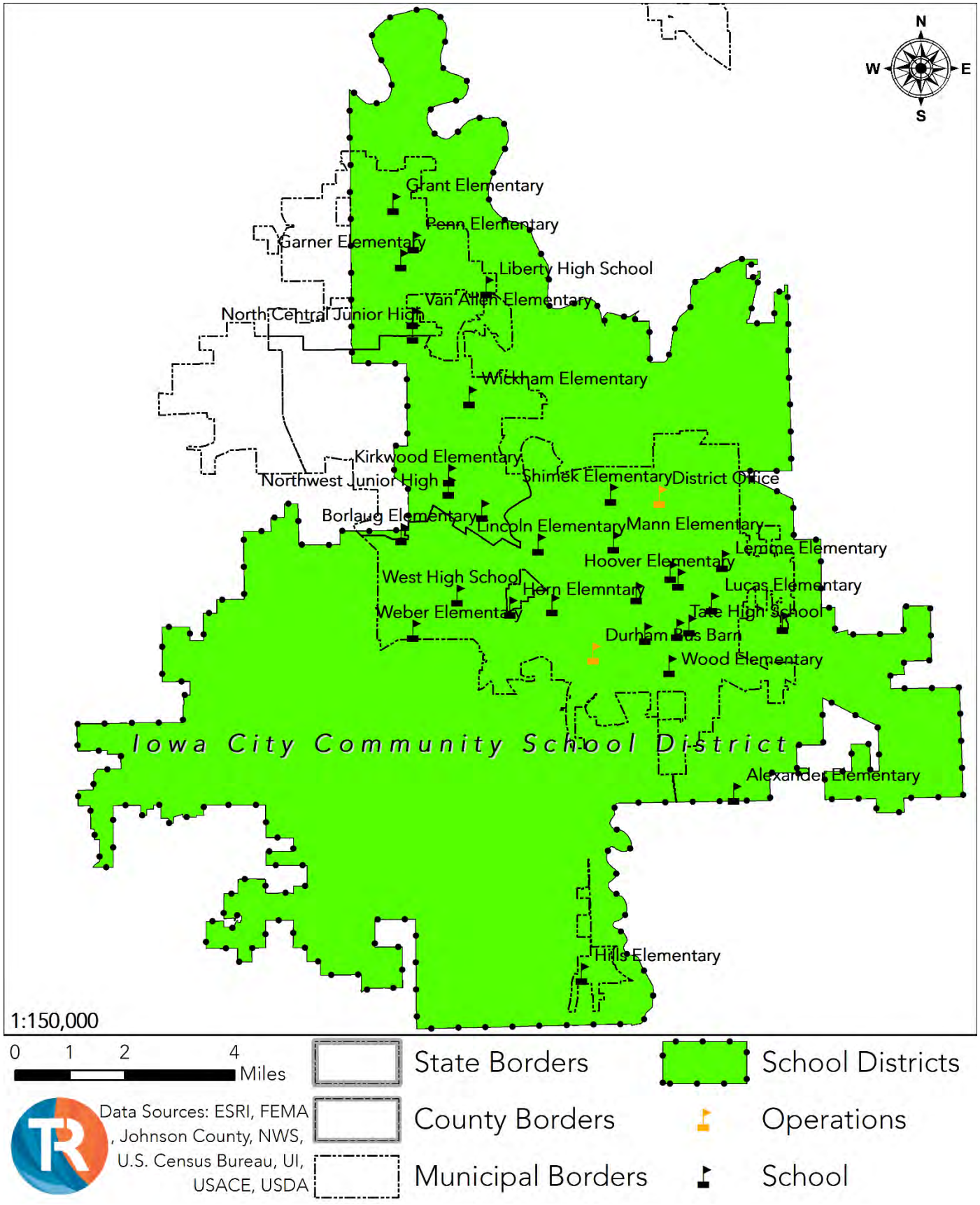
Map 2.26 – Community School Districts, Johnson County



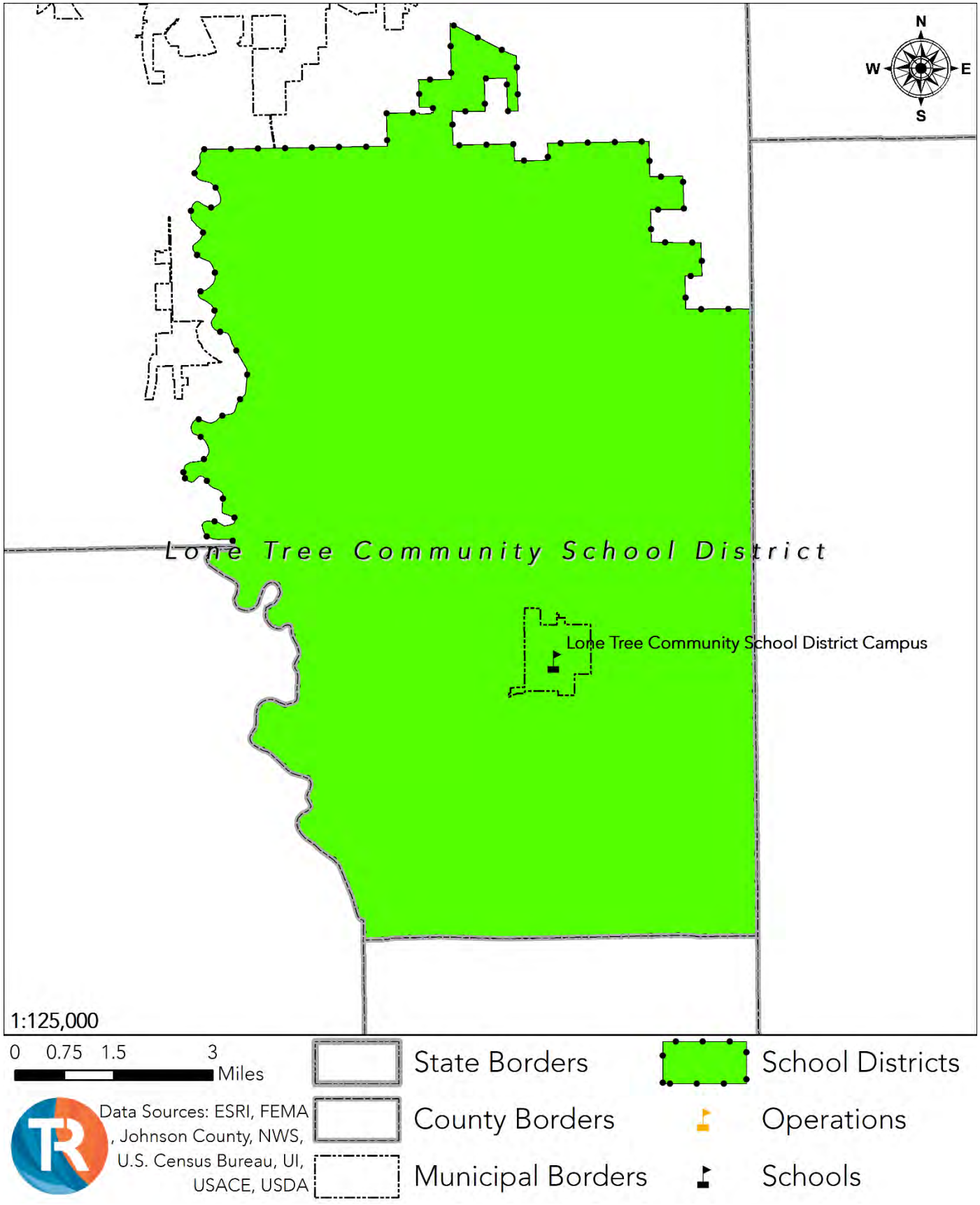
Map 2.27 – Clear Creek-Amana Community School District



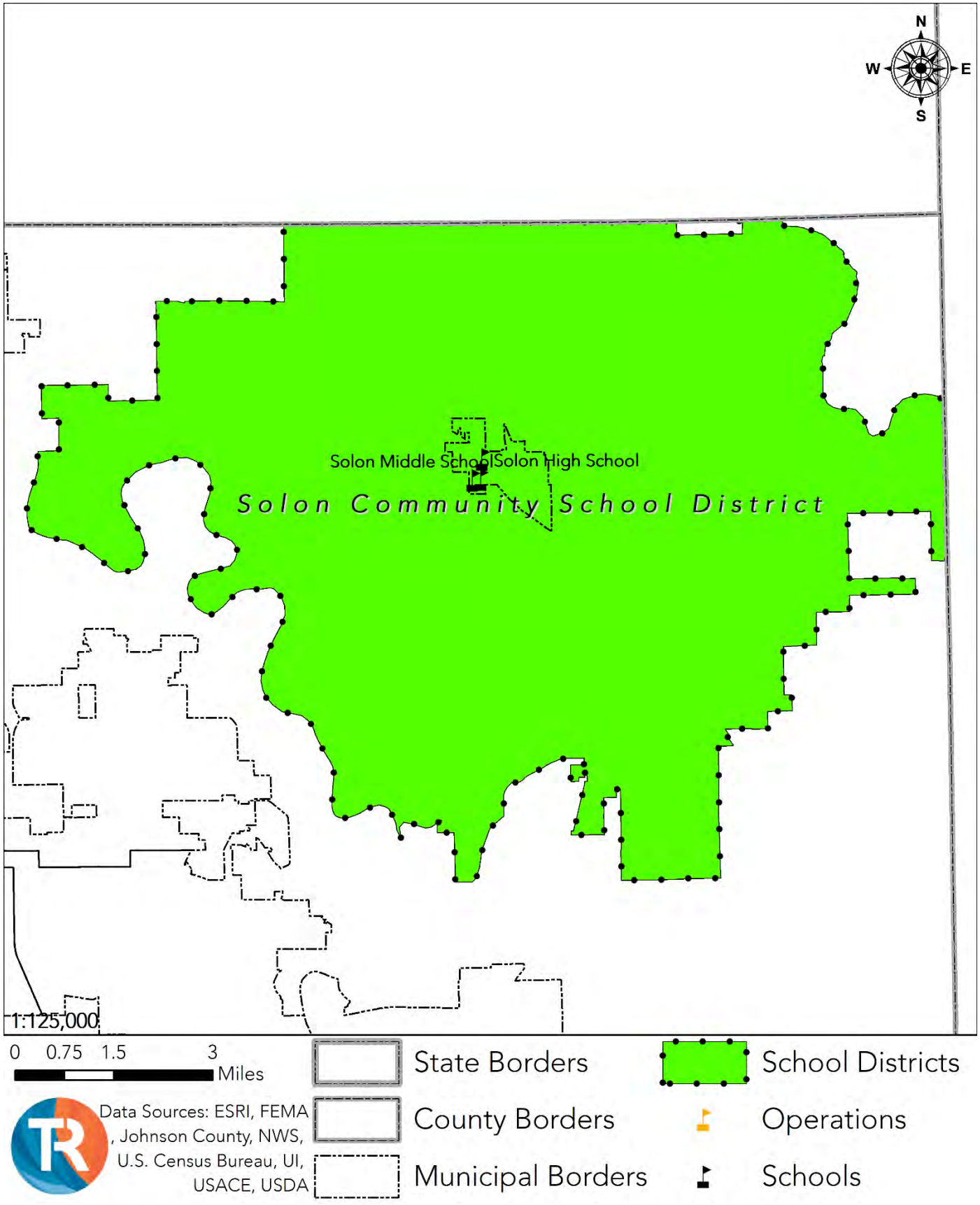
Map 2.28 – Iowa City Community School District



Map 2.29 – Lone Tree Community School District



Map 2.30 – Solon Community School District



Purpose

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

Intent

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

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

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

3.1 – Methodology

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

Area-Wide Hazards

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

Hazards with Identified Hazard Areas

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

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

3.2 – Hazard Selection

Appropriately identifying and selecting which natural hazards will be assessed is the first step in developing a risk assessment. The State of Iowa's Homeland Security and Emergency Management profiles twelve natural hazards and seven human-caused hazards in its statewide hazard mitigation plan. Of those hazards, this plan profiles six natural and one human-caused hazards.

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

Table 3.1 – Disaster Declarations

Designation	Declaration	Hazards	Start Date	End Date
DR-193	04/22/1965	Floods	N/A	N/A
DR-240	05/29/1968	Severe Storms, Tornadoes	N/A	N/A
DR-269	08/14/1969	Floods	N/A	N/A
DR-348	08/18/1972	Floods, Severe Storms	N/A	N/A
DR-386	05/23/1973	Floods Severe Storms	N/A	N/A
DR-443	06/24/1974	Floods, Severe Storms	N/A	N/A
DR-868	05/26/1990	Floods, Severe Storms	05/18/1990	07/06/1990
DR-879	09/06/1990	Floods, Severe Storms	07/25/1990	08/31/1990
DR-911	07/12/1991	Floods, Severe Storms	06/01/1991	06/15/1991
DR-996	07/09/1993	Floods, Severe Storms	04/13/1993	10/01/1993
DR-1121	06/24/1996	Floods	05/08/1996	05/28/1996
DR-1230	07/02/1998	Floods, Severe Storms, Tornadoes	06/13/1998	07/15/1998
DR-1420	06/19/2002	Floods, Severe Storms	06/03/2002	06/25/2002
DR-1688	02/23/2007	Winter Storms	02/23/2007	03/02/2007
DR-1737	01/04/2008	Winter Storms	10/12/2007	12/11/2007
DR-1763	05/27/2008	Floods, Severe Storms, Tornadoes	05/25/2008	08/13/2008
DR-4119	05/31/2013	Floods, Severe Storms, Winds	04/17/2013	04/30/2013
DR-4126	07/02/2013	Floods, Severe Storms, Tornadoes	05/19/2013	06/15/2013
DR-4187	08/5/2014	Floods, Severe Storms, Tornadoes, Winds	06/26/2014	07/08/2014

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

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

The table below lists all of the natural hazards included in the statewide plan, whether they are included in this plan, and if excluded, a summary justification of why it has been excluded. A lengthier justification for exclusion can be found later in this section, 3.10 – Excluded Hazards.

Table 3.2 – Hazard Inclusion

Hazard	Determination	Summary Justification
Dam & Levee Failure	Included	Hazard Area Identified
Drought	Included	Disaster History
Earthquakes	Excluded	No reasonable risk
Expansive Soils	Excluded	No reasonable risk
Landslide	Excluded	No reasonable risk
River & Flash Flood	Included	Disaster History
Severe Winter Storms	Included	Disaster History
Sinkholes	Excluded	No reasonable risk
Thunderstorms	Included	Disaster History
Tornado & Windstorm	Included	Disaster History
Wildland or Grass Fire	Included	Risk Identified
Winter Storms	Included	Disaster History

3.3 – Dam & Levee Failures

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

Dams fail in two ways, a controlled spillway release done to prevent full failure, or the partial or complete collapse the dam itself. In each instance an overwhelming amount of water, and potentially debris, is released. Dam failures are rare, but when they occur can cause loss of life, and immense damage to infrastructure and the environment.

Common reasons for dam failure are the following:

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

Dams are located throughout Johnson County and surrounding counties. See the maps on the following pages for their location. In Johnson County, the potential hazard area for dam and levee failure is generally the areas surrounding and downstream of the dam or levee structure. The planning area contains five USACE rated high-hazard dams as well as two levees.

Location & Extent

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

The location of the planning area's high-hazard dams and levees are depicted in the maps at the end of this sub section. They are located in Coralville, Iowa City, and unincorporated Johnson County and can affect the Iowa City CSD and Clear Creek Amana CSD. In the event one of these dams or levees fails, water will likely inundate downstream towards lower elevation areas.

Most of the dams in Johnson County are low risk so failure would likely only result in flooding of the surrounding 100-year floodplain. However, failure of the Coralville Reservoir Dam would result in disastrous flooding. Preliminary estimates from the United States Army Corp of Engineers show that if the Coralville Dam were to fail, the flooding would reach the sixth floor of the Mayflower residence hall located on Dubuque Street in Iowa City. A very rough estimate of this elevation is around 700 feet above sea level, which would result in flooding in Coralville, Iowa, and the majority of University of Iowa facilities.

There is usually little to no warning in the event of a dam or levee break. If a larger dam or a dam that is far upstream, like the Coralville Reservoir Dam were fail, there would be approximately two hours before impact. Other smaller dams that lie closer to populated areas have less time. If either of the planning area's levees were to fail, residents would have as little as minutes to avoid being affected.

History & Probability

There have been no failures of high hazard dams or levees in Johnson County.

Given the absence of any historical precedence of dam failure in Johnson County, a history having reoccurring structural flaws, or any indication that the dams and levees are being poorly maintained, the probability of experiencing a dam or levee failure event is categorized as 'rare.'

Vulnerability of and Impact on Facilities

Facilities within a dam failure inundation area are at extreme risk. The water level of a dam failure can range from inches, causing damage similar to small floods, to completely engulfing a structure in water. Additionally, the speed of the flow can cause variations in the impact. A slow flow will cause damage similar to a riverine flood, however, a fast moving, high level flow has the potential to completely destroy a structure. See the table below for a breakdown of the planning area's structural vulnerability and impact from each high-hazard dam and levee.

Table 3.3 – Vulnerability & Impact of Structures, Dam & Levee Failures

Dam or Levee	Count	UI Structures	CSD Campuses	Value
Coralville Reservoir Dam	300	167	8	$277,930,481
Davis Dam	24	0	0	$7,797,000
M.A. Ewalt Detention/Retention Basin	0	0	0	$0
North Branch Ralston Creek Dam	62	0	0	$19,942,000
Scott Boulevard Dam	5	0	0	$1,197,700
Coralville Levee	578	0	0	$ 371,242,000
West Side Levee	181	0	0	$37,605,000
Total =	1,150	92	8	$715,713,481

Vulnerability of and Impact on Critical Facilities

Only a failure of the Coralville Reservoir Dam threatens the planning area's critical facilities. The table below lists out the 45 critical facilities that would be affected by a failure of the Coralville Reservoir Dam.

Table 3.4 – Vulnerability & Impact of Critical Facilities, Coralville Reservoir Dam

Name	Type	Owner	Location
Atrium Village	Assisted Living	Private	Hills
Citizen Building Apartments	Assisted Living	Private	Iowa City
Coralville City Hall	Local	Coralville	Coralville
Coralville Fire Station #1	Fire/EMS	Coralville	Coralville
Coralville Police Station	Law Enforcement	Coralville	Coralville
Coralville Public Works	Public Works	Coralville	Coralville
Coralville Senior Residences	Assisted Living	Private	Coralville

Eastern Iowa Light & Power Naples Ave. Substation	Utility	Private	Johnson Co.
Eastern Iowa Light & Power Sand Road Substation	Utility	Private	Johnson Co.
Ecumenical Towers	Assisted Living	Private	Iowa City
Healthcare Logistics Management Center	IT	UI	Iowa City
Hills City Hall	Local	Hills	Hills
Hills Community Center	Local	Hills	Hills
Hills Fire Station	Fire/EMS Response	Hills	Hills
Hills Public Works	Public Works	Hills	Hills
Hills Sewage Lagoons	Water Treatment	Hills	Hills
Hills Water Tower	Water Treatment	Hills	Hills
Iowa City City Hall	Local	Iowa City	Iowa City
Iowa City Fire Station #1	Fire/EMS	Iowa City	Iowa City
Iowa City Municipal Airport	Airport	Private	Iowa City
Iowa City Police Station	Law Enforcement	Iowa City	Iowa City
Iowa City Public Works	Public Works	Iowa City	Iowa City
Iowa City Transit	Public Works	Iowa City	Iowa City
Iowa City Underground Reservoir #4	Water Treatment	Iowa City	Iowa City
Iowa River Landing	Medical/Laboratory	UI	Coralville
ITS Switching Facility	IT	UI	Iowa City
Johnson County Administration	Local	Johnson Co.	Iowa City
Johnson County AME	Local	Johnson Co.	Iowa City
Johnson County HHS	Local	Johnson Co.	Iowa City
Johnson County Sheriff	Law Enforcement	Johnson Co.	Iowa City
Linn County Rec Tiffin Substation (2nd St.)	Utility	Private	Coralville
Mercy Hospital	Hospital	Private	Iowa City
Midamerican Energy Coral Ridge Substation	Utility	Private	Coralville
Midamerican Energy Hills Substation	Utility	Private	Johnson Co.
Midamerican Energy Substation B	Utility	Private	Iowa City
Midamerican Energy Substation L	Utility	Private	Iowa City
Midamerican Energy Substation P	Utility	Private	Coralville
Tiffin City Hall	Local	Tiffin	Tiffin
Tiffin Public Works	Public Works	Tiffin	Tiffin
Tiffin Water Treatment Plant	Water Treatment	Tiffin	Tiffin
Eastern Iowa Light & Power Naples Ave. Substation	Utility	Private	Johnson Co.
Eastern Iowa Light & Power Sand Road Substation	Utility	Private	Johnson Co.
Ecumenical Towers	Assisted Living	Private	Iowa City
Hills City Hall	Local	Hills	Hills
Hills Community Center	Local	Hills	Hills
Hills Fire Station	Fire/EMS	Hills	Hills
Hills Public Works	Public Works	Hills	Hills
Hills Sewage Lagoons	Water Treatment	Hills	Hills
Hills Water Tower	Water Treatment	Hills	Hills
Iowa City City Hall	Local	Iowa City	Iowa City
Iowa City Fire Station #1	Fire/EMS	Iowa City	Iowa City
Iowa City Municipal Airport	Airport	Private	Iowa City
Iowa City Police Station	Law Enforcement	Iowa City	Iowa City
Iowa City Public Works	Public Works	Iowa City	Iowa City
Iowa City Transit	Public Works	Iowa City	Iowa City
Iowa City Underground Reservoir #4	Water Treatment	Iowa City	Iowa City
Johnson County Administration	Local	Johnson Co.	Iowa City
Johnson County AME	Local	Johnson Co.	Iowa City
Johnson County HHS	Local	Johnson Co.	Iowa City
Johnson County Sheriff	Law Enforcement	Johnson Co.	Iowa City

Linn County Rec Tiffin Substation (2nd St.)	Utility	Private	Coralville
Mercy Hospital	Hospital	Private	Iowa City
Midamerican Energy Coral Ridge Substation	Utility	Private	Coralville
Midamerican Energy Hills Substation	Utility	Private	Johnson Co.
Midamerican Energy Substation B	Utility	Private	Iowa City
Midamerican Energy Substation L	Utility	Private	Iowa City
Midamerican Energy Substation P	Utility	Private	Coralville
Newton Road Ramp	Water Treatment	UI	Coralville
North Campus Chilled Water Facility	Water Treatment	UI	Iowa City
Substation L Control Building	Utility	UI	Iowa City
Tiffin City Hall	Local	Tiffin	Tiffin
Tiffin Public Works	Public Works	Tiffin	Tiffin
Tiffin Water Treatment Plant	Water Treatment	Tiffin	Tiffin
UI Power Plant	Utility	UI	Iowa City
UI Water Plant	Water Treatment	UI	Iowa City

Vulnerability of and Impact on Population

Populations within a dam failure inundation area are at extreme risk. Depending on the speed of the water's arrival, a community's population may not have time to evacuate. Additionally, evacuation routes can be blocked by the dam waters. If flood waters arrive quickly, many people can die. Depending on the elevation of the water, a community's population may not have any available shelter to avoid the waters. See the table below for a breakdown of the planning area's population vulnerability and impact from each high-hazard dam and levee.

Table 3.5 – Vulnerability & Impact of Populations, Dam & Levee Failures

Dam or Levee	Population	Housing Units	Students
Coralville Reservoir Dam	26,946	12,646	3,434
Davis Dam	102	41	0
M.A. Ewalt Detention/Retention Basin	0	0	0
North Branch Ralston Creek Dam	145	65	0
Scott Boulevard Dam	20	9	0
Coralville Levee	2,355	1,404	0
West Side Levee	355	197	0
Total =	29,923	14,362	3,434

Vulnerability of and Impact on Systems

A failure from any of the dams or levees will have a minimal impact on the planning area's tourism, educational, economic, or transportation systems with exception of the Coralville Reservoir Dam. A failure of the Coralville Reservoir Dam would have a catastrophic impact on the planning area's systems.

If the Coralville Reservoir Dam fails, it is likely that major transportation routes through the county would be significantly damaged and unusable until they are repaired. Theoretically, all three major transportation routes through the county, I-80, US-6, and US-218, would be unusable for months until their bridges over the Iowa River were rebuilt. The economic impact of losing the use of these roadways would have a financially region-wide impact.

The University of Iowa is a critical cultural, educational, and economic keystone to the planning area. A failure of the Coralville Reservoir Dam threatens to impact 167 UI facilities. This level of impact would have incalculable effects on the University of Iowa. The services gap what would be created by this scenario is considered irreplaceable.

Key Considerations

Population growth trends have not led to an increase in the planning area's risk to dam or levee failures since municipal governments have curtailed growth along the Iowa River and its tributaries. Additionally, both the Coralville and West Side Levees were constructed since the development of Johnson County's last hazard mitigation plan. Both levees act to decrease the risk of Coralville and Iowa City respectively, however, this reduction in risk is not reflected in the USACE dam failure study depicted in the end of this subsection as it was conducted in 2012.

In terms of risk variance, Coralville, Iowa City, Lone Tree, Tiffin, the University of Iowa, segments of unincorporated Johnson County (downstream from the Coralville Reservoir Dam), the Clear Creek Amana CSD, Iowa City CSD, and the Lone Tree CSD are threatened by a dam or levee failure.

The majority of the University of Iowa's structures would be significantly damaged and a number would be destroyed by a catastrophic failure of the Coralville Reservoir Dam. An estimated 167 structures are within the identified inundation area. The Iowa City CSD campuses that are threatened by a failure are Coralville Central Elementary, Hills Elementary, Lincoln Elementary, Horace Mann Elementary, and Northwest Junior High. The Clear Creek Amana CSD campuses that are threatened are the Clear Creek Amana High School, Clear Creek Amana Middle School, and Tiffin Elementary. Luckily, none of the high hazard dams identified have a history or failure or are in states of disrepair.

Table 3.6 – Vulnerability & Impact, Coralville Reservoir Dam

Asset	Count	Value
Population	26,946	-
Housing Units	12,646	-
UI Structures	167	-
CSD Students	3,434	-
CSD Campuses	8	$177,120,481
Agriculture	46	$16,512,000
Commercial	879	$932,935,000
Government	20	$21,501,000
Industrial	150	$82,277,000
Residential	6,178	$1,331,411,000
Multi-Unit Residential*	520	$968,754,000
Total =	7,893	$3,530,510,481

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Table 3.7 – Vulnerability & Impact, Davis Dam

Asset	Count	Value
Population	102	-
Housing Units	41	-
UI Structures	0	-
CSD Students	0	-
CSD Campuses	0	$0
Agriculture	0	$33,000
Commercial	1	$494,000
Government	0	$0
Industrial	0	$0
Residential	22	$5,325,000
Multi-Unit Residential*	1	$1,945,000
Total =	24	$ 7,797,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Table 3.8 – Vulnerability & Impact, North Branch Ralston Creek Dam

Asset	Count	Value
Population	145	-
Housing Units	65	-
UI Structures	0	-
CSD Students	0	-
CSD Campuses	0	$0
Agriculture	0	$0
Commercial	5	$ 3,010,000
Government	0	$0
Industrial	0	$0
Residential	57	$16,932,000
Multi-Unit Residential*	0	$0
Total =	62	$19,942,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Table 3.9 – Vulnerability & Impact, Scott Boulevard Dam

Asset	Count	Value
Population	20	-
Housing Units	9	-
UI Structures	0	-
CSD Students	0	-
CSD Campuses	0	$0
Agriculture	0	$0
Commercial	0	$0
Government	0	$0
Industrial	0	$0
Residential	5	$1,197,700
Multi-Unit Residential*	0	$0
Total =	5	$1,197,700

*Multi-Unit Residential is defined as a structure with 5 or more residential units
**The data are from the U.S. Census Bureau and FEMA

Table 3.10 – Vulnerability & Impact, Coralville Levee

Asset	Count	Value
Population	2,355	-
Housing Units	1,404	-
UI Structures	0	-
CSD Students	0	-
CSD Campuses	0	$0
Agriculture	5	$1,964,000
Commercial	99	$101,193,000
Government	0	$0
Industrial	14	$13,338,000
Residential	372	$69,584,000
Multi-Unit Residential*	88	$185,163,000
Total =	578	$371,242,000

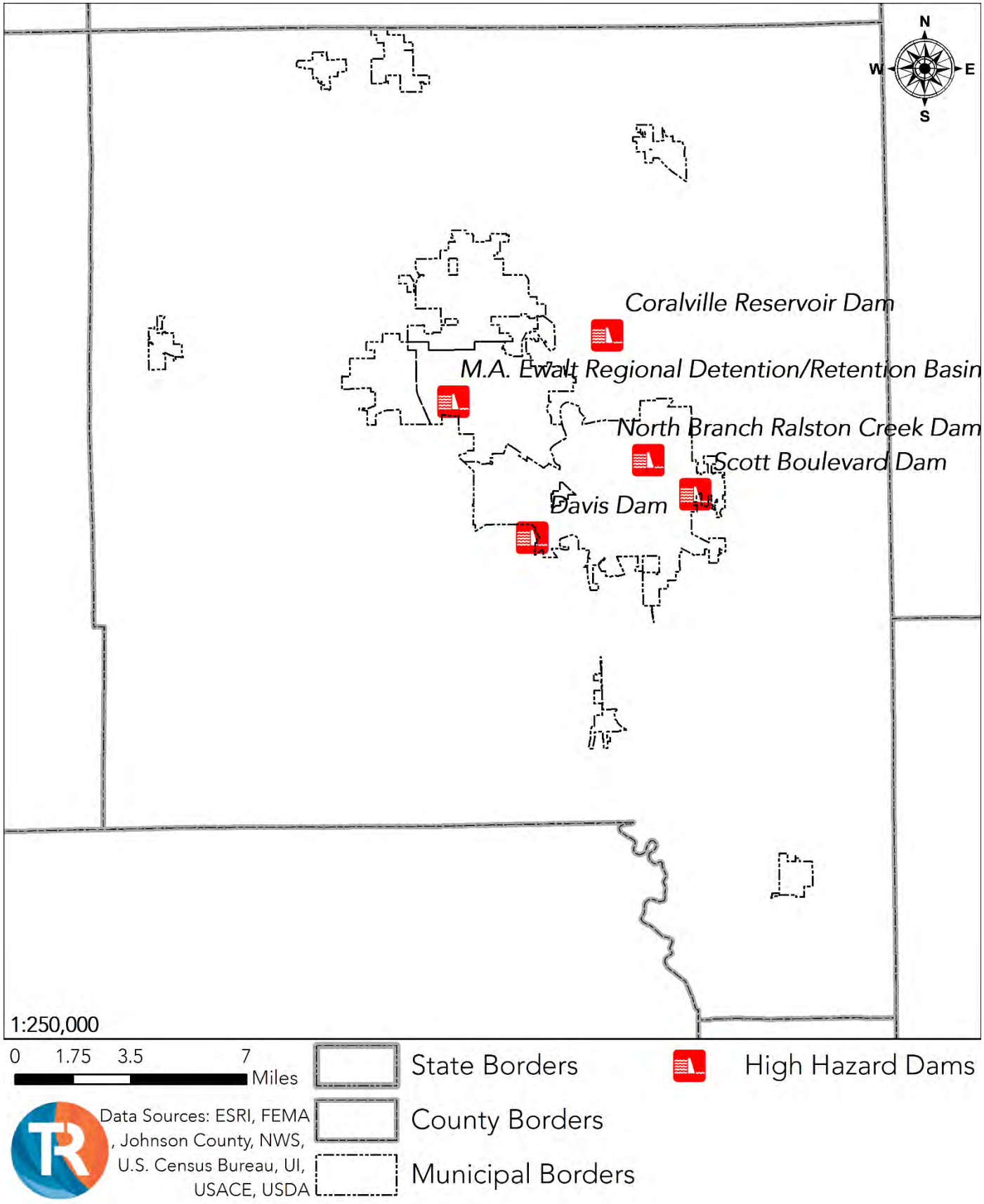
*Multi-Unit Residential is defined as a structure with 5 or more residential units
**The data are from the U.S. Census Bureau and FEMA

Table 3.11 – Vulnerability & Impact, West Side Levee

Asset	Count	Value
Population	355	-
Housing Units	197	-
UI Structures	0	-
CSD Students	0	-
CSD Campuses	0	$0
Agriculture	1	$327,000
Commercial	7	$15,535,000
Government	0	$0
Industrial	2	$3,788,000
Residential	170	$16,010,000
Multi-Unit Residential*	1	$1,945,000
Total =	181	$37,605,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units
**The data are from the U.S. Census Bureau and FEMA

Map 3.1 – High Hazard Dams, Johnson County



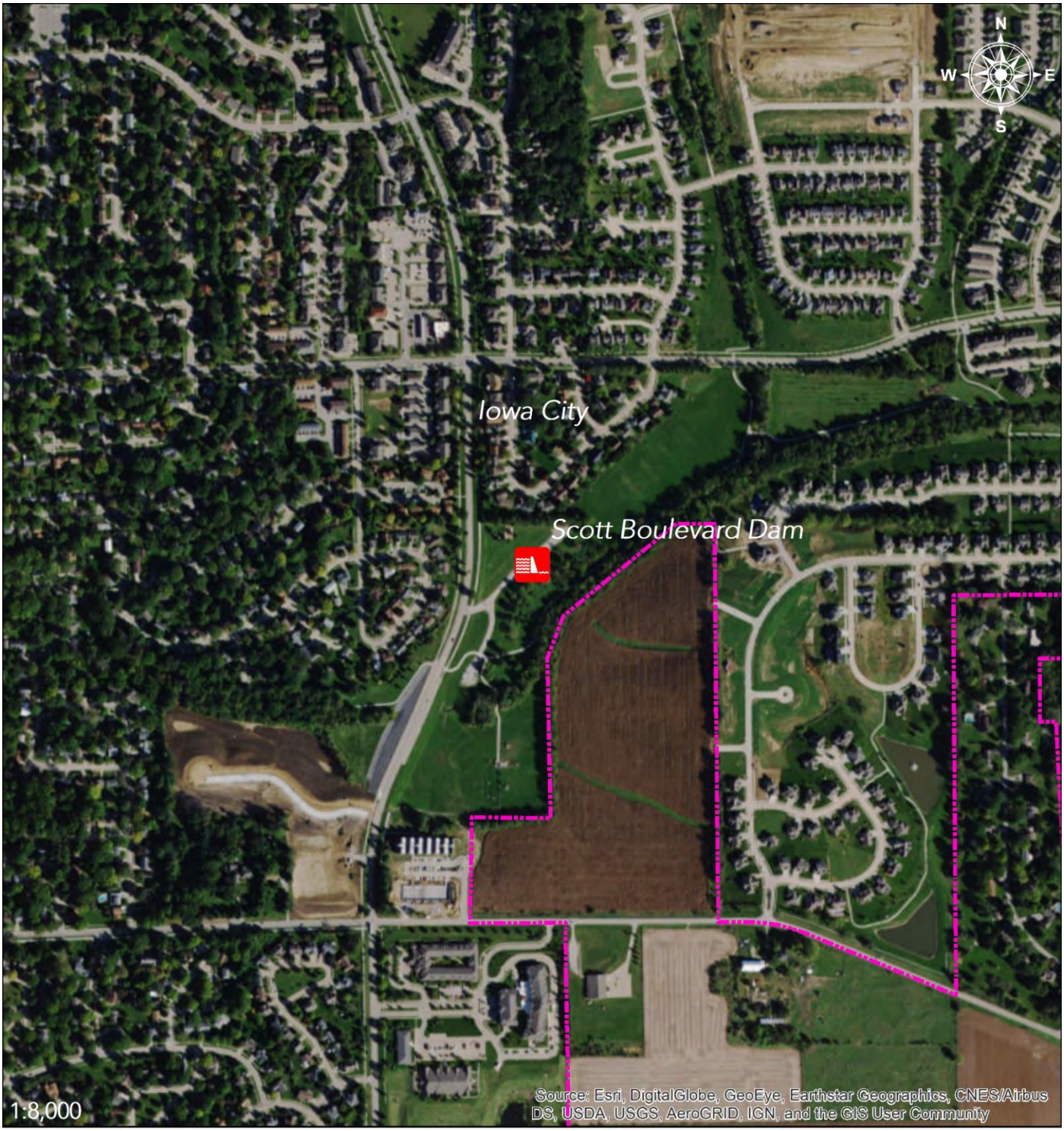
Map 3.2 – Coralville Reservoir Dam

Map 3.3 – Davis Dam

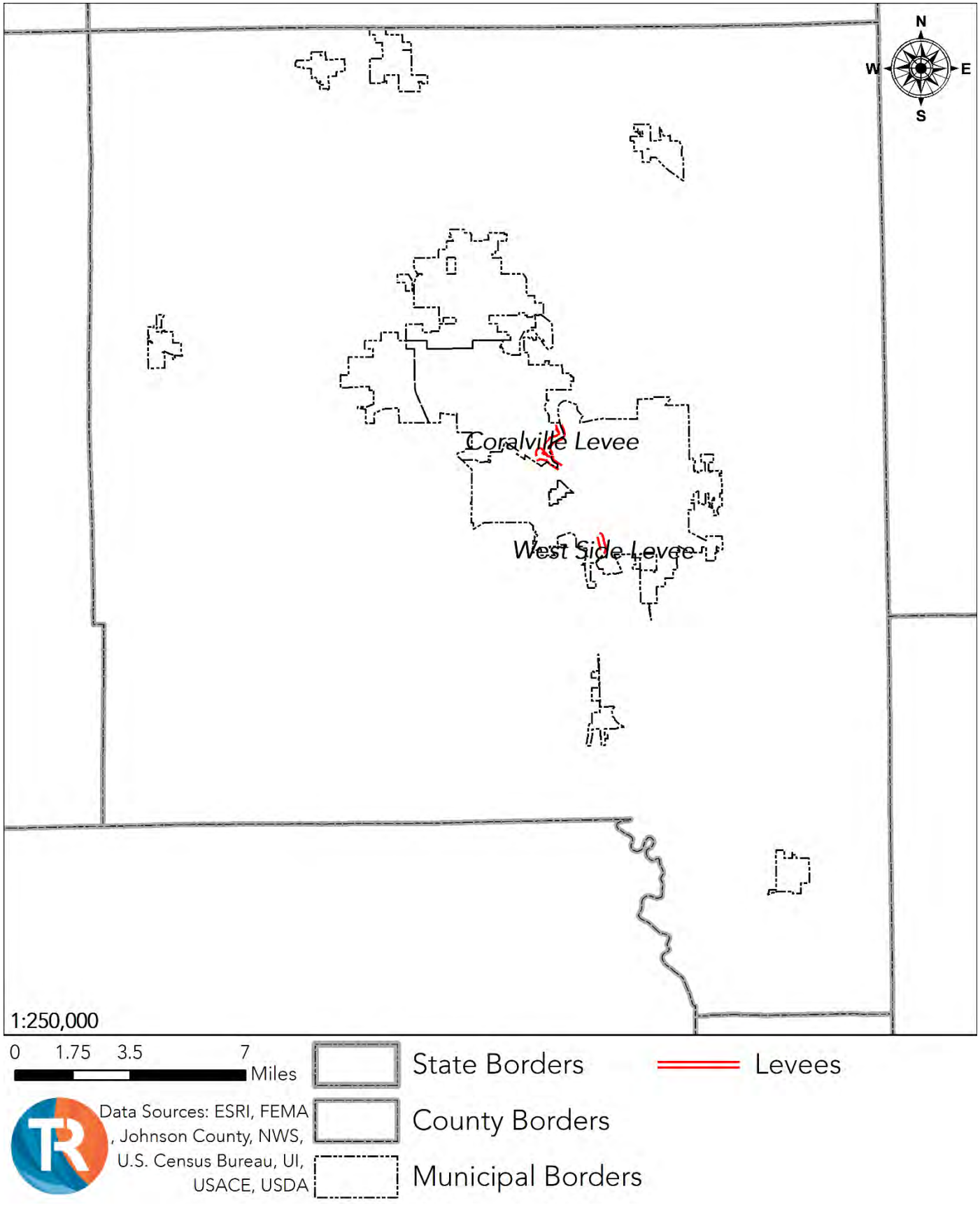
Map 3.4 – M.A. Ewalt Regional Detention/Retention Basin

Map 3.5 – North Branch Ralston Creek Dam

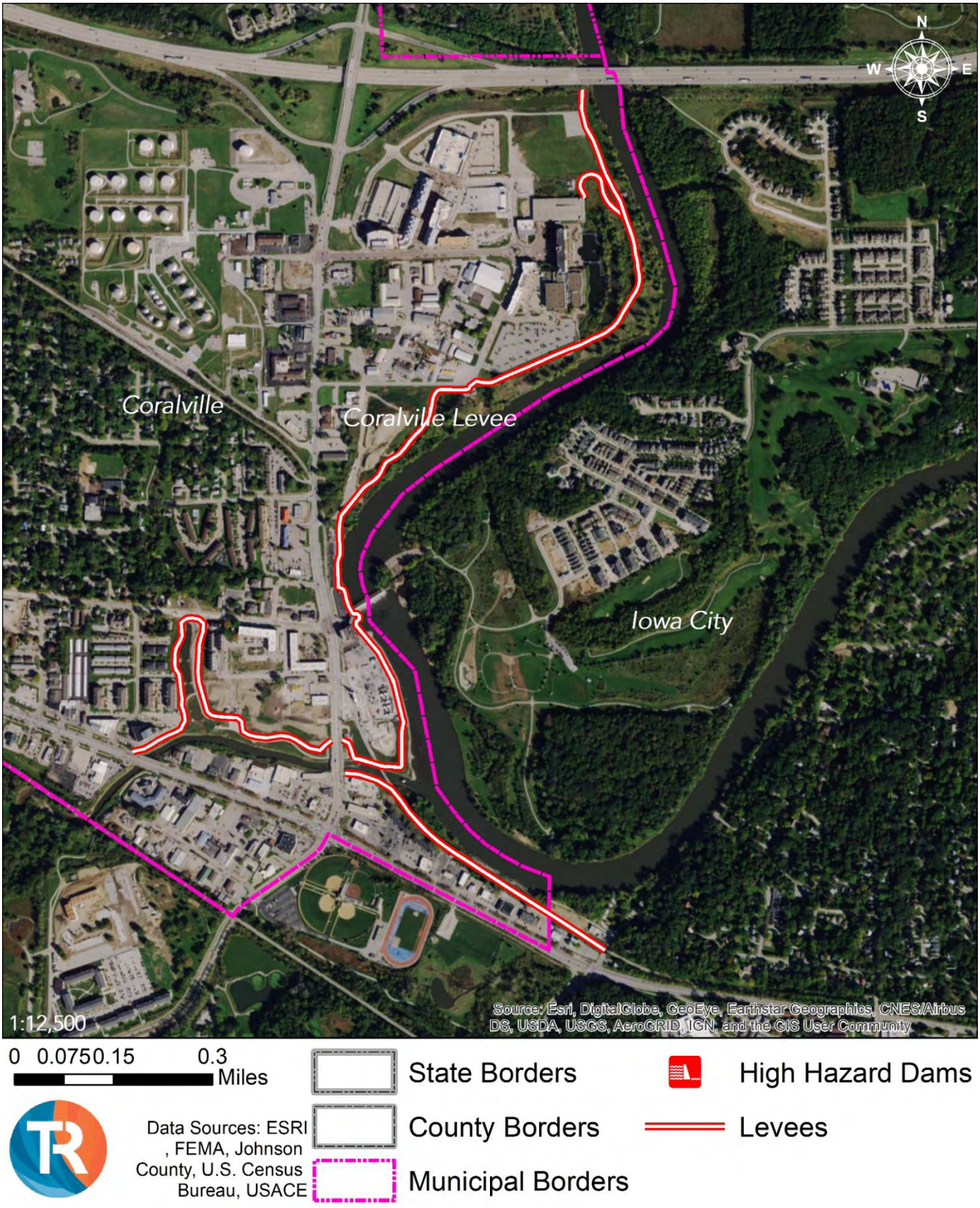
Map 3.6 – Scott Boulevard Dam



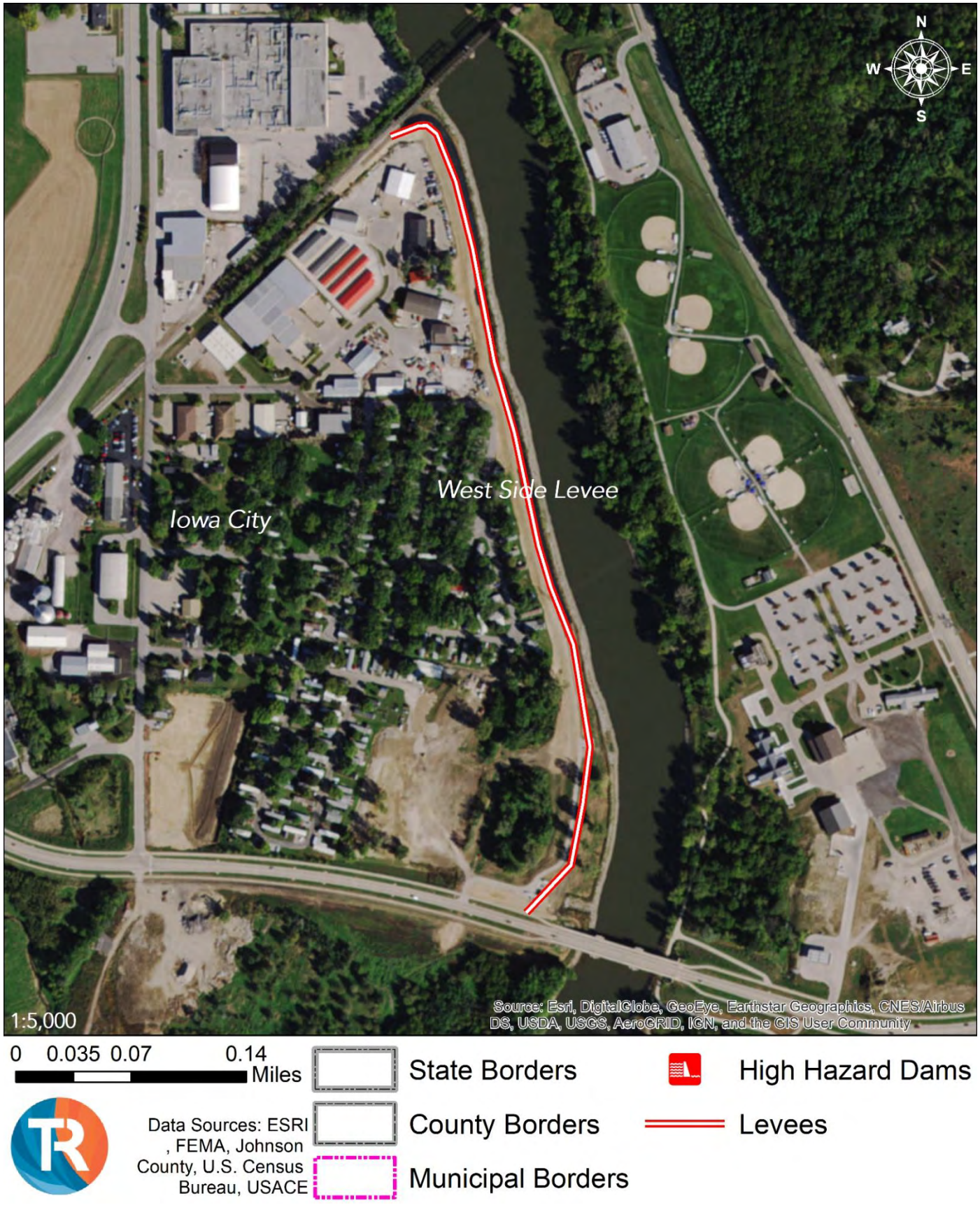
Map 3.7 – Levees, Johnson County



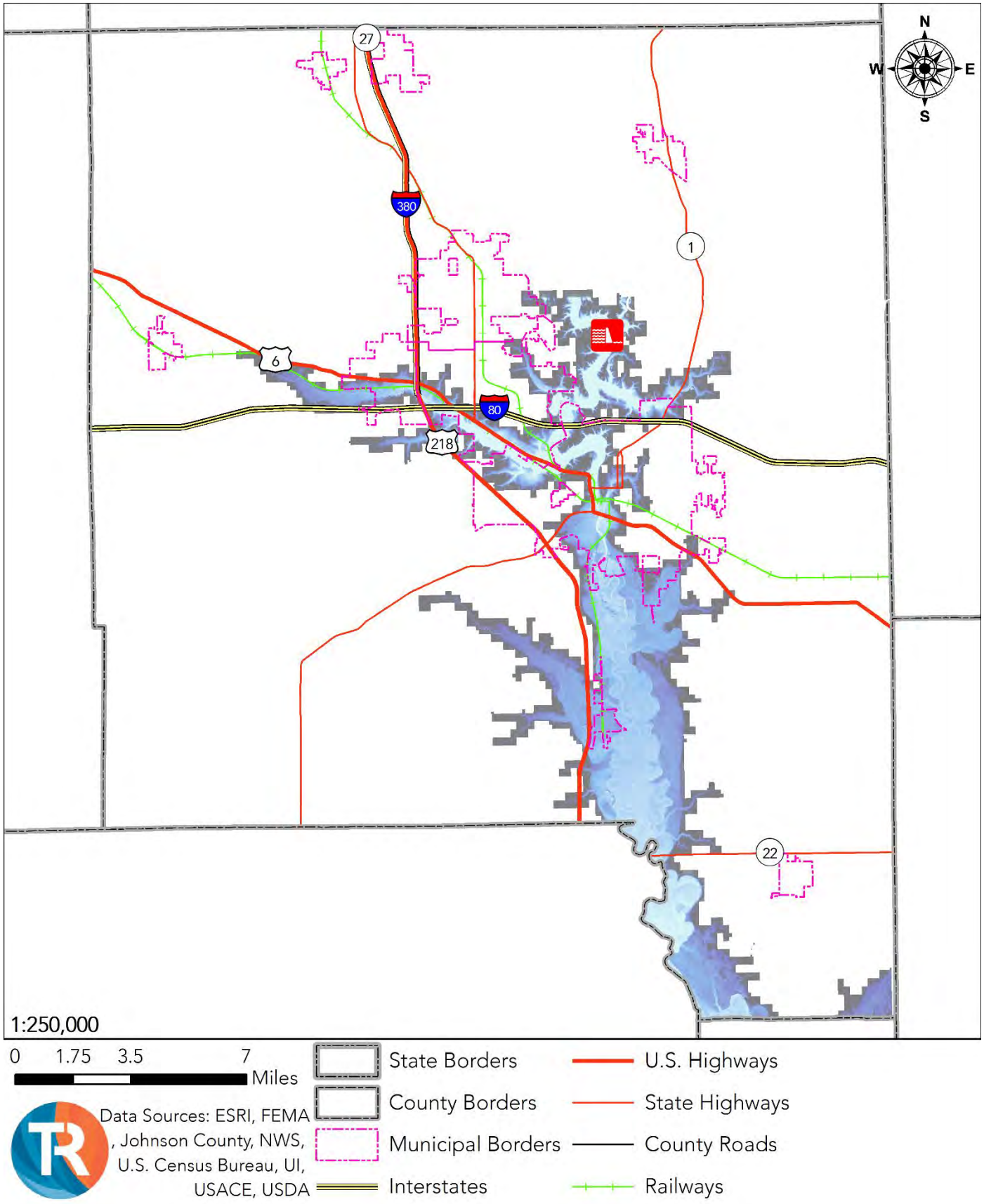
Map 3.8 – Coralville Levee



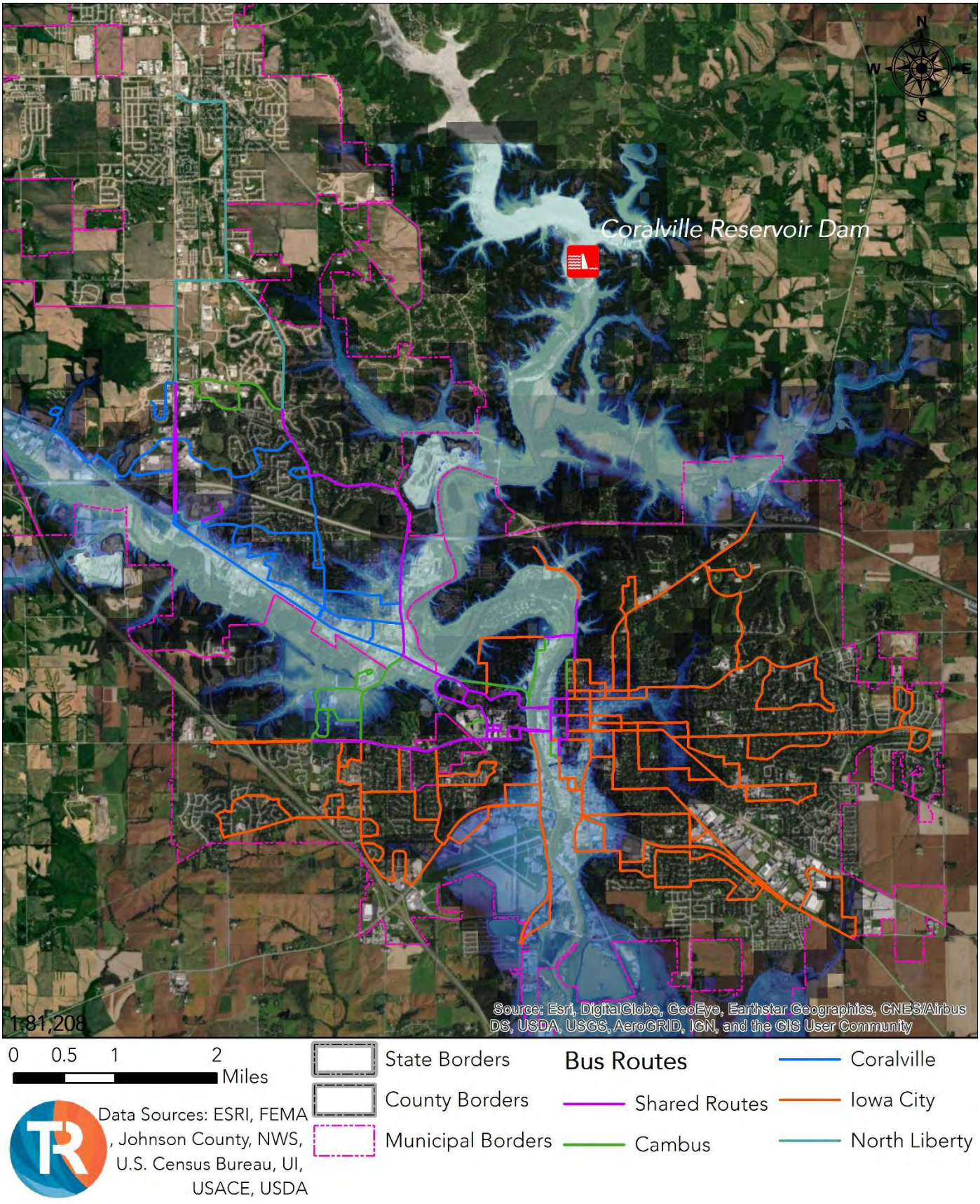
Map 3.9 – West Side Levee



Map 3.10 – Coralville Reservoir Dam Failure, Transportation



Map 3.11 – Coralville Reservoir Dam Failure, Bus Transportation



3.4 – Droughts

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

Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops.
Hydrological: When surface and subsurface water levels are significantly below their normal levels.
Meteorological: When there is a significant departure from the normal levels of precipitation.
Socio-Economic: When the water deficiency begins to significantly affect the population.

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

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

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

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

Location & Extent

Drought is part of normal climate fluctuations in the United States. According to Johnson County's drought history, most drought events affect the state for at least two to three months at a time, but

there have been a few years where a drought has only last one month. It should be noted, though, that climatic variability can cause dry conditions for up to years at a time. Droughts occur over large geographic areas. It is extremely likely that if any part of the planning area is experiencing a drought that the whole planning area will also be experiencing drought conditions.

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

Table 3.12 – Drought Monitor Scale

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

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

History & Probability

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

Since 1997, NOAA has recorded 15 droughts in the planning area. Although NOAA's data for crop loss is incomplete, it has recorded $30,730,000 in crop losses from three of these droughts. For a complete

list of NOAA recorded drought events, please reference Appendix E.

Given the historic precedent set by past droughts, it is highly likely that the planning area will experience season-long droughts in the future. As a rough estimate, the planning area should expect to see a two to three-month long drought every three to four years.

Vulnerability of and Impact on Facilities

Droughts do not have an impact on structures.

Vulnerability of and Impact on Critical Facilities

Droughts do not have an impact on structures.

Vulnerability of and Impact on Population

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

Vulnerability of and Impact on Systems

Drought's primary impact is on agriculture and livestock and thus can have significant effects on a jurisdiction's agricultural and tourist economies. If the precipitation level is below normal, farmers and ranchers will struggle to grow their crops and feed their livestock. If rivers, streams, and lakes dry up, tourists will be less likely to enjoy a jurisdiction's amenity resources.

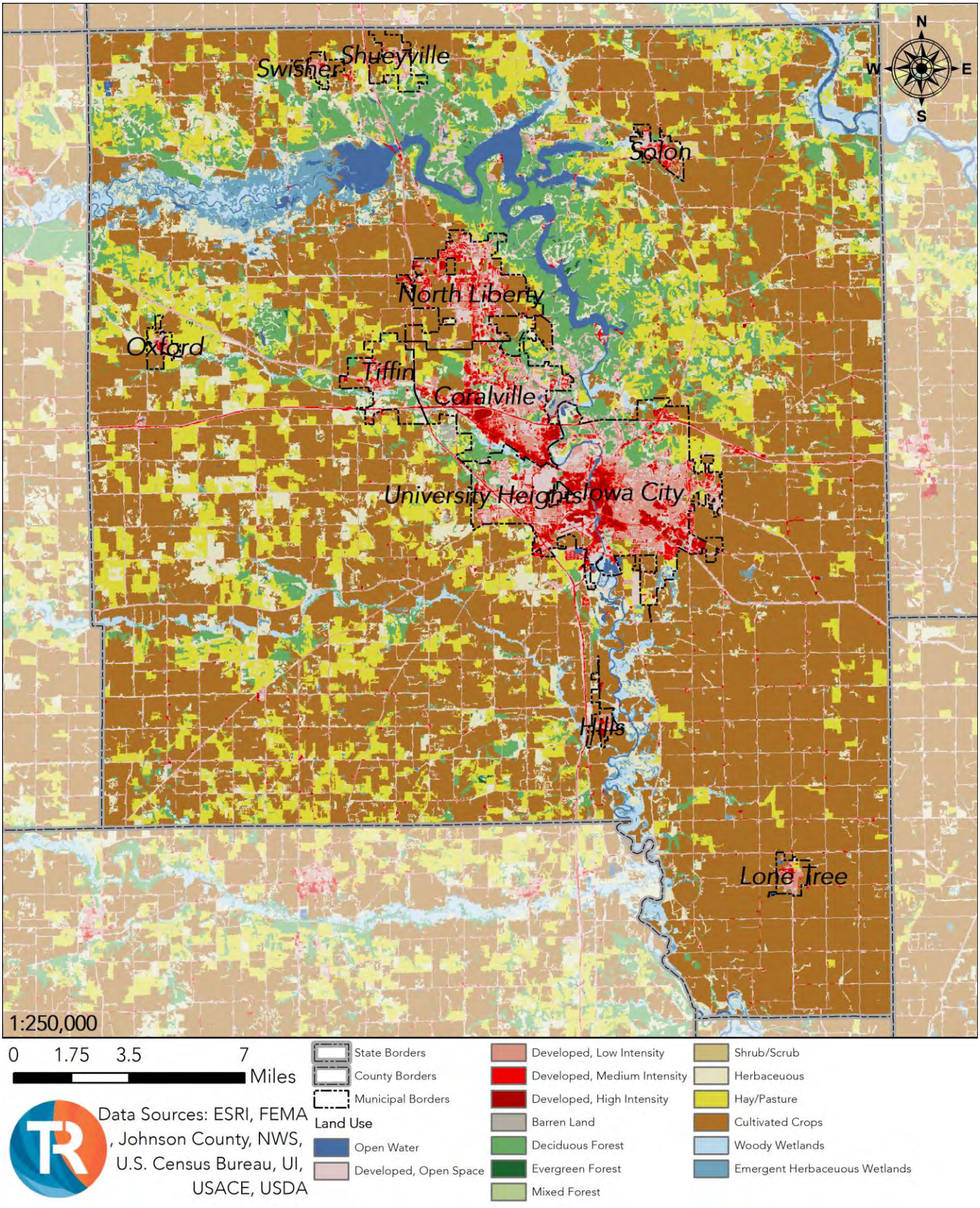
The planning area hosts 1,342 farms across 328,672 acres of land. The USDA estimates that the total value of products from these farms is $258,259,000 per year. All of them are considered vulnerable to droughts. An estimate of the land engaged in agricultural activities can be found in the map at the end of this section.

Key Considerations

The entire planning area is at risk to droughts. Even though the direct impact of a drought will likely affect the county at large instead of the incorporated cities, a drought's effects would quickly spread to the interdependent economies of the cities throughout Johnson County. Additionally, although population growth would place various communities at a higher vulnerability to droughts, the usage of water by the population pales in comparison to the amount used by agricultural activities and is largely negated. Considering the most direct, agricultural risk, the communities most at risk are those that have greater portions of agricultural land. Those communities are unincorporated Johnson County along with the municipalities of Hills, Lone Tree, North Liberty, Oxford, Shueyville, Solon, Swisher, and Tiffin.

The University of Iowa requires significant amounts of water to maintain some of its critical operations. Whereas a municipality's population can ration water for a while to lessen the effects of a drought, UI's hospital and a number of its research facilities are extremely limited in how much water can be rationed. The loss of water for both of these systems has the potential to cost millions of dollars in research shortfall and hospital operations.

Map 3.12 – Land Use, Johnson County



3.5 – Floods

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

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

Location & Extent

Various types of floods can happen quickly, under an hour, in the form of a flash flood, or accumulate seasonally over a period of weeks as is the case in a riverine flood. Flooding can occur anytime throughout the year, but is typically associated with the spring season.

A variety of factors affect the severity of flash and riverine flooding within the planning area. These include topography, weather characteristics, development, and geology. Intense flooding will create havoc in any jurisdictions affected. The predicative magnitude of flash and riverine floods varies greatly.

Flash flooding is unpredictable and can occur anywhere throughout the planning area. Johnson County and its participating jurisdictions are generally equally likely to experience flash flooding in low-lying areas, poor drainage, or suburban sprawl. Historical documentation warns that the areas around; Muddy Creek, Clear Creek, and Biscuit Creek running through Coralville; and Ralston Creek and Willow Creek running through Iowa City are areas of reoccurring flash flooding while most historical incidents recorded by NOAA mention sporadic low-lying areas throughout the planning area.

NOAA flash flood records indicate that Johnson County and its participating jurisdictions have seen up to 8 inches of accumulation in rural and some urban areas, however the general average is between 1 to 3 inches during notable flash floods. These records rarely mention accumulation in residential or commercial structures, but often block roadways, trap motorists, and damage vehicles.

Riverine flooding throughout the planning area varies. Special Flood Hazard Areas (SFHA) were identified via effective NFHL maps produced by FEMA and located at the end of this hazard profile. According to the currently identified SFHAs, the county, every municipality with the exception of Lone Tree and University Heights have assets located within floodplains. Currently, none of the CSDs have structures within identified floodplains, however, there is evidence to suggest that all three campuses of the Clear Creek-Amana CSD as well as Hills Elementary of the Iowa City CSD are

now located in 100-year floodplains. This specific aspect will be further discussed under the "Key Considerations" subsection of this hazard profile.

A typical riverine flood in the planning exceeds the river crest by roughly one to one and a half feet above river crest, considered a minor flood by the NWS' established flood states for the Iowa River. However, three catastrophic riverine floods have impacted the planning area in the last 30 years which were measured at exceeding the established flood stage by 9.53 feet, considered a major flood by the NWS' established flood states. These values have recently been changed by the NWS to reflect the increase in the planning area's resiliency due to a number of completed mitigation projects. The NWS' new and old flood stages for the Iowa River are listed in the table below. The new flood stage depths took effect on February 19th, 2019. It is logical to conclude that any of the identified floodplains can again see a riverine flood again in the future, but will see less minor riverine flooding.

Table 3.13 – Iowa River Flood Stages (Current)

Stage	Old Depth (Ft.)	New Depth (Ft.)	Definition
Action	21	21	Preparation
Minor	22	23.5	Minimal or no property damage, but possibly some public threat (inundation of roads)
Moderate	23	24.5	Some inundation of structures and roads near streams. Some evacuations of people or transfer of property to higher elevations
Major	25	26	Extensive inundation of structures and roads. Significant evacuations of people and transfer or property to higher elevations

History & Probability

There have been three times since 1958 in which water has overtopped the spillway of the Coralville Reservoir Dam. Twice this occurred in single event in 1993, and again in 2008. In both cases, catastrophic riverine flooding occurred. In 2008, heavy rain fell in late May and into June causing massive flooding that extended throughout the entire Midwest region. It's estimated that in the State of Iowa alone, these floods caused 10 billion dollars in damages.

In Iowa City, the record river crest was set on June 15, 2008 at 31.53 feet (9.53 feet above the flood stage) and 23.15 feet (8.15 feet above the flood stage) in Lone Tree. The impact on the University of Iowa alone was estimated at $230,000,000. Road closures throughout eastern Iowa were immense including both interstate highways that run through the planning area. Downstream, the City of Hills was completely surrounded by sandbags and other flood protective measures. Fortunately, no one was injured or killed as a result of this event.

Since 1996, NOAA has recorded 38 flash floods in the planning area. Most flash floods have shown to accumulate under 3 inches, but can accumulate up to 8 inches. These flash floods have not caused any personal injury or deaths in the planning area, but have caused $3,250,700 in property damage.

Since 1996, NOAA has recorded 24 riverine floods in the planning area. Most riverine floods have shown to accumulate under 3 inches, but can accumulate up to 8 inches. These riverine floods have not caused any personal injury or deaths in the planning area, but have caused $231,200,000 in property damage. For a complete list of NOAA recorded flash and riverine floods, please reference Appendix E.

Based on the data recorded by NOAA, the planning area should expect a notable flash flood at a rate of 1.65 per year. All FEMA identified SFHAs are classified as primary type A floodplains meaning they are subject to inundation at a rate of 1% per year. Please see the table on the following page for the various floodplain classifications that exist throughout the planning area.

Table 3.14 – Floodplain Classifications

Zone Class	Description
A	Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
AE	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
B	Areas subject to inundation by 0.2-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.

Vulnerability of and Impact on Facilities

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

The average riverine flood event in Johnson County costs $9,633,333, while the existing range of a single incident has been from $0 to $230,000,000. The average flash flood costs $90,277, while the existing range of a single incident has been from $0 to $1,500,000. The planning area has incurred a total of $ 231,200,000 in property damage from riverine floods and $3,250,000 in property damage from flash floods.

The planning areas municipal, community school district, and university structures are valued at $21,667,403,369. Since flash flooding threatens the entire planning area, all structures are considered exposed and vulnerable. A GIS analysis of FEMA's identified SFHAs puts a total of $1,942,998,000 worth of the planning area's municipal structural inventory exposed to riverine flooding. Please see the tables below for a breakdown of these values by type of flooding and jurisdiction. At the present, the identified floodplains show 16 of the University of Iowa's facilities are vulnerable and at risk. As

previously noted, although the current floodplain mapping does not indicate, it is believed that all three campuses of the Clear Creek-Amana CSD located in Tiffin (Clear Creek-Amana Middle School, High School, and Tiffin Elementary) and Hills Elementary of the Iowa City CSD, are located in newly formed, expanded floodplains. These CSD facilities are valued at $119,739,085.

Table 3.15 – Vulnerable Municipal Structures by Count, Riverine Floods

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Uni-Johnson Co.	18	44	0	20	690	8	780
Coralville	5	92	0	18	511	58	684
Hills	1	3	0	0	21	0	25
Iowa City	10	180	12	34	1,460	85	1,781
Lone Tree	0	0	0	0	0	0	0
North Liberty	2	7	0	8	288	10	315
Oxford	0	3	0	1	28	0	32
Shueyville	0	3	0	0	26	0	29
Solon	0	4	0	2	143	5	154
Swisher	0	6	0	2	151	0	159
Tiffin	1	4	0	4	168	5	182
University Heights	0	0	0	0	0	0	0
Total =	37	346	12	89	3,486	171	4,141

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Table 3.16 – Vulnerable Municipal Structures by Value, Riverine Floods

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Uni-Johnson Co.	$7,321,000	$52,114,000	$1,136,000	$9,855,000	$270,184,000	$192,148,000	$532,758,000
Coralville	$2,752,000	$104,544,000	$0	$14,466,000	$139,636,000	$95,001,000	$356,399,000
Hills	$106,000	$837,000	$0	$75,000	$5,261,000	$0	$6,279,000
Iowa City	$2,927,000	$173,372,000	$18,940,000	$23,494,000	$294,176,000	$209,348,000	$722,257,000
Lone Tree	$0	$0	$0	$0	$0	$0	$0
North Liberty	$270,000	$5,125,000	$0	$4,253,000	$58,697,000	$14,036,000	$82,381,000
Oxford	$0	$1,273,000	$0	$175,000	$6,327,000	$0	$7,775,000
Shueyville	$462,000	$4,125,000	$0	$500,000	$68,400,000	$0	$73,487,000
Solon	$0	$5,119,000	$0	$2,329,000	$36,415,000	$17,819,000	$61,682,000
Swisher	$11,000	$6,763,000	$8,000	$299,000	$45,117,000	$0	$52,198,000
Tiffin	$207,000	$1,008,000	$0	$905,000	$37,742,000	$7,920,000	$47,782,000
University Heights	$0	$0	$0	$0	$0	$0	$0
Total =	$14,056,000	$354,280,000	$20,084,000	$56,351,000	$961,955,000	$536,272,000	$1,942,998,000

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Vulnerability of and Impact on Critical Facilities

Since flash floods have the potential to affect the entire planning area, all of this plan's identified critical facilities are equally vulnerable to flash flooding. Of the planning area's 193 critical facilities, 19 are located within FEMA identified SFHAs. Please see the table below for a list of these facilities.

Table 3.17 – Vulnerable Critical Facilities, Riverine Floods

Facility	Type	Location
Coralville Senior Residences	Assisted Care	Coralville
Eastern Iowa Light & Power Substation – Sand Road	Utility	Johnson County
Hills Sewage Lagoons	Water Treatment Facility	Hills
Iowa City City Call	Local Government	Iowa City
Iowa City Fire Station #1	Fire/Medical Response	Iowa City
Iowa City Municipal Airport	Airport	Iowa City
Iowa City Police Station #1	Law Enforcement	Iowa City
Linn County REC Crozier Substation	Utility	Johnson County
Linn County REC Oxford Substation	Utility	Johnson County
Lone Tree Water Treatment Plant	Water Treatment Facility	Lone Tree
Midamerican Energy Pipeline Station 5459	Utility	Johnson County
North Liberty Public Works	Public Works	North Liberty
Oxford Public Works	Public Works	Oxford
Solon Shed	Public Works	Solon
Solon Water Treatment Plant	Water Treatment Facility	Solon
Swisher Water Treatment Plant	Water Treatment Facility	Swisher
Tiffin City Hall	Local Government	Tiffin
Tiffin Public Works	Public Works	Tiffin
Tiffin Water Treatment Plant	Water Treatment Facility	Tiffin

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Vulnerability of and Impact on Population

If evacuation is not heeded, or flood waters rise quickly enough, Johnson County and it participating jurisdictions' population can drown or become trapped on rooftops or points of high elevations. As seen in 2008, entire municipalities can be blocked off. Depending on the conditions, this will expose them to elements and deprive them of basic needs and services.

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

Although the planning area has seen catastrophic flooding, it has not experienced any direct injuries or deaths as a result. The entire population of 149,210 and their 55,967 housing units are considered vulnerable and exposed to flash flooding while 11,653 residents in 5,686 housing units are currently identified as exposed and vulnerable to riverine floods. Similarly, all 18,541 CSD students, 33,564 UI students, and their respective 2,943 and 5,274 staff and faculty are considered vulnerable and exposed to flash flooding. Of the CSD campuses identified or suspected to be in a floodplain, 1,866 students are considered vulnerable and exposed as well as a variable number of staff and faculty.

Table 3.18 – Vulnerable Municipal Populations, Riverine Flooding

Municipality	Population	Housing Units
Uni-Johnson Co.	1,793	800
Coralville	2,165	1,205
Hills	33	22
Iowa City	5,516	2,642
Lone Tree	0	0
North Liberty	788	394
Oxford	68	31
Shueyville	49	26
Solon	370	170
Swisher	398	153
Tiffin	473	243
University Heights	0	0
Total =	11,653	5,686

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Vulnerability of and Impact on Systems

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

Extensive riverine flooding can significantly impact local governments' ability to provide basic goods and services to their communities either by losing essential facilities or by blocked infrastructure. This can take the form of lost law enforcement, fire prevention, medical, or water treatment facilities. Additionally, the public bus transit systems provided are essential to many UI commuters and residents alike.

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

Key Considerations

In addition to variations in vulnerability and risk previously mentioned in this hazard profile, there are three risk altering events that have occurred since the development of Johnson County's previous hazard mitigation plan and the establishment of FEMA's currently identified SFHAs.

At the time of the previous hazard mitigation plan's development, the planning area had 11 repetitive loss properties. At the time of this plan's development, there are no longer any repetitive loss properties in the planning area.

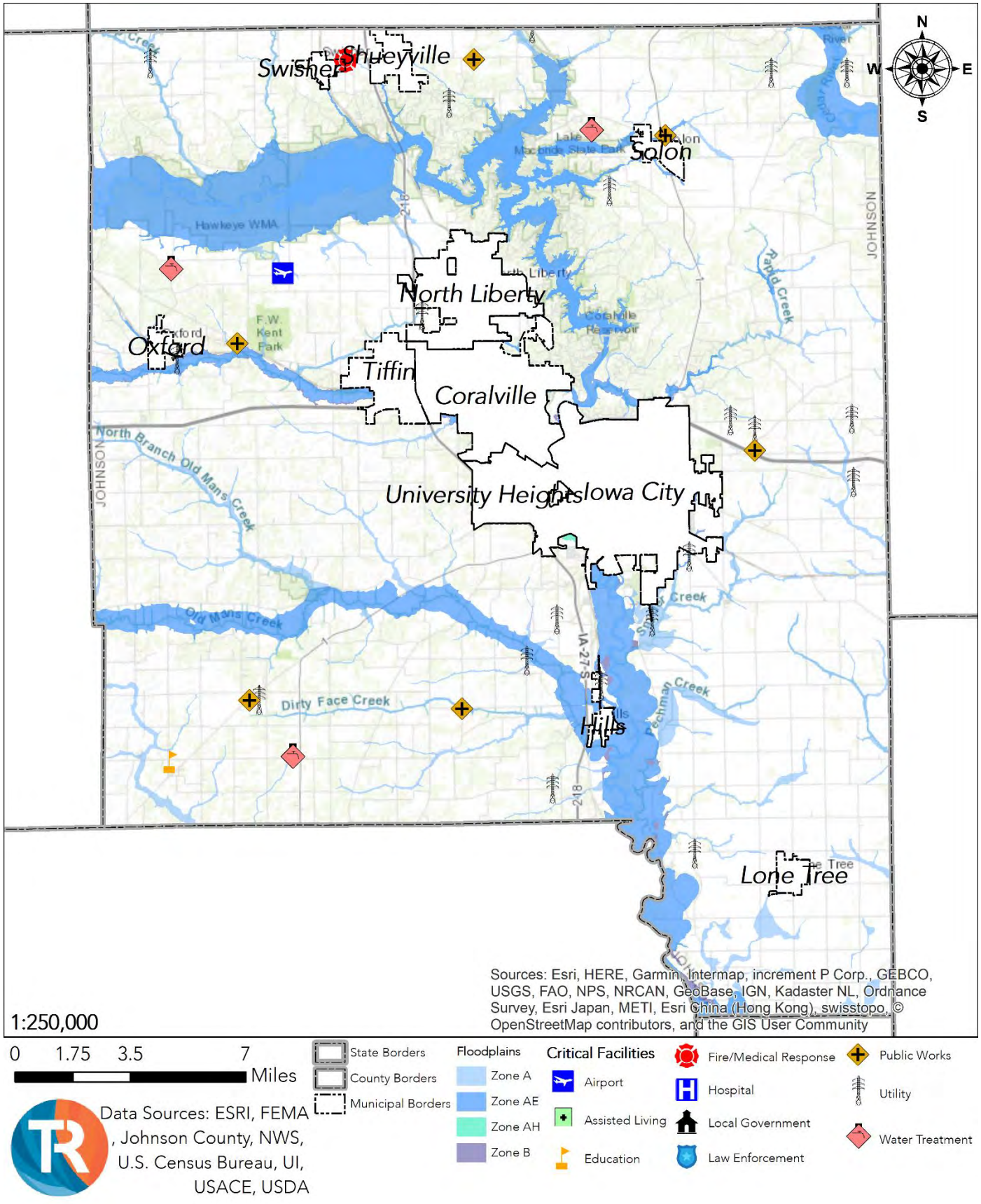
After the 2008 flooding, two systems of levees were constructed, the Coralville Levee and the West Side Levee. Both of these have been previously identified in Section 3.3 – Dam & Levee Failure. FEMA's NFHL and its identified SFHAs were established prior to the construction of these levee systems. It logically stands that not only would the SFHAs that were identified to exist on the opposite side of these levees no longer exist (making those areas of Coralville and Iowa City better protected), but that riverine flood waters would now exceed previously identified levels downstream.

A discussion with JCEMA and plan stakeholders has led to the belief that the SFHAs around Tiffin, Hills, the western portion of Coralville, and downstream of Iowa City into unincorporated Johnson County are now larger than they are currently identified, placing those communities at a greater risk. This is also the reason that this plan identified the three campuses of the Clear Creek-Amana CSD as now existing in a floodplain as previously they were barely outside of the SFHAs. To further compound the issue, the City of Tiffin is allowing a number of residential construction projects to occur in the already identified floodplains.

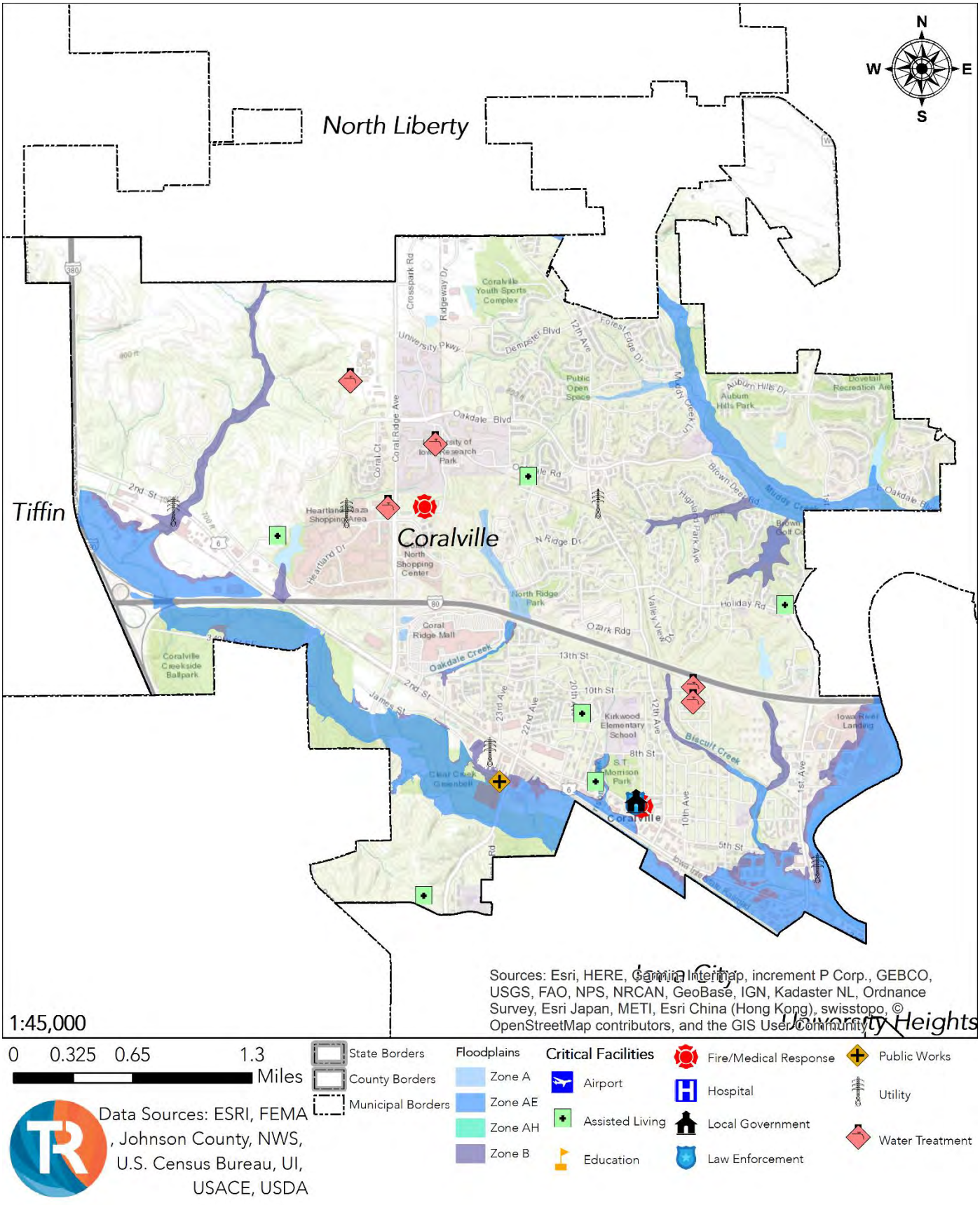
After the 2008 floods, the University of Iowa developed a Flood Emergency Response Plan (FERP). Part of this comprehensive document are detailed plans and instructions for implementing Hesco flood barriers, invisible flood walls, and pump operations designed to protect the campus against significant flooding from the Iowa River.

Additionally, the University of Iowa completed numerous mitigation projects to protect against riverine flooding. Some highly vulnerable buildings were relocated out of the floodplains of the Iowa River. The campuses system of underground steam tunnels had flooded in 2008. As a result, UI installed watertight doors throughout the tunnels allowing sections to seal-off water buildup. Lastly, UI constructed a system of raised sidewalks throughout its campus to act as an earthen flood barrier in conjunction with these other protective measures. These mitigation efforts stand to significantly reduce the University of Iowa's vulnerability and risk to riverine flooding along the Iowa River.

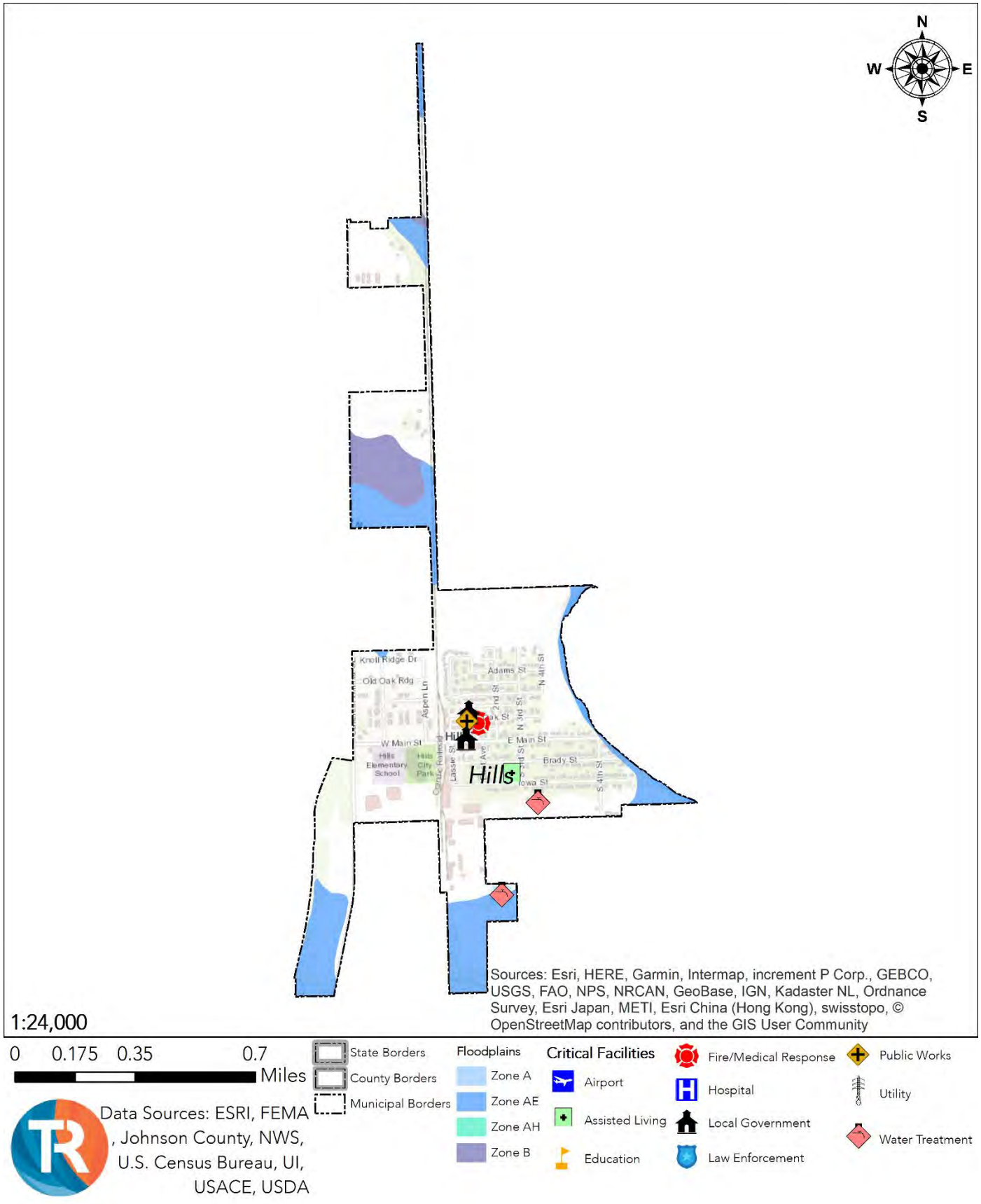
Map 3.13 – Floodplains, Johnson County



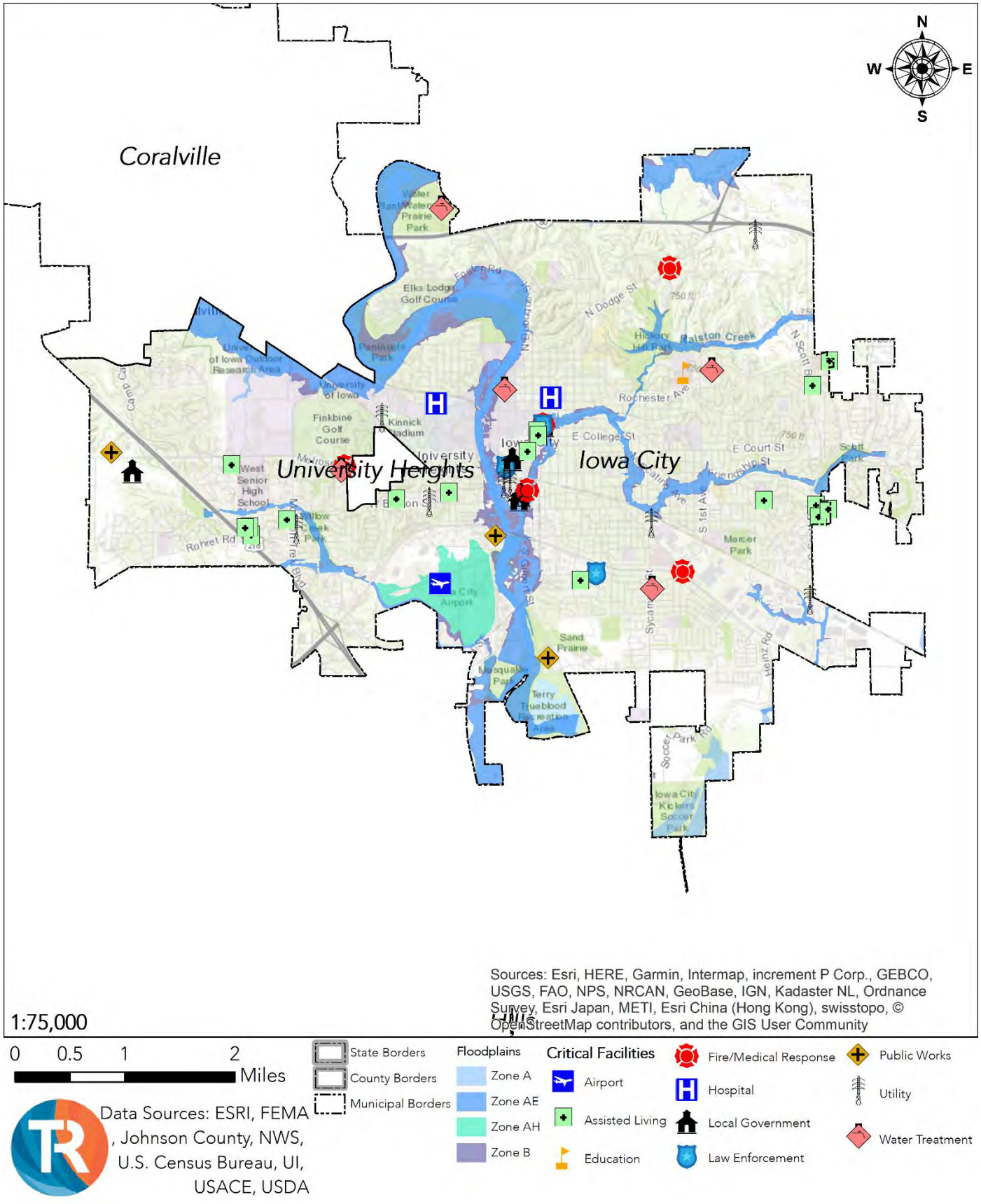
Map 3.12 – Floodplains, Coralville



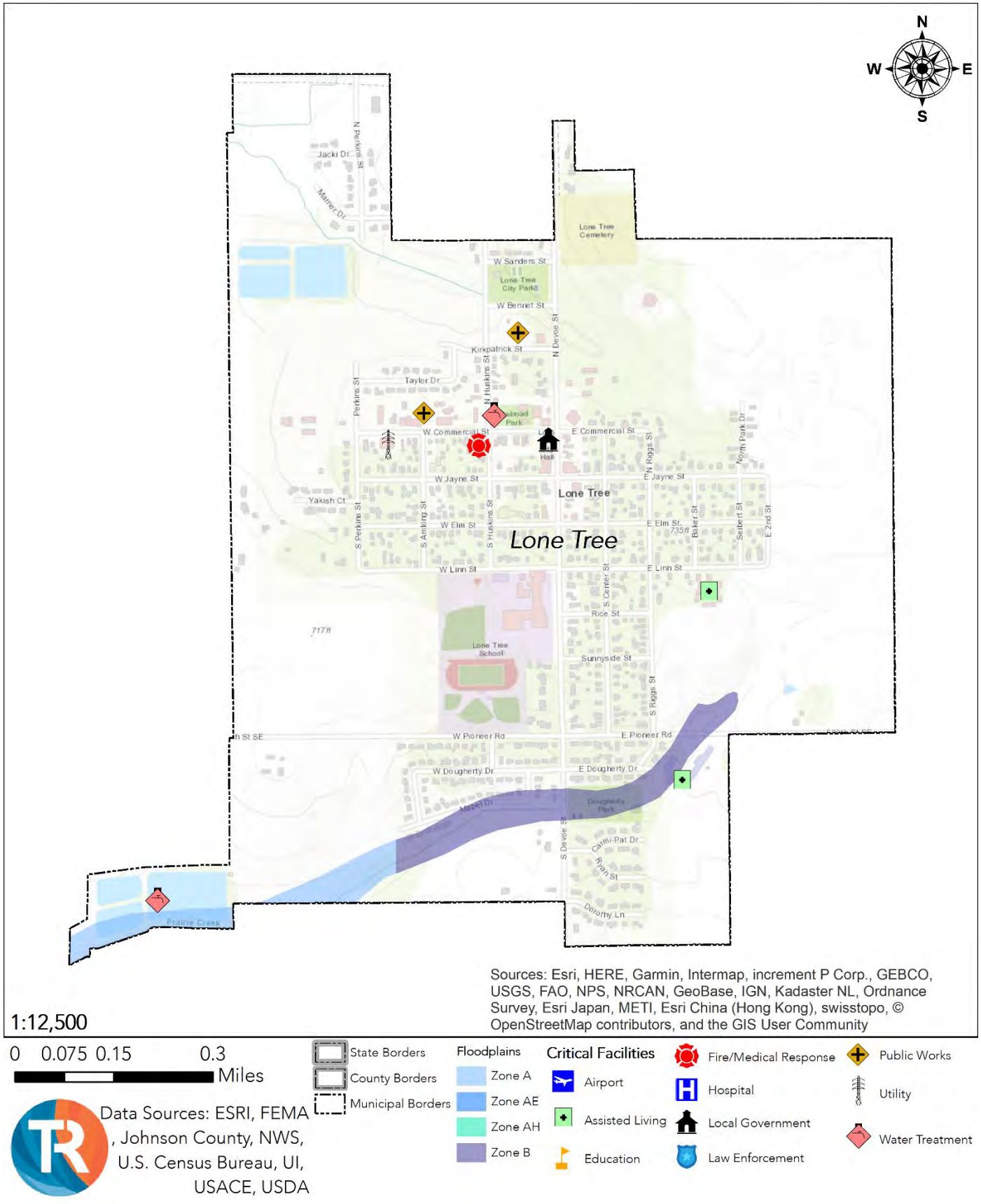
Map 3.13 – Floodplains, Hills



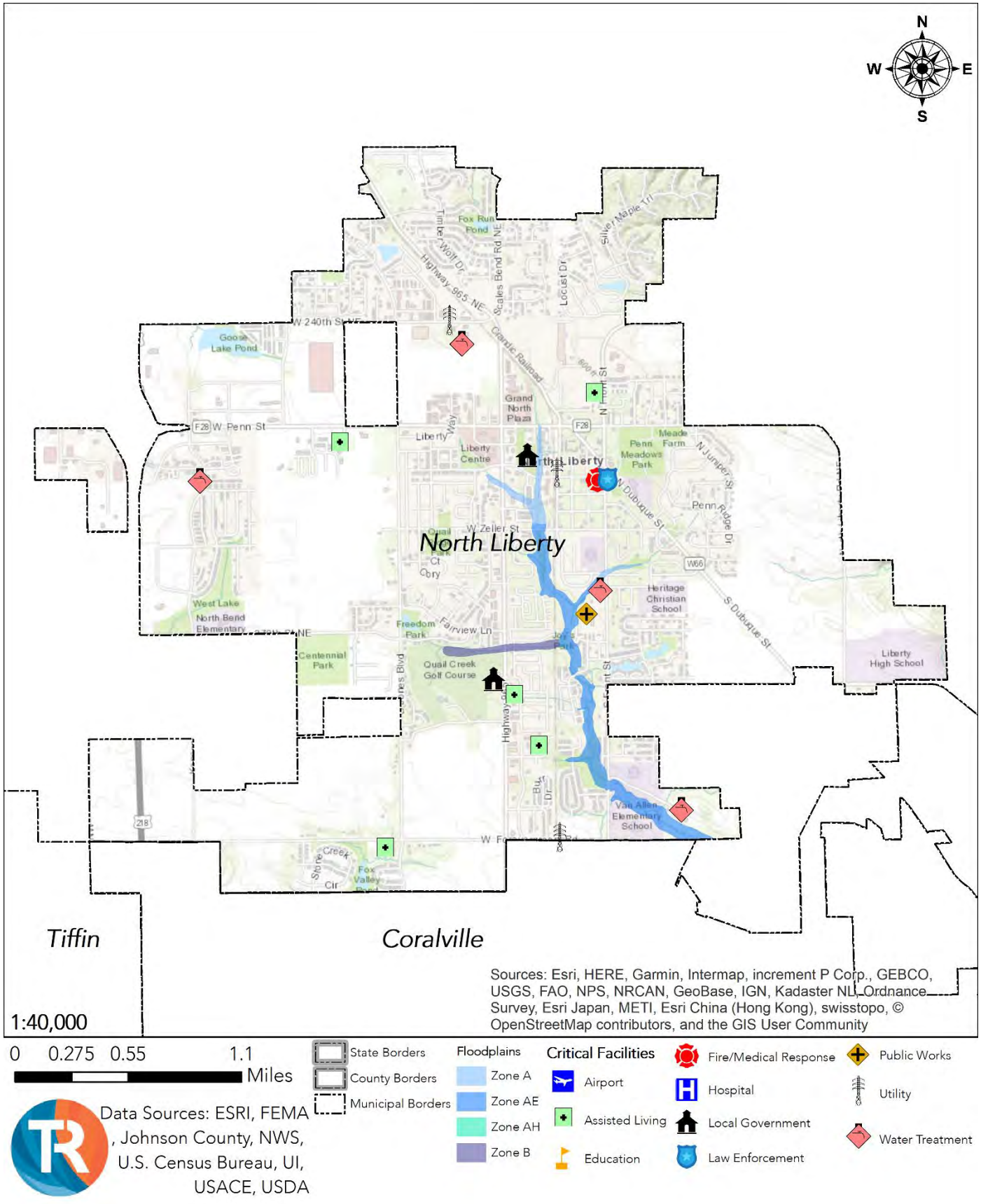
Map 3.14 – Floodplains, Iowa City



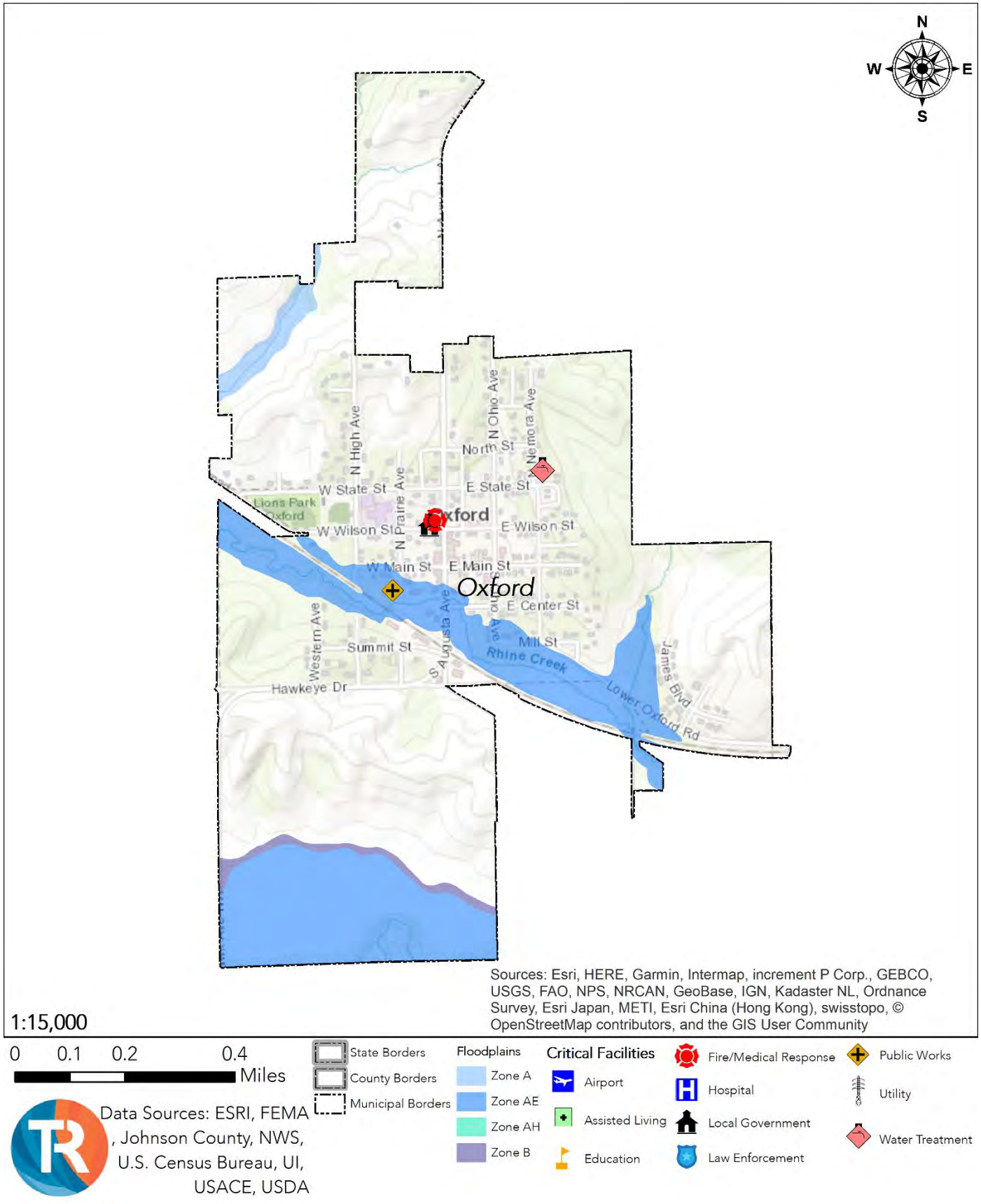
Map 3.15 – Floodplains, Lone Tree



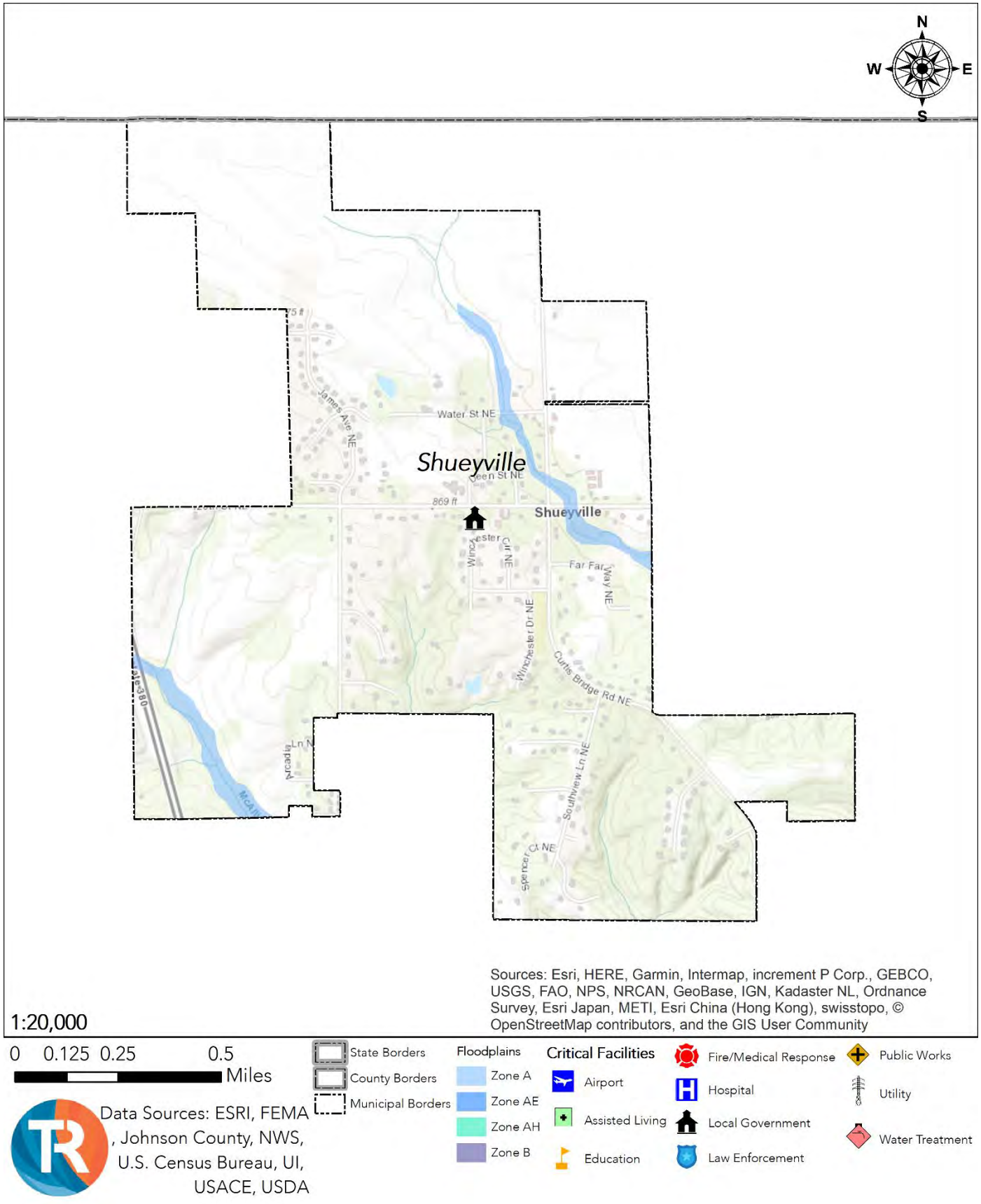
Map 3.16 – Floodplains, North Liberty



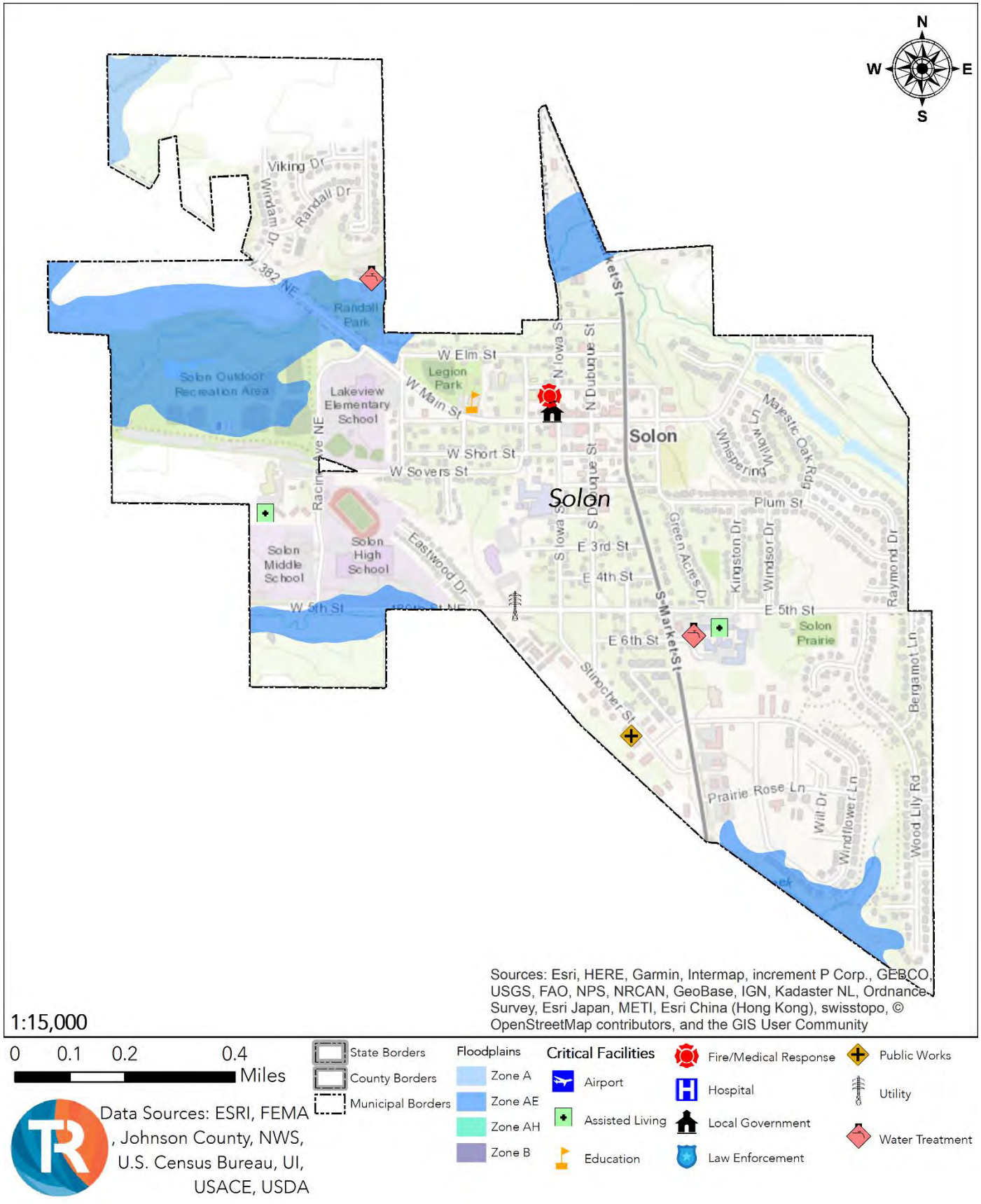
Map 3.17 – Floodplains, Oxford



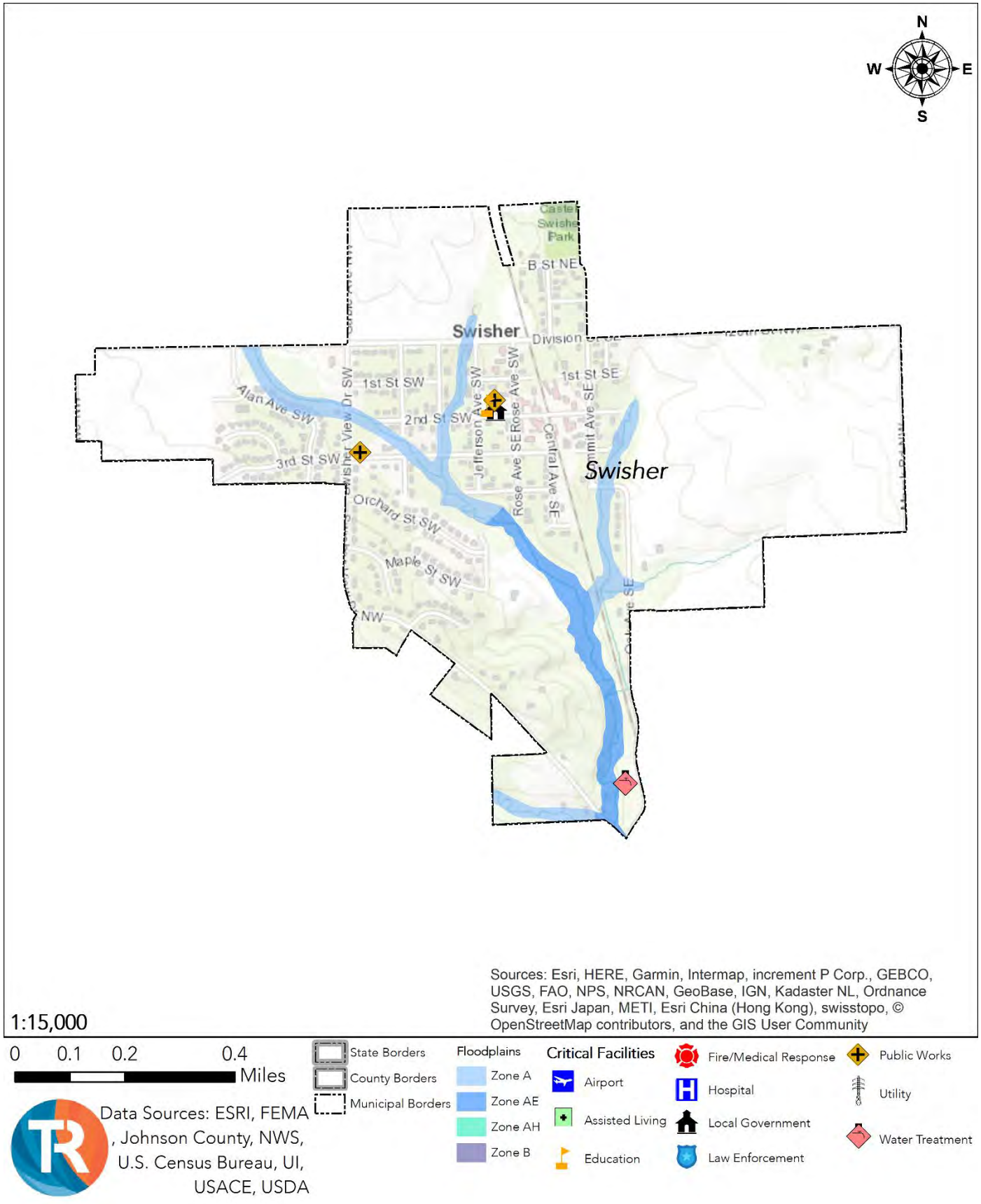
Map 3.18 – Floodplains, Shueyville



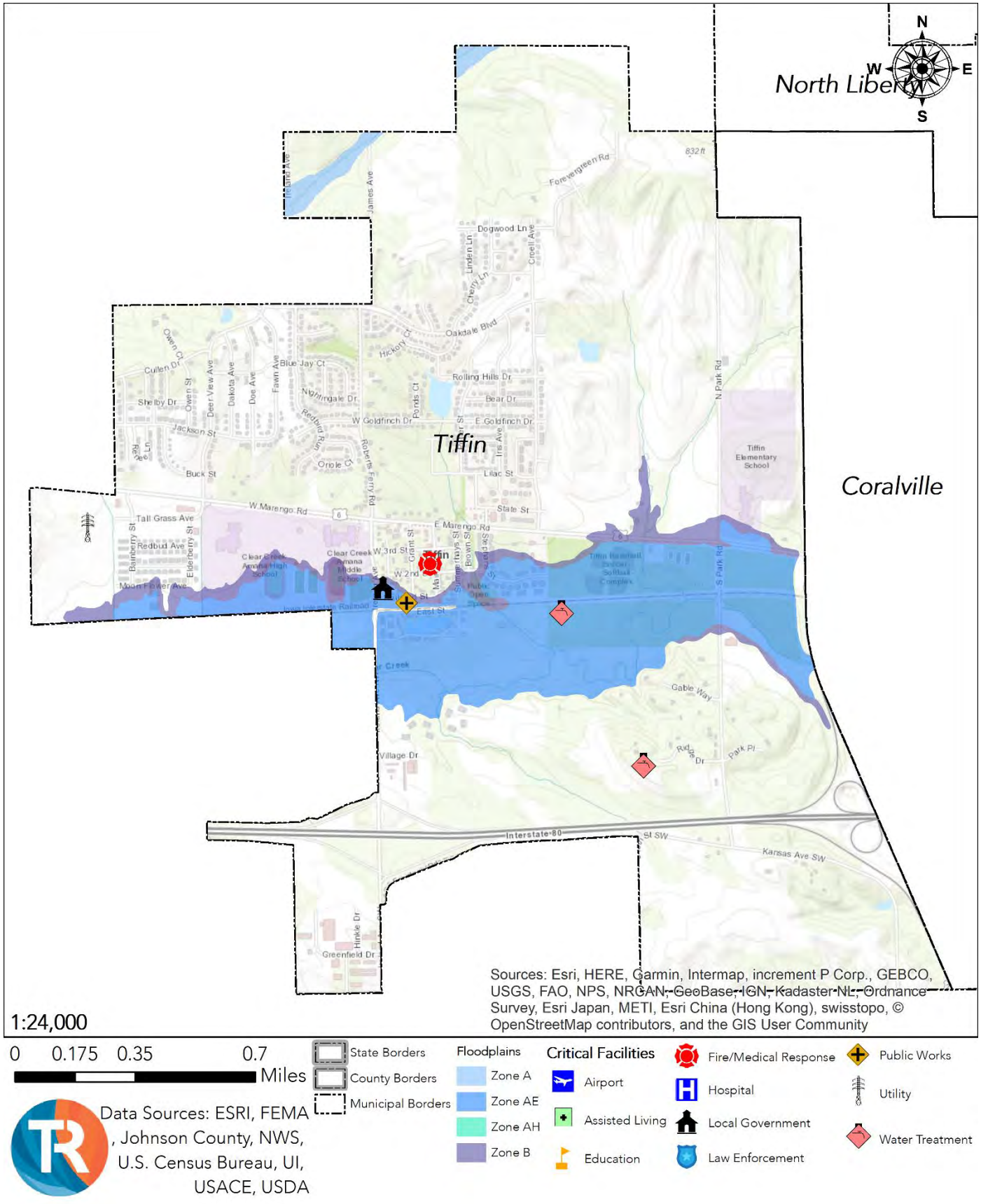
Map 3.19 – Floodplains, Solon



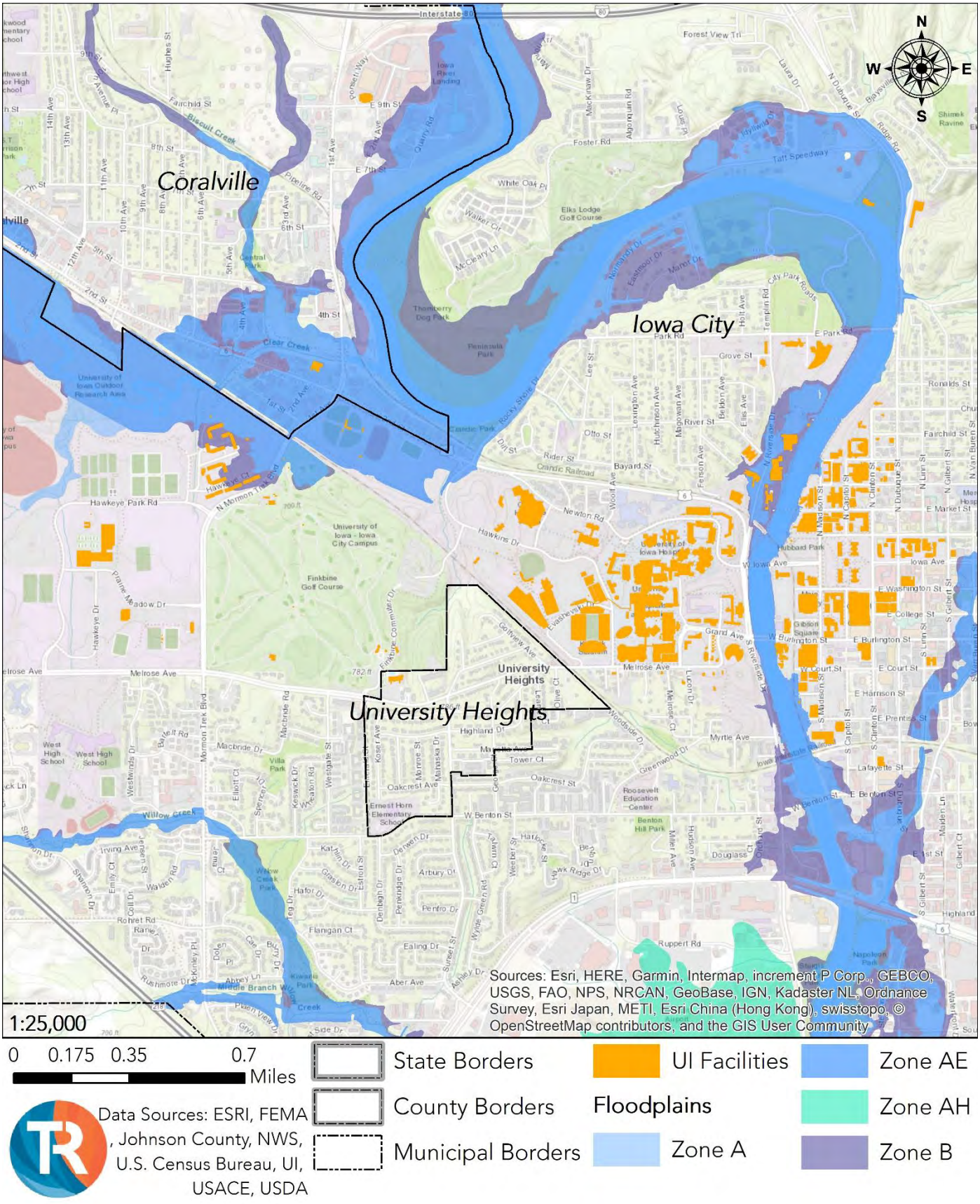
Map 3.20 – Floodplains, Swisher



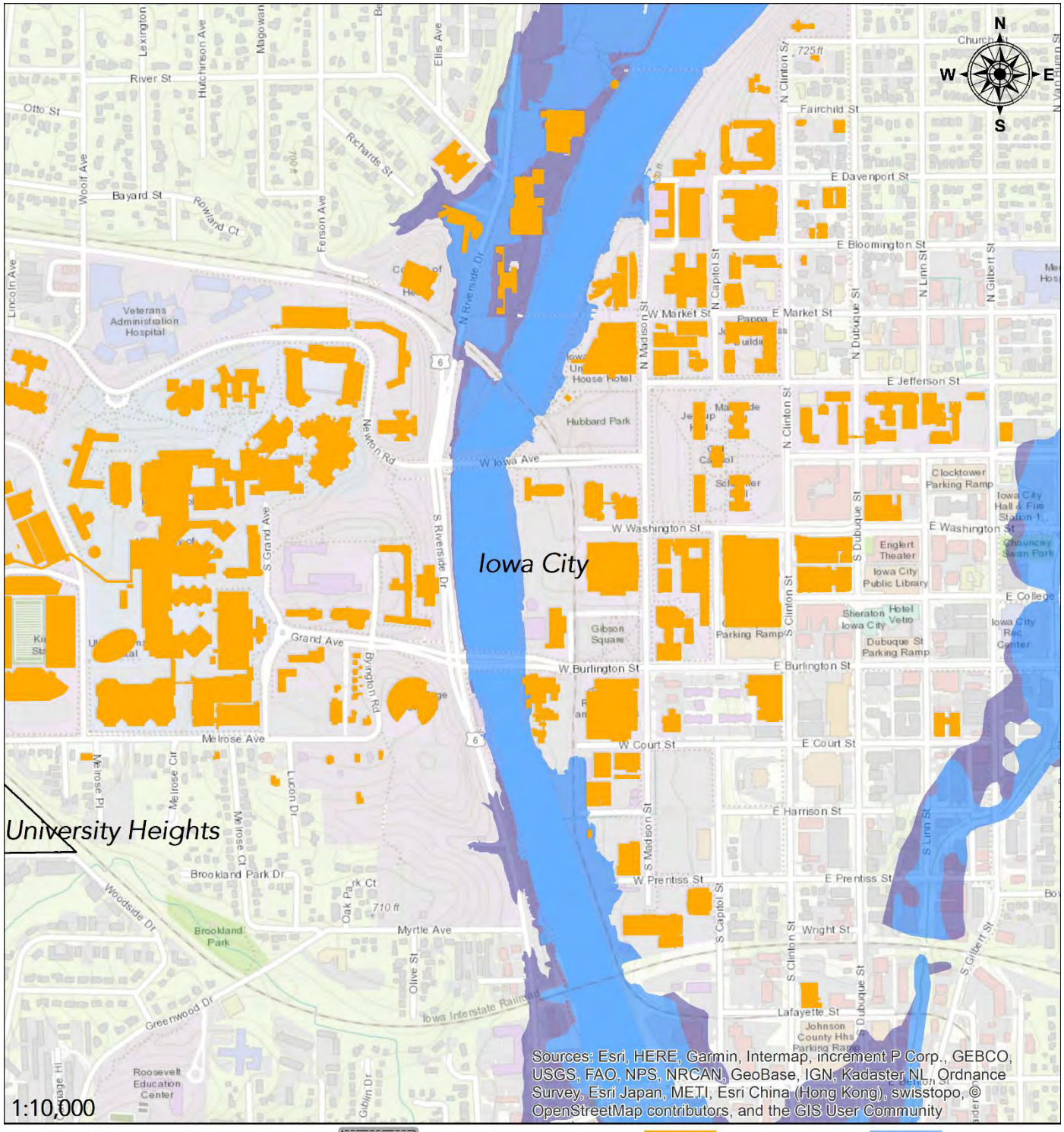
Map 3.21 – Floodplains, Tiffin



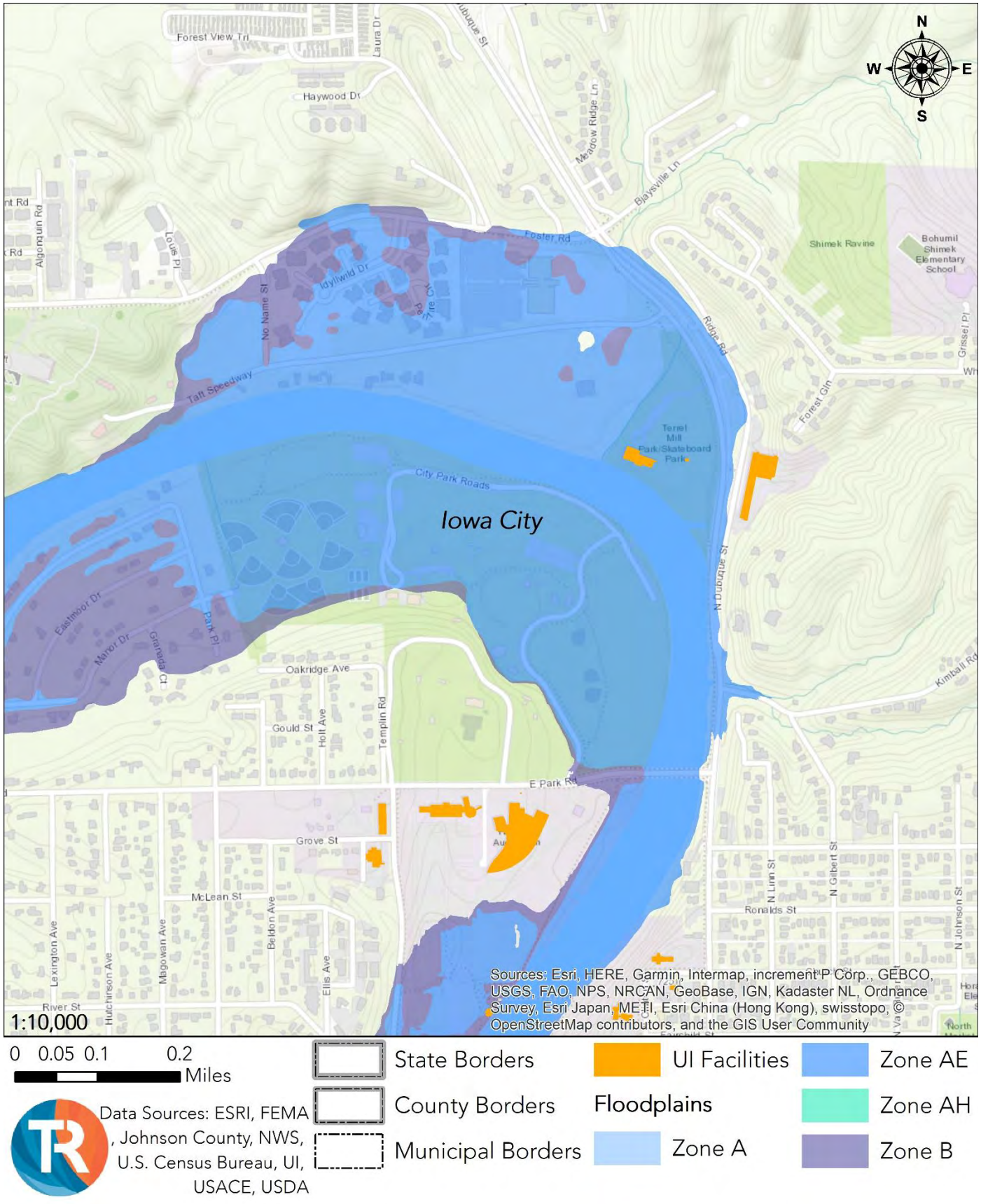
Map 3.22 – Floodplains, University of Iowa



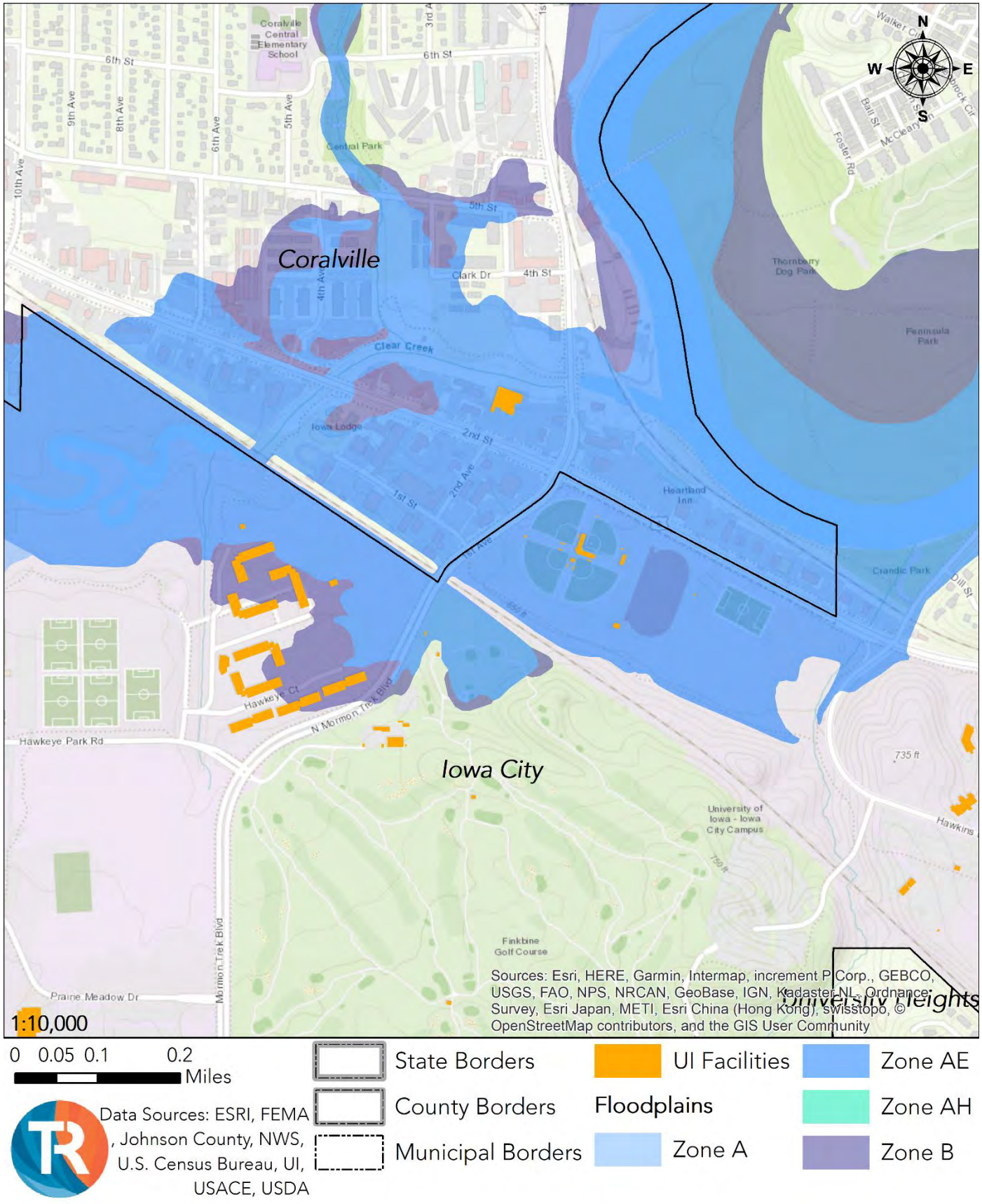
Map 3.23 – Floodplains, University of Iowa #2



Map 3.24 – Floodplains, University of Iowa #3



Map 3.25 – Floodplains, University of Iowa #4



3.6 – Severe Storms

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

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

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

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

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

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

For consistency with the NWS and NOAA, high and strong winds are shown separate from thunderstorm winds when raw, collected data is displayed. However, for their impacts and probability, they are combined and referred to simply as "wind" events.

Location & Extent

Severe storms are an area-wide hazard as they can strike anywhere in the planning area. Storms, severe or not, are often predicted within a day or multiple days in advance. The planning area is well covered and protected by 66 storm warning sirens (Depicted in Map 2.3) which assist in preventing damage to the planning area's residents and property.

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

Strong, high, and thunderstorm winds are classified as winds which occur between 40 and 70 miles per hour lasting for 1 hour or greater or of 58 miles per hour for any duration. The Beaufort Scale shown on the next page displays the ranges of wind speed and correlates them with their typical effects. At a

level 7 and 8 citizens should remain indoors and anywhere above a level 8 will cause damage to structures. Damage to any amount of structures can cause serious disruption to Johnson County and its participating jurisdictions. The scope of damage can range from one residential house up to widespread destruction of homes and reinforced buildings throughout the county. The planning area occasionally receives wind events between 50 and 60 miles per hour or a Beaufort level between 9 and 10.

Table 3.19 – Beaufort Scale

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

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

Table 3.20 – Lightning Activity Intensity Scale

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

Hail typically falls in sizes anywhere from 0.75 to 0.88 inches in the planning area. A complete hail index with size and typical damages can be found in the table below. Any incidents of hail can cause injury to Johnson County and its participating jurisdictions' citizens, while anything above 1 inch could cause damage to structures. If windows are broken, some facilities will be rendered unusable until repaired.

Table 3.21 – NOAA/TORRO Hailstorm Intensity Scale

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

History & Probability

Since 1996, NOAA has recorded 133 hailstorms in the planning area. Most hail has shown to remain under 1 inch in size, however, on occasion the planning area has seen hail larger than 2 inches. These hailstorms have not caused any personal injury or deaths in the planning area, but have caused $40,414,700 in property damage. For a complete list of NOAA recorded hail, high wind, lightning, and thunderstorm winds, please reference Appendix E.

Since 1996, NOAA has recorded 10 lightning strikes in the planning area. One of these strikes seriously injured a resident of the planning area. They have also caused $1,066,200 in property damage.

Since 1996, NOAA has recorded 150 wind events in the planning area. Most of these events have been measured at between 50 to 60 miles per hour, but have a few have been measured in the 70s. In 2011, one of these wind events caused the death of one of the planning area's residents. Wind events have caused a total of $33,183,400 in property damage throughout the planning area.

Based on the data recorded by NOAA, the planning area should expect a hailstorm at a rate of 5.78 per year, a significant lightning strike at a rate of 0.43 per year, and a dangerous wind event at a rate of 6.52 per year.

Vulnerability of and Impact on Facilities

Structural vulnerability to severe storms is the same throughout Johnson County and its participating jurisdictions. Hail can be costly by damaging rooftops, outdoor equipment, and windows. Lightning can strike anything with the potential to significantly damage electrical infrastructure or ignite a fire. Wind events create flying debris which can damage infrastructure and buildings. Strong enough wind can cause structure damage to older, less well constructed buildings even toppling or leveling them. A FEMA Code 361 Tornado Safe Room will provide more than sufficient protection and resistance to any form of severe storm as they are designed and constructed above the standard metrics of a severe storm.

The average hailstorm in Johnson County and its participating jurisdictions costs $303,869 while the existing range of a single incident has been from $0 to $40,000,000.

The average lightning event in Johnson County and its participating jurisdictions costs $106,620 while the existing range of a single incident has been from $0 to $515,000.

The average wind event in Johnson County and its participating jurisdictions costs $221,222, while the existing range of a single incident has been from $0 to $30,700,000.

Johnson County and its participating jurisdictions' municipal, community school district, and university structures are valued at a total of $21,667,403,369. Since severe storms threaten the entire planning area equally, all municipal, community school district, and university structures are considered exposed and vulnerable.

Vulnerability of and Impact on Critical Facilities

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

Vulnerability of and Impact on Population

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

Johnson County and its participating municipal jurisdictions have a total population of 149,210 in 55,967 housing units all of which are vulnerable and at risk to severe storms. Additionally, all 18,541 CSD and 33,564 university students and their 2,943 CSD and 5,274 university staff and faculty are considered exposed and vulnerable.

Historically, there have been 1 fatality and 1 injury recorded from severe storms in the planning area.

Vulnerability of and Impact on Systems

Johnson County and its participating jurisdictions' assets and systems' vulnerability to severe storms is the same throughout the planning area.

Hail damage is typically superficial and does not hamper a community's assets, systems, or activities. Lightning strikes can destroy or damage a community asset, but since their strikes are typically isolated and rarely hit anything, it is unlikely to significantly impact a larger system. Wind events can destroy and damage multiple structures and points of infrastructure. It has the potential to significantly impact a community's power grid compounding the effects of other hazards such as, extreme heat, tornadoes, and winter storms. CSD and public transit buses are considered vulnerable as they can be damaged by hail, by falling trees and other debris, as well as be exposed to hazardous driving conditions from high speed winds.

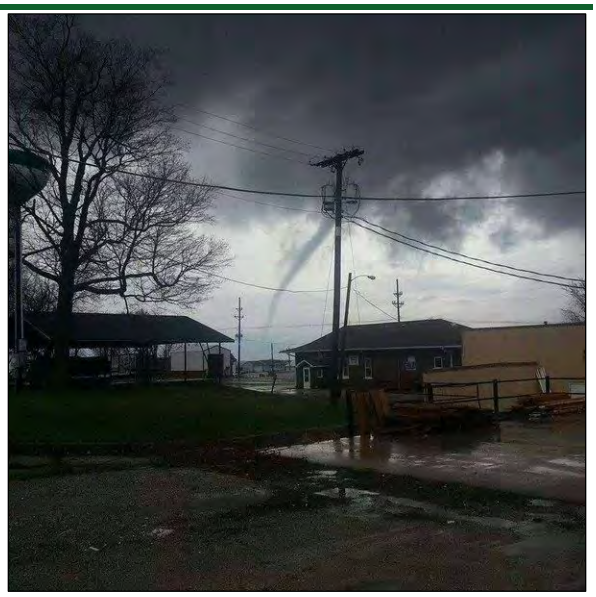
Key Considerations

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

Unincorporated Johnson County, Hills, Iowa City, Lone Tree, Oxford, and University Heights all retain significant levels of building stock constructed prior to the 1960s. These buildings were generally constructed to lower wind resistant standards and codes and thus these jurisdictions are considered more vulnerable.

Iowa City, North Liberty, Shueyville, Solon, Swisher, and Tiffin have seen significant population growth since the development of their last hazard mitigation plan (Measured at greater than 5% growth). These communities are considered to be more vulnerable and at risk to severe storms than they were at the time their last plan was developed.

3.7 – Tornadoes



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

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

Location & Extent

Many tornadoes only exist for a few seconds in the form of a touchdown. A tornado may arrive with a storm front and touchdown in a matter of seconds without warning. Other times tornado watches and sirens will alert communities of high potential tornado producing weather or an already formed tornado and its likely path. The planning area is well covered and protected by 65 storm warning sirens. (Depicted in Map 2.3)

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

Until 2007 the Fujita Tornado Scale ranked the severity of tornadoes. The Fujita scale assigned a numerical F value, F0 through F5, based on the wind speeds and estimated damage. Since 2007 the U.S. switched over to the Enhanced Fujita Scale. The altered scale adjusted the wind speed values per F level and introduced a rubric for estimating damage. Most tornados have wind speeds less than 110 miles per hour, and travel a few miles before dissipating. The planning area should expect to see tornadoes of EF1 or EF2, but should be prepared for a tornado up to an EF5.

Table 3.22 – Fujita Scale

Fujita Scale		EF Scale	
Fujita Scale	3-Second Gust Speed (mph)	EF Scale	3-Second Gust Speed (mph)
F0	45-78	EF0	65-85
F1	79-117	EF1	86-109
F2	118-161	EF2	110-137
F3	162-209	EF3	138-167
F4	210-261	EF4	168-199
F5	262-317	EF5	200-234

History & Probability

Since 1954, the NWS has recorded 33 tornadoes in the planning area. Most have been EF1 or EF2 while the most intense has been an EF3. These tornadoes have caused 49 recorded injuries, 1 death, and an estimated $30,022,000 in property damage. For a complete list of NWS recorded tornadoes, please reference Appendix E.

Based on the data recorded by the NWS, the planning area should expect a tornado at a rate of 0.46 tornadoes per year.

Vulnerability of and Impact on Facilities

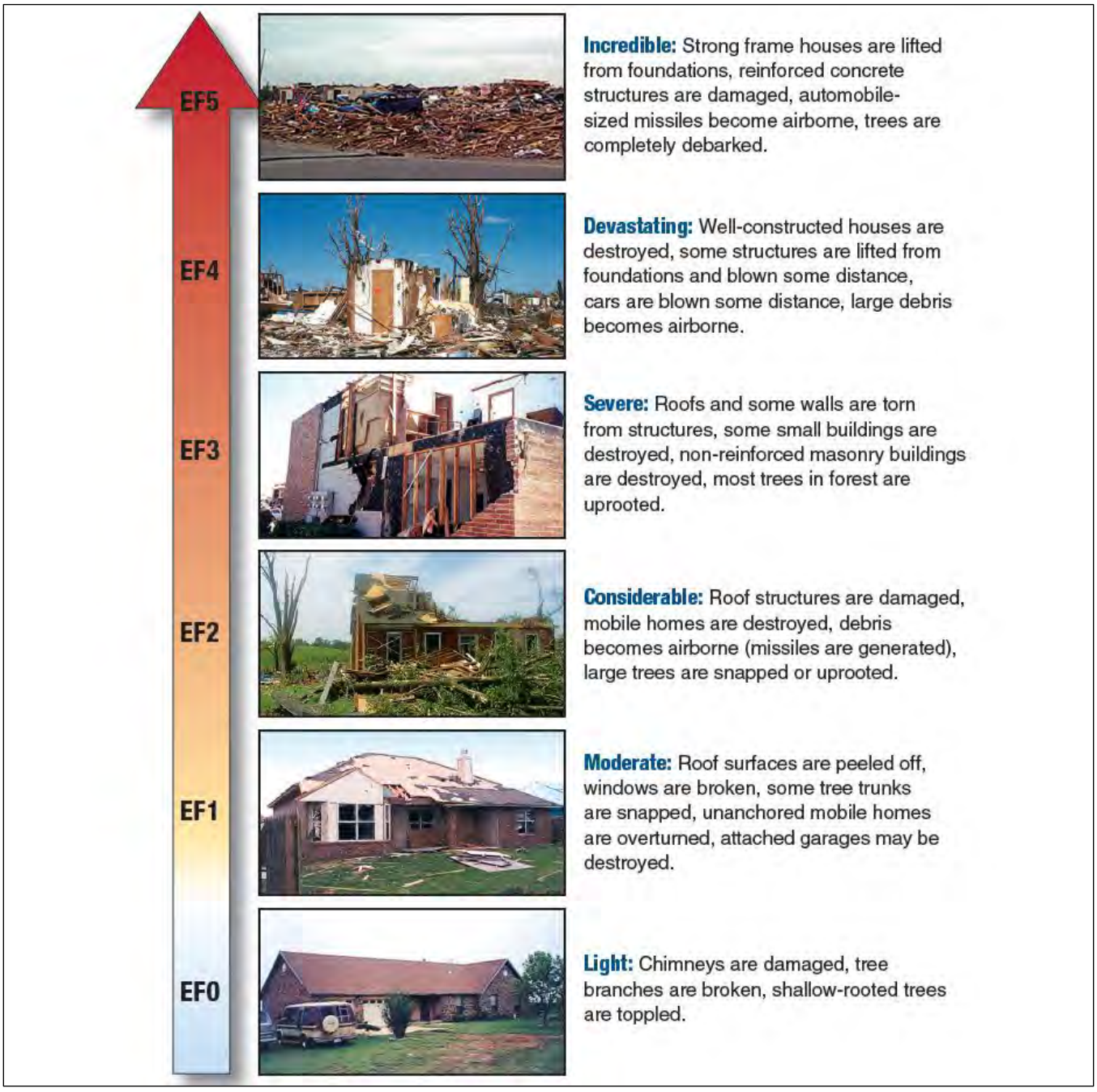
Most tornadoes are in the EF0 – EF2 class. Building to modern wind standards and state codes provides significant protection from these hazard events; however, a community in the direct path of a violent, high scale tornado can do little to prevent significant property damage. Designing buildings to protect against extreme wind speeds, such as those associated with an EF4 or EF5 is extremely challenging and cost prohibitive. Anything less than a FEMA Code 361 compliant structure is susceptible to significant damage or complete destruction. A comparison of EF scale to the expected impact on facilities can be seen in Table 3.22.

The average tornado event in the planning costs $909,757, while the existing range of a single incident has been between and EF0 and EF3 costing between $0 and $1,200,000.

Johnson County and its participating jurisdictions' municipal, community school district, and university structures are valued at a total of $21,667,403,369. Since tornadoes threaten the entire planning area

equally, all municipal, community school district, and university structures are considered exposed and vulnerable.

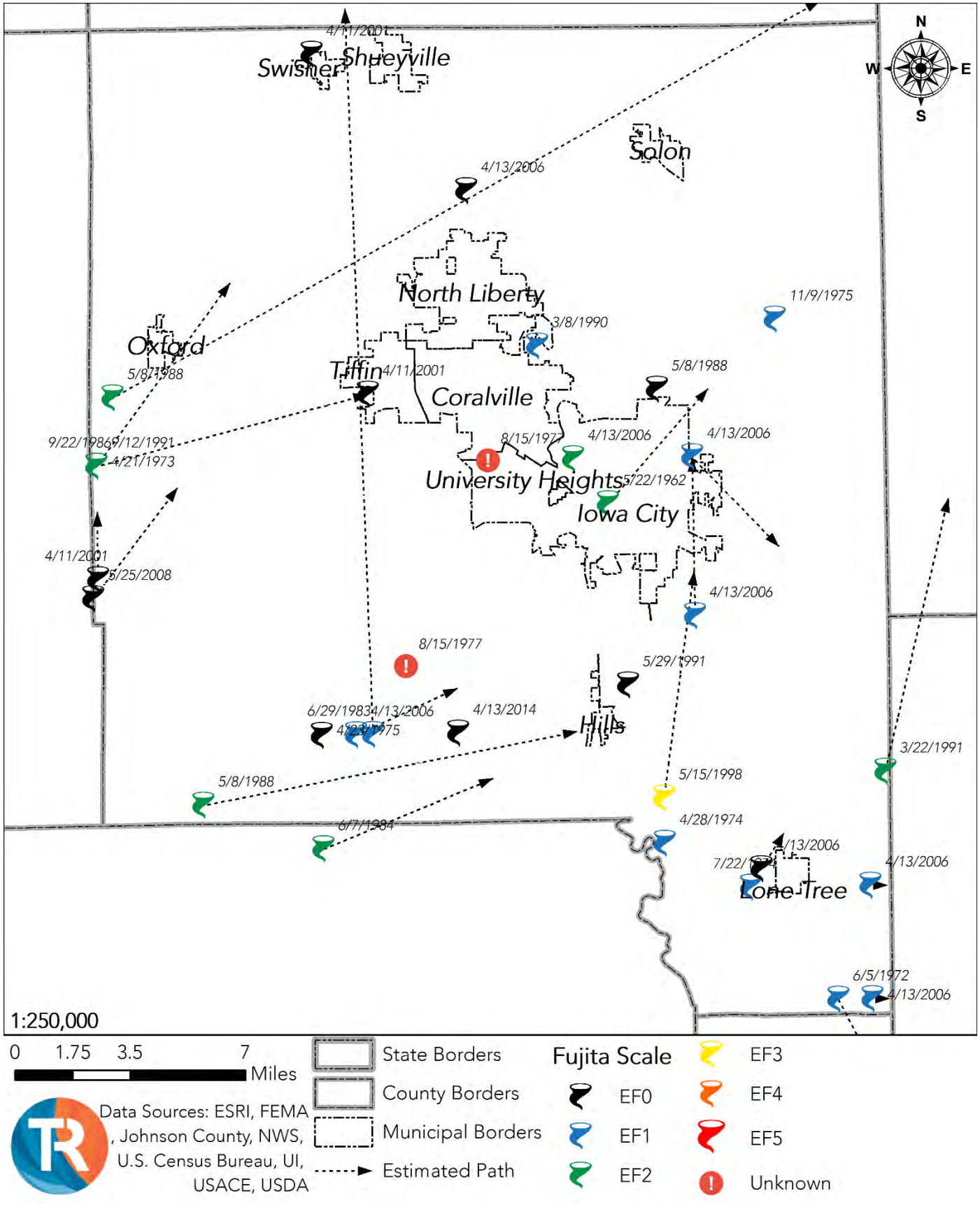
Table 3.22 – Fujita Damage Scale



Vulnerability of & Impact on Critical Facilities

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

Map 3.26 – Historical Tornadoes, Johnson County



Vulnerability of and Impact on Population

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

Johnson County and its participating municipal jurisdictions have a total population of 149,210 in 55,967 housing units all of which are vulnerable and at risk to tornadoes. Additionally, all 18,541 CSD and 33,564 university students and their 2,943 CSD and 5,274 university staff and faculty are considered exposed and vulnerable.

Vulnerability of and Impact on Systems

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

Key Considerations

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

Unincorporated Johnson County, Hills, Iowa City, Lone Tree, Oxford, and University Heights all retain significant levels of building stock constructed prior to the 1960s. These buildings were generally constructed to lower wind resistant standards and codes and thus these jurisdictions are considered more vulnerable.

Iowa City, North Liberty, Shueyville, Solon, Swisher, and Tiffin have seen significant population growth since the development of their last hazard mitigation plan (Measured at greater than 5% growth). These communities are considered to be more vulnerable and at risk to tornadoes than they were at the time their last plan was developed.

3.8 – Wildland Fires

The NWS defines a wildfire as: Any free burning uncontainable wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment. They can occur naturally, by human accident, and on rare occasions by human action. Typically, their point of origin is far from human development with the exception of roads, power lines, and similar rural infrastructure. There is a constant threat to hikers, campers, and other people engaging in outdoor activities. Significant danger to life and property occurs when human development meets and becomes intertwined with wildland's vegetation. The threat of wildfire and grass fires increases in areas prone to intermittent drought, or are generally arid or dry.

Population de-concentration in the U.S. has resulted in rapid development in the outlying fringe of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities, especially forests, communities bordering forests and prairies where fires branch off. This demographic change is increasing the size of the wildland-urban interface (WUI), defined as the area where structures and other human development meet or intermingle with undeveloped wildland. Its expansion has increased the likelihood that wildland and grass fires will threaten life and property.

Location & Extent

Johnson County and the planning area's fire response efforts are not inhibited by mountainous or significantly vegetated large areas that traditionally make it difficult to extinguish fires. Due to this, wildland and grass fires are usually extinguished in relatively short amounts of time when compared to wildland or grass fires in the western United States. Additionally, although wildland and grass fires can occur almost anywhere throughout the planning area, the fuel available for a fire to burn and spread is less dense and thus does not create fires that have momentum that they do throughout the western United States.

The vast majority of wildland and grass fires that occur in the planning area occur in areas containing brush, grass, and crops. Although these types of fuel do not pose as intense a level of a fire as does heavily vegetated forests, nearly every acre of undeveloped land in the planning area is covered in by some form of vegetation that could act as fuel for a fire. The map on the following page depicts the basic varieties of vegetation throughout the planning area.

The planning area is most often affected by grass and brush fires, which are usually contained and extinguished before there is a threat to life and developed property. Most grass fires are contained to

highway and rail right-of-way ditches and are less than a few acres in size. Fires often burn large portions of field crops during harvest. Given the conditions present in the planning area, a fire should not be expected to supersede Rank 2 on the index below.

Table 3.23 – Burn Severity Index

Rank	Burn Severity	Description	Characteristics
0	Unburned	Fire extinguished before reaching microsite	• Leaf litter from previous years intact and uncharred • No evidence of char around base of trees and shrubs • Pre-burn seedlings and herbaceous vegetation present.
1	Low Severity Burn	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 ° C
2	Medium-Low Severity Burn	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
3	Medium-High Severity Burn	Flames that were slightly taller than those of Medium-low intensity fires, but these fires had occasional hot spots that killed large trees, With significant reduction in the understory	• Soil exposure on l-50% of the area • Flame lengths <6m • High understory mortality with some overstory trees affected
4	High Severity Burn	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 ° C

**This index is courtesy of the Southern Appalachian Forest Coalition.*

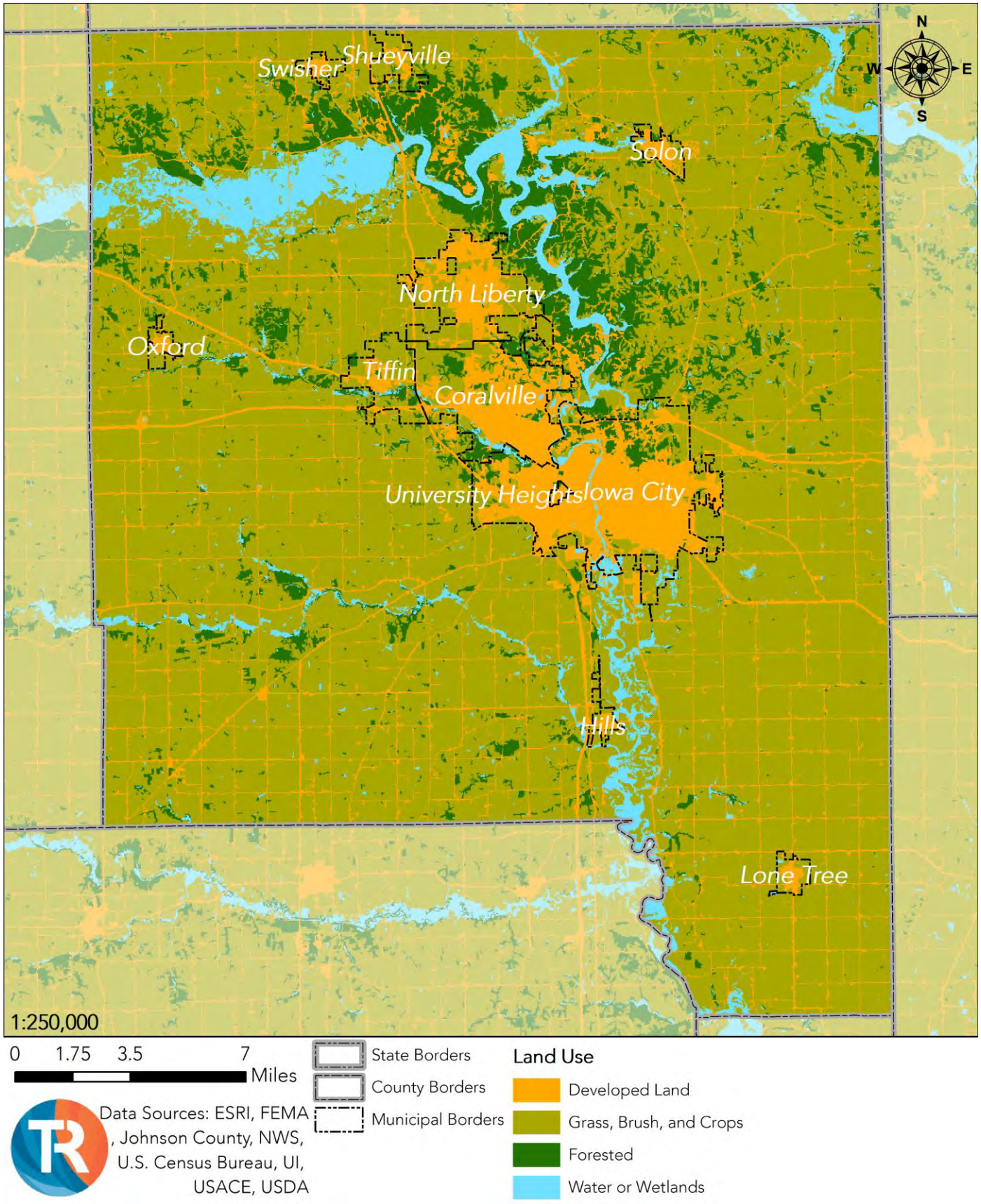
Most wildland fires occur without warning and spread quickly but the event depends upon a number of conditions. Wind can turn a small flame into a multi-acre grassfire within a matter of minutes, while this can be further compounded by the level of moisture and available fuel based on the area's land use.

History & Probability

There have not been any wildland fires in the planning area that would be considered historically significant. However, small grass fires do occur multiple times per year in rural areas of the county.

Manageable wildland and grass fires will occur in Johnson County on a regular basis throughout the year. However, it is highly unlikely that they will occur in an urban area, within any of the established municipal borders.

Map 3.27 – Vegetative Fuel, Johnson County



Vulnerability of and Impact on Facilities

A wildland fire burning near a jurisdiction may cover it in soot, cause secondary fires from traveling coals, or directly engulf facilities burning them to the ground. Properties located in some rural areas can prove more difficult to reach by first responders. Additionally, many of these rural locations do not have adequate water supplies for first responders to utilize in extinguishing these fires, causing them to spread farther than they normally would. Facilities can be protected by creating defensible spaces or buffer zones, maintaining a fuel free environment, and structural modifications to prevent the growth of a wildland fire.

Grass and brush fires threaten almost every structure that exists in a vegetated area as depicted in Map 3.25 located earlier in this hazard profile. Johnson County and its participating jurisdictions' 42,811 municipal structures are valued at $15,846,495,000. A GIS analysis of the identified WUI puts a total of 5,105 of the planning area's municipal structure inventory worth $1,632,909,000 vulnerable to and at high risk to wildland fires. Please see the table on the following pages for a breakdown of these values by jurisdiction and maps located at the end of this hazard profile for depictions of the WUI zones.

Table 3.24 – Vulnerable Municipal Structures by Count, Wildland Fires

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Uni-Johnson Co.	21	138	3	51	2968	22	3,203
Coralville	1	1	0	0	39	0	41
Hills	0	0	0	0	0	0	0
Iowa City	0	13	0	6	423	24	466
Lone Tree	0	0	0	0	0	0	0
North Liberty	1	6	0	9	337	16	369
Oxford	0	0	0	0	0	0	0
Shueyville	3	12	0	4	245	0	264
Solon	5	55	2	15	659	15	751
Swisher	0	0	0	0	0	0	0
Tiffin	0	3	0	0	8	0	11
University Heights	0	0	0	0	0	0	0
Total =	31	228	5	85	4,679	77	5,105

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Table 3.25 – Vulnerable Municipal Structures by Value, Wildland Fires

Municipality	Ag	Com	Gov	Ind	Res	Res-M	Total
Uni-Johnson Co.	$5,676,000	$83,042,000	$846,000	$13,634,000	$659,503,000	$204,958,000	$967,659,000
Coralville	$124,000	$46,000	$0	$0	$11,593,000	$0	$11,763,000
Hills	$0	$0	$0	$0	$0	$0	$0
Iowa City	$0	$11,023,000	$0	$3,405,000	$82,587,000	$85,680,000	$182,695,000
Lone Tree	$0	$0	$0	$0	$0	$0	$0
North Liberty	$99,000	$1,898,000	$0	$21,595,000	$87,717,000	$21,192,000	$0
Oxford	$0	$0	$0	$0	$0	$0	$0
Shueyville	$1,579,000	$4,391,000	$0	$500,000	$88,146,000	$0	$94,616,000
Solon	$811,000	$37,282,000	$3,117,000	$6,265,000	$162,130,000	$31,857,000	$241,462,000

Swisher	$0	$0	$0	$0	$0	$0	$0
Tiffin	$0	$486,000	$0	$0	$1,727,000	$0	$2,213,000
University Heights	$0	$0	$0	$0	$0	$0	$0
Total =	$8,289,000	$138,168,000	$3,963,000	$45,399,000	$1,093,403,000	$343,687,000	$1,632,909,000

*Multi-Unit Residential is defined as a structure with 5 or more residential units
**The data are from the U.S. Census Bureau and FEMA

The University of Iowa has one facility in its Main Campus Districts and nine facilities at the Lake McBride Nature Recreation Area in identified WUI zones and considered vulnerable. These 10 buildings total value is equal to $181,359,654. Four CSD campuses are located within WUI zones. Even in these four cases, each campus is located within close proximity of municipal fire stations. The table below outlines the four CSD campuses that exist within identified WUI zones.

Table 3.26 – Vulnerable Community School Districts, Wildland Fires

School	CSD	Location	WUI Level	Value
Lakeview Elementary	Solon	Solon	Medium	$
Liberty High School	Iowa City	North Liberty	Low	$79,515,000
Solon High School	Solon	Solon	Medium	$
Solon Middle School	Solon	Solon	Low	$
			Total =	$

Vulnerability of and Impact on Critical Facilities

Of the planning area's 145 critical facilities, only 11 are located in high risk WUI zones. Please see the table below for a breakdown of these facilities and their WUI risk level.

Table 3.27 – Vulnerable Critical Facilities, Wildland Fires

Facility	Type	Location	WUI Level
Linn County Lake MacBride Substation	Utility	Johnson County	Low
Secondary Roads – Oxford	Public Works	Johnson County	Low
Secondary Roads – Shueyville	Public Works	Johnson County	Low
Shueyville Community Building	Local Government	Shueyville	Medium
Alliant Energy Solon Substation	Utility	Solon	Low
Solon Care Center	Assisted Care	Solon	Medium
Solon City Hall	Local Government	Solon	High
Solon Community Housing	Assisted Care	Solon	Medium
Solon Fire Station	Fire Prevention	Solon	High
Solon Public Works	Public Works	Solon	Low
Solon Water Treatment Plant	Water Treatment	Solon	Medium

Vulnerability of and Impact on Population

An inability to properly evacuate is a populations greatest vulnerability. They can be caught off guard due to improper warning systems and become trapped in a growing wildland fire. Johnson County and its participating jurisdictions have a population of 149,210 of which 13,987 are considered vulnerable and at high risk to wildland fires. Similarly, of the total 55,967 housing units in the planning area, 5,343 are considered vulnerable and at high risk to wildland and brush fires. The CSD campuses are risk educate a total of 2,229 students and have a variable number of staff and faculty.

Table 3.28 – Vulnerable Municipal Populations, Wildland Fires

Municipality	Population	Housing Units
Uni-Johnson Co.	7,896	3,169
Coralville	96	46
Hills	0	0
Iowa City	2,050	544
Lone Tree	0	0
North Liberty	1,292	522
Oxford	0	0
Shueyville	681	245
Solon	1,954	806
Swisher	0	0
Tiffin	18	11
University Heights	0	0
Total =	13,987	5,343

**Multi-Unit Residential is defined as a structure with 5 or more residential units*
***The data are from the U.S. Census Bureau and FEMA*

Vulnerability of and Impact on Systems

It is unlikely that a single wildland fire will grow large enough to cause significant or long-lasting damage to Johnson County and this plan's participating jurisdictions' economies, education services, or hinder the local governments' ability to provide services to their communities. However, a potent enough incident may cause short-term problems for their transportation systems in regards to response operations.

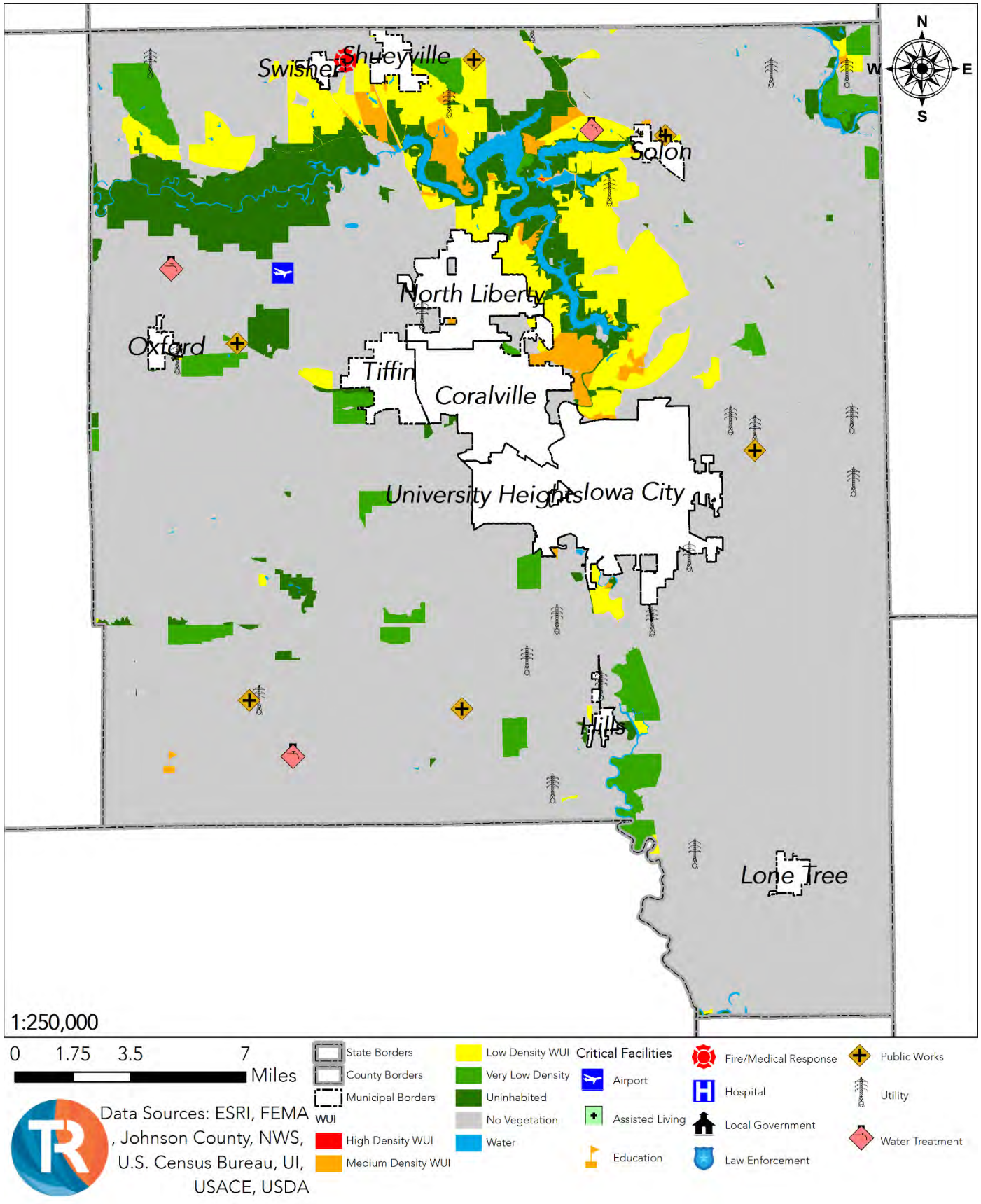
In the event a wildland fire begins to burn and grow, evacuation routes may become blocked by the fire or by other people attempting to evacuate. The impingement of the local transportation system makes appropriate warning and information paramount in mitigating Johnson County and its participating jurisdictions' systems vulnerability to wildland fires. It is unlikely that any of the participating school districts or local municipal buses would become trapped by wildland fires since exceptional care will be taken by JCEMA to reroute these buses.

Key Considerations

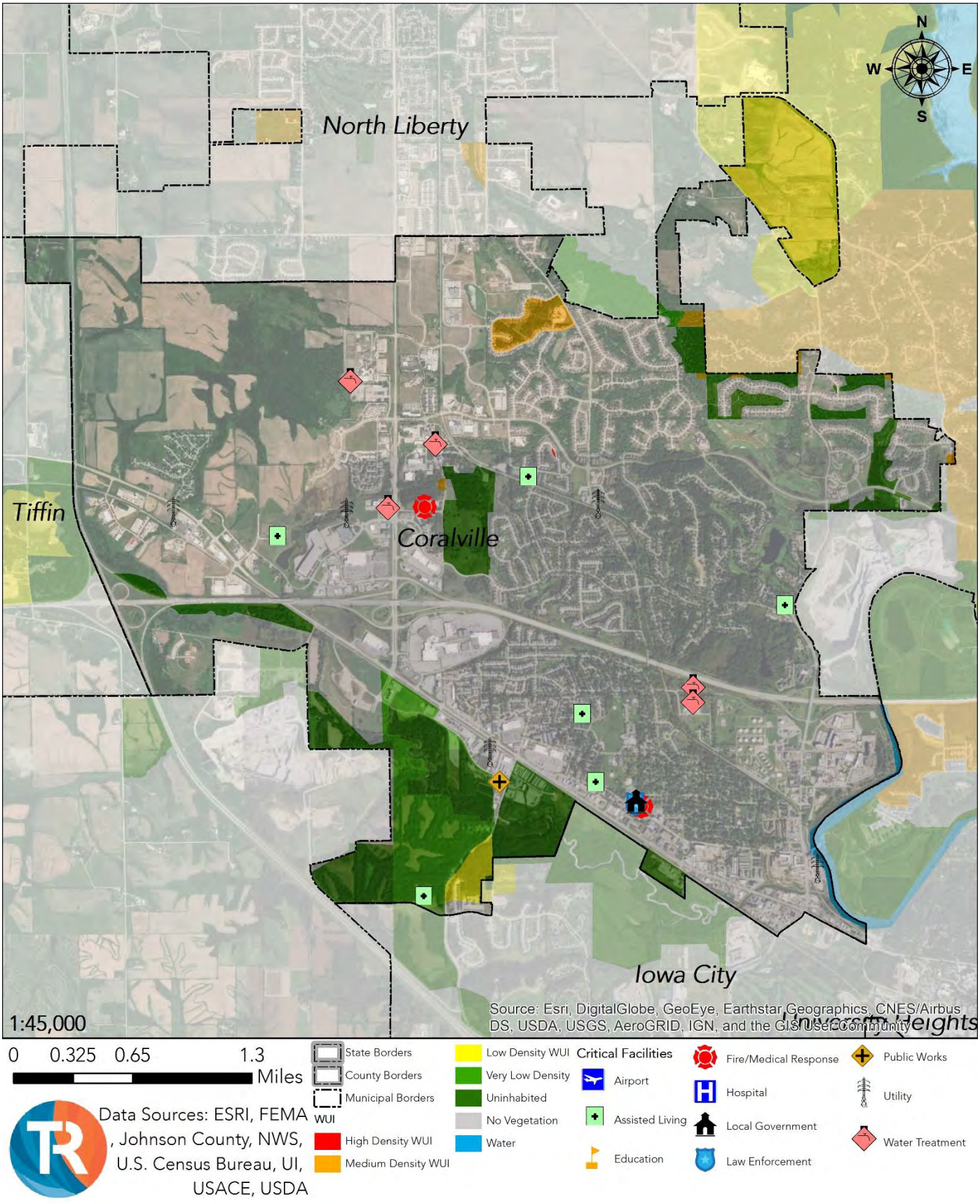
As depicted throughout this section, every jurisdiction has a small vulnerability to grass and brush fires although the total risk is minimal due to the available vegetative fuel available. In terms of identified WUI locations, unincorporated Johnson County, Coralville, Iowa City, North Liberty, Shueyville, Solon, and Tiffin have segments that could reasonably be considered high risk to wildland fires. The vast majority of the University of Iowa's structures exist in areas without significant vegetation as considered to be at an extremely low risk state. Only Mayflower Hall and the nine facilities noted at the Lake McBride Nature Recreation Area exists within an identified WUI zone, and even then, it is located well within the short-term response areas of Iowa City.

Iowa City, North Liberty, Shueyville, Solon, Swisher, and Tiffin have seen significant population growth since the development of their last hazard mitigation plan (Measured at greater than 5% growth). Off these communities, Iowa City, North Liberty, and Swisher's growth has not been into vegetated WUI areas and thus their vulnerability and risk to wildland fires has not increased since their last plan was developed. However, Shueyville, Solon, and Tiffin's growth has been into heavily vegetated areas and thus they are considered more vulnerable and at risk than they were during the development of their last mitigation plan.

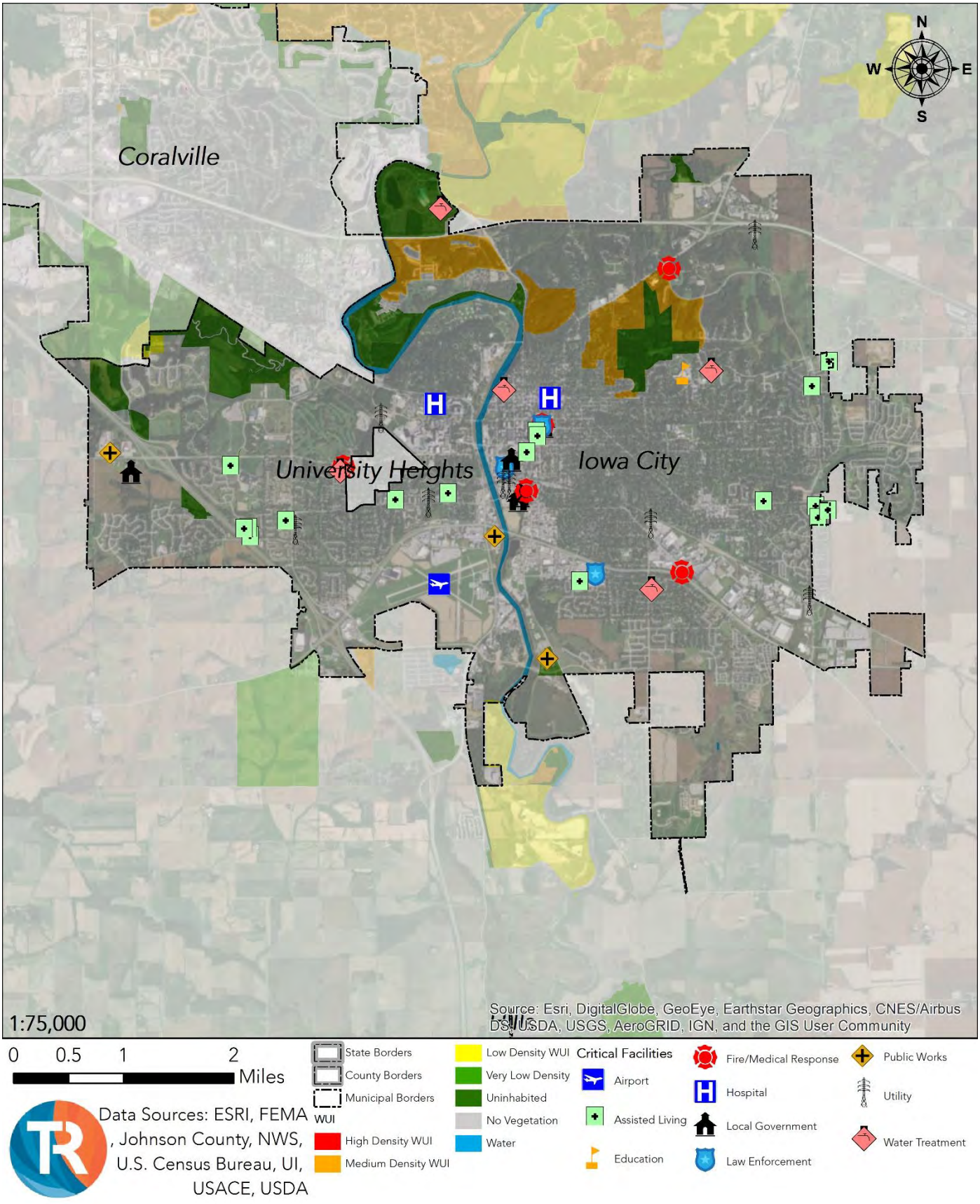
Map 3.28 – WUI, Johnson County



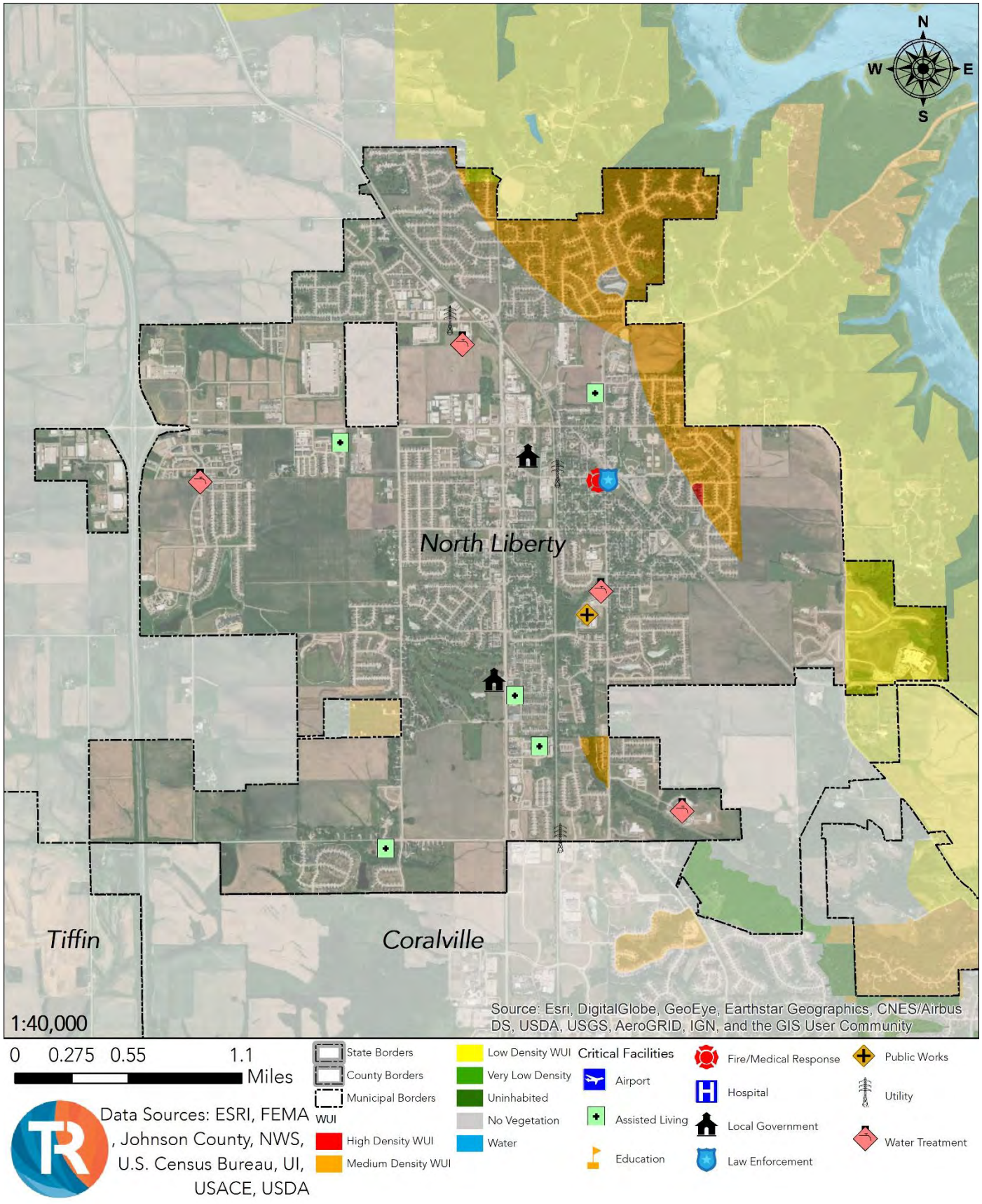
Map 3.29 – WUI, Coralville



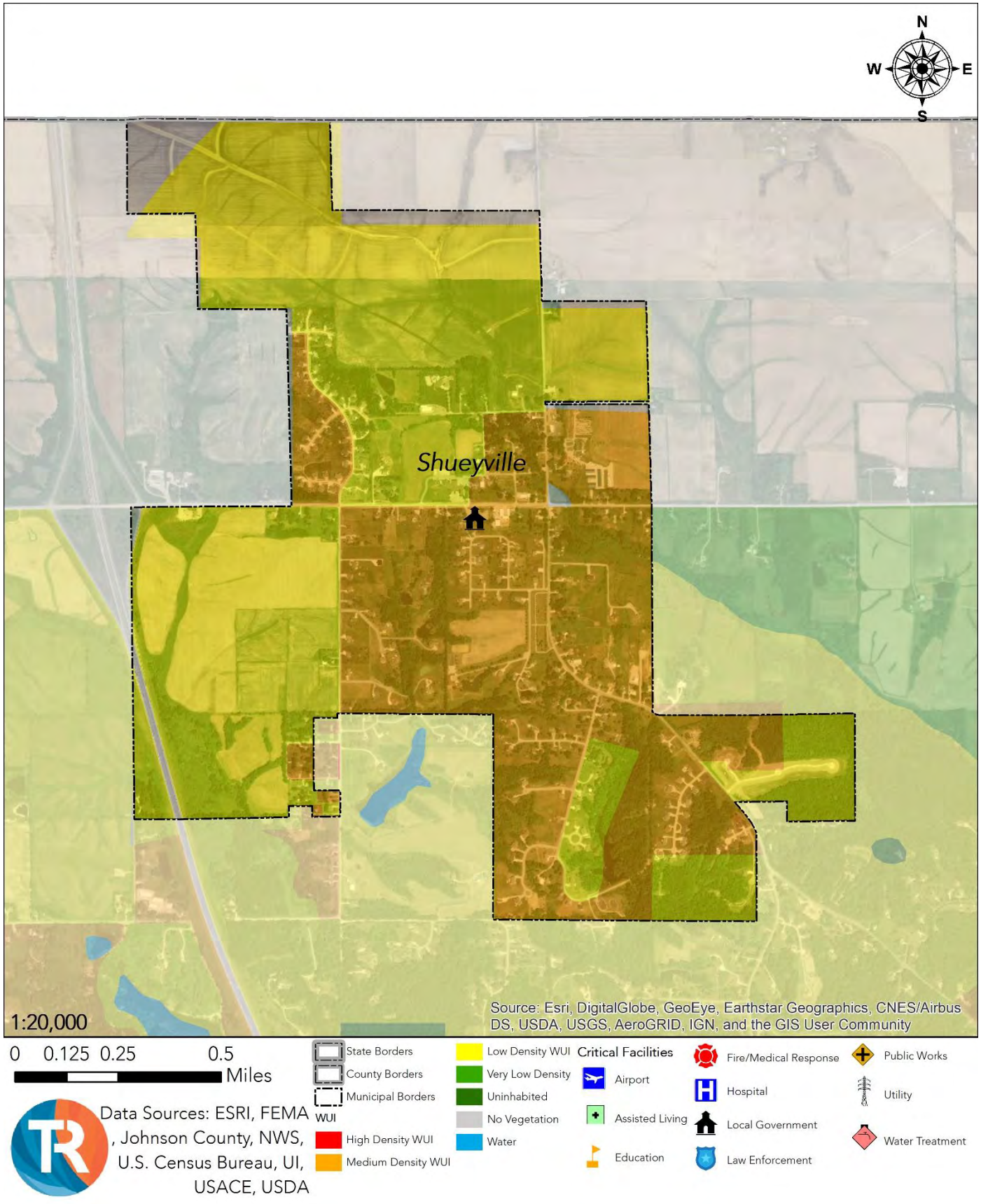
Map 3.30 – WUI, Iowa City



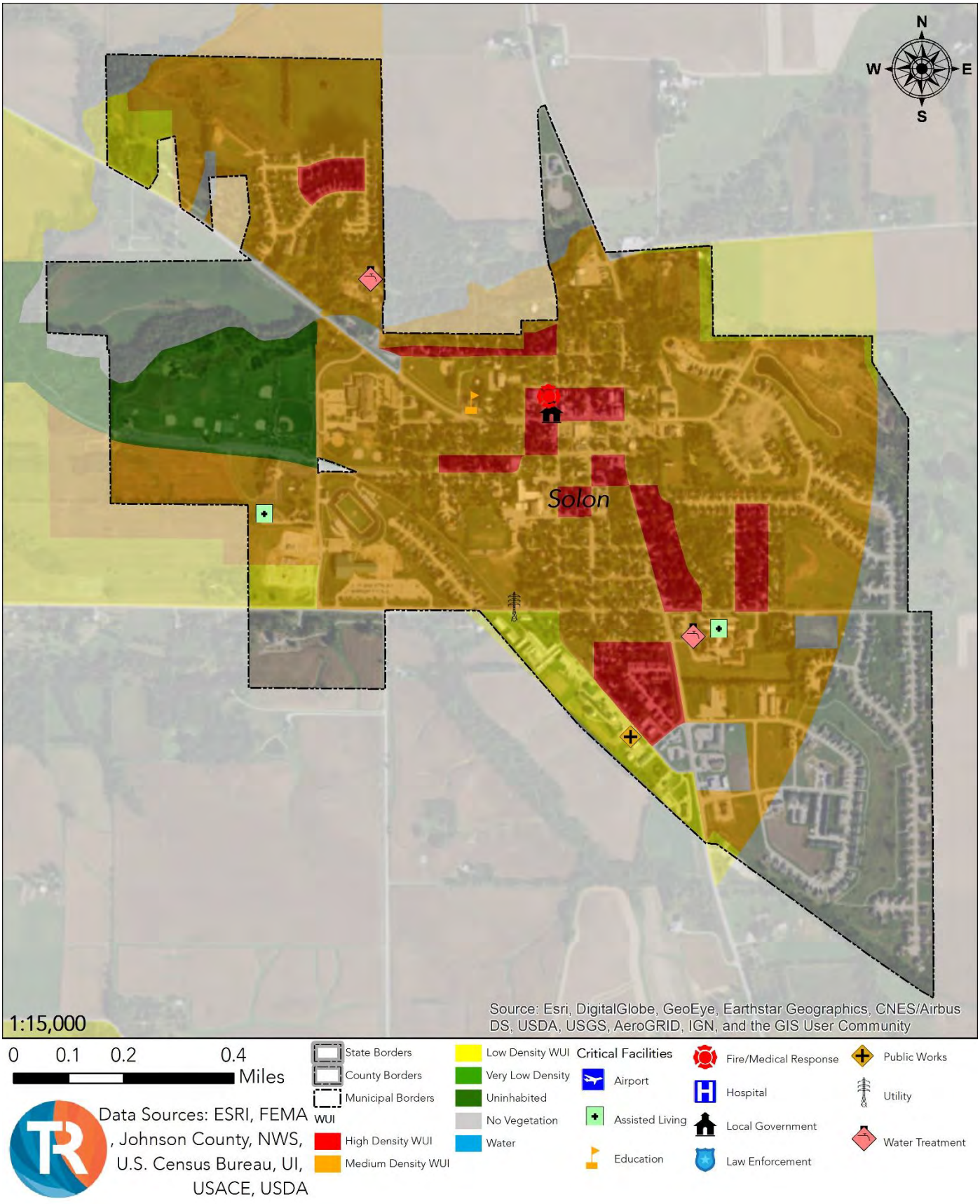
Map 3.31 – WUI, North Liberty



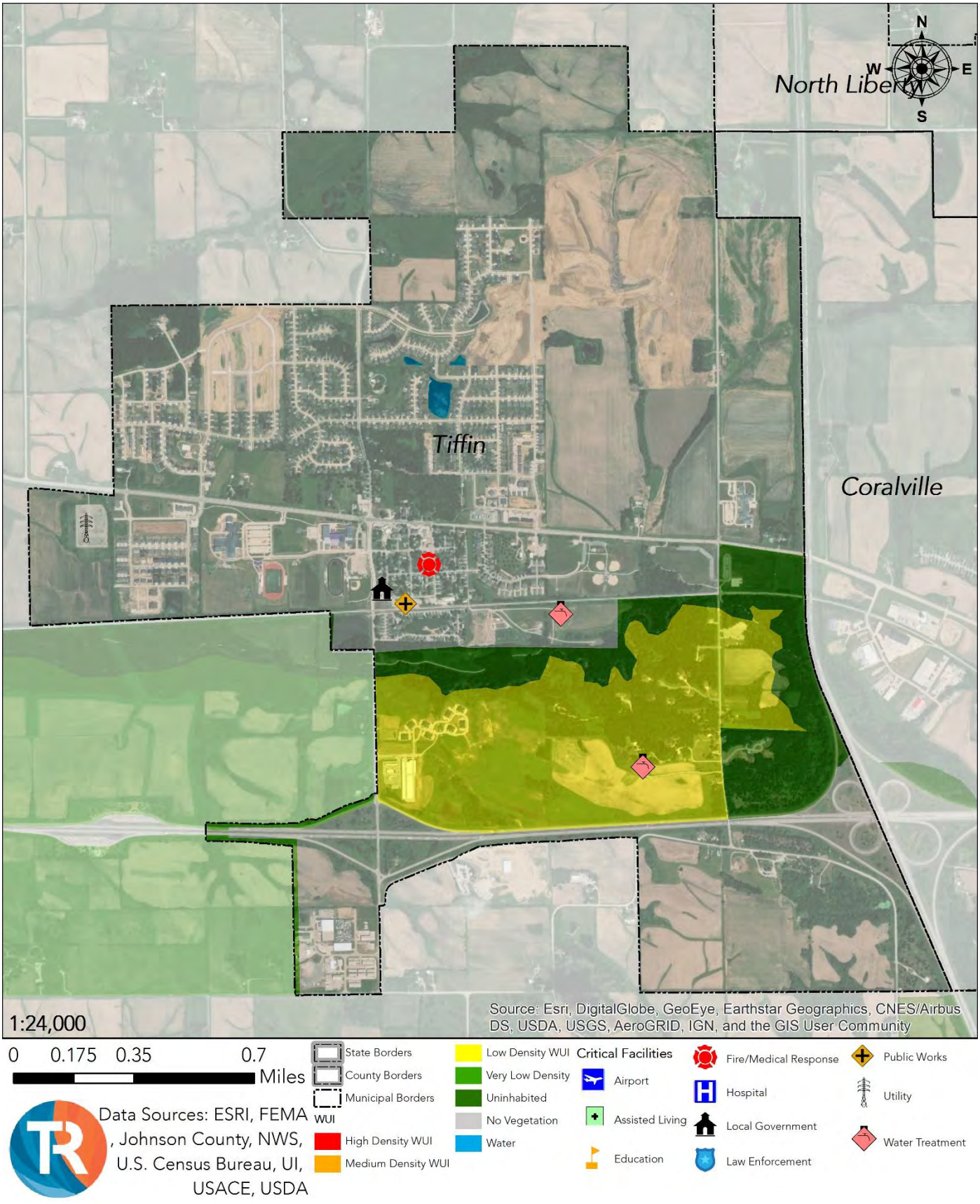
Map 3.32 – WUI, Shueyville



Map 3.33 – WUI, Solon



Map 3.34 – WUI, Tiffin



3.9 – Winter Storms

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

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

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

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

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

Location & Extent

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

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

Johnson County and its participating jurisdictions will typically receive 4 to 6 inches of snow during a winter storm, but a single storm in the planning area has managed to accumulate up to a reported 10 to 14 inches. Additionally, Johnson County and its participating jurisdictions have seen up to 2.00 inches of accumulated ice. They should be prepared for the typical average of anywhere between 0.25 to 0.75 inches of ice during a winter storm.

History & Probability

Since 1996, NOAA has recorder 113 winter storms in the planning area. Most ice storms leave under 1 inch of accumulation however, on one occasion the planning area has seen ice accumulation as much as 2 inches. Snowfall from winter storms has varied greatly ranging from just a few inches to greater than a foot of snow accumulation.

These winter storms have not caused any personal injury or deaths in the planning area, but have caused $1,006,000 in property damage. For a complete list of NOAA recorded winter storms, please reference Appendix E.

Based on the data recorded by NOAA, the planning area should expect a winter storm at a rate of 4.91 per year.

Vulnerability of and Impact on Facilities

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

Johnson County and its participating jurisdictions' municipal, community school district, and university structures are valued at a total of $21,667,403,369. Since winter storms threaten the entire planning area equally, all municipal, community school district, and university structures are considered exposed and vulnerable.

The average winter storm in Johnson County and its participating jurisdictions costs $8,902, while the existing range of a single incident has been from $0 to $1,000,000.

Vulnerability of and Impact on Critical Facilities

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

Vulnerability of and Impact on Population

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

Johnson County and its participating jurisdictions have a total population of 149,210 in 55,967 housing units all of which are vulnerable and at risk to winter storms. Additionally, all 18,541 CSD and 33,564 university students and their 2,943 CSD and 5,274 university staff and faculty are considered exposed and vulnerable.

Historically, there have been 1 recorded fatality and 0 injuries relating to winter storms across region wide fronts in Johnson County and its participating jurisdictions. (This fatality occurred outside of the weather dataset's range, but is noteworthy and thus included).

Vulnerability of and Impact on Systems

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

Key Considerations

Winter storms have ability to affect a portion of or the entire planning area. Unfortunately, there is no way to predict ahead of time which areas will likely be more or less adversely directly affected. In regards to winter storm impacts, the rural municipalities of Unincorporated Johnson County, Hills, Lone Tree, Shueyville, Solon, and Swisher are less dense and rely on a more decentralized power grid. Residents of these communities stand to last without out power for a greater period of time caused by a debilitating ice storm or blizzard. Further, the rural CSDs of Lone Tree and Solon stand to be affected by more days of cancelled school due to power outages or unplowed transportation infrastructure.

Iowa City, North Liberty, Shueyville, Solon, Swisher, and Tiffin have seen significant population growth since the development of their last hazard mitigation plan (Measured at greater than 5% growth). These communities are considered to be more vulnerable and at risk to winter storms than they were at the time their last plan was developed.

Furthermore, significant road blockage or dangerous conditions caused by ice or snow accumulation can hamper or shut down the public transit system that serves North Liberty, Coralville, Iowa City, and the University of Iowa. (Depicted in Section 2, Map 2.3)

The University of Iowa claims 6,225 part-time students, which this plan assumes the majority are commuters. It is likely that a debilitating winter storm would prevent these students from attending classes, and potentially prevent critical staff and faculty from arriving at work, either by delaying or shutting down public transit or blocking other transportation infrastructure, while those who live closer to or on campus are still able to attend or arrive.

3.10 – Excluded Hazards

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

The following natural hazards were included in Johnson County's previous hazard mitigation plan but have been excluded from this update.

Earthquakes

There is only one recorded incident of a minor earthquake occurring in the planning area. In 1948 shaking was felt in Oxford, but no injuries, fatalities, or property damage was recorded. The USGS identifies the planning area as being in Seismic Risk zone of 0 and 1, the lowest two categories possible.

Additionally, there is no study or analysis that claims any part of the planning area is at risk to an event emanating from the New Madrid Seismic Zone (NMSZ). The most comprehensive and predominate study on a NMSZ event claims an eight-state region of effect. Iowa is not one of these eight states.

Expansive Soils

Neither Iowa or Johnson County is considered a state with expansive soils issues. Although clay soil deposits might exist in isolate places, simply the existence of clay soil deposits does not correlate to an expansive soils problem. There are no documented cases of clay soils shrinking and expanding that have directly caused property damage.

Extreme Heat

Johnson County has experienced only one singular event considered as an extreme heat event and three others considered heat events. It is likely that it will experience more in the future, although infrequently. These events do not pose a threat to any of the planning area's structures but does pose a potential risk to its population. However, other than the maintenance and function of ventilation and air conditioning units, there are no projects or actions that fit under FEMA or the wider emergency management community's definition and scope of mitigation.

Landslides

There is not a significant threat from landslides to the planning area or throughout Iowa. A mudslide did occur in April of 2013 on the University of Iowa's campus, although no one was injured and only slight property damage was incurred, largely from cleanup activities. This shift in soil was caused by extensively heavy rains, not due to a generally unstable soil composition.

Although steep slopes do exist throughout the county, the climatic and topographic conditions are not present to consider them a reasonable or measurable threat to people or property.

Sinkholes

Historically, no sinkholes have formed in Johnson County. Typically, sinkholes only occur in areas that have what is called "Karst Formations," but the existence of a Karst Formation does not guarantee a sinkhole will ever form.

Other than their formation occurring where Karst Formations also exist, sinkholes are extremely difficult to pinpoint and predicting them based on a general historical precedent is best.
Areas of Johnson County have potential karst topography so there is a potential, but due to the lack of historical precedence, they are unlikely to form.

3.11 – Risk Summary

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

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

Table 3.29 – Hazard Risk Summary

Jurisdiction	Dam Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Uni-Johnson County	1	2	5	6	4	2	2
Coralville	1	1	4	5	3	1	2
Hills	1	2	5	6	4	1	2
Iowa City	1	1	4	5	3	1	2
Lone Tree	0	2	1	6	4	1	2
North Liberty	0	2	3	5	3	1	2
Oxford	0	2	2	6	4	1	2
Shueyville	0	2	1	6	4	2	2
Solon	0	2	1	6	4	2	2
Swisher	0	2	2	6	4	1	2
Tiffin	1	2	4	5	3	1	2
University Heights	0	1	1	5	3	0	2
University of Iowa	1	1	4	5	3	1	2
Clear Creek-Amana CSD	1	0	4	5	3	0	2
Iowa City CSD	1	0	2	5	3	1	2
Lone Tree CSD	1	0	1	5	3	0	2
Solon CSD	0	0	1	5	3	1	2

Section 4 – Mitigation Strategy

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

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

4.1 – Mitigation Capabilities

Each type of stakeholder provides a set of capabilities, in some cases broad and in some cases narrow, by which they can increase the planning area's resiliency.

The broadest form of mitigation capabilities come from the county and municipal governments. Their inherent legal authority allows them to institute the greatest regulatory and developmental changes.

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

Fiscal Capability

Johnson County and its participating jurisdictions in this mitigation plan are not unique in the issues felt by small governments to retain the staff and resources necessary to accomplish the strategies necessary to mitigate the hazards in their area. However, they are aware of potential diverse funding sources available to communities for, assisting in the fiscal needs required to implement local hazard mitigation plans, including both government and private programs.

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

Johnson County and its participating jurisdictions should seek out FEMA grant funding from the Pre-Disaster Mitigation Grant Program (PDM), Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance Grant Program (FMA). Given the size of the municipalities involved in this plan and the pocketed areas of significant flood risk, municipal governments should have access to the United States Department of Housing and Urban Development's Community Development Block

Grant Program (CDBG) which occasionally will award grants to assist with projects that fall under hazard mitigation.

Institutional Capability

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

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

Johnson County and the University of Iowa have already taken a pro-active approach by becoming certified StormReady Communities through the NWS and recognized as NOAA Large Venue Lightning Ready. JCEMA actively collaborates with the NWS to train locals as certified SKYWARN Storm Spotters. The other participants of this plan should engage JCEMA and the UI for assistance in becoming StormReady Communities and increasing the number of trained spotters.

StormReady Communities

The NWS StormReady program helps communities with the communication and safety skills needed to save lives and property. StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education, and awareness. This label is granted to communities that meet a measured level of weather preparedness and staffing capabilities.

Additionally, the University of Iowa conceived the idea for the Iowa Flood Center (IFC) in the midst of flood recovery and post-disaster research after the record-setting floods of 2008. In 2009, legislative funding was secured for the research group to actively engage in flood-related projects that help Iowans understand their flood risk and better prepare for flooding. This group not only works on flood resiliency in Johnson County, but has assisted floodplain mapping in 85 Iowa counties, created flood-inundation maps for 20 Iowa communities, worked on cost-efficient sensor networks, and created a centralized workforce and database of flood knowledge, predictions, and mitigation for use across the State of Iowa.

Political Capability

During the process of the development of this plan, opposition to mitigation measures was not evident in Johnson County or in the participating stakeholders. In fact, the county has taken a proactive approach to mitigation efforts after the 2008 flood. The primary limiting factor is funding, which is made more difficult by the current situation in the local, state, and national economy.

The county, cities, and their partnerships with the participating agencies are well-organized and responsive to community needs. Leadership is informed and remains up-to-date on the hazards that

threaten the area. Citizens who did participate in the public meetings and presentations showed an interest in doing things to promote a safer community. Therefore, the county and cities (the governing board, staff, and citizen population) appear willing to promote the economic efficiency and social utility of the mitigation measures contained in this plan, if appropriate funding can be identified.

Technical Capability

The participating stakeholders have the basic technology needed to mitigate and respond to natural disasters. They are equipped with state-of-the-art emergency operations center (EOC) in case of disaster. Personnel are equipped with the P25 interoperable radio systems and other communications equipment, which can act as a backup to land lines in case basic services are lost. The county is connected to the Internet giving them access to various NWS and NOAA alerts and data, which is a valuable source of information on approaching weather and hazards as well as providing resource coordination. The EOC is equipped with a complete reverse 911 system and a backup location.

The planning area is protected by a network of 66 outdoor severe weather sirens, 1 campground severe storm shelter, 2 lightning early warning detection systems, and 5 weather STEM smart weather technology units.

JCEMA can continue to educate and train staff through federal and state emergency management programs and federal weather programs. By simply educating and increasing their technical capabilities, indirect incremental changes will happen over time that will spill over into hazard resiliency.

General Authority & Regulations

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

Building Codes & Inspection

Building codes and inspections provide local governments with the means to maintain county structures that are resilient to natural hazards. Johnson County and each of the participating municipality has adopted the 2015 International Building and Fire Prevention Code. These codes prescribe minimum standards for building construction, which ensures that new buildings and structures are built to standards that are seismically sound, fire resistant and developed within flood-proofing measures. These codes also require appropriate hazard code updating and compliance when certain thresholds are met for remodel and renovation of existing buildings. These codes also authorize local governments to carry out building inspections to ensure local structures adhere to the minimum state building standards.

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

Land Use Planning

Through land use regulatory powers granted by the state, local governments can control the location, density, type and timing of land use and development in the community. Provisions of the land use plans are implemented through regulatory tools that include zoning and subdivision ordinances, and taxation.

Out of the plan's participating municipalities, only Hills, Lone Tree, and Oxford are without a comprehensive land use plan. These plan participants might not have the full administrative resources to develop their own plan, but could partner with the county government to develop one. Although this will not be as effective as individual land use plans, it will benefit them to a better degree than they currently have. Additionally, partial land use planning partnered with the county will put these municipalities on the path to fully employ land use planning in the future.

Zoning

Within its land use planning authority, each participating local government is authorized to divide the planning area into zones. For each type of zone (as defined in a written code and by zoning maps) the local government may classify, designate, regulate, and restrict the use of buildings (land and structures) to permit the most compatible use of land within the county consistent with the needs of residential, commercial and industrial developments, and the promotion of the public health, safety, welfare and general prosperity of the county and its residents.

Taxation

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

Floodplain Programs

Floodplain management is the operation of a community program of measures for reducing flood damage. These measures take a variety of forms; and generally include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances. Each participating jurisdiction has codified floodplain development regulations in place, although some participants may be granting special

construction permits. Additionally, the State of Iowa has floodplain development regulations in place to set forth minimum standards in the event a local community does not.

All participating municipalities are participants in the National Flood Insurance Program (NFIP). Iowa City and Coralville are members of the Community Rating System (CRS) program and both have CRS ratings of 7.

Johnson County, Coralville, and Iowa City employ their own floodplain managers. Their role is to enforce NFIP, State of Iowa, and other floodplain regulations within their municipal borders. Floodplain managers utilize State of Iowa Department of Natural Resources (DNR) floodplain maps in order to administer their programs and to actuarially rate new construction for flood insurance or development restrictions.

In each participating municipality, development in a floodplain is restricted. This restriction is enforced through the building permit application process. When an individual or business applies for a construction permit, its location within or outside of an identified floodplain is noted and reviewed. In the case of Unincorporated Johnson County, Coralville, or Iowa City, these permits are reviewed by their floodplain mangers. If the applicant is within one of the communities that does not have their own floodplain manager, they have the option to go through the review process via Johnson County's floodplain manager or through the DNR's application process. In the event the proposed construction site is within an identified floodplain, the construction must be located one foot above the established base flood elevation (BFE). This is then verified by each municipality's department in charge of ordinance and code compliance. This process meets the minimum regulations set forth by the NFIP and the IA DNR.

4.2 – Mitigation Goals

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

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

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

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

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

Goal 5: Minimize the risk to property from droughts.

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

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

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

Goal 9: Minimize the risk to life and property from wildland fires.

Goal 10: Minimize the risk to life and property from winter storms.

4.3 – Mitigation Projects

This plan identifies a comprehensive range of 22 possible and unique mitigation projects and 4 possible and unique mitigation actions. The selected set carefully takes an all-hazards approach to mitigation while simultaneously addressing each of the individual seven profiled hazards.

The projects and actions were selected based upon their potential to reduce the risk to life and property with an emphasis on new and existing infrastructure, ease of implementation, community and agency support, consistency with local jurisdictions' plans and capabilities, available funding, vulnerability, and total risk. For further information on evaluation criteria, please see Section 4.4. The full list of mitigation projects, their descriptions, and prioritization per jurisdiction and stakeholder can be found in Appendix F and Appendix G.

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

Table 4.1 – Mitigation Projects Summary

Project/Action	Jurisdictions
Backup Generators	All Jurisdictions (Except UI)
Bury Utility Lines, Pipes, and Tanks	All Jurisdictions
Debris & Natural Fuels Reduction	All Jurisdictions (Except University Heights, Clear Creek-Amana CSD, Lone Tree CSD)
Defensible Spaces & Buffer Zones	All Jurisdictions (Except University Heights, Clear Creek-Amana CSD, Lone Tree CSD)
Elevate Structures	All Jurisdictions
FEMA Code 361 Safe Rooms	All Jurisdictions
Floodproofing	All Jurisdictions
Insulation & Energy Efficiency	All Jurisdictions
Levee Construction	Solon
Looped Grid Power Systems	All Jurisdictions
Low Flow Utilities	All Municipal Governments, UI
Rainwater Retention Basins	All Municipal Governments, UI
Raise Transportation Infrastructure	All Jurisdictions
Relocate or Buyout Vulnerable Structures	All Jurisdictions (Except UI)
Snow Fences	All Jurisdictions
Storm Water Drainage Upgrade	All Jurisdictions
Storm Water Pump Stations	All Jurisdictions
Storm Siren Network Expansion	All Jurisdictions
Structural Integrity Monitoring Instruments	Johnson County, Coralville, Hills, Iowa City, Tiffin, UI, Clear Creek-Amana CSD, Iowa City CSD, Lone Tree CSD
Transportation Status & Routing Systems	All Municipal Governments, UI
Water Line Insulation	All Jurisdictions
Wildland Fire Structural Retrofit	All Jurisdictions (Except University Heights, Clear Creek-Amana CSD, Lone Tree CSD)

Table 4.2 – Mitigation Actions Summary

Project/Action	Jurisdictions
Comprehensive Land Use Planning	Oxford, Lone Tree
Dam Failure Evacuation Planning	Coralville, Hills, Iowa City, Johnson County, Tiffin, UI, Clear Creek-Amana CSD, Iowa City CSD, Lone Tree CSD
Public Awareness & Education	All Jurisdictions
Train SKYWARN Storm Spotters	Johnson County

Mitigation Project Updates

Johnson County's prior approved mitigation plan contained suggested projects and actions that are no longer considered qualified mitigation projects or actions, rather, they classify as response, recovery, or preparedness. If a project or action that was included in Johnson County's prior plan is not listed below or listed as "carried forward" in Appendix F, it has been deleted.

The 2008 floods that struck the region instigated an incredible interest and created a number of funding opportunities for the planning area. Since the development of the last hazard mitigation plan, many of this plan's participating jurisdictions took advantage of this to increase their hazard resiliency, most notably against riverine and flash flooding. The table below lists the mitigation projects that have been completed or initiated since the development of their last hazard mitigation plan.

Table 4.3 – Mitigation Project Updates

Mitigation Project	Jurisdiction	Status	Notes
Backup Generators	North Liberty	Completed	Community Center
Backup Generators	Solon	Completed	Water Treatment
Backup Generators	Swisher	Underway	City Hall & Public Works
Buyout Vulnerable Structures	Johnson County	Completed	RL Properties
Buyout Vulnerable Structures	Johnson County & Solon	Completed	Railroad Bridge Abutments
Levee Construction	Coralville	Completed	Coralville Levee
Levee Construction	Iowa City	Completed	West Side Levee
Raise Transportation Infrastructure	Coralville	Completed	Raised Bridges
Raise Transportation Infrastructure	Iowa City	Completed	N. Dubuque St. (Gateway Project)
Raise Transportation Infrastructure	Iowa City	Completed	Park Road Bridge (Gateway Project)
Raise Transportation Infrastructure	UI	Completed	River bank sidewalks
Relocate Vulnerable Structures	Iowa City	Completed	North Waste Water Plant
Relocate Vulnerable Structures	Solon	Completed	Structures at Randall Park
Relocate Vulnerable Structures	UI	Completed	
Storm Shelter	Johnson County	Completed	AME Building
Storm Siren Network Expansion	Solon	Completed	
Storm Water Drainage Upgrade	Coralville	Completed	
Storm Water Drainage Upgrade	Solon	Completed	
Storm Water Drainage Upgrade	Solon	Completed	Attendance Center
Storm Water Drainage Upgrade	Solon CSD	Completed	Middle School
Storm Water Pump Stations	Coralville	Completed	
Storm Water Pump Stations	Iowa City	Completed	
Storm Water Pump Stations	North Liberty	Completed	
Storm Water Pump Stations	UI	Completed	
Waterproofing	UI	Completed	Steam Tunnels

4.4 – Project Evaluation

Johnson County and this plan's participants will utilize the STAPLE+E method of assessing mitigation actions, projects, and alternatives. Upon deciding to move forth with a mitigation project, according to decision-making process of the participating jurisdiction, the decision-making body will use the form on the following page. The evaluation will be conducted according the definitions in the table below:

Table 4.4 – STAPLE+E

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

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

Table 4.5 – STAPLE+E Sample Form

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

4.5 – Planning Integration

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

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

Emergency Management Planning

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

Emergency Operations Plans

JCEMA's next EOP update will reflect the most probable and dangerous hazard event scenarios from the plan's risk assessment. Additionally, the plan will be referenced in its entirety as an appendix to the EOP. This revision is the responsibility of JCEMA for all of the jurisdictions participating in this plan. Upon revision completion, all participating jurisdictions and appropriate emergency services will be notified of the revisions and sent out new copies of the EOP. Any and all other emergency operations planning conducted by UI or the community school districts will reference this plan where appropriate.

State of Iowa Homeland Security and Emergency Management

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

Democratic Governments & Boards

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

This plan should be integrated into agenda proposal's designs and cross-referenced during deliberation and discussion of the proposed activity. By using this plan's risk assessment, development and capital improvement projects can be appropriately implemented taking into consideration a community's resiliency.

Comprehensive Land Use Planning

With the exception of Oxford and Lone Tree, all participating municipal governments maintain a comprehensive land use plan. These plans detail building codes, ordinances, zoning, and other land

use measures as they relate to hazard risk reduction. Upon future updates of these plans, at a minimum, this mitigation plan will be considered for serving as a base guide to updating and improving hazard risk reduction measures contained within the comprehensive land use plans.

University of Iowa Campus Master Plan

The State of Iowa requires state universities to produce and maintain a five-year campus master plan. The plan should indicate past, present, and anticipated development and note any significant changes from plans previously presented to the state's Board or Committee. The campus master plan should relate directly to the university's strategic and academic plans.

It is developed and maintained as a product of an inclusive process that has evolved with a broad spectrum of campus leaders, including all deans, representatives of all campus constituencies, and representatives of both Iowa City and Coralville. The master plan is intended to control the general order of the campus, not the details of design. This encourages using the master plan as a living document, one that has built in a significant degree of flexibility.

UI's current campus plan already takes into consideration significant hazard mitigation and threat reduction measures. As their campus master plan continues to be updated and maintained it will use this plan as a reference document for furthering its hazard resiliency risk minimizing goals.

Community School District Facilities Master Plans

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

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

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


NiceHash Profitibility
How to reboot a rig
Johnson County
Iowa
Johnson County
Home
I Want To...
Departments
Boards/Commissions/Councils
Calendar
Search
Emergency Management Home
News Releases
Damage Assessment Reporting
Commission Agendas/Minutes
LEPC
JECC
Related Links
Johnson County CERT
Special Needs Emergency Registry
Register for Weather & EMA Alerts
SkyWarn Net Reports
Emergency Preparedness Info
2008 EMA Flood Response
Medical Reserve Corps
Johnson County ARES/RACES
Current Weather at the JECC
facebook
EMA
News Releases
These files are in Adobe PDF format
NEWS RELEASES
01-30-18 Hazard Mitigation Plan Update Kick-off Meeting, Thursday, February 22
05-16-17 Preparedness Exercise Scheduled for May 17, 2017, in Iowa City from 8:00 am until Noon
05-03-17 Additional Outdoor Siren Testing to be Performed out of Sequence this Friday in Johnson County
03-29-17 Outdoor Weather Sirens will Not be Sounding Today as part of the NWS Statewide Tornado Drill
03-27-17 March 27th through 31st is Severe Weather Awareness Week
03-21-17 Inspiron Logistics Press Release Regarding Alert Sent in Error to Johnson County Citizens
03-20-17 Wireless Emergency Alert System Error Message
Publication of Budget FY18
Publication of Budget FY17
09-28-16 Outflow at Coralville Lake Temporarily Reduced
08-15-16 - Resources for Solon Flash Flood Damage
08-12-16 2016 Solon Flood Damage
08-08-16 Post Active Shooter Response Training Hosted in Johnson County
07-21-16 Heat Emergency Preparedness & Outdoor Events
05-20-16 Preparedness Exercise in Coralville May 21, 9:00 am until noon
05-19-16 Load Restrictions and Lane Closures on Highway 965 Bridge Over the Iowa River
03-21-16 Statewide Tornado Drill Moved to March 24
03-14-16 Storm Spotter Training Cancelled
03-14-16 Gov. Branstad Designates March 21 - 25 as Severe Weather Awareness Week
11-06-15 Disaster and Emergency Animal Rescue Training
05-26-15 Johnson County to host 'Water Emergency Preparedness Training'
03-23-15 Iowa Statewide Tornado Drill
03-18-15 Severe Weather Week
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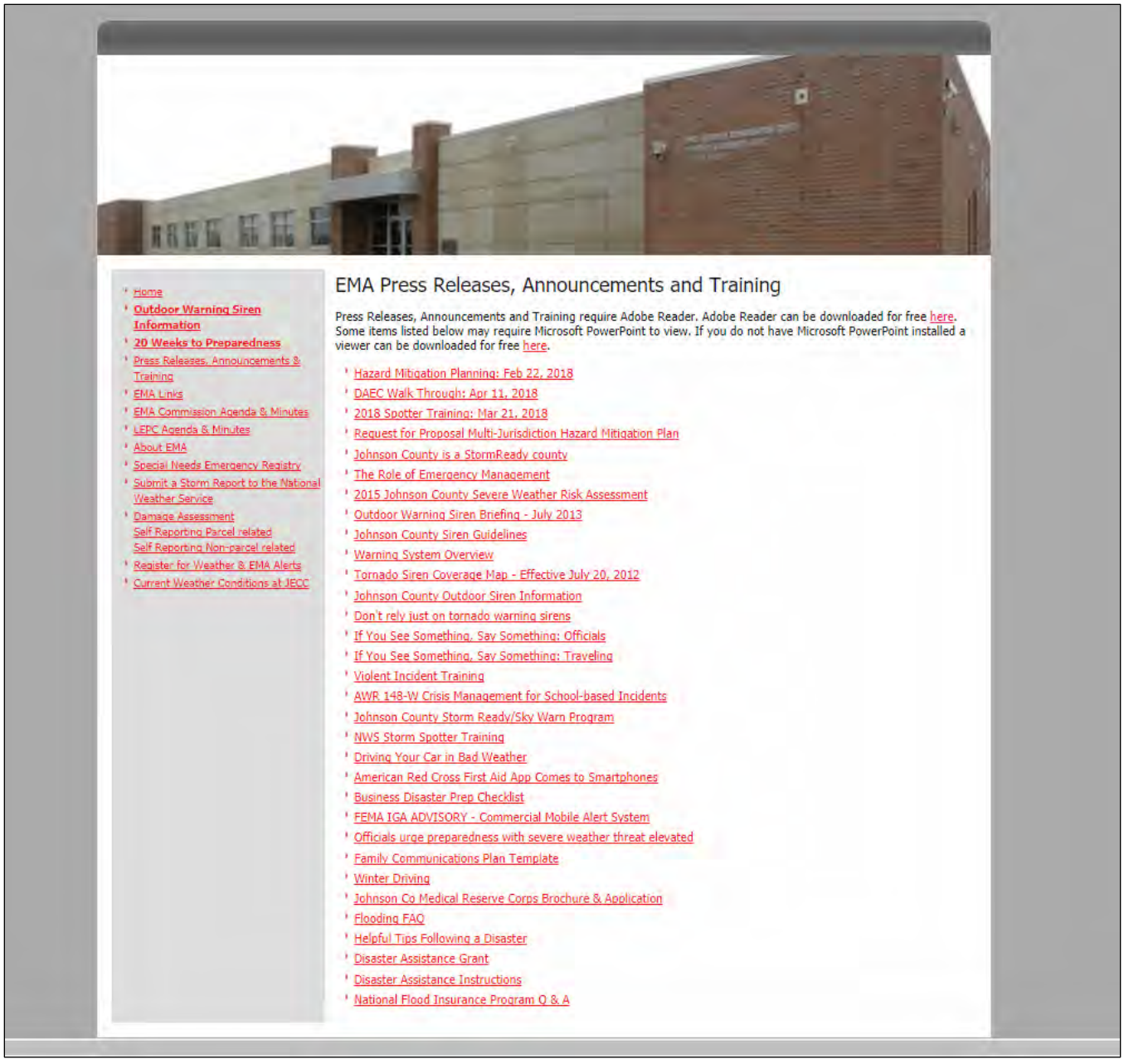

- Home
- **Outdoor Warning Siren Information**
- **20 Weeks to Preparedness**
- Press Releases, Announcements & Training
- EMA Links
- EMA Commission Agenda & Minutes
- LEPC Agenda & Minutes
- About EMA
- Special Needs Emergency Registry
- Submit a Storm Report to the National Weather Service
- Damage Assessment
  Self Reporting Parcel related
  Self Reporting Non-parcel related
- Register for Weather & EMA Alerts
- Current Weather Conditions at JECC

EMA Press Releases, Announcements and Training

Press Releases, Announcements and Training require Adobe Reader. Adobe Reader can be downloaded for free here. Some items listed below may require Microsoft PowerPoint to view. If you do not have Microsoft PowerPoint installed a viewer can be downloaded for free here.

- Hazard Mitigation Planning: Feb 22, 2018
- DAEC Walk Through: Apr 11, 2018
- 2018 Spotter Training: Mar 21, 2018
- Request for Proposal Multi-Jurisdiction Hazard Mitigation Plan
- Johnson County is a StormReady county
- The Role of Emergency Management
- 2015 Johnson County Severe Weather Risk Assessment
- Outdoor Warning Siren Briefing - July 2013
- Johnson County Siren Guidelines
- Warning System Overview
- Tornado Siren Coverage Map - Effective July 20, 2012
- Johnson County Outdoor Siren Information
- Don't rely just on tornado warning sirens
- If You See Something, Say Something: Officials
- If You See Something, Say Something: Traveling
- Violent Incident Training
- AWR 148-W Crisis Management for School-based Incidents
- Johnson County Storm Ready/Sky Warn Program
- NWS Storm Spotter Training
- Driving Your Car in Bad Weather
- American Red Cross First Aid App Comes to Smartphones
- Business Disaster Prep Checklist
- FEMA IGA ADVISORY - Commercial Mobile Alert System
- Officials urge preparedness with severe weather threat elevated
- Family Communications Plan Template
- Winter Driving
- Johnson Co Medical Reserve Corps Brochure & Application
- Flooding FAQ
- Helpful Tips Following a Disaster
- Disaster Assistance Grant
- Disaster Assistance Instructions
- National Flood Insurance Program Q & A

Cook

Continued from Page 1B

year that he made this bold claim: "Keita Bates-Diop didn't play last year (missing the final 23 games with a stress fracture in his leg). Had he played, they wouldn't have won 17 games. They probably would have won 24 games."

Whether Bates-Diop alone is worth seven wins is debatable. But he's certainly good enough to help bury Iowa again if the Hawkeyes don't find a way to contain him or at least get him in foul trouble (he has not fouled out of a game this season).

That brings things back to Cook, who has solidified himself as Iowa's leader in the weeks since that first run-in with Bates-Diop. Cook, at 6-9, is averaging 20.6 points in his past five games while contending with some of the best big men in the league, if not the country.

That stretch included 17 points against Wisconsin's Ethan Happ; another 17, with 10 rebounds, against Minnesota's Jordan Murphy; 19 points against Penn State's Mike Watkins; and 26 points Tuesday while tangling with Michigan State's stable of frontcourt stars.

If the Hawkeyes have any shot at pulling off an upset at Value City Arena, where the Buckeyes are 14-2 this season, it rests on Cook holding his own inside yet again. Not alone, and not against just Bates-Diop. He'll need freshman center Luka Garza and sophomore reserve forward Cordell Pemsl to also pull their weight against Ohio State's rookie center Kaleb Wesson (10.8 points per game) and senior forward Jae'Sean Tate (12.9).

"Tate is one of the more underrated players nationally. He is phenomenal. He's a mismatch nightmare," McCaffery said.

Cook is working his way into that conversation as well. He's at the top of every opponent's game plan, right where McCaffery expected him to be when he recruited him out of St. Louis and then proclaimed him the player with the highest ceiling of anyone he's brought to Iowa City in his eight seasons.

"He's a thinker. He's a worker. He knows he's good. He wants to be great. And he's making progress to get to that point," McCaffery said.

McCaffery pointed to one play in the Michigan State game when Cook grabbed a rebound off a missed 3-pointer. He quickly dribbled downcourt while everyone anticipated either one of his ferocious dunks (he has 50 on the year) or one of his curious turnovers (he has 58). Instead, Cook jump-stopped in the lane and found point guard Jordan Bohannon for a 3-pointer to put the Hawkeyes ahead by four points in a game they eventually lost 96-93.

"Those kind of plays are who he is," McCaffery said of his emerging star.

"He has a really good demeanor to play this game. A combination of competitiveness and intellectual approach."

Cook is becoming Iowa's bell cow, and the team desperately needs one. A strong showing for him and the team at Ohio State would cement that status.

McCaffery said he doesn't worry about asking too much from a second-year player.

"No. 1, does he want it? And No. 2, do I think he can do it? And the answer to that is yes on both counts," McCaffery said.

"That's what we need him to do and that's what he's doing."

OFFICIAL PUBLICATION

Iowa City Community School District
Board of Directors Meeting Minutes
Tuesday, January 9, 2018
Educational Services Center
1725 N. Dodge Street
Iowa City, Iowa 52246

Members present: Lori Roetlin, Paul Roesler, Janet Godwin, JP Claussen, Ruthina Malone, Shawn Eyestone, Phil Hemingway. Also present: Steve Murley, Superintendent; Matt Degner, Assistant Superintendent; Jane Fry, Assistant Superintendent; Craig Hansel, Chief Financial Officer/Board Secretary; Kristin Pedersen, Community Affairs Coordinator; Duane Van Hamert, Facilities Management Department Director; Leslie Finger, Director of Budget & Finance; Lisa Glenn, Director of Special Education; Kim Colvin, Board Recording Secretary.

President Godwin called the meeting to order at 6:01 pm.

District Business - Consent Agenda

1.Minutes of the December 12, 2017 Regular Board Meeting
2.Accounts Payable in the amount of $1,858,804.68 General Fund, $184,866.24 Management Fund, $208,290.25 Nutrition Fund, $232,081.23 Student Activities Fund, $237,885.16 Physical Plant & Equip. Levy Fund, $469,903.06 Capital Projects Fund SAVE, $232,191.54 Capital Projects Fund GO Bond
3. Certificated Staff A(1-15), B(1-2), C(1-3), D(1-7), E(1-30), F(1), and G (1)
4.Open Enrollment into ICCSD for 2018-2019 for Katie Nason and open enrollment out of ICCSD for 2018-2019 for Shea Paulsen, Dylan Reed, Brooklyn Walz
5.Iowa STEM BEST Grant Agreement
6.Group Life and LTD amendments
7.Inter-agency Agreement with UI Dept. of Child Life & Therapeutic Play
8.Tate High School, HVAC Commissioning, Testing & Balancing, Award of Contract
9.City High, HVAC Commissioning, Testing & Balancing, Award of Contract
10.Southeast Junior High, HVAC Commissioning, Testing & Balancing, Award of Contract
11.North Central Junior High, HVAC Commissioning, Testing & Balancing, Award of Contract
12.Alexander Elementary, High School, HVAC Commissioning, Testing & Balancing, Award of Contract
13.Asbestos Abatement, Longfellow Elementary School, Change Request 1
14.Approve Consent Agenda
Motion to approve the consent agenda as presented.
Motion by Lori Roetlin, second by Paul Roesler.
Final Resolution: Motion Carries
Yes: Lori Roetlin, Paul Roesler

OFFICIAL PUBLICATION

Ruthina Malone, Shawn Eyestone Nay: Phil Hemingway
Motion by Hemingway, seconded by Eyestone to adjourn. All were in favor and the meeting adjourned at 6:52 pm.

Janet Godwin, Board President
Craig Hansel, Board Secretary

Iowa City Community School District
Board Work Session Minutes
Tuesday, January 9, 2018
Educational Services Center
1725 N. Dodge Street
Iowa City, Iowa 52245

Members present: JP Claussen, Shawn Eyestone, Janet Godwin, Phil Hemingway, Ruthina Malone, Paul Roesler, Lori Roetlin. Also Present: Steve Murley, Superintendent; Craig Hansel, Chief Financial Officer/Board Secretary; Jane Fry, Assistant Superintendent; Kim Colvin, Board Recording Secretary.

President Godwin called the meeting to order at 6:58 pm.

The one agenda item was Boundary Discussion.

Motion to adjourn. All were in favor and the meeting adjourned at 7:30 pm.

Janet Godwin, Board President
Craig Hansel, Board Secretary

PUBLIC NOTICE JOHNSON COUNTY EMERGENCY MANAGEMENT AGENCY AND TWO RIVERS EMERGENCY MANAGEMENT: PLANS TO REVISE AND UPDATE THE HAZARD MITIGATION PLAN

The Johnson County Emergency Management Agency along with Two Rivers Emergency Management is working to revise and update its hazard mitigation plan. The plan will assess natural hazards' risk and vulnerabilities to each community in Johnson County and provide recommendations to increase their resiliency. In doing so, these actions aim to protect property and those who live, work, and conduct business in Johnson County and its communities.

All residents, businesses, community neighbors, and other interested parties are invited to attend the plan's kick-off meeting on Thursday, February 22nd at 6:00 PM. The Johnson County Emergency Management Agency will be hosting the meeting at their offices located at 4329 Melrose Ave, Iowa City, IA 52246.

PUBLIC NOTICE OF STORM WATER DISCHARGE

Connolly Construction, Inc. plans to submit a Notice of Intent to the Iowa Department of Natural Resources to be covered under the NPDES General Permit No. 2 Storm water Discharge Associated with Industrial Activity for Construction Activities

The storm water discharge from lake bottom excavation, dam regrading and shoreline protection located in NW 24 Oxford Twp Johnson county

Storm water will be discharged

OFFICIAL PUBLICATION

William W. Vorheis, Deceased, bearing date of the 24th day of July, 1992, the First Codicil to Last Will and Testament of William W. Vorheis, Deceased, bearing date of June 10, 1997, and the Second Codicil to Last Will and Testament of William W. Vorheis, Deceased, bearing date of October 16, 2002, were admitted to probate in the above-named court and there will be no present administration of the estate. Any action to set aside the will must be brought in the district court of the county within the later to occur of four months from the date of the second publication of this notice or one month from the date of mailing of this notice to all heirs of the decedent and devisees under the will whose identities are reasonably ascertainable, or thereafter be forever barred.

Dated this 6th day of February, 2018.

CARY C. VORHEIS
2434 340th Street S.W.
Tiffin, IA 52340
Petitioner

Robert N. Downer, ICIS PIN No: AT0002090
Attorney for Petitioner
Moordon, Stoppel & Downer P.L.C.
122 South Linn Street
Iowa City, IA 52240
Date of second publication
17th day of February, 2018
Probate Code Section 305

TRUST NOTICE
IN THE MATTER OF THE WILLIAM W. VORHEIS REVOCABLE TRUST AGREEMENT
dated July 24, 1992, as Amended.

To all persons regarding William W. Vorheis, Deceased, who died on or about January 17, 2018. You are hereby notified that Bankers Trust, N.A. of Cedar Rapids, Iowa, is the Trustee of the William W. Vorheis Revocable Trust Agreement dated July 24, 1992, as Amended. Any action to contest the validity of the trust must be brought in the District Court of Johnson County, Iowa, within the later to occur of four (4) months from the date of second publication of this notice or thirty (30) days from the date of mailing this notice to all heirs of the decedent settlor and the spouse of the decedent settlor whose identities are reasonably ascertainable. Any suit not filed within this period shall be forever barred.

Notice is further given that any person or entity possessing a claim against the trust must mail proof of the claim to the trustee at the address listed below via certified mail, return receipt requested, by the later to occur of four (4) months from the second publication of this notice or thirty (30) days from the date of mailing this notice if required or the claim shall be forever barred unless paid or otherwise satisfied.

Dated this 6th day of February, 2018.

WILLIAM W. VORHEIS

Survey responses needed for Hazard Mitigation Plan update

City of Iowa City sent this bulletin at 04/04/2018 09:00 AM CDT

SHARE Having trouble viewing this email? View it as a Web page.

City of IOWA CITY

FOR IMMEDIATE RELEASE
Date: 04/04/2018
Contact: Johnson County Emergency Management
Phone: 319-356-6700

Survey responses needed for Hazard Mitigation Plan update

Residents, businesses and community partners are invited to submit a survey as Johnson County works to update its Hazard Mitigation Plan, which is used by multiple jurisdictions including Iowa City.

Hazard Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. It is most effective when implemented under a comprehensive, long-term mitigation plan, according to the Federal Emergency Management Agency, or FEMA.

Deadline to submit the survey is Monday, April 16, 2018.

For more information, contact Johnson County Emergency Management at 319-356-6700.

TWORIVERS EMERGENCY MANAGEMENT

Sign-In Documentation

Johnson County Multi-Jurisdictional Multi-Hazard Mitigation Plan
February 22nd, 2018

Name (Printed)	Position & Organization	Phone Number	Email Address
Anthony Gentz	TREM - Mitigation Planning Manager	612-598-4429	tony@tworiversem.com
RAY CARLEY	Asst Director Building & Grounds OAKNOLL	3511720	rcarley@oaknoll.com
DAVE WILSON	Johnson Co. EMA Director	319-356-6064	DAVE-WILSON@JCEC-EMA.ORG
Liz Ford	Supervisor Iowa City Animal Services	3193565296	Liz-ford@iowa-city.org
BECKY SOGLIN	JOHNSON COUNTY PLANNING, DEVELOPMENT & SUSTAINABILITY	319 356-6083	bsoglin@co.johnson.ia.us
Michael Thorp	Airport Ops Spec IC Airport	JA 356 5045	michael-thorp@iowa-city.org
Fiona Johnson	Director JCAS	319-321-5793	Fjohnson@co.johnson.ia.us
JOHN GRIER	Fire Chief - ICFD	319 321 2812	john-grier@iowa-city.org
BRUCE McAVOY	UI PUBLIC SAFETY - FIRE SAFETY	319 335 5389	bruce-mcavoy@uiowa.edu

TWORIVERS EMERGENCY MANAGEMENT

Sign-In Documentation

Johnson County Multi-Jurisdictional Multi-Hazard Mitigation Plan
February 21st, 2018

Name (Printed)	Position & Organization	Phone Number	Email Address
Anthony Gertz	IREM - Mitigation Planning Manager	612-598-4429	tony@tworiversem.com
TRAVIS BECKMAN	DEPUTY DIRECTOR - JCEMA	319-356-6762	travis.beckman@jecc-ema.org
James Lacina	Env. Health Coor. - JC Public Health	319-356-6040	jlacina@co.johnson.ia.us
DAVE WILSON	EMA Director - JCEMA	319-356-6761	DAVE.WILSON@JECC-EMA.org
TIM KEMP	EMA COMM. CHAIR - MAYOR HILLS	319-430-7947	KEMPFCEA@SHARONTC.NET
BRANDON SIGGINS	EMERGENCY COMM COORDINATOR - JECC	319-310-4316	BRANDON.SIGGINS@JECC-EMA.org
Ron Knoche	Public Works Director Iowa City	319 356 5138	ron-knoche@iowa-city.org

TWORIVERS EMERGENCY MANAGEMENT

Sign-In Documentation

Johnson County Multi-Jurisdictional Multi-Hazard Mitigation Plan
June 21nd, 2018

Name (Printed)	Position & Organization	Phone Number	Email Address
SCOTT KLEPPE	PUBLIC WORKS DIRECTOR CITY OF SOLON	319-631-5071	scott.kleppe@solon-iowa.com
Chris Taylor	Mayor City of Swisher	319-333-8050	mayor@swisheria.org
Anthony J. Goetz	Emergency Manager, Two Rivers EM	612-598-4429	tonya@tworiversem.com
DAVE WILSON	EMA - JOHNSON CO.	319-356-6761	DAVE.WILSON@JECC-EMA.ORG
TRAVIS BECKMAN	EMA - JOHNSON CO	319-3567762	travis.beckman@jecc-ema.org

TWORIVERS EMERGENCY MANAGEMENT

Sign-In Documentation

Johnson County Multi-Jurisdictional Multi-Hazard Mitigation Plan
June 21nd, 2018

Name (Printed)	Position & Organization	Phone Number	Email Address
Lon Galarde UI –	AO Central Maint Svcs Facilities Mgmt	319-335 3071	lon-galarde@uiowa.edu
Michael Thorp	Airport Manager IC Airport	319 356 5045	michael-thorp@iowa-city.org
Lucy Wiederholt	Associate Director & Chief UIPD	319-335-5022	lucy-wiederholt@uiowa.edu
Bruce McAvoy	Fire Safety Cdor UIDPS	3193355389	bruce-mcavoy@uiowa.edu
Josey Bathke	Risk Mgr, Univ. IA	319 3842580	josephine-bathke@uiowa.edu
Floyd Johnson	Emergency Management UI	319-930-6611	floyd-johnson@uiowa.edu
BEN CLARK	CITY OF IOWA CITY	319-356-5430	ben-clark@iowa-city.org
JOHN GRIER	ICFD	319 356 5256	john-grier@iowa-city.org
Ashley Monroe	IOWA CITY	319 356-5012	ashley-monroe@iowa-city.org
Anthony Goertz	Two Rivers Emergency Management	612-598-4429	tony@tworiversem.com
Josh Busard	Johnson County PDS	319-356-6083	jbusard@co.johnson.ia.us

TWORIVERS EMERGENCY MANAGEMENT

Sign-In Documentation

Johnson County Multi-Jurisdictional Multi-Hazard Mitigation Plan
June 21nd, 2018

Name (Printed)	Position & Organization	Phone Number	Email Address
Anthony Goetz	Two Rivers Emergency Management	612-598-4424	tony@tworiversem.com
Dan Vinson	Chief NLPD	319-626-5725	dvinson@northliberty.iowa.gov
JIM Kessler	City of Coralville Building	319-248-1720	JKessler@Coralville.org
DAVID CLARK	CITY OF CORALVILLE - WASTEWATER	319-248-1745	DCLARK@CORALVILLE.ORG
KEVIN CALLAHAN	" " - WATER	319-248-1770	KCallahan@Coralville.org
Orey Schwitzer	City of Coralville Fire	319 248-1939	OSchwitzer@coralville.org
Eric Fishes	" "	319-248-1740	efisher@coralville.org
Shan Kron	Coralville	319248-1800	skron@coralville.org
Tracey Mulcahey	North Liberty	1026-5712	tmulcahey@northliberty.iowa.org
Scott Larson	Coralville Engineering Dept	319-248-1720	slarson@coralville.org
Ellen Habel	City of Coralville	319 248 1700	ehabel@coralville.org
Mike Funke	"		mfunke@coralville.org


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Johnson County
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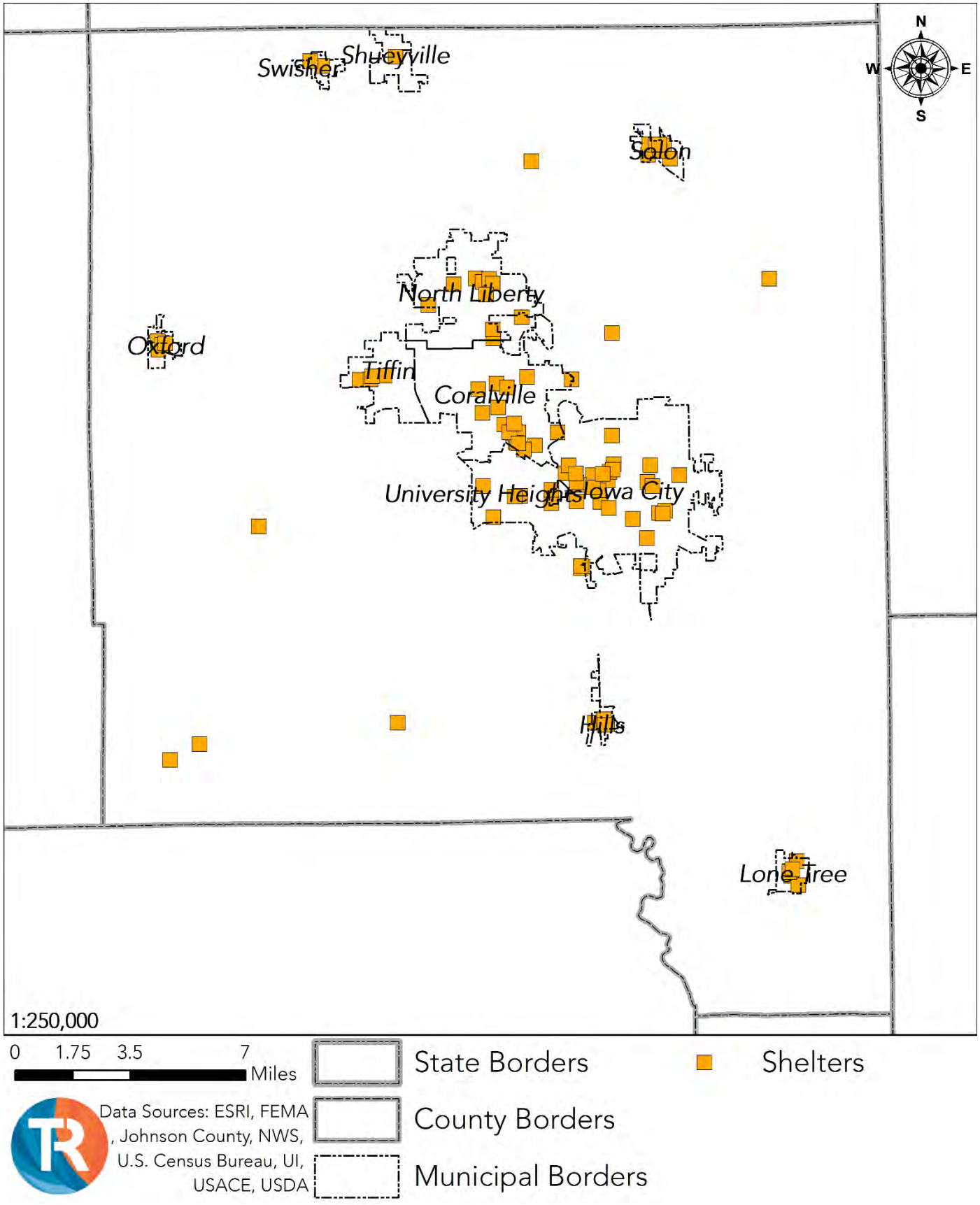
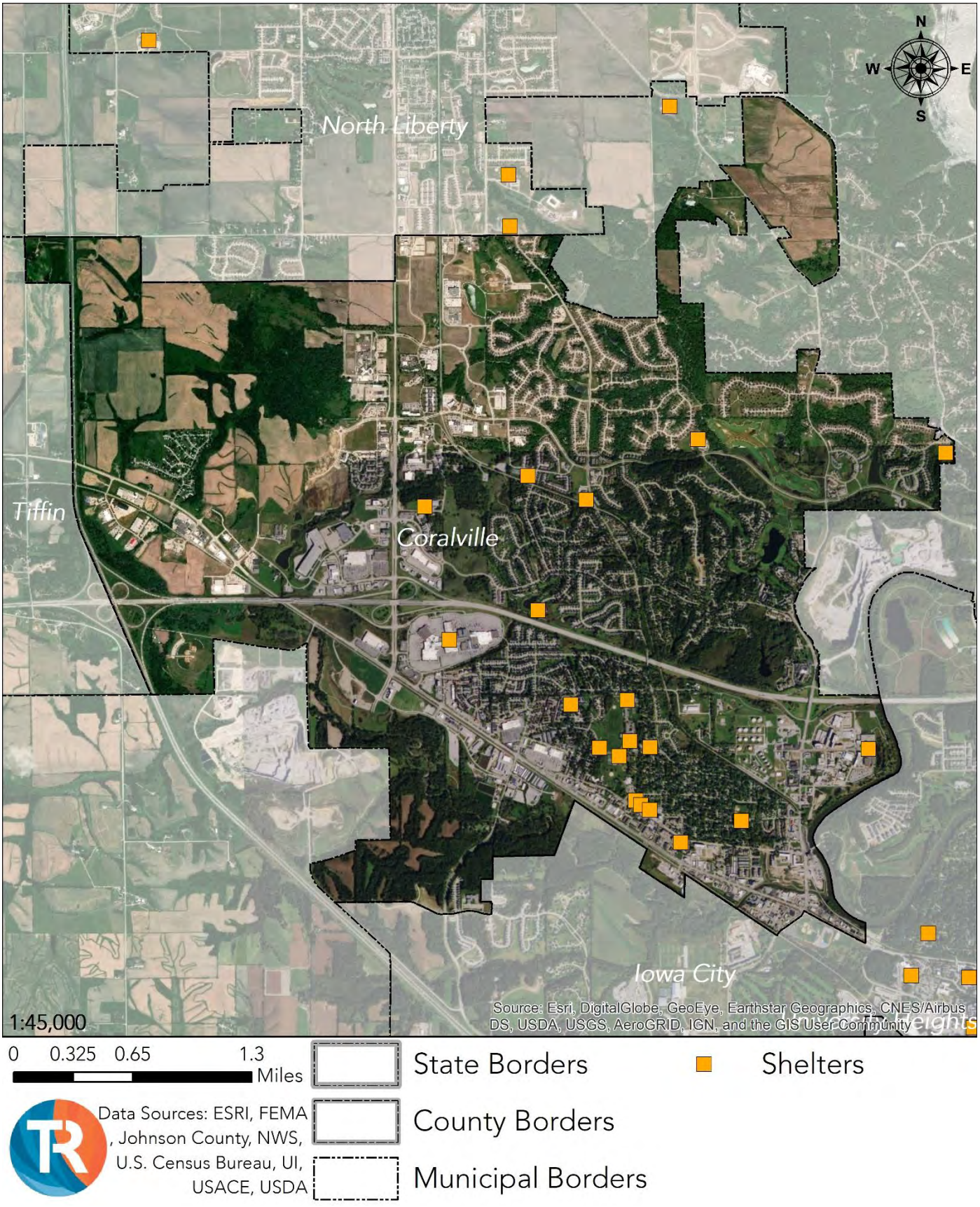
Special Needs Emergency Registry
Register for Weather & EMA Alerts
SkyWarn Net Reports
Emergency Preparedness Info
Johnson County ARES/RACES
Current Weather at the JECC
facebook
Emergency Management
Mission Statement:
The mission of our agency is to support our responders, citizens, visitors, businesses and municipalities, and to ensure that we all continuously work together to identify threats, build, sustain, and improve our local capabilities to prepare for, protect against, respond to and recover from any hazards that face our community and that through mitigation efforts we work to decrease the consequences of disasters that occur within or threaten our community.
Dave Wilson
Coordinator
Tweets by @JohnsonCoEMA
Johnson Co IA EMA
@JohnsonCoEMA
Kinnick WeatherSTEM is reporting a wind chill below zero.
Embed
View on Twitter
Emergency warning sirens are tested on the first Wednesday of each month at 10:00 am. For Information on the County outdoor warning system click on the Emergency Preparedness link on the left menu
NEWS
Storm Spotter Training, March 27
Johnson County MRAP Fact Sheet
Strategic Business Plan FY 2013-2017
Johnson County Risk Assessment and Statistics (1995 - 2016)
Submit a Storm Report to the National Weather Service
Federal Disaster Declarations in Johnson County 1965 to 2013
Presidential Disaster Declarations December 1964 to January 2013
The draft of the Johnson County Multi-Jurisdictional Hazard Mitigation Plan is available for public viewing and feedback. To obtain a copy to review, please contact Deputy EMA Director Travis Beckman at 319-356-6762 or by email at travis.beckman@jecc-ema.org.
JC ENS
ALERT IOWA
Johnson County Emergency Notification System
CONTACT

Map B.1 – Shelters, Johnson County

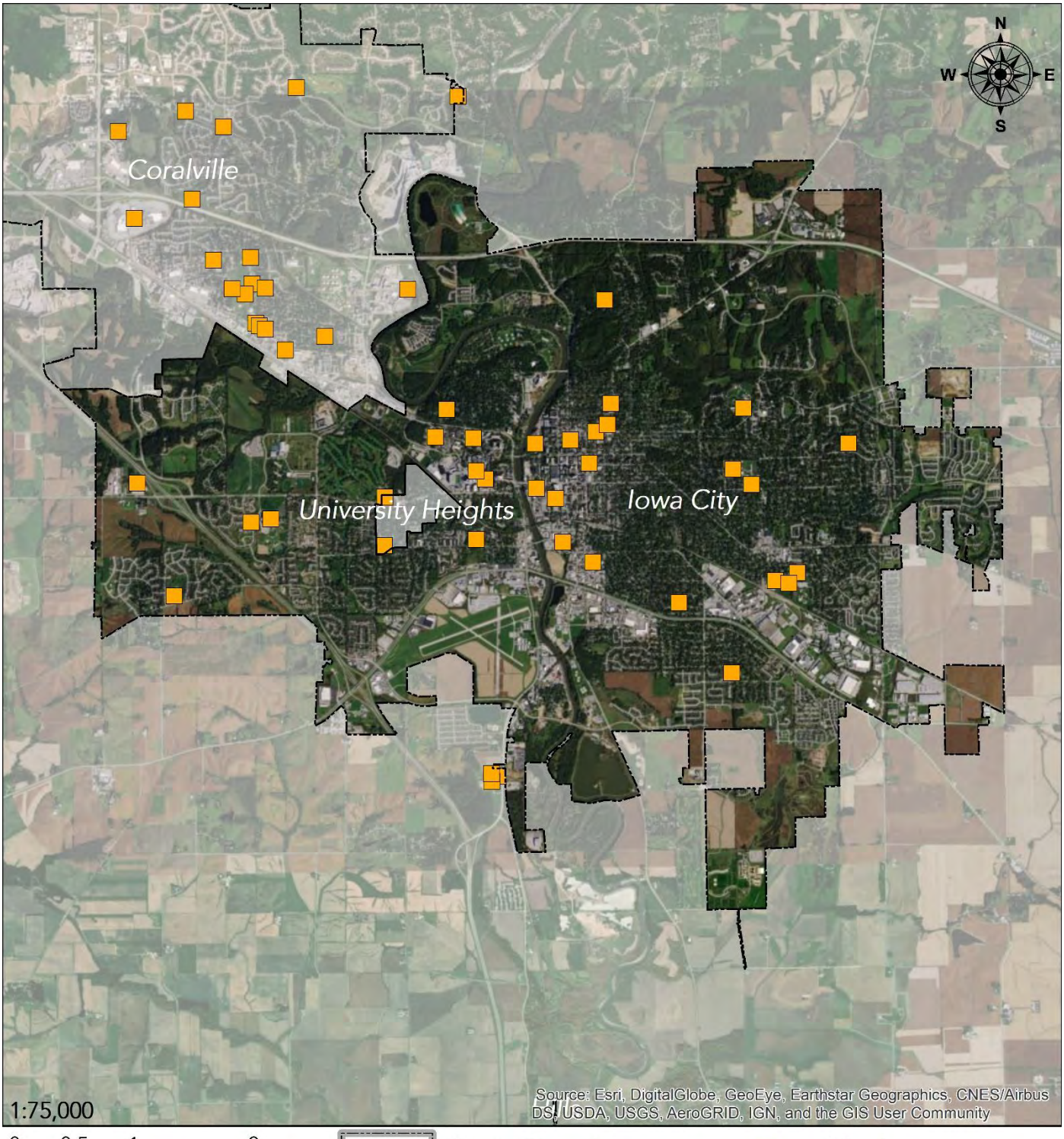


Map B.2 – Shelters, Coralville

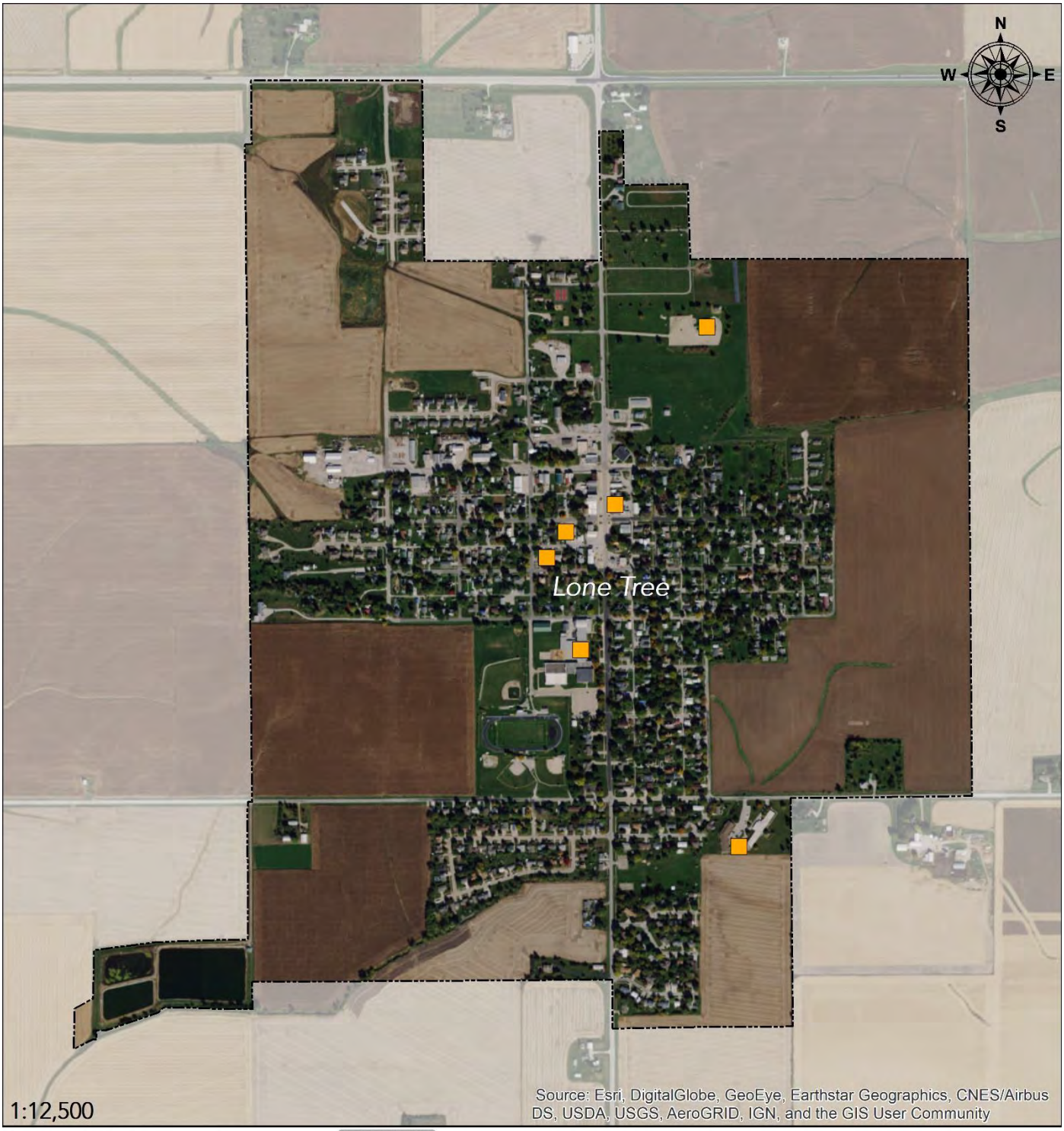


Map B.3 – Shelters, Hills

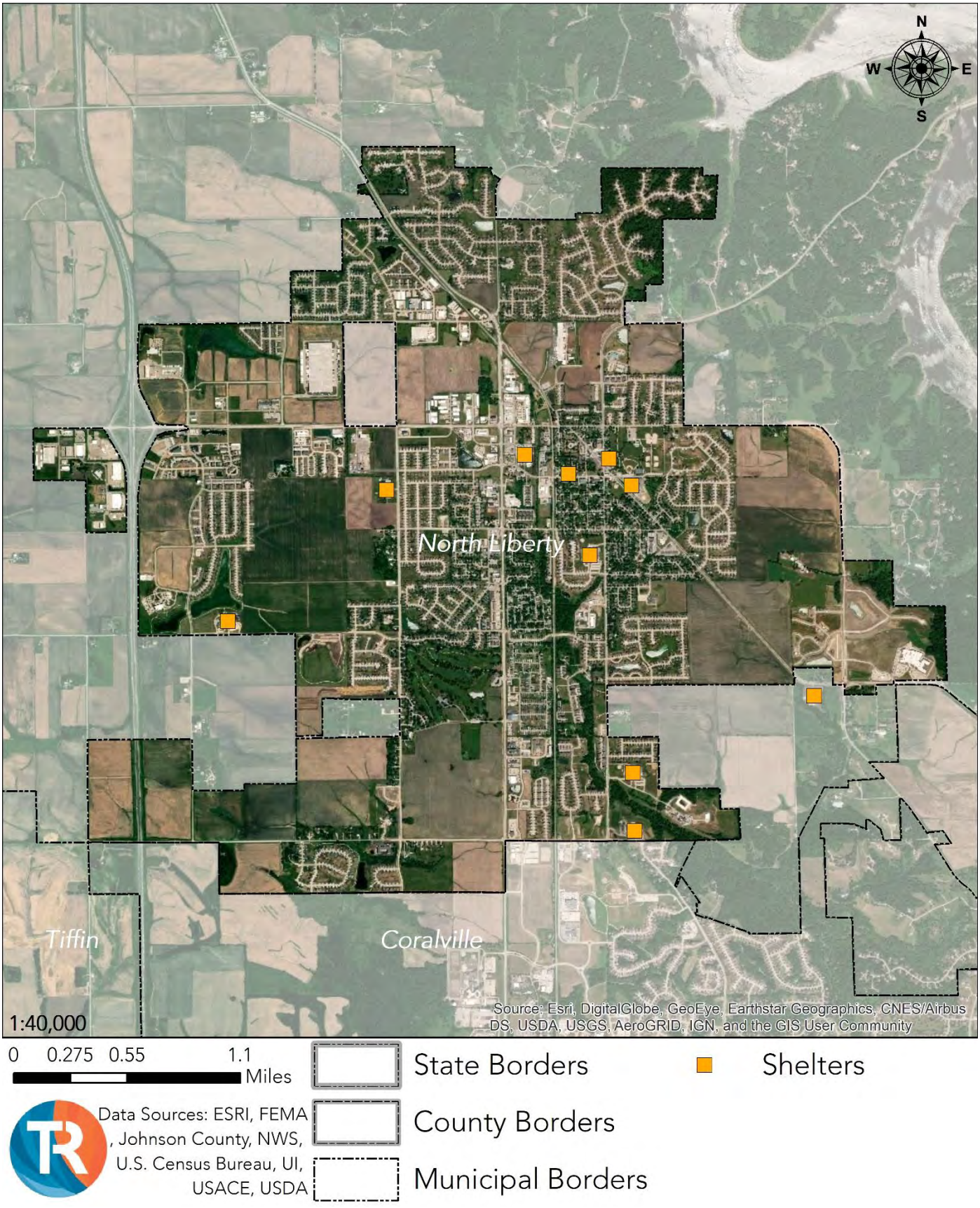
Map B.4 – Shelters, Iowa City



Map B.5 – Shelters, Lone Tree

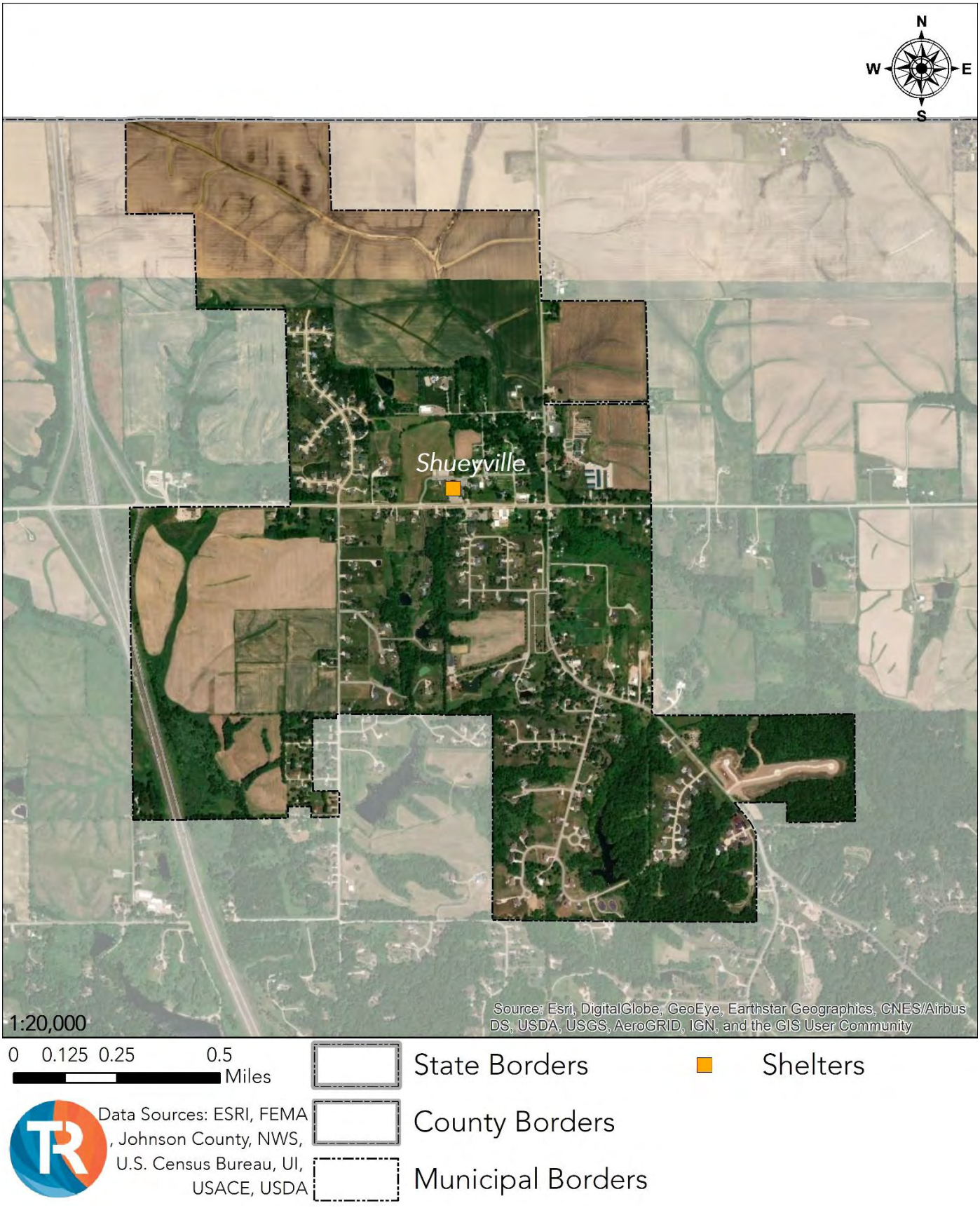


Map B.6 – Shelters, North Liberty

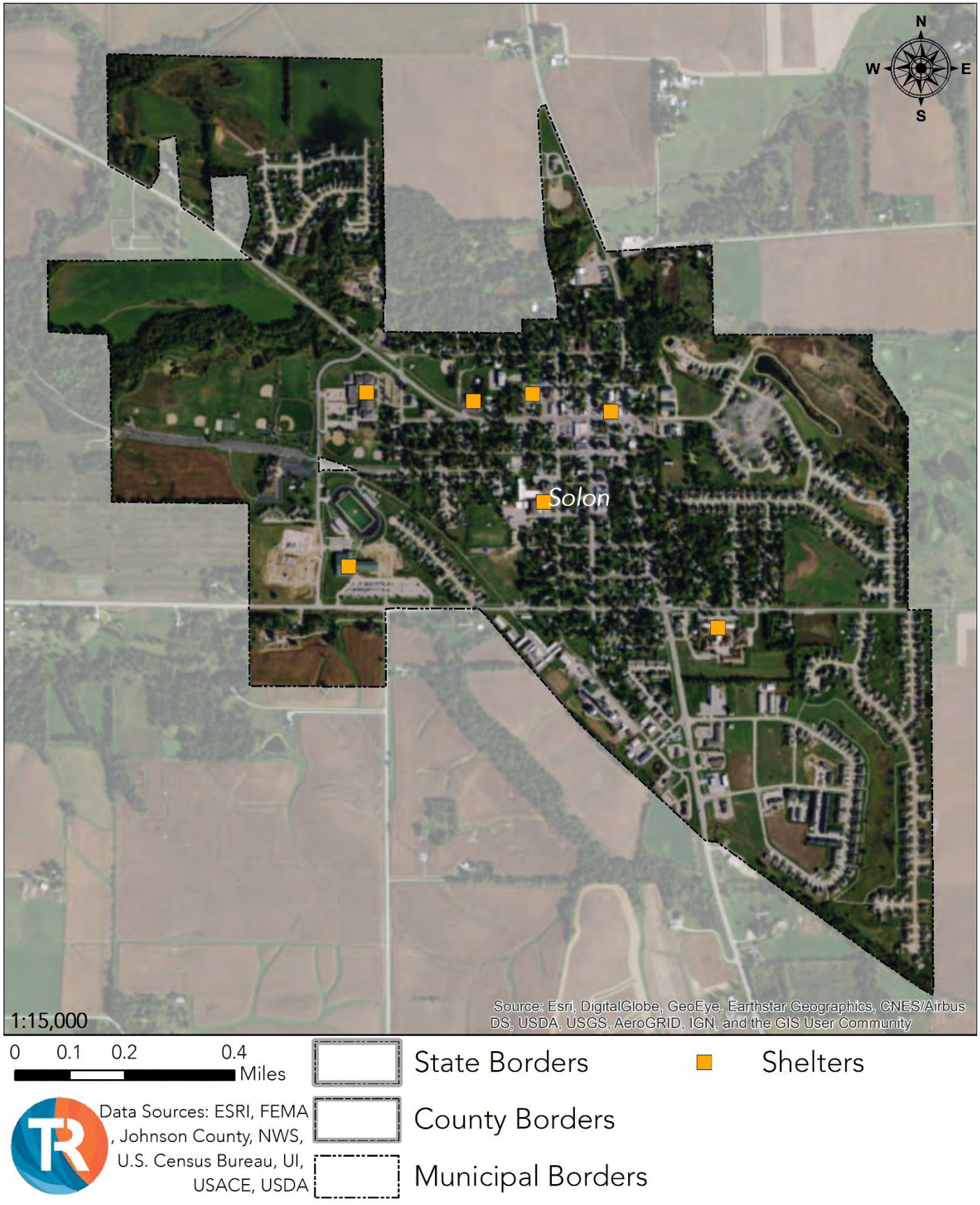


Map B.7 – Shelters, Oxford

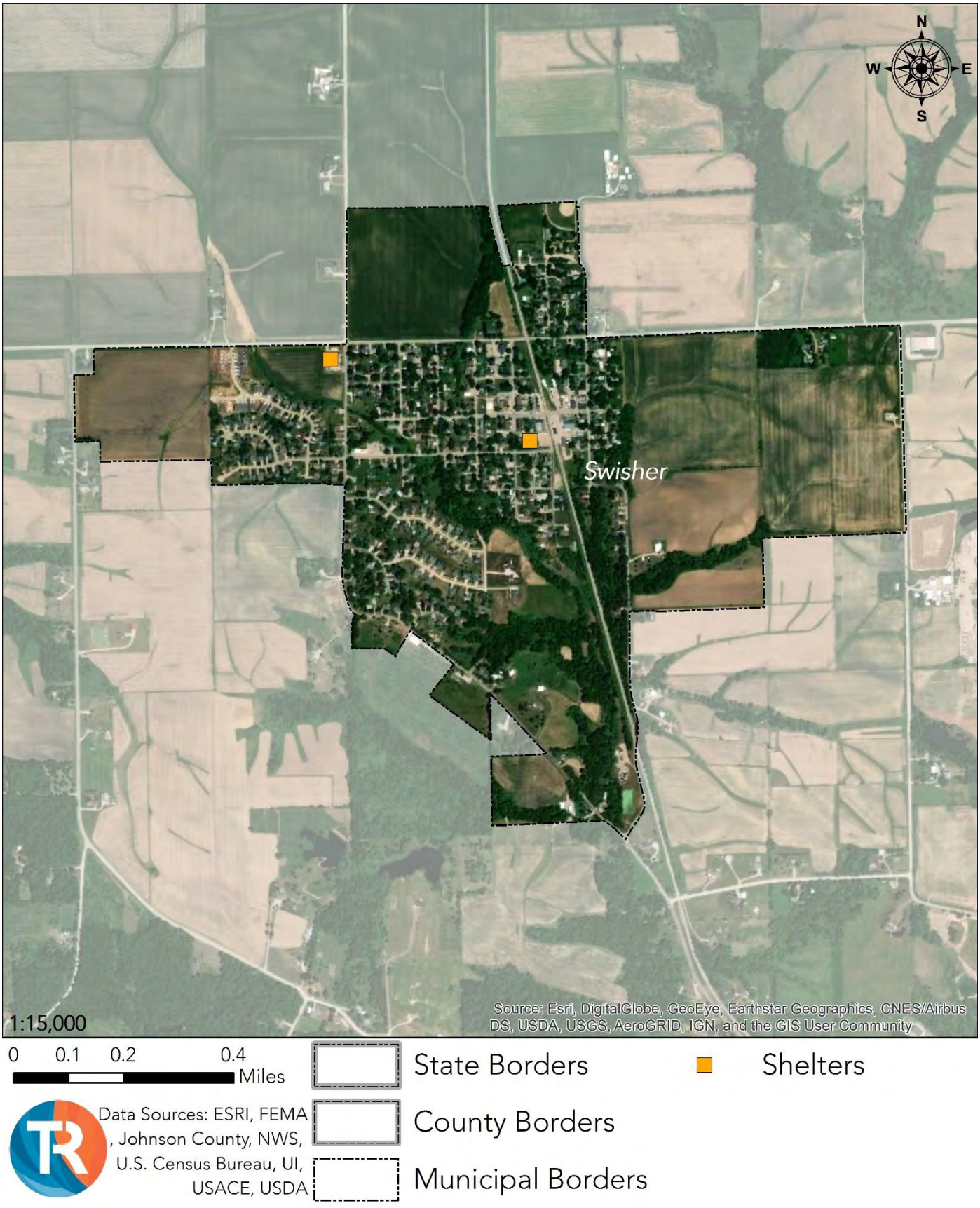
Map B.8 – Shelters, Shueyville



Map B.9 – Shelters, Solon

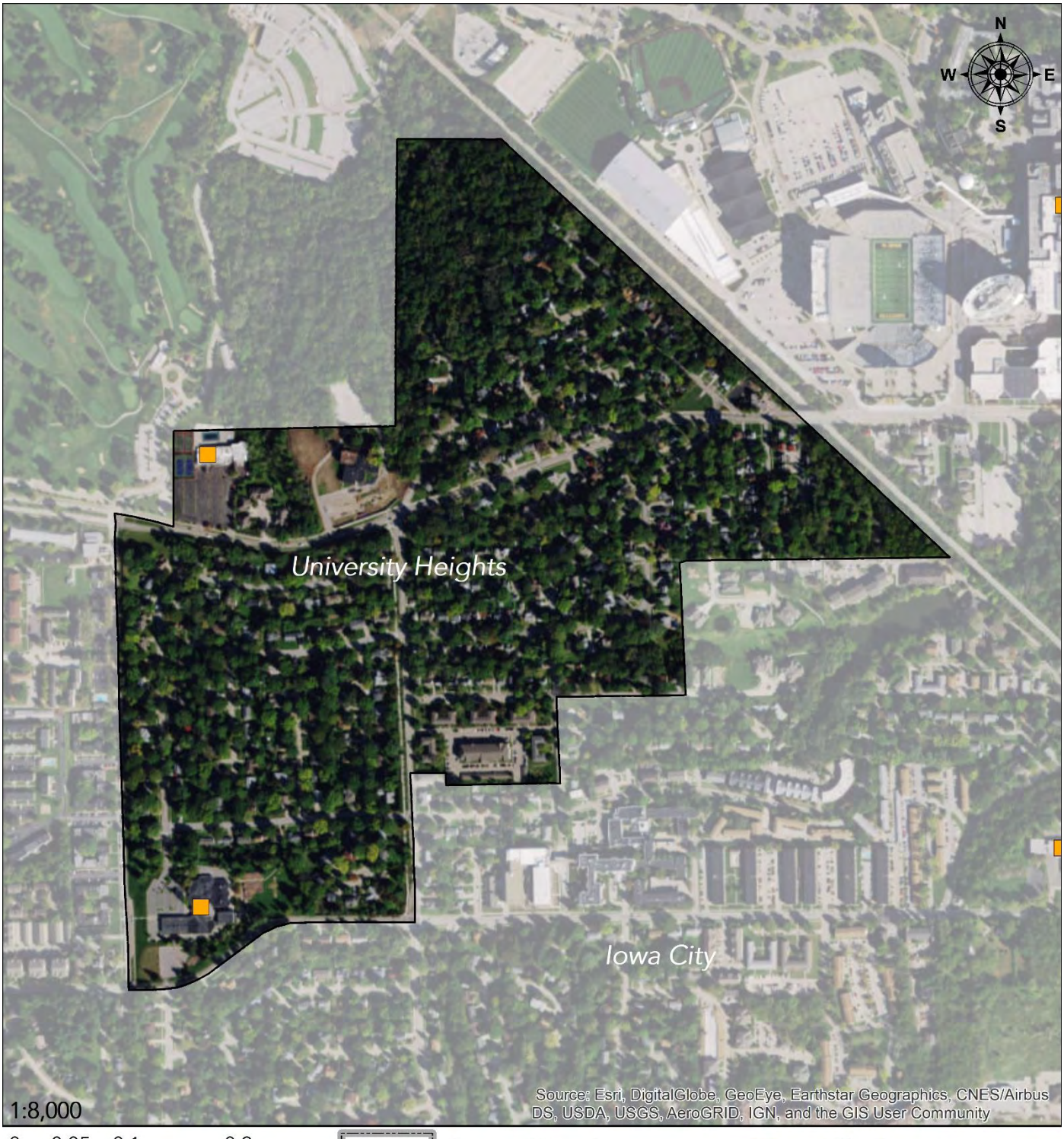


Map B.10 – Shelters, Swisher



Map B.11 – Shelters, Tiffin

Map B.12 – Shelters, University Heights



Appendix C – Community School District Facility Enrollment

The following information has been provided and verified by the State of Iowa Department of Education and the pertinent community school district. The structural values have been summed per campus location.

Table C.1 – Clear Creek Amana Community School District

Campus	Students	Structural Values
Administrative Office	-	$280,784
Clear Creek Elementary	291	$8,113,846
High School	642	$45,564,740
Middle School	551	$49,431,341
North Bend Elementary	484	$12,429,412
Tiffin Elementary	481	$19,761,480
Total =	2,449	$135,581,603

Table C.2 – Iowa City Community School District

Campus	Construction Year	Students	Structural Values
Alexander Elementary	2015	430	$16,579,766
Borlaug Elementary	2012	503	$15,051,136
Coralville Elementary	1948	427	$15,102,768
District Office	-	-	$18,831,316
Durham Bus Barn	2007	-	$2,744,511
Garner Elementary	2010	688	$13,261,763
Grant Elementary	2019*	-	$18,765,000
Hills Elementary	1965	192	$4,981,524
Hoover Elementary	1954	263	$6,972,607
Hoover East Elementary	2017	-	$18,085,000
Horn Elementary	1969	395	$6,031,767
Iowa City High School	1939	1,605	$82,589,071
Kirkwood Elementary	1963	354	$7,521,618
Lemme Elementary	1970	398	$6,909,782
Liberty High School	2017/2018	948	$79,515,000
Lincoln Elementary	1926	215	$9,864,384
Longfellow Elementary	1917	341	$13,505,000
Lucas Elementary	1962	457	$12,497,360
Mann Elementary	1917	216	$11,365,000
North Central Junior High	2006	570	$26,460,235
Northwest Junior High	1970	710	$21,049,244
Penn Elementary	1961	621	$17,418,198
Roosevelt Education Center	1931	-	$5,821,307
Shimek Elementary	1970	215	$4,539,817
South East Junior High	1959	789	$36,566,028
Tate High School	2005	460	$8,787,713
Twain Elementary	1954	342	$13,299,835
Van Allen Elementary	2005	505	$14,891,722
Weber Elementary	1993	464	$14,038,102
West High School	1969	1,526	$80,307,366
Wickham Elementary	1997	482	$10,077,959
Wood Elementary	1969	302	$10,139,065
Total =		14,118	$611,634,187

**Scheduled to open 08/01/2019*

Table C.3 – Lone Tree Community School District

Campus	Students	Structural Values
Elementary, Junior & Senior High	499	$22,205,953
Total =	499	$22,205,953

Table C.4 – Solon Community School District

Campus	Students	Structural Values
High School	475	$0
Intermediate School	240	$0
Lakeview Elementary	452	$0
Middle School	354	$0
Total =	1,521	$61,703,105

DRAINAGE AREA ABOVE DAM 3,115 Sq. Mi.

REAL ESTATE ACQUIRED

Fee 24,000 Acres up to elevation 702.0
Easement 9,567 Acres to elevation 717.0

CORALVILLE RESERVOIR POOL DATA

Flood Control Pool:

Elevation 712.0 NGVD
Length 27 Valley Miles
Area 24,300 Acres
Flood Control Capacity (683-712) 385,000 Acre-Feet

Normal Conservation Pool:

Elevation 683.0 NGVD
Length 18.7 Valley Miles
Area 4,100 Acres
Conservation Pool Capacity (650-683) 24,800 Acre-Feet

CORALVILLE DAM

Type Rolled Earthfill
Length 1,400 Feet
Top Elevation 743.0 NGVD
Top Width 22 Feet
Maximum Base Width 650 Feet
Maximum Height Above Streambed 100 Feet
Freeboard 5 Feet
Volume 1,130,000 Cubic Yards

OUTLET STRUCTURE

Type Circular Concrete Conduit With Intake Structure, Gate Tower, and Stilling Basin Through the Base of the Dam

Conduit Size 23-Foot Diameter

Gates Three 8.33'x19' Service Gates, Plus one 8.33'x19' Emergency Gate

Weight of Gate: 40,000 Lbs Ea. Approximate

Service Bridge Load Capacity H-15
Service Bridge Size (2-60.5' Spans) 12'x123.25'
Outflow Capacity at Elevation 670.0 7,000 cfs
Outflow Capacity at Elevation 680.0 11,000 cfs (Ref. Plate 2-9 Reg. Man.)
Outflow Capacity at Elevation 712.0 20,000 cfs
Minimum Outflow 150 cfs

STILLING BASIN

Type Chute with uncontrolled concrete weir
Length 180 Feet (chute and stilling basin)
Width 23 to 75 Feet

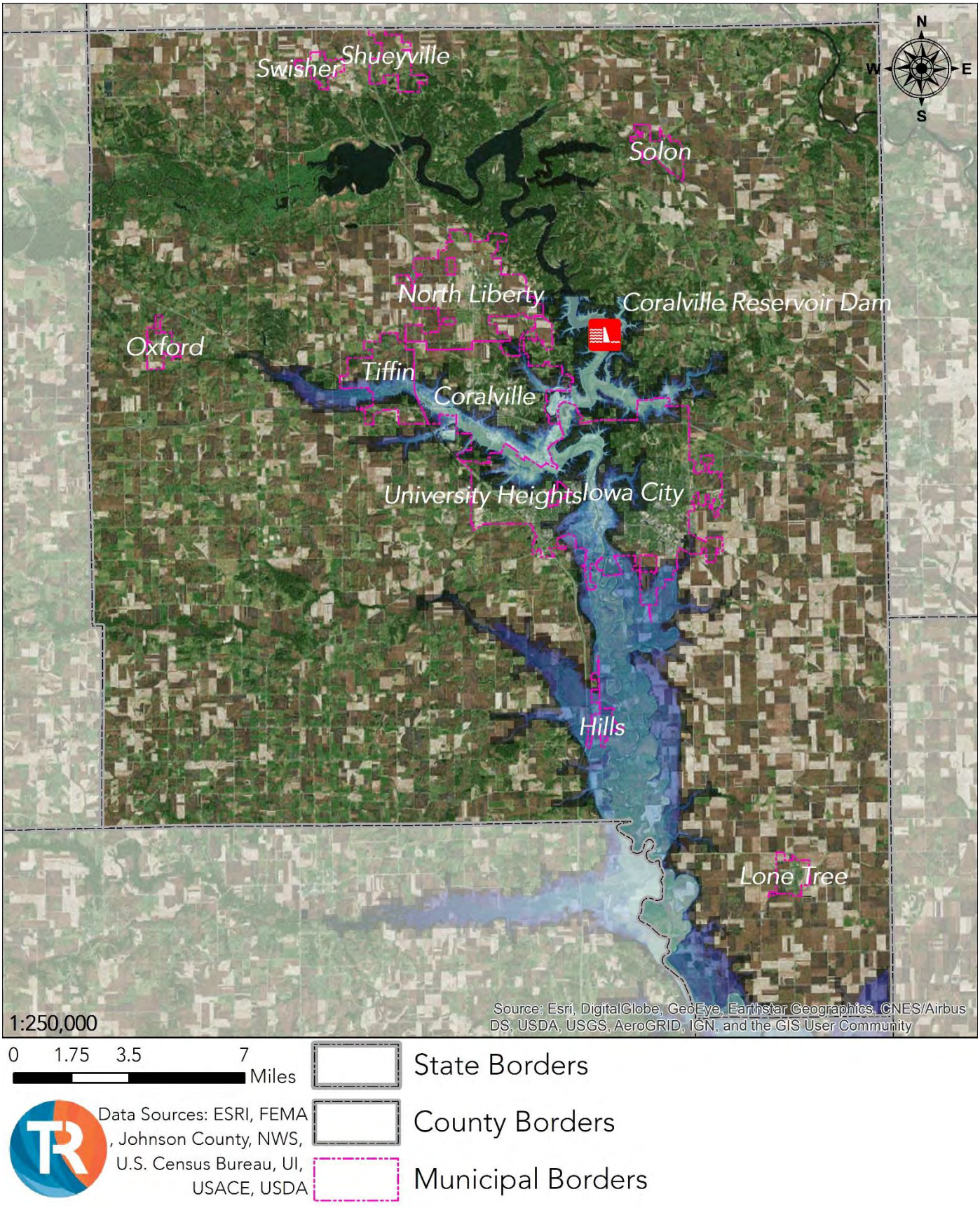
SPILLWAY

Type Chute Spillway with Uncontrolled Concrete Weir

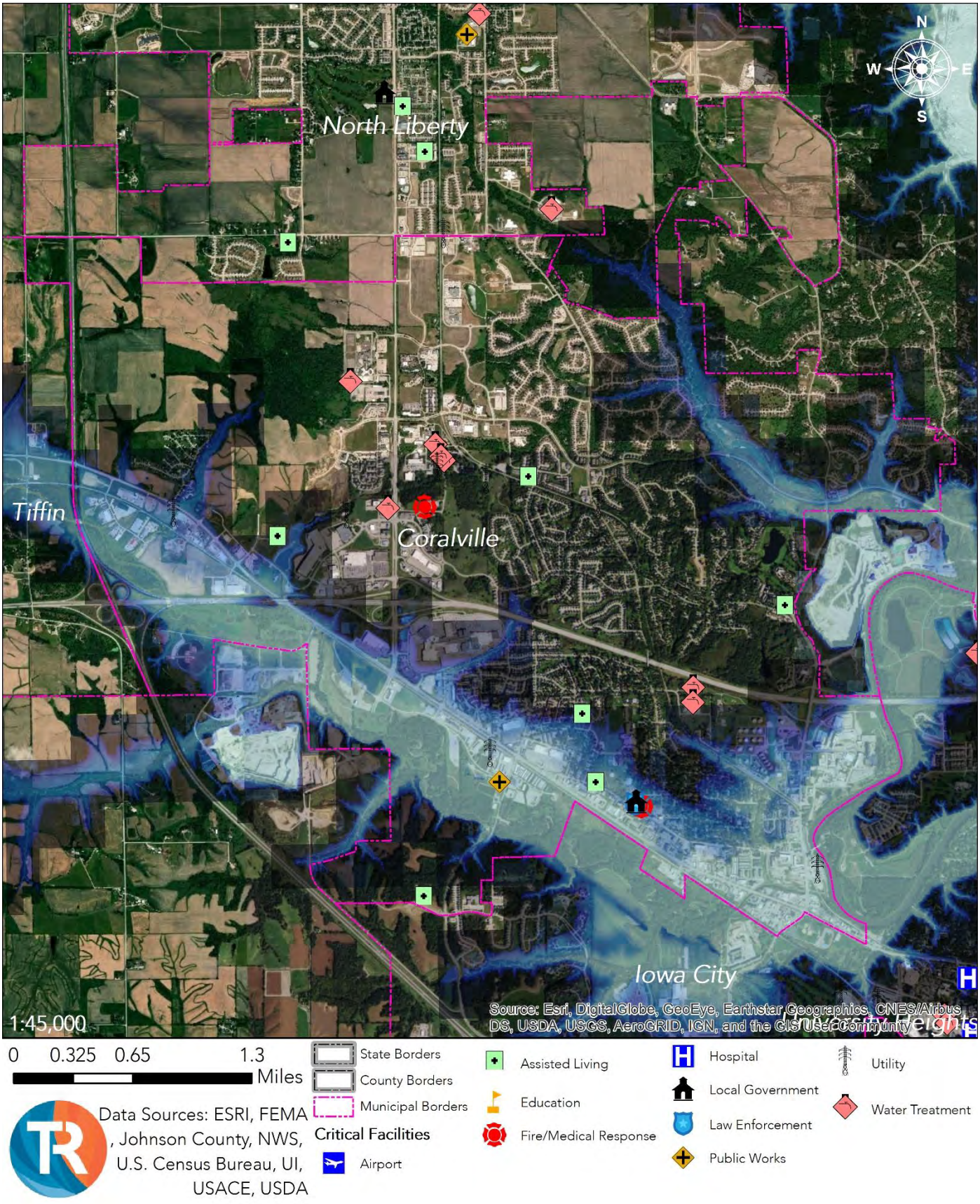
Width 500 Feet
Crest elevation 712.0 NGVD
Discharge Capacity at Elevation 737.9 244,000 cfs

DOWNSTREAM FLOODWAY CORRIDOR TO MISSISSIIPPI RIVER 83.3 Mi.

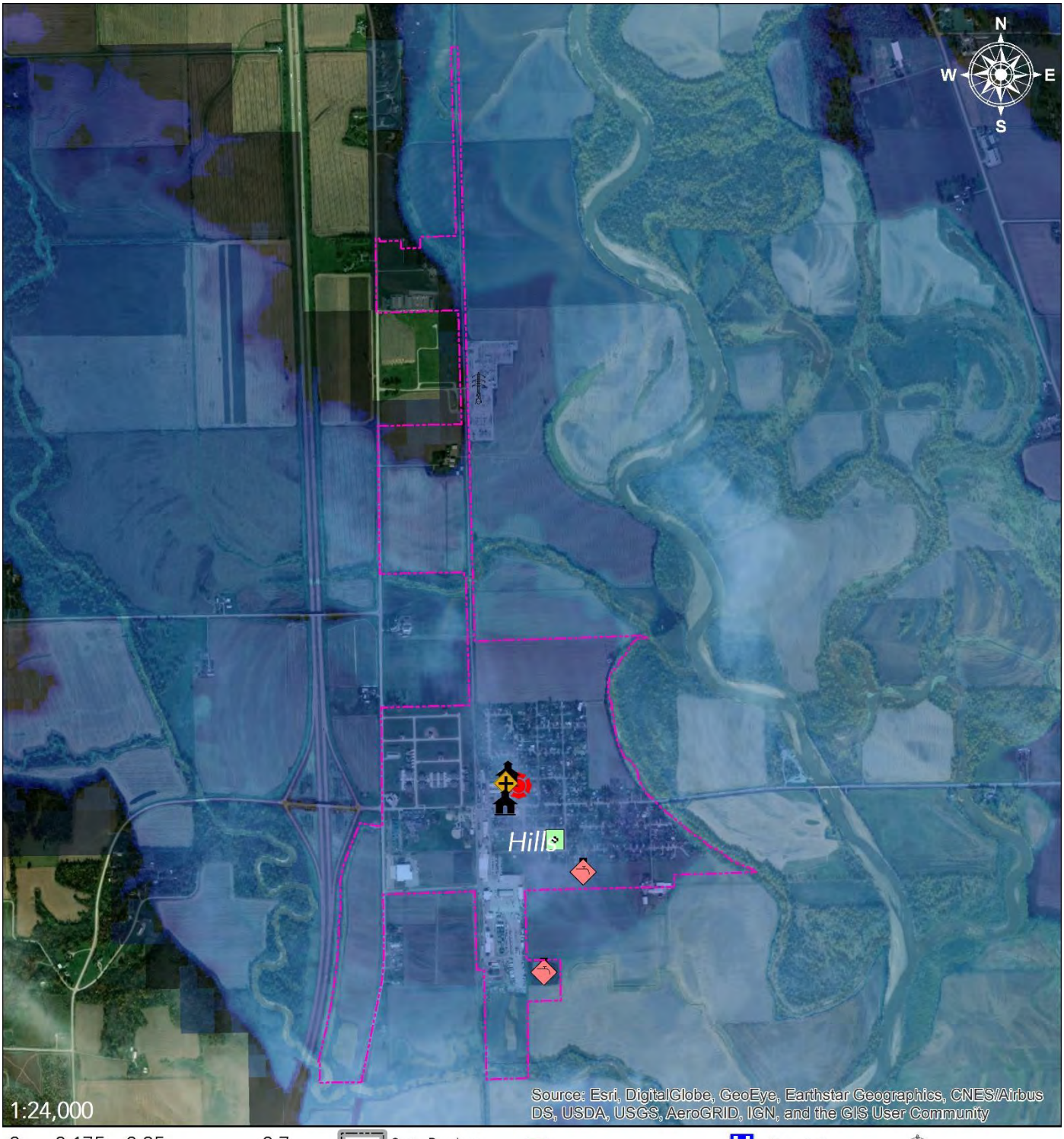
Map D.1 – Coralville Dam Failure #1



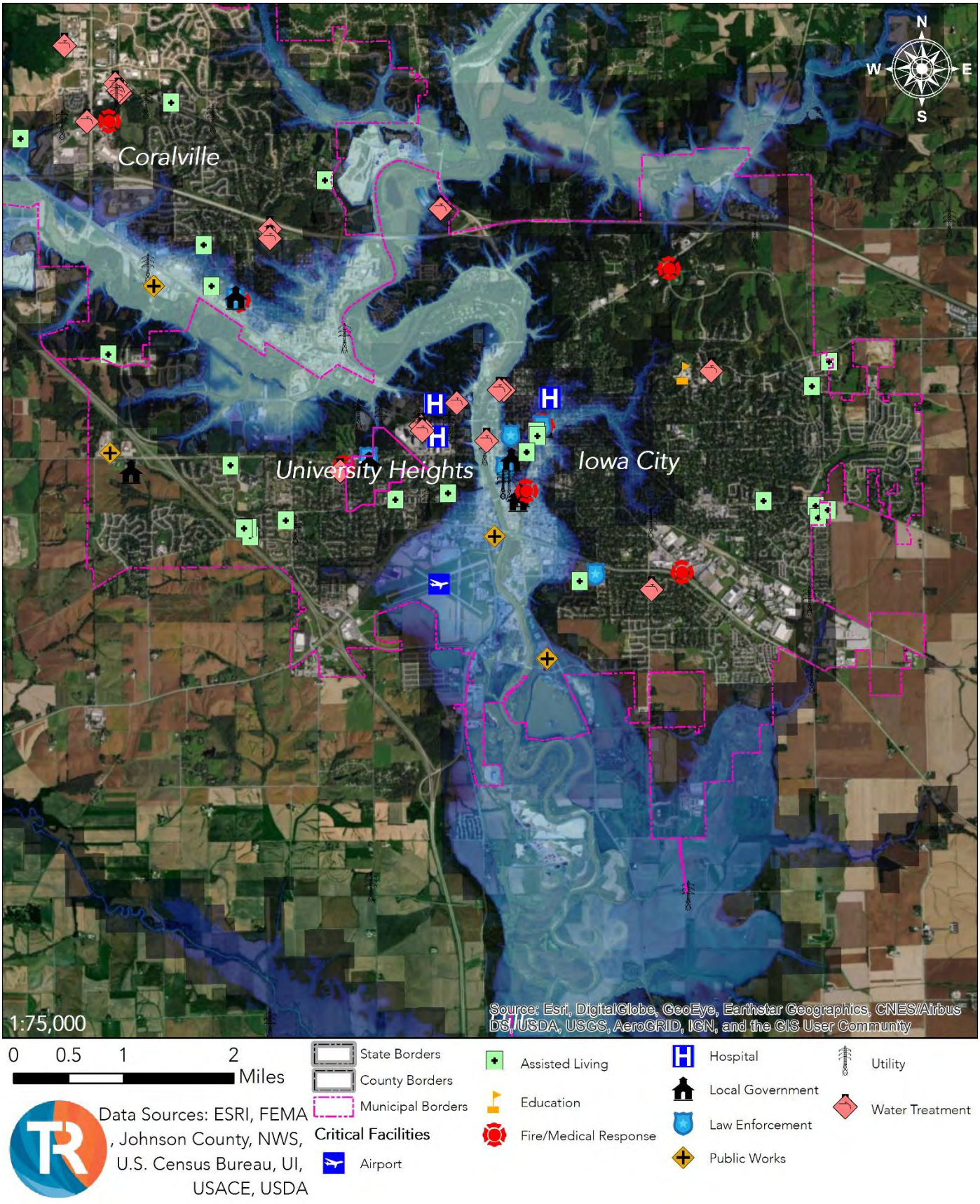
Map D.2 – Coralville Dam Failure #2



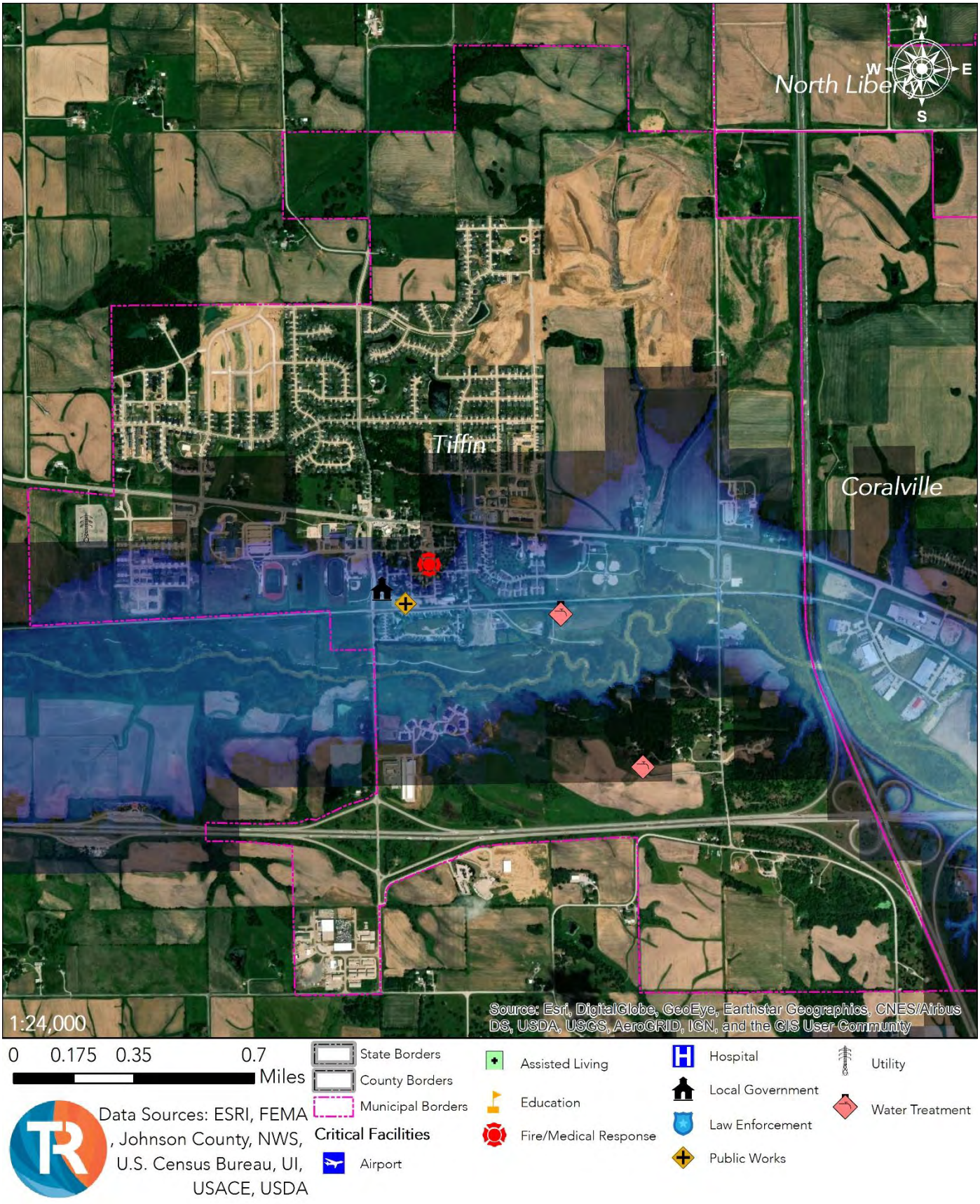
Map D.3 – Coralville Dam Failure #3



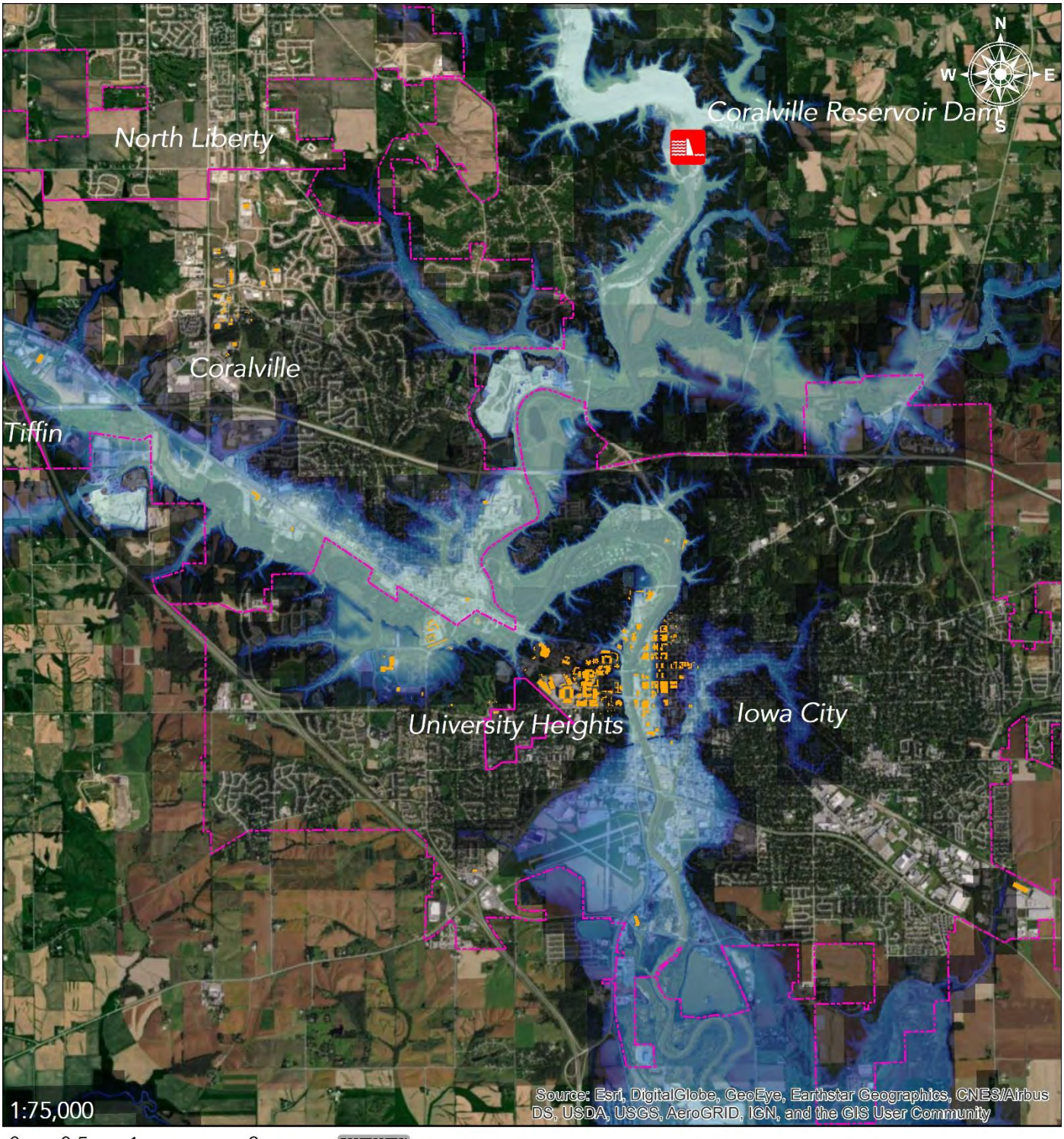
Map D.4 – Coralville Dam Failure #4



Map D.5 – Coralville Dam Failure #5



Map D.6 – Coralville Dam Failure #6

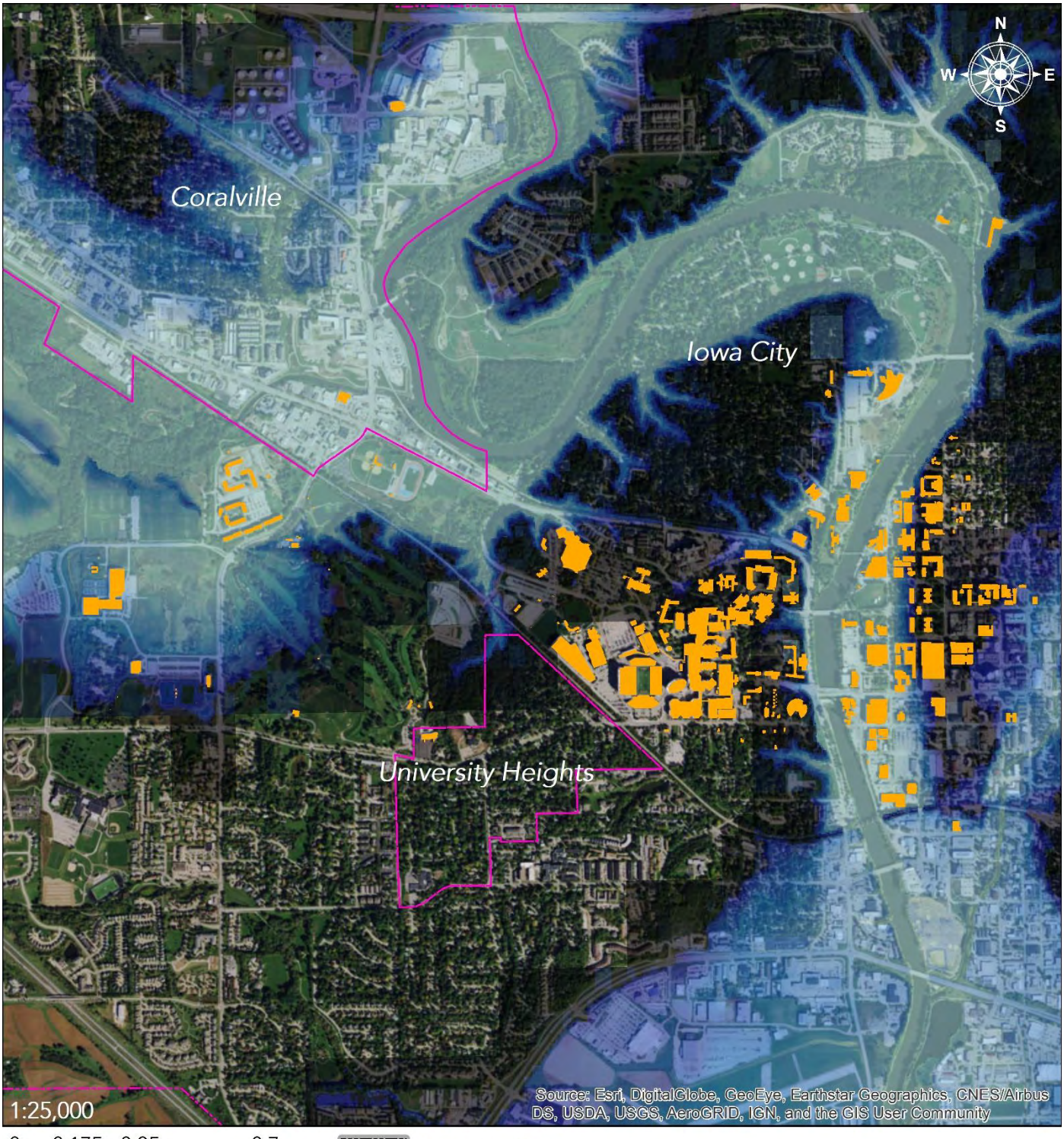


0 0.5 1 2 Miles

Data Sources: ESRI, FEMA, Johnson County, NWS, U.S. Census Bureau, UI, USACE, USDA

State Borders
County Borders
Municipal Borders
UI Facilities

Map D.7 – Coralville Dam Failure #7



0 0.175 0.35 0.7 Miles

Data Sources: ESRI, FEMA, Johnson County, NWS, U.S. Census Bureau, UI, USACE, USDA

State Borders
County Borders
Municipal Borders
UI Facilities

Appendix E – NOAA/NWS Records

Table E.1 – Drought Records

Location	Event Date	Crop Damage
Countywide	8/1/2003	$14,880,000
Countywide	7/1/2005	$8,590,000
Countywide	8/1/2005	$7,260,000
Countywide	9/1/2005	$0
Countywide	10/1/2005	$0
Countywide	11/1/2005	$0
Countywide	12/1/2005	$0
Countywide	1/1/2006	$0
Countywide	2/1/2006	$0
Countywide	3/1/2006	$0
Countywide	7/10/2012	$0
Countywide	8/7/2012	$0
Countywide	11/1/2012	$0
Countywide	9/3/2013	$0
Countywide	10/1/2013	$0
	Total =	$30,730,000

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

Table E.2 – Flash Flood Records

Location	Event Date	Injuries	Deaths	Property Damage
Countywide	2/20/1997	0	0	$0
Countywide	10/17/1998	0	0	$0
Countywide	6/13/2000	0	0	$0
Iowa City	8/23/2002	0	0	$0
Iowa City	6/22/2007	0	0	$0
Tiffin	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$0
Lone Tree	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$500,000
Iowa City	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$0
Oakdale	7/16/2007	0	0	$0
Oakdale	7/16/2007	0	0	$0
Solon	7/17/2007	0	0	$0
University Heights	8/8/2007	0	0	$0
Coralville	6/3/2008	0	0	$0
Municipal Airport	6/8/2008	0	0	$25,000
Coralville	6/12/2008	0	0	$500,000
Municipal Airport	7/2/2008	0	0	$0
Lone Tree	6/21/2009	0	0	$100,000
University Heights	6/23/2009	0	0	$0
Solon	8/27/2009	0	0	$100,000
Cou Falls	6/15/2010	0	0	$250,000
Lone Tree	7/30/2010	0	0	$25,000
Oxford	8/4/2010	0	0	$0
Swisher	4/17/2013	0	0	$250,000
Iowa City	6/24/2013	0	0	$0

Iowa City	6/30/2014	0	0	$0
Municipal Airport	6/30/2014	0	0	$0
Iowa City	6/22/2016	0	0	$0
Swisher	8/11/2016	0	0	$0
Swisher	8/11/2016	0	0	$1,500,000
Swisher	8/12/2016	0	0	$0
Iowa City	7/21/2017	0	0	$0
Iowa City	7/21/2017	0	0	$0
Countywide	2/20/1997	0	0	$0
Countywide	10/17/1998	0	0	$0
Countywide	6/13/2000	0	0	$0
Iowa City	8/23/2002	0	0	$0
Iowa City	6/22/2007	0	0	$0
Tiffin	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$0
Iowa City	6/22/2007	0	0	$0
	Totals =	0	0	$ 3,250,000

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

Table E.3 – Hail Records

Location	Event Date	Size (Inches)	Injuries	Deaths	Property Damage	Crop Damage
Oxford	5/18/1997	1.75	0	0	$1,000	$0
Coralville	5/18/1997	1.75	0	0	$0	$0
Iowa City	5/18/1997	2.75	0	0	$40,000,000	$0
Oxford	6/18/1998	1.75	0	0	$200	$0
Coralville	6/18/1998	1.75	0	0	$0	$0
Iowa City	6/18/1998	2.75	0	0	$0	$0
Lone Tree	6/6/1999	1.75	0	0	$0	$0
Iowa City	5/10/2001	0.75	0	0	$0	$0
River Junction	4/18/2002	1	0	0	$0	$0
Tiffin	4/18/2002	0.75	0	0	$0	$0
Oxford	5/8/2002	0.75	0	0	$0	$0
North Liberty	10/1/2002	0.75	0	0	$0	$0
Swisher	5/10/2003	0.75	0	0	$0	$0
Iowa City	5/14/2003	1	0	0	$100,000	$0
Iowa City	5/14/2003	1.75	0	0	$100,000	$0
Iowa City	5/7/2004	0.88	0	0	$0	$0
Iowa City	5/7/2004	0.88	0	0	$0	$0
Iowa City	5/7/2004	1.75	0	0	$70,000	$10,000
Swisher	5/7/2004	0.88	0	0	$0	$5,000
Shueyville	5/7/2004	0.88	0	0	$0	$5,000
Solon	5/7/2004	0.88	0	0	$0	$5,000
Shueyville	5/17/2004	0.88	0	0	$0	$5,000
Hills	5/20/2004	1	0	0	$2,000	$10,000
Cosgrove	8/27/2004	0.75	0	0	$0	$2,000
Lone Tree	3/12/2006	0.75	0	0	$0	$0
Lone Tree	4/2/2006	0.75	0	0	$0	$0
Tiffin	4/2/2006	0.88	0	0	$500	$0
Swisher	4/13/2006	1.5	0	0	$2,000	$0
Oxford	4/13/2006	0.75	0	0	$0	$0
Cosgrove	4/13/2006	1.75	0	0	$8,000	$0
Tiffin	4/13/2006	2	0	0	$15,000	$0
Cou Falls	4/13/2006	1.75	0	0	$2,000	$0

Coralville	4/13/2006	0.88	0	0	$0	$0
Oxford	4/13/2006	1.75	0	0	$10,000	$0
Swisher	4/13/2006	1.75	0	0	$3,000	$0
Iowa City	4/13/2006	1.75	0	0	$50,000	$0
Iowa City	4/13/2006	1	0	0	$3,000	$0
Solon	4/13/2006	0.75	0	0	$0	$0
Iowa City	4/13/2006	2.75	0	0	$30,000	$0
North Liberty	4/13/2006	1	0	0	$5,000	$0
Solon	4/13/2006	1	0	0	$3,000	$0
Newport	6/6/2006	1.75	0	0	$7,000	$2,000
Morse	6/6/2006	1.75	0	0	$0	$0
River Junction	6/6/2006	1	0	0	$3,000	$0
Iowa City	6/21/2006	0.88	0	0	$0	$0
North Liberty	6/25/2006	0.88	0	0	$0	$1,000
Hills	11/10/2006	0.75	0	0	$0	$0
Iowa City	3/31/2007	0.75	0	0	$0	$0
Iowa City	6/21/2007	0.75	0	0	$0	$0
Oakdale	7/16/2007	1.75	0	0	$0	$0
Swisher	7/16/2007	1	0	0	$0	$0
Swisher	7/16/2007	0.75	0	0	$0	$0
Oxford	9/30/2007	0.88	0	0	$0	$0
Solon	10/2/2007	0.88	0	0	$0	$0
Oakdale	6/14/2008	0.88	0	0	$0	$0
Oakdale	6/14/2008	1	0	0	$0	$0
Iowa City	6/14/2008	0.88	0	0	$0	$0
Municipal Airport	6/14/2008	0.88	0	0	$0	$0
Iowa City	6/14/2008	0.75	0	0	$0	$0
Lone Tree	7/21/2008	0.88	0	0	$0	$0
River Junction	7/21/2008	0.88	0	0	$0	$0
Swisher	7/10/2009	1	0	0	$0	$0
Oakdale	7/10/2009	0.88	0	0	$0	$0
North Liberty	7/10/2009	0.75	0	0	$0	$0
Oakdale	7/10/2009	0.75	0	0	$0	$0
Iowa City	7/10/2009	0.88	0	0	$0	$0
Tiffin	4/5/2010	1	0	0	$0	$0
North Liberty	4/5/2010	1	0	0	$0	$0
North Liberty	4/5/2010	0.75	0	0	$0	$0
North Liberty	4/5/2010	0.88	0	0	$0	$0
Solon	4/5/2010	1	0	0	$0	$0
Hills	4/6/2010	0.88	0	0	$0	$0
Iowa City	4/30/2010	0.75	0	0	$0	$0
Iowa City	4/30/2010	1	0	0	$0	$0
North Liberty	6/18/2010	0.88	0	0	$0	$0
Swisher	4/3/2011	1.75	0	0	$0	$0
Swisher	4/3/2011	1.75	0	0	$0	$0
Swisher	4/3/2011	2	0	0	$0	$0
North Liberty	5/22/2011	1	0	0	$0	$0
University Heights	5/22/2011	0.75	0	0	$0	$0
Solon	5/22/2011	1.5	0	0	$0	$0
Municipal Airport	5/22/2011	1.5	0	0	$0	$0
Iowa City	5/22/2011	1	0	0	$0	$0
Iowa City	5/22/2011	1.75	0	0	$0	$0
Elmira	5/24/2011	1	0	0	$0	$0

Hills	6/8/2011	0.75	0	0	$0	$0
Municipal Airport	6/9/2011	0.75	0	0	$0	$0
Solon	5/3/2012	1.75	0	0	$0	$0
Solon	5/3/2012	0.75	0	0	$0	$0
Amish	8/19/2012	0.88	0	0	$0	$0
Hills	9/7/2012	1	0	0	$0	$0
Iowa City	4/17/2013	0.75	0	0	$0	$0
North Liberty	4/17/2013	1	0	0	$0	$0
Tiffin	4/17/2013	0.75	0	0	$0	$0
Municipal Airport	7/19/2013	0.88	0	0	$0	$0
Hills	2/20/2014	0.75	0	0	$0	$0
Hills	4/27/2014	0.75	0	0	$0	$0
Iowa City	4/27/2014	0.75	0	0	$0	$0
North Liberty	5/12/2014	0.75	0	0	$0	$0
Iowa City	6/16/2014	1	0	0	$0	$0
Iowa City	6/16/2014	0.75	0	0	$0	$0
Iowa City	6/16/2014	1.75	0	0	$0	$0
Iowa City	6/16/2014	1.5	0	0	$0	$0
Iowa City	6/16/2014	1	0	0	$0	$0
University Heights	7/12/2014	0.88	0	0	$0	$0
Oakdale	8/4/2014	1	0	0	$0	$0
Iowa City	8/4/2014	0.75	0	0	$0	$0
Municipal Airport	8/4/2014	0.75	0	0	$0	$0
Hills	9/4/2014	0.75	0	0	$0	$0
Iowa City	4/8/2015	0.75	0	0	$0	$0
Hills	11/11/2015	0.75	0	0	$0	$0
Iowa City	11/11/2015	0.75	0	0	$0	$0
North Liberty	6/22/2016	0.75	0	0	$0	$0
Oasis	2/23/2017	0.88	0	0	$0	$0
Iowa City	2/28/2017	0.75	0	0	$0	$0
University Heights	2/28/2017	0.75	0	0	$0	$0
Iowa City	2/28/2017	1.25	0	0	$0	$0
Iowa City	2/28/2017	0.88	0	0	$0	$0
Iowa City	2/28/2017	1	0	0	$0	$0
Oasis	2/28/2017	1.5	0	0	$0	$0
North Liberty	2/28/2017	0.75	0	0	$0	$0
Iowa City	2/28/2017	0.88	0	0	$0	$0
Hills	2/28/2017	1.25	0	0	$0	$0
Municipal Airport	2/28/2017	0.88	0	0	$0	$0
Hills	2/28/2017	1	0	0	$0	$0
Amish	4/10/2017	1	0	0	$0	$0
Hills	5/17/2017	0.75	0	0	$0	$0
Hills	6/15/2017	1	0	0	$0	$0
Iowa City	7/11/2017	0.75	0	0	$0	$0
Oasis	7/11/2017	1.5	0	0	$0	$0
Williamstown	7/21/2017	1	0	0	$0	$0
Tiffin	7/21/2017	1	0	0	$0	$0
University Heights	7/21/2017	0.88	0	0	$0	$0
		Totals =	0	0	$40,414,700	$45,000

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

Table E.4 – High Wind Records

Location	Event Date	Wind Speed (MpH)	Injuries	Deaths	Property Damage
Countywide	5/24/1996	59.84	0	0	$500,000
Countywide	10/29/1996	59.84	0	0	$0
Countywide	4/6/1997	55.24	0	0	$250,000
Countywide	9/29/1997	59.84	0	0	$0
Countywide	11/9/1998	67.90	0	0	$0
Countywide	2/25/2001	56.39	0	0	$0
Countywide	2/11/2003	44.88	0	0	$0
Countywide	12/12/2004	59.84	0	0	$10,000
Countywide	10/26/2008	57.54	0	0	$0
Countywide	10/27/2010	59.84	0	0	$0
Countywide	6/13/2011	64.44	0	0	$100,000
Countywide	6/13/2011	59.84	0	0	$25,000
Countywide	2/19/2016	63.29	0	0	$0
Countywide	5/24/1996	59.84	0	0	$500,000
Countywide	10/29/1996	59.84	0	0	$0
Countywide	4/6/1997	55.24	0	0	$250,000
Countywide	9/29/1997	59.84	0	0	$0
Countywide	11/9/1998	67.90	0	0	$0
Countywide	2/25/2001	56.39	0	0	$0
Countywide	2/11/2003	44.88	0	0	$0
Countywide	12/12/2004	59.84	0	0	$10,000
Countywide	10/26/2008	57.54	0	0	$0
Countywide	10/27/2010	59.84	0	0	$0
		Totals =	0	0	$885,000

The data are from the NOAA NCDC Storm Events Database.

Table E.5 – Lightning Records

Location	Event Date	Injuries	Deaths	Property Damage
Coralville	4/13/2006	0	0	$515,000
Solon	6/21/2007	0	0	$200
Swisher	6/22/2007	0	0	$500,000
Oxford	7/19/2007	0	0	$5,000
Coralville	8/23/2007	0	0	$5,000
North Liberty	8/13/2010	0	0	$10,000
Tiffin	8/20/2010	1	0	$1,000
North Liberty	6/8/2011	0	0	$25,000
Hills	6/20/2015	0	0	$5,000
Iowa City	10/20/2015	0	0	$0
	Totals =	1	0	$1,066,200

The data are from the NOAA NCDC Storm Events Database.

Table E.6 – Riverine Flood Records

Location	Event Date	Injuries	Deaths	Property Damage
Countywide	5/9/1996	0	0	$0
Countywide	5/17/1999	0	0	$0
Iowa City	6/10/1999	0	0	$0
North Liberty	6/12/1999	0	0	$0
Countywide	7/23/1999	0	0	$0

Countywide	6/1/2000	0	0	$0
Countywide	7/1/2000	0	0	$0
Iowa City	7/4/2000	0	0	$0
Coralville	7/10/2000	0	0	$0
Countywide	2/24/2001	0	0	$0
Coralville	7/11/2002	0	0	$0
Iowa City	7/11/2002	0	0	$0
Countywide	5/9/2003	0	0	$500,000
Countywide	6/1/2004	0	0	$0
Countywide	6/11/2004	0	0	$0
Iowa City	4/1/2008	0	0	$230,000,000
Kent County Park	6/1/2008	0	0	$0
Hills	6/22/2009	0	0	$250,000
Iowa City	7/11/2009	0	0	$0
Hills	6/15/2010	0	0	$375,000
Hills	8/4/2010	0	0	$75,000
Hills	4/18/2013	0	0	$0
Swisher	6/23/2014	0	0	$0
River Junction	7/1/2014	0	0	$0
	Totals =	0	0	$231,200,000

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

Table E.7 – Thunderstorm Records

Location	Event Date	Wind Speed (MpH)	Injuries	Deaths	Property Damage	Crop Damage
Lone Tree	4/18/1996	92.06	0	0	$0	$0
Iowa City	10/29/1996	69.05	0	0	$0	$0
Iowa City	4/5/1997	57.54	0	0	$0	$0
Countywide	6/21/1997	69.05	0	0	$0	$0
Countywide	8/16/1997	59.84	0	0	$0	$0
Iowa City	6/24/1998	-	0	0	$4,500	$0
Iowa City	6/28/1998	-	0	0	$1,000	$0
Countywide	6/29/1998	-	12	0	$30,700,000	$14,000,000
North Liberty	5/16/1999	-	0	0	$5,000	$0
Iowa City	5/16/1999	-	0	0	$200	$0
Swisher	7/2/2000	57.54	0	0	$0	$0
North Liberty	5/17/2001	-	0	0	$2,000	$0
Iowa City	7/8/2001	59.84	0	0	$0	$0
Countywide	7/8/2001	59.84	0	0	$0	$0
Hills	3/9/2002	-	0	0	$200,000	$0
Coralville	4/18/2002	70.20	0	0	$0	$0
Swisher	5/8/2002	59.84	0	0	$0	$0
Coralville	6/26/2002	59.84	0	0	$0	$0
Coralville	6/26/2002	62.14	0	0	$0	$0
Iowa City	6/26/2002	70.20	0	0	$0	$0
Shueyville	7/8/2002	70.20	0	0	$0	$0
Coralville	7/8/2002	70.20	0	0	$0	$0
Iowa City	7/8/2002	70.20	0	0	$0	$0
Oxford	7/5/2003	70.20	0	0	$70,000	$10,000
Solon	7/5/2003	70.20	0	0	$50,000	$10,000
Coralville	7/20/2003	59.84	0	0	$2,000	$5,000
Iowa City	7/20/2003	59.84	0	0	$30,000	$0

North Liberty	8/20/2003	57.54	0	0	$2,000	$0
Iowa City	8/3/2004	70.20	0	0	$2,000	$3,000
Iowa City	10/29/2004	59.84	0	0	$4,000	$0
Iowa City	10/29/2004	59.84	0	0	$2,000	$0
Oasis	10/29/2004	59.84	0	0	$0	$50,000
Morse	10/29/2004	59.84	0	0	$4,000	$0
Swisher	5/11/2005	59.84	0	0	$4,000	$0
Hills	8/11/2005	65.59	0	0	$0	$20,000
Swisher	4/13/2006	57.54	0	0	$500	$0
Cosgrove	4/13/2006	70.20	0	0	$1,000	$0
Newport	6/6/2006	59.84	0	0	$0	$2,000
Tiffin	7/17/2006	57.54	0	0	$5,000	$0
Iowa City	7/17/2006	70.20	0	0	$15,000	$0
Sharon Center	7/17/2006	59.84	0	0	$0	$10,000
Coralville	7/25/2006	65.59	0	0	$5,000	$0
Swisher	8/10/2006	65.59	0	0	$2,000	$0
North Liberty	8/10/2006	65.59	0	0	$5,000	$0
Iowa City	8/10/2006	65.59	0	0	$4,000	$0
Tiffin	7/18/2007	64.44	0	0	$0	$0
Kent County Park	9/30/2007	70.20	0	0	$0	$0
Oxford	9/30/2007	70.20	0	0	$0	$0
Lone Tree	9/30/2007	70.20	0	0	$5,000	$0
Solon	10/2/2007	57.54	0	0	$0	$0
Coralville Reservoir	4/25/2008	57.54	0	0	$0	$0
North Liberty	4/25/2008	59.84	0	0	$0	$0
Lake Macbride	5/25/2008	64.44	0	0	$50,000	$0
Oakdale	5/25/2008	70.20	0	0	$5,000	$0
Solon	5/25/2008	59.84	0	0	$1,000	$0
Solon	5/25/2008	69.05	0	0	$10,000	$0
Iowa City	6/14/2008	59.84	0	0	$0	$0
Swisher	7/7/2008	59.84	0	0	$5,000	$0
Sharon Center	7/21/2008	70.20	0	0	$50,000	$0
River Junction	7/21/2008	80.55	0	0	$0	$0
Hills	7/21/2008	70.20	0	0	$0	$0
Lone Tree	7/21/2008	70.20	0	0	$0	$0
Lone Tree	7/21/2008	74.80	0	0	$5,000	$0
Tiffin	6/23/2009	80.55	0	0	$0	$0
Oakdale	6/23/2009	59.84	0	0	$0	$0
Hills	6/23/2009	70.20	0	0	$0	$0
Coralville	7/24/2009	64.44	0	0	$0	$0
Kent County Park	8/9/2009	59.84	0	0	$0	$0
North Liberty	6/18/2010	70.20	0	0	$25,000	$0
Iowa City	6/18/2010	64.44	0	0	$25,000	$0
North Liberty	6/18/2010	59.84	0	0	$100,000	$0
Oakdale	6/18/2010	64.44	0	0	$5,000	$0
North Liberty	4/3/2011	70.20	0	0	$0	$0
Swisher	5/29/2011	59.84	0	0	$0	$0
Swisher	5/29/2011	59.84	0	0	$0	$0
Lake Macbride	5/29/2011	74.80	0	1	$10,000	$0
Sharon Center	7/24/2011	80.55	0	0	$50,000	$0
Cou Falls	7/27/2011	89.76	0	0	$125,000	$0
Solon	5/3/2012	59.84	0	0	$0	$0
Swisher	7/25/2012	59.84	0	0	$0	$0

Oakdale	7/25/2012	51.79	0	0	$200	$0
Williamstown	8/4/2012	70.20	0	0	$0	$0
Oakdale	8/4/2012	57.54	0	0	$0	$0
Oakdale	8/4/2012	59.84	0	0	$0	$0
Coralville	8/4/2012	59.84	0	0	$0	$0
North Liberty	8/4/2012	69.05	0	0	$0	$0
North Liberty	8/4/2012	64.44	0	0	$0	$0
Iowa City	9/5/2012	64.44	0	0	$0	$0
Municipal Airport	9/5/2012	65.59	0	0	$0	$0
Municipal Airport	9/5/2012	64.44	0	0	$10,000	$0
Iowa City	9/5/2012	64.44	0	0	$0	$0
Iowa City	5/19/2013	69.05	0	0	$0	$0
Municipal Airport	5/30/2013	59.84	0	0	$0	$0
Oakdale	6/24/2013	63.29	0	0	$0	$0
Municipal Airport	6/24/2013	64.44	0	0	$0	$0
Oakdale	6/24/2013	59.84	0	0	$0	$0
Oakdale	6/24/2013	59.84	0	0	$0	$0
Kent County Park	6/24/2013	62.14	0	0	$0	$0
Amish	6/24/2013	59.84	0	0	$0	$0
Hills	7/19/2013	59.84	0	0	$1,000	$0
Iowa City	9/19/2013	74.80	0	0	$10,000	$0
North Liberty	9/19/2013	89.76	0	0	$140,000	$0
Iowa City	9/19/2013	70.20	0	0	$1,000	$0
University Heights	2/20/2014	64.44	0	0	$10,000	$0
Williamstown	4/12/2014	74.80	0	0	$0	$0
Williamstown	4/12/2014	59.84	0	0	$0	$0
Iowa City	4/12/2014	80.55	0	0	$0	$0
River Junction	4/12/2014	70.20	0	0	$0	$0
Tiffin	4/27/2014	64.44	0	0	$0	$0
Iowa City	4/27/2014	64.44	0	0	$0	$0
Iowa City	4/27/2014	80.55	0	0	$0	$0
Hills	6/16/2014	59.84	0	0	$0	$0
University Heights	6/16/2014	69.05	0	0	$0	$0
Swisher	6/16/2014	57.54	0	0	$0	$0
Swisher	6/16/2014	59.84	0	0	$0	$0
North Liberty	6/30/2014	59.84	0	0	$0	$0
North Liberty	6/30/2014	80.55	1	0	$0	$0
Iowa City	6/30/2014	69.05	0	0	$0	$0
Iowa City	6/30/2014	57.54	0	0	$0	$0
Oakdale	7/12/2014	70.20	0	0	$0	$0
Oakdale	8/22/2014	74.80	0	0	$25,000	$0
Oxford	11/11/2015	70.20	0	0	$0	$0
Cosgrove	11/11/2015	70.20	0	0	$0	$0
Iowa City	11/11/2015	59.84	0	0	$0	$0
Iowa City	11/11/2015	59.84	0	0	$500,000	$0
Municipal Airport	7/6/2016	57.54	0	0	$0	$0
Municipal Airport	7/6/2016	58.69	0	0	$0	$0
Tiffin	3/6/2017	70.20	0	0	$0	$0
North Liberty	3/6/2017	70.20	0	0	$0	$0
Sharon Center	3/6/2017	57.54	0	0	$0	$0
Iowa City	3/6/2017	59.84	0	0	$0	$0
Williamstown	3/6/2017	57.54	0	0	$0	$0
Municipal Airport	3/6/2017	74.80	0	0	$0	$0

North Liberty	5/17/2017	57.54	0	0	$0	$0
Lone Tree	5/17/2017	69.05	0	0	$10,000	$0
Lone Tree	5/17/2017	57.54	0	0	$0	$0
Williamstown	7/21/2017	57.54	0	0	$0	$0
		Totals =	13	1	$32,298,400	$14,110,000

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

Table E.8 – Tornado Records

Location	Event Date	Fujita Class	Injuries	Deaths	Property Damage
Johnson County	5/22/1962	F2	0	1	$250,000
Johnson County	6/5/1972	F1	0	0	$25,000
Johnson County	4/21/1973	F2	0	0	$2,500,000
Johnson County	4/28/1974	F1	2	0	$25,000
Johnson County	7/22/1974	F1	0	0	$25,000
Johnson County	4/23/1975	F0	0	0	$0
Johnson County	11/9/1975	F1	0	0	$25,000
Johnson County	8/15/1977	-	0	0	$250,000
Johnson County	8/15/1977	-	0	0	$250,000
Johnson County	6/29/1983	F1	0	0	$250,000
Johnson County	6/7/1984	F2	0	0	$2,500,000
Johnson County	9/22/1986	F1	0	0	$25,000
Johnson County	5/8/1988	F2	0	0	$2,500,000
Johnson County	5/8/1988	F2	0	0	$2,500,000
Johnson County	5/8/1988	F0	0	0	$2,500
Johnson County	3/8/1990	F1	0	0	$250,000
Johnson County	3/22/1991	F2	0	0	$250,000
Johnson County	5/29/1991	F0	0	0	$2,500
Johnson County	9/12/1991	F2	0	0	$250,000
Hills	5/15/1998	F3	17	0	$6,000,000
Oxford	4/11/2001	F0	0	0	$25,000
Tiffin	4/11/2001	F0	0	0	$0
Swisher	4/11/2001	F0	0	0	$0
Sharon Center	4/13/2006	F1	0	0	$20,000
Iowa City	4/13/2006	F2	30	0	$12,000,000
Hills	4/13/2006	F1	0	0	$70,000
Lone Tree	4/13/2006	F1	0	0	$5,000
Lone Tree	4/13/2006	F1	0	0	$2,000
Hills	4/13/2006	F1	0	0	$10,000
North Liberty	5/25/2008	EF0	0	0	$10,000
Lone Tree	4/13/2014	EF0	0	0	$0
Windham	4/27/2014	EF0	0	0	$0
Sharon Center	7/21/2017	EF0	0	0	$0
		Totals =	49	1	$30,022,000

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

Table E.9 – Winter Storm Records

Location	Event Date	Storm Type	Injuries	Deaths	Property Damage
Countywide	11/14/1996	Winter Mix	0	0	$0
Countywide	12/25/1996	Winter Mix	0	0	$0
Countywide	12/27/1996	Winter Mix	0	0	$0
Countywide	1/9/1997	Winter Mix	0	0	$0
Countywide	1/15/1997	Winter Mix	0	0	$0

Countywide	1/24/1997	Winter Mix	0	0	$0
Countywide	2/3/1997	Winter Mix	0	0	$0
Countywide	2/28/1998	Winter Mix	0	0	$0
Countywide	12/6/1998	Winter Mix	0	0	$0
Countywide	12/6/1998	Winter Mix	0	0	$0
Countywide	12/30/1998	Winter Mix	0	0	$0
Countywide	1/1/1999	Winter Mix	0	0	$0
Countywide	1/18/1999	Winter Mix	0	0	$0
Countywide	3/5/1999	Winter Mix	0	0	$0
Countywide	3/8/1999	Winter Mix	0	0	$0
Countywide	12/16/1999	Winter Mix	0	0	$0
Countywide	12/19/1999	Winter Mix	0	0	$0
Countywide	12/23/1999	Winter Mix	0	0	$0
Countywide	1/3/2000	Winter Mix	0	0	$0
Countywide	1/17/2000	Winter Mix	0	0	$0
Countywide	1/19/2000	Winter Mix	0	0	$0
Countywide	1/29/2000	Winter Mix	0	0	$0
Countywide	2/17/2000	Winter Mix	0	0	$0
Countywide	12/7/2000	Winter Mix	0	0	$0
Countywide	12/10/2000	Winter Mix	0	0	$0
Countywide	12/15/2000	Ice Storm	0	0	$0
Countywide	1/13/2001	Winter Mix	0	0	$0
Countywide	1/28/2001	Ice Storm	0	0	$0
Countywide	2/7/2001	Winter Mix	0	0	$0
Countywide	2/8/2001	Winter Mix	0	0	$0
Countywide	2/14/2001	Winter Mix	0	0	$0
Countywide	2/23/2001	Winter Mix	0	0	$0
Countywide	3/15/2001	Winter Mix	0	0	$0
Countywide	1/30/2002	Winter Mix	0	0	$0
Countywide	3/1/2002	Winter Mix	0	0	$0
Countywide	1/28/2003	Winter Mix	0	0	$0
Countywide	2/14/2003	Winter Mix	0	0	$0
Countywide	3/4/2003	Winter Mix	0	0	$0
Countywide	1/16/2004	Winter Mix	0	0	$5,000
Countywide	12/8/2005	Winter Mix	0	0	$0
Countywide	2/16/2006	Winter Mix	0	0	$1,000
Countywide	1/13/2007	Winter Mix	0	0	$0
Countywide	1/20/2007	Winter Mix	0	0	$0
Countywide	2/6/2007	Winter Mix	0	0	$0
Countywide	2/13/2007	Winter Mix	0	0	$0
Countywide	2/16/2007	Winter Mix	0	0	$0
Countywide	2/24/2007	Ice Storm	0	0	$1,000,000
Countywide	3/1/2007	Winter Mix	0	0	$0
Countywide	4/11/2007	Winter Mix	0	0	$0
Countywide	11/21/2007	Winter Mix	0	0	$0
Countywide	12/1/2007	Ice Storm	0	0	$0
Countywide	12/6/2007	Winter Mix	0	0	$0
Countywide	12/11/2007	Ice Storm	0	0	$0
Countywide	12/15/2007	Winter Mix	0	0	$0
Countywide	12/22/2007	Winter Mix	0	0	$0
Countywide	12/28/2007	Winter Mix	0	0	$0
Countywide	1/17/2008	Winter Mix	0	0	$0
Countywide	1/20/2008	Winter Mix	0	0	$0

Countywide	1/29/2008	Winter Mix	0	0	$0
Countywide	2/3/2008	Winter Mix	0	0	$0
Countywide	2/5/2008	Winter Mix	0	0	$0
Countywide	2/11/2008	Winter Mix	0	0	$0
Countywide	2/16/2008	Winter Mix	0	0	$0
Countywide	2/25/2008	Winter Mix	0	0	$0
Countywide	2/28/2008	Winter Mix	0	0	$0
Countywide	11/29/2008	Winter Mix	0	0	$0
Countywide	12/3/2008	Winter Mix	0	0	$0
Countywide	12/8/2008	Winter Mix	0	0	$0
Countywide	12/16/2008	Winter Mix	0	0	$0
Countywide	12/18/2008	Winter Mix	0	0	$0
Countywide	12/21/2008	Blizzard	0	0	$0
Countywide	12/24/2008	Winter Mix	0	0	$0
Countywide	2/13/2009	Winter Mix	0	0	$0
Countywide	3/28/2009	Winter Mix	0	0	$0
Countywide	12/8/2009	Winter Mix	0	0	$0
Countywide	12/9/2009	Blizzard	0	0	$0
Countywide	12/23/2009	Ice Storm	0	0	$0
Countywide	12/25/2009	Winter Mix	0	0	$0
Countywide	1/6/2010	Winter Mix	0	0	$0
Countywide	1/20/2010	Ice Storm	0	0	$0
Countywide	1/25/2010	Winter Mix	0	0	$0
Countywide	2/7/2010	Winter Mix	0	0	$0
Countywide	2/21/2010	Winter Mix	0	0	$0
Countywide	3/19/2010	Winter Mix	0	0	$0
Countywide	12/11/2010	Winter Mix	0	0	$0
Countywide	12/15/2010	Winter Mix	0	0	$0
Countywide	12/23/2010	Winter Mix	0	0	$0
Countywide	1/17/2011	Winter Mix	0	0	$0
Countywide	2/1/2011	Blizzard	0	0	$0
Countywide	2/27/2011	Winter Mix	0	0	$0
Countywide	1/11/2012	Winter Mix	0	0	$0
Countywide	1/20/2012	Winter Mix	0	0	$0
Countywide	2/23/2012	Winter Mix	0	0	$0
Countywide	3/2/2012	Winter Mix	0	0	$0
Countywide	12/19/2012	Blizzard	0	0	$0
Countywide	1/27/2013	Winter Mix	0	0	$0
Countywide	1/30/2013	Winter Mix	0	0	$0
Countywide	2/21/2013	Winter Mix	0	0	$0
Countywide	2/26/2013	Winter Mix	0	0	$0
Countywide	3/4/2013	Winter Mix	0	0	$0
Countywide	12/19/2013	Winter Mix	0	0	$0
Countywide	12/21/2013	Winter Mix	0	0	$0
Countywide	1/18/2014	Winter Mix	0	0	$0
Countywide	3/1/2014	Winter Mix	0	0	$0
Countywide	11/15/2014	Winter Mix	0	0	$0
Countywide	1/5/2015	Winter Mix	0	0	$0
Countywide	1/8/2015	Winter Mix	0	0	$0
Countywide	2/1/2015	Winter Mix	0	0	$0
Countywide	2/25/2015	Winter Mix	0	0	$0
Countywide	11/20/2015	Winter Mix	0	0	$0
Countywide	12/28/2015	Winter Mix	0	0	$0

Countywide	12/24/2017	Winter Mix	0	0	$0
Countywide	12/29/2017	Winter Mix	0	0	$0
		Totals =	0	0	$1,006,000

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

Backup Generators

Backup generators provide critical facilities with electricity in the event a community's electrical transmission grid is either damaged by a disaster or overloaded by excessive use during an event.	
Hazard/s Addressed	Dam & Levee Failures, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Medium
Timeframe	1 – 2 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Bury Utility Lines, Pipes, and Tanks

Transferring existing utilities lines, pipes, and chemical storage tanks from above ground to below ground will significantly reduce the amount of property damage incurred from wind, ice, and snow related events.	
Hazard/s Addressed	Severe Storms, Tornadoes, Winter Storms
Effectiveness	Medium
Timeframe	1 – 5 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Comprehensive Land Use Planning

The jurisdiction will work with its available resources or pool its resources with its neighbors to develop comprehensive land use planning in order to bolster its ordinances, zoning, and floodplain regulations in order to increase its resiliency and detour future development from risky construction practices.	
Hazard/s Addressed	Dam & Levee Failures, Droughts, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Medium
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	Municipal Planning Departments
Funding Sources	Local Budgets

Dam Failure Evacuation Planning

JCEMA and UI will work with municipal governments and school boards to develop a comprehensive and flexible evacuation plan to address a catastrophic failure of the Coralville Dam.	
Hazard/s Addressed	Dam & Levee Failures
Effectiveness	Medium
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, Fire, and Police Departments, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	Local Budgets

Debris & Natural Fuels Reduction

Reducing the amount of debris and natural fuels in a community will deprive wildfires of the material it requires to spread and prevent high winds from launching deadly and damaging debris around during a severe storm or tornado. This project will be implemented in high risk areas as identified in this plan's WUI maps and well-known to burn areas as determined by the participating jurisdictions and appropriate local agencies.	
Hazard/s Addressed	Severe Storms, Tornadoes, Wildland Fires
Effectiveness	Medium
Timeframe	1 Year
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works and Fire Departments, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Defensible Spaces & Buffer Zones

Creating defensible spaces and buffer zones void of vegetative fuel and covered with gravel or rock helps prevent the spread of wildfire as well as creating an area in which local emergency response serviced can safely operate. This 2-pronged approach directly mitigates damage to property and protects lives, but also indirectly mitigates the threat to life and property in the area at large. This project will be implemented in high risk areas as identified in this plan's WUI maps and well-known to burn areas as determined by the participating jurisdictions and appropriate local agencies.	
Hazard/s Addressed	Wildland Fires
Effectiveness	Medium
Timeframe	1 Year
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works and Fire Departments, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Elevate Structures

Structures located within identified flood zones can be elevated above base flood elevation or predicted other predicted flood inundation levels.	
Hazard/s Addressed	Dam & Levee Failure, Floods
Effectiveness	High
Timeframe	1 – 3 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

FEMA Code 361 Safe Rooms

FEMA Code 361 regulations ensure a structure is capable of withstanding wind speeds greater than 200 miles per hour. Additionally, these anti-tornado regulations also ensure the structure is protected against hail, lightning, high and strong winds. This project can be implemented as a retrofit of a current structure or the construction of a new facility. Any critical facility is a potential target for this, but realistically location will be determined by which participating jurisdictions have the want and resources to accomplish this project.	
Hazard/s Addressed	Severe Storms, Tornadoes
Effectiveness	High
Timeframe	1 – 3 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Floodproofing

This technique is often used when relocation or buying out is not an option as is the case with a historic building or it would require astronomical funding that is not available. Floodproofing projects constitute any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage. Wet floodproofing reduces property damage counteracting hydrostatic pressure on walls or other support structures by equalizing the pressure between the interior and exterior of a structure.	
Hazard/s Addressed	Dam & Levee Failure, Floods
Effectiveness	Medium
Timeframe	1 – 3 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Insulation & Energy Efficiency

Upgrading a facility's windows, windows frames, roofing, and insulation will allow it to better maintain a desired warm or cool temperature during prolonged extreme heat or winter storms. Additionally, it decreases the energy load necessary to do so, decreasing the burden on the local energy grid.	
Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 – 3 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Levee Construction

Building a levee wall helps to regulate water levels and the direction of flow. They can be constructed artificially or as an elongation of a naturally occurring ridgeline or earthen berm.	
Hazard/s Addressed	Dam & Levee Failure, Floods
Effectiveness	High
Timeframe	1 – 5 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Governments (Solon), School Boards, UI Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Looped Grid Power Systems

Linear power grids have single points of failure that are vulnerable to a number of hazards. Looped power grids operate in parallel and are thus significantly more resistant to damage allowing the utilities to maintain power after an event.	
Hazard/s Addressed	Dam & Levee Failure, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Medium
Timeframe	1 – 5 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Low Flow Utilities

To decrease water usage before, during, and after a drought, communities can install low water flow utilities throughout its critical facilities and infrastructure. This will not only decrease water usage, but also decrease water demands. The planning area should implement this project in conjunction with their school districts and critical facilities standard maintenance cycles.	
Hazard/s Addressed	Droughts
Effectiveness	Low
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Public Awareness & Education

A campaign will inform and educate the public on hazard risks, allowing them to better protect their property through preparation and their lives through appropriate evacuation and survival procedures.	
Hazard/s Addressed	Dam & Levee Failure, Droughts, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Low
Timeframe	1 Year
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Planning Departments, School Boards, UI Department of Public Safety
Funding Sources	N/A

Rainwater Retention Basins

Rainwater retention basins are artificial basins built in strategic locations to protect against floods and droughts by collecting and holding rainwater for an extended period of time. The participating jurisdictions should implement these installations in areas where the water can be used during a drought, for agricultural or urban use, or in areas where poor functioning, outdated, or old stormwater drainage systems are in place.	
Hazard/s Addressed	Droughts, Floods
Effectiveness	Low
Timeframe	1 – 4 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Raise Transportation Infrastructure

To combat uncontrollable waters emanating from a dam or levee failure, flash flood, or riverine flood, transportation infrastructure may be raised to allow its continued use in a disaster as well as a partial earthen berm to protect a neighboring lower elevation area. Additionally, the increased elevation of road or railway bridges can prevent the buildup of debris during incidents of high floodwaters and preventing further water buildup.	
Hazard/s Addressed	Dam & Levee Failure, Floods
Effectiveness	High
Timeframe	1 – 5 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Relocate or Buyout Vulnerable Structures

Some structures may be able to be relocated from identified floodplains or dam inundation zones. Removing them from identified hazard area will eliminate their risk.	
Hazard/s Addressed	Dam & Levee Failure, Floods
Effectiveness	High
Timeframe	1 – 5 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Planning Departments, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

SKYWARN Storm Spotter Training

The NWS' SKYWARN Storm Spotter training program educates and delivers basic weather identification, spotting, and reporting information to any concerned citizens. Educating citizens in this program helps increase specific awareness and creates a skillset that helps the NWS create more accurate and timely warnings for tornadoes, severe storms, flash flooding, and other severe weather.	
Hazard/s Addressed	Floods, Severe Storms, Tornadoes, Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Fire and Police Departments, School Boards, UI Department of Public Safety
Funding Sources	Local Budgets

Snow Fences

Snow fences force drifting snow to accumulate in a desired place minimizing the amount of snowdrift on roads and railways. Controlling snow accumulation decreases the danger to a jurisdiction's citizens traveling during and after a winter storm. This project should be implemented along major transportation routes throughout the planning area.	
Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Storm Water Drainage System Upgrade

Significant flood damage in developed communities can be prevented by upgrading their storm water drainage system. This mitigation measure will allow flood waters to drain quicker and prevent excess accumulation. This project should be implemented in older drainage systems and any expanding areas throughout the planning area.	
Hazard/s Addressed	Floods
Effectiveness	Medium
Timeframe	1 – 4 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Storm Water Pump Stations

Storm water pump stations help protect areas by pumping away large volumes of water therefore preventing or decreasing the level of a flood. Pump stations can vary in size and design, allowing them to be tailored to the needs of a specific floodplain, region, or site-specific facility.	
Hazard/s Addressed	Floods
Effectiveness	Medium
Timeframe	1 – 4 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	FMA, HMGP, PDM, Local Budgets

Storm Siren Network Expansion

The jurisdiction will continue to improve their alert, broadcast, and warning systems to give information and instructions in the face of an impending hazard impact to prevent injury and property damage. These systems will allow citizens to better protect themselves in the event of an impending or potentially impending hazard. Additionally, hazard or weather specific information can be delivered to assist in achieving the previously stated goal.	
Hazard/s Addressed	Dam & Levee Failures, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Medium
Timeframe	1 – 4 Years
Prior Plan Inclusion	Yes, Carried Forward
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Structural Integrity Monitoring Instruments

Dam failure is often preventable, but due to the structural nature of their construction and limited inspection resources, inspections happen too infrequently. Installing a series of seismic monitoring instruments at strategic locations along a dam can detect small, often unnoticed or detected, shifts in the dam's substructure that are the primary cause in premature collapse or failure. These instruments serve not only as early warning devices, but as the means to ensuring a dam's maintenance and repair schedule is kept.	
Hazard/s Addressed	Dam & Levee Failure
Effectiveness	Medium
Timeframe	1 Year
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Transportation Status & Routing System

Installing a transportation status and routing system will allow a community to effectively mitigate the effects of multiple hazards on its travelling population. Using smart grid and intelligent transit control systems, a jurisdiction can effectively route its transportation systems according to situational need whether it is to avoid severe weather, flooding, dam failure, wildfires or any number of hazards. By having a better control of its transportation network, and thus the location of its citizens, a community detour its citizens from entering into the harm of a hazard. This project should be a planning area wide implementation of all major and heavily used transportation networks.	
Hazard/s Addressed	Dam & Levee Failure, Floods, Severe Storms, Tornadoes, Wildland Fires, Winter Storms
Effectiveness	Medium
Timeframe	1 – 5 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Water Line Insulation

Insulating a facility's water pipes helps prevent them from freezing and bursting due to sudden and prolonged low temperatures during winter storms. The planning area should implement this project in conjunction with their school districts and critical facilities standard maintenance cycles.	
Hazard/s Addressed	Winter Storms
Effectiveness	Low
Timeframe	1 Year
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Wildland Fire Structural Retrofit

Retrofitting structures with screened vent enclosures, double paned glass, and spark arrestors will reduce the chances of a structure igniting from a wildfire as well as a wildfire's chance of spreading.	
Hazard/s Addressed	Wildland Fires
Effectiveness	Medium
Timeframe	1 – 2 Years
Prior Plan Inclusion	No
Lead Organization	JCEMA, Municipal Public Works and Fire Departments, School Boards, UI Department of Public Safety and Facilities Management
Funding Sources	HMGP, PDM, Local Budgets

Appendix G – Project Prioritization

Table G.1 – Action & Project Prioritization, Johnson County

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	High	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	High	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	High	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	High	High	Medium	Low	Low
Low Flow Utilities	X	Medium	X	X	X	X	X
Public Awareness & Education	Low	Medium	High	High	Medium	Low	Low
Rainwater Retention Basins	X	Medium	High	X	X	X	X
Raise Transportation Infrastructure	Low	X	High	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	High	X	X	X	X
SKYWARN Storm Spotter Training	X	X	High	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	High	X	X	X	X
Storm Water Pump Stations	X	X	High	X	X	X	X
Storm Siren Network Expansion	Low	X	High	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	Low	X	High	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.2 – Action & Project Prioritization, Coralville

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Medium	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Medium	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	Low	Low	Medium	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Medium	X	X	X	X
Raise Transportation Infrastructure	Low	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Medium	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	Low	X	Medium	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	Low	X	Medium	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.3 – Action & Project Prioritization, Hills

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	High	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	High	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	High	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	High	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	Low	Low	High	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	High	X	X	X	X
Raise Transportation Infrastructure	Low	X	High	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	High	X	X	X	X
SKYWARN Storm Spotter Training	X	X	High	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	High	X	X	X	X
Storm Water Pump Stations	X	X	High	X	X	X	X
Storm Siren Network Expansion	Low	X	High	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	Low	X	High	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.4 – Action & Project Prioritization, Iowa City

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Medium	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Medium	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	Low	Low	Medium	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Medium	X	X	X	X
Raise Transportation Infrastructure	Low	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Medium	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	Low	X	Medium	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	Low	X	Medium	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.5 – Action & Project Prioritization, Lone Tree

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.6 – Action & Project Prioritization, North Liberty

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Medium	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Medium	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Medium	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Medium	X	X	X	X
Raise Transportation Infrastructure	X	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Medium	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	X	X	Medium	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Medium	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.7 – Action & Project Prioritization, Oxford

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.8 – Action & Project Prioritization, Shueyville

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.9 – Action & Project Prioritization, Solon

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.10 – Action & Project Prioritization, Swisher

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.11 – Action & Project Prioritization, Tiffin

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Medium	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Medium	High	Medium	Low	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	Low	Low	Medium	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Medium	X	X	X	X
Raise Transportation Infrastructure	Low	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Medium	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	Low	X	Medium	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	Low	X	Medium	High	Medium	Low	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.12 – Action & Project Prioritization, University Heights

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	X	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	X	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	X	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	X	Low	Low	High	Medium	X	Low
Rainwater Retention Basins	X	Low	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	X	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	X	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	X	X

Table G.13 – Action & Project Prioritization, University of Iowa

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Medium	High	Medium	X	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	Low	X
Elevate Structures	Low	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Medium	High	Medium	X	Low
Low Flow Utilities	X	Low	X	X	X	X	X
Public Awareness & Education	Low	Low	Medium	High	Medium	Low	Low
Rainwater Retention Basins	X	Low	Medium	X	X	X	X
Raise Transportation Infrastructure	Low	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	X	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	Low	X	Medium	High	Medium	X	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	Low	High	Medium	X	Low
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.14 – Action & Project Prioritization, Clear Creek-Amana Community School District

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Medium	High	Medium	X	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	X	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Medium	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Medium	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Medium	High	Medium	X	Low
Low Flow Utilities	X	X	X	X	X	X	X
Public Awareness & Education	Low	X	Medium	High	Medium	X	Low
Rainwater Retention Basins	X	X	Medium	X	X	X	X
Raise Transportation Infrastructure	Low	X	Medium	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Medium	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Medium	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Medium	X	X	X	X
Storm Water Pump Stations	X	X	Medium	X	X	X	X
Storm Siren Network Expansion	Low	X	Medium	High	Medium	X	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	X	X	X	X	X
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	X	X

Table G.15 – Action & Project Prioritization, Iowa City Community School District

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	X	X	X	X	X	X
Public Awareness & Education	Low	X	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	X	Low	X	X	X	X
Raise Transportation Infrastructure	Low	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	Low	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	X	X	X	X	X
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Table G.16 – Action & Project Prioritization, Lone Tree Community School District

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	Low	X	Low	High	Medium	X	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	Low	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	X	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	Low	X	Low	X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	Low	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	Low	X	Low	High	Medium	X	Low
Low Flow Utilities	X	X	X	X	X	X	X
Public Awareness & Education	Low	X	Low	High	Medium	X	Low
Rainwater Retention Basins	X	X	Low	X	X	X	X
Raise Transportation Infrastructure	Low	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	Low	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	Low
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	Low	X	Low	High	Medium	X	Low
Structural Integrity Monitoring Instruments	Low	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	X	X	X	X	X
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	X	X

Table G.17 – Action & Project Prioritization, Solon Community School District

Project/Action	Dam & Levee Failure	Droughts	Floods	Severe Storms	Tornadoes	Wildland Fires	Winter Storms
Backup Generators	X	X	Low	High	Medium	Low	Low
Bury Utility Lines, Pipes, and Tanks	X	X	X	High	Medium	X	Low
Comprehensive Land Use Planning	X	X	X	X	X	X	X
Dam Failure Evacuation Planning	X	X	X	X	X	X	X
Debris & Natural Fuels Reduction	X	X	X	High	Medium	Low	X
Defensible Spaces & Buffer Zones	X	X	X	X	X	X	X
Elevate Structures	X	X		X	X	X	X
FEMA Code 361 Safe Rooms	X	X	X	High	Medium	X	X
Floodproofing	X	X	Low	X	X	X	X
Insulation & Energy Efficiency	X	X	X	X	X	X	Low
Looped Grid Power Systems	X	X	Low	High	Medium	Low	Low
Low Flow Utilities	X	X	X	X	X	X	X
Public Awareness & Education	X	X	Low	High	Medium	Low	Low
Rainwater Retention Basins	X	X	Low	X	X	X	X
Raise Transportation Infrastructure	X	X	Low	X	X	X	X
Relocate or Buyout Vulnerable Structures	X	X	Low	X	X	X	X
SKYWARN Storm Spotter Training	X	X	Low	High	Medium	X	Low
Snow Fences	X	X	X	X	X	X	
Storm Water Drainage System Upgrade	X	X	Low	X	X	X	X
Storm Water Pump Stations	X	X	Low	X	X	X	X
Storm Siren Network Expansion	X	X	Low	High	Medium	Low	Low
Structural Integrity Monitoring Instruments	X	X	X	X	X	X	X
Transportation Status & Routing Systems	X	X	X	X	X	X	X
Water Line Insulation	X	X	X	X	X	X	Low
Wildland Fire Structural Retrofit	X	X	X	X	X	Low	X

Appendix H – Plan Adoption Resolutions

<JCEMA>

<CORALVILLE>

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RESOLUTION NO. 2019-15

At a meeting of the City Council of the City of Oxford, held May 14, 2019

Resolution of the city council adopting the finalized Johnson County IA, Countywide Hazard Mitigation Plan (CHMP); Providing and effective date; and for other purposes:

WHEREAS, The participating jurisdictions of Johnson County have worked together to develop a strategy known as the Johnson County CHMP to improve disaster resistance in the planning area; AND

WHEREAS, the Federal Disaster Mitigation Act of 2000 (DMA2000) pursuant 44 CFR Part 201 and the Federal Emergency Management Agency (FEMA) require communities to adopt an approved hazard mitigation plan in order to be eligible to receive pre-disaster and post disaster federal funding for mitigation purposes; AND

WHEREAS, the participating jurisdiction has participated in the hazard mitigation plan by the formation of a Mitigation Planning Committee (MPC); AND

WHEREAS, the MPC recommends the formal adoption of the Johnson County CHMP by the passing of this resolution.

Therefore, be it resolved by the city council that:

Section 1: The participating stakeholder hereby approves and adopts the hazard mitigation plan in its entirety with projects as adopted by the MPC; AND agree to be governed by the CHMP attached hereto and incorporated.

Section 2: The participating stakeholder authorizes the appropriate participating officials to pursue funding opportunities for implementation of proposals designated therein; AND will upon receipt of such funding or other necessary resources, seek to implement the actions contained in the plan.

Section 3: The participating jurisdiction will continue to cooperate and participate in the hazard mitigation planning process, holding regular meetings, including reporting of progress as required by FEMA, the State of Iowa Homeland Security and Emergency Management Department and the MPC.

The resolution was offered for adoption
by Weppler
The motion to adopt was seconded
by Struzynski

And upon being put to a successful vote; Oxford City Mayor's signature:
Name, Title and Date: Margaret B. Johnson, Mayor Pro Tem May 14, 2019

<SHUEYVILLE>

<SOLON>

<SWISHER>

<TIFFIN>

<UNIVERSITY HEIGHTS>

<U OF IA>

<CLEAR CREEK CSD>

<IOWA CITY CSD>

<LONE TREE CSD>

<SOLON CSD>

Appendix I – FEMA Approval Letter