Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa

October 2016 Update

EMERGENCY MANAGEMENT
JEFFERSON COUNTY

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Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa

Adopted: 12/19/2016

Expires: 12/19/2021

Prepared by: Area 15 Regional Planning Commission

Special thanks to the Jefferson County Board of Supervisors, the Jefferson County Emergency Management Agency, and the residents of Jefferson County

This plan was developed in coordination with the Federal Emergency Management Agency and Iowa Homeland Security and Emergency Management

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[1] *Current as of the date of adoption. Information is subject to change without notice.*

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Section 1 – Introduction to Mitigation Planning

Thunderstorms, flooding, tornadoes, blizzards – these are examples of natural hazards that may affect Iowans each year. These events threaten to cause millions of dollars in property damage annually and can be fatal to humans and animals that are in harm's way. To protect lives and property from natural and man-made hazards, it is vital for citizens and local leaders to identify potential losses and take measures to reduce them. This process is known as mitigation planning.

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards.[2] Hazards can be natural, such as those mentioned above, or man-made, such as a radiological incident or transportation accidents involving hazardous materials. Hazard mitigation planning encourages long-term reduction of vulnerability to natural and man-made hazards, with the overarching goal of saving lives and reducing property damage. Mitigation actions should provide a cost-effective and environmentally sound methods to reduce the potential financial impacts of disasters to property owners and governmental entities. Mitigation should also minimize disruption to communities by protecting critical resources and infrastructure systems such as water, food, shelter, energy, medical treatment, and transportation.

A variety of mitigation actions can be undertaken to help curb the potential impacts of any hazard. Examples of mitigation measures can include infrastructure improvements, purchasing emergency response equipment, and outfitting a community shelter with a back-up power supply. Warning sirens can be installed to notify residents of an approaching storm and NOAA radios or cell phone alerts could be utilized to inform the public of information during the storm including shelter locations. Proactive mitigation measures help save lives and protect property.

Background

44 CFR § 201.6 – The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

The response to and mitigation of natural disasters has been a subject of increasing focus for the federal government throughout the past few decades. The Federal Emergency Management Agency (FEMA) provides assistance to local governments for disaster response and recovery through the Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act). The Stafford Act amended the original Disaster Relief Act of 1974, which created a system triggering financial and physical assistance upon the issuance of a Presidential

[2] 44 CFR §201.2

Disaster Declaration. This program was amended again with the passage of The Disaster Mitigation Act of 2000 (DMA2K). This legislation established a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). DMA2K increased the amount of funds available to states, and requires state and local governments to have adopted an approved hazard mitigation plan in order to qualify for post-disaster HMGP funding. This document was developed in accordance with FEMA's plan requirements, which are outlined under Code of Federal Regulations, Title 44, Part 201.6, *Local Mitigation Plans* (44 CFR §201.6). The full text of 44 CFR §201.6 may be found in Appendix A.

44 CFR § 201.6(a)(1) – A local government must have a mitigation plan approved to receive HMGP project grants. A local government must have a mitigation plan approved in order to apply or and receive mitigation project grants under all other mitigation grant programs.

Local governments are required to have a FEMA-approved Local Mitigation Plan in place in order to apply for and receive grant funding under FEMA's several mitigation-related programs.[3] The number of projects eligible for grant funding changes annually and is based on recent Presidential Disaster Declarations and priorities determined at the state level. Each of the following FEMA grant programs provides funding opportunities for pre- and post-disaster mitigation activities.[4]

- **Hazard Mitigation Grant Program (HMGP):** HMGP assists in implementing long-term hazard mitigation measures following Presidential Disaster Declarations. Funding is available to implement projects in accordance with state, tribal, and local priorities.
- **Pre-Disaster Mitigation (PDM):** PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while also reducing reliance on federal funding from actual disaster declarations.
- **Flood Mitigation Assistance (FMA):** FMA provides funds on an annual basis to reduce or eliminate the risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).
- **Repetitive Flood Claims (RFC):** RFC provides funds on an annual basis to reduce the risk of flood damage to individual properties insured under the NFIP that have had one or more claim payments for flood damages. RFC provides up to 100% federal funding for projects in communities that meet the reduced capacity requirements.
- **Severe Repetitive Loss (SRL):** SRL provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that are qualified as severe repetitive loss structures. SRL provides up to 90% federal funding for eligible projects.

[3] 44 CFR §201.6
[4] FEMA Hazard Mitigation Assistance

Purpose

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

A hazard mitigation plan is intended to accomplish several goals and objectives. Most importantly, the mitigation planning process provides a platform for the community to recognize and address the hazards that may impact them. The local mitigation plan is the representation of a jurisdiction's commitment to reduce risks associated with natural hazards, serving as a guide for decision makers as they commit resources toward such a reduction of the effects of hazards. The purpose of this plan is to engage citizens, public officials, and other local leaders in a planning process that will formulate strategies to address the hazards that could occur in Jefferson County.[5]

This document is an update of the Jefferson County Iowa Hazard Mitigation Plan, which was completed and adopted in 2010. Data collected during this process was used to identify means to reduce the effects of disasters upon residents, property, and resources. There are three parts of this particular plan that accomplish the purpose:

1. Identifying, profiling, and ranking hazards that may affect Jefferson County;
2. Assessing local capabilities, developing goals, and identifying mitigation actions to reduce vulnerability to hazards; and
3. Implementing the plan and associated mitigation actions while continuously monitoring, evaluating, and updating the plan.

Plan Organization

The Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County is organized as follows:

- Section 1: Introduction to Mitigation Planning
- Section 2: Mitigation Planning Process
- Section 3: Planning Area Profile
- Section 4: Hazard Identification & Risk Assessment
- Section 5: Mitigation Strategy
- Section 6: Implementation
- Section 7: Local Focus
- Section 8: Appendices

[5]*This hazard mitigation plan is not to be confused with the Jefferson County Emergency Operations Plan (EOP). The major difference between this plan and the EOP is that the hazard mitigation plan addresses hazards before they occur. The EOP is designed to be a guide on how to respond in the case of an emergency or disaster.*

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Section 2 – Mitigation Planning Process

44 CFR § 201.6(b) – An open public involvement process is essential to the development of an effective plan.

In 2013, the Jefferson County Board of Supervisors and Emergency Management Agency initiated this project with the assistance of the Area 15 Regional Planning Commission. The County chose to pursue a 5-year Plan Update, as their existing plan (completed in 2010) was set to expire in 2016. Upon the award of HMGP funding for planning, Jefferson County enlisted the services of the Area 15 Regional Planning Commission as a consultant to facilitate the planning process and to draft the hazard mitigation plan document.

The hazard mitigation planning process is outlined by FEMA as a series of somewhat sequential tasks. Although the Local Mitigation Planning Handbook frames the planning process slightly differently, a similar approach was taken to develop this plan as was used to create the *2010 Jefferson County Hazard Mitigation Plan*. The tasks for mitigation planning are outlined below.[6]

1. Determine the Planning Area & Resources
2. Build the Planning Team
3. Create an Outreach Strategy
4. Review Community Capabilities
5. Conduct a Risk Assessment
6. Develop a Mitigation Strategy
7. Keep the Plan Current
8. Review & Adopt the Plan
9. Create a Safe & Resilient Community

Planning Meetings & Local Involvement

44 CFR § 201.6(c)(1) – [The plan shall include] documentation of the planning process used to develop the plan, including who was involved in the process, and how the public was involved.

44 CFR § 201.6(b)(2) – [The plan shall include] an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

The planning area was identified in the NOI and application for HMGP funds. Seven cities, two school districts, one university, and the unincorporated areas of Jefferson County were identified as participants in this plan update. From the beginning of the planning process, Area 15 staff worked with representatives from Jefferson County and its Emergency Management Agency to

[6] FEMA Local Mitigation Planning Handbook

determine the appropriate outreach strategy. Planning staff contacted each community and school directly to inform them about the planning process and to identify potential meeting times and locations. A data collection guide was distributed to each city, school, and fire department within the planning area to survey documents and services and to inventory assets. This aided in identifying existing plans and critical facilities, providing the important information that was used to assess the vulnerability of each community to hazards. The surveys are found in Appendix G.

Through countywide and local planning meetings, hazards were re-examined to determine which pose the biggest threat for each jurisdiction. Planning teams were able to help develop the risk assessment by analyzing these hazards using various resources and local knowledge. The planning teams then identified, discussed, and prioritized community goals and mitigation actions.

The countywide planning team included emergency management staff, elected officials, city and county personnel, first responders and school representatives. Countywide meetings were held throughout the planning process. Representatives from each jurisdiction were expected to attend at least two countywide planning team meetings. Additional assistance from outside volunteers also contributed to the development of this plan, including data gathering from city or school staff and various County offices. A list of plan participants may be found in Appendix E.

A total of three countywide meetings were held. A kick-off meeting was held on September 11, 2014; the hazard identification and risk assessment meeting was held on October 2, 2014; and the mitigation strategy meeting was held on January 8, 2015. In addition, at least one meeting was held with each participating jurisdiction to address the localized needs and concerns of the individual communities and schools. Throughout the planning process, neighboring communities and the general public were provided the opportunity to give input and feedback for the plan. Public notices for each meeting were published in the Fairfield Ledger, which has circulation throughout Jefferson County. Citizens and stakeholders were encouraged to attend local and countywide mitigation planning meetings throughout the planning process and invited to comment during the plan review period.

Area 15 RPC is the council of governments for a six-county region in southeast Iowa. The RPC board of directors is comprised of County Supervisors from Jefferson and four surrounding counties, as well as at-large members representing small businesses and economic development agencies. Updates on the plan's status were provided monthly in the RPC board meeting agenda information packets. Board Members were invited to share this information with the communities, citizens, and any other interested parties in neighboring counties.

Similar information was also made available to the members of Opportunity[2], a regional marketing group which is serves as the region's Comprehensive Economic Development Strategy (CEDS) committee. The CEDS is a document is a tool that aids in developing goals and strategies that guide economic growth in the region.

Additionally, the Jefferson County Emergency Manager during the planning stages—Joe Stever—reached out to several other potential stakeholders via telephone to encourage their participation in countywide and local planning meetings.

44 CFR § 201.6(b)(1) – [The planning process shall include] an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

Before this plan was adopted within each local jurisdiction it was made available for public review and comment at the Jefferson County Court House and on the Area 15 RPC website for a period of thirty days. Area 15 staff compiled this document and completed the associated plan review tool and then submitted to Iowa Homeland Security and FEMA for review. Each of the participating jurisdictions adopted the plan pending comments from the State and Federal review process, and upon the completion of the plan, a final draft was provided to each participating jurisdiction.

Review of Existing Plans

44 CFR § 201.6(b)(3) – [The planning process shall include] review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Existing plans, studies, reports, and other technical information were reviewed by Area 15 RPC staff with each jurisdiction during the plan development process. This was done in an effort to be consistent with the goals and priorities previously identified by the County and each jurisdiction.

The following documents were reviewed during the development of this plan:

- 2013 State of Iowa Hazard Mitigation Plan
- 2010 Jefferson County Multi-Jurisdictional Hazard Mitigation Plan
- 2010 Jefferson County Code of Ordinances (with 2016 amendments)
- Jefferson County Emergency Operations Plan
- Area 15 Region Comprehensive Economic Development Strategy: 2012-2017

Other documents referenced that are specific to each individual jurisdiction may be found in each of the local jurisdiction profiles in Section 7.

It is intended that this multi-jurisdictional hazard mitigation plan be incorporated into the existing and future plans of all the participating jurisdictions, where appropriate. The actions identified in this plan should be considered during the development processes of any future planning activities, including: capital improvement plans, budgets, comprehensive plans, and emergency management and operations plans.

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Section 3 – Planning Area Profile

Jefferson County is located in Southeast Iowa, encompassing approximately 437 square miles. It is bordered by Keokuk and Washington Counties to the north, Henry County to the east, Van Buren County to the south, and Wapello County to the west. As the map on the preceding page shows, seven incorporated cities lie within the county: Batavia, Fairfield, Libertyville, Lockridge, Maharishi Vedic City, Packwood, and Pleasant Plain. Established in 2001, Maharishi Vedic City is Iowa's newest incorporated city.

The following communities and educational institutions are officially represented in this plan:

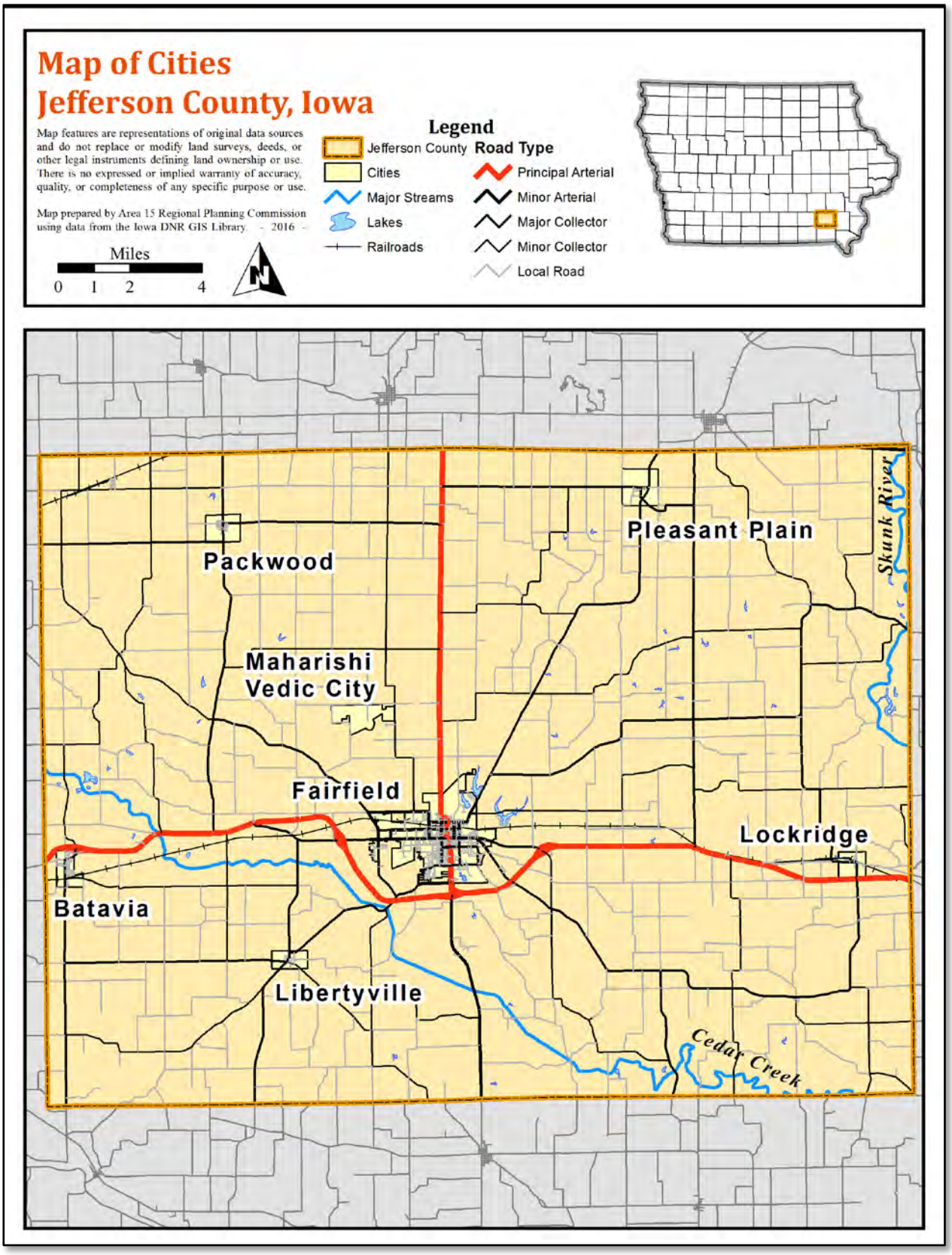
Batavia	Lockridge	Fairfield Schools
Fairfield	Maharishi Vedic City	Pekin Schools
Libertyville	Packwood	Maharishi University
	Pleasant Plain	

Historic Overview[7]

The first settler to be born in the area which would become Jefferson County was William Coop, son of Col. W. G. Coop, in July 1836. Prior to the settlement of the land, there were two Indian tribes who inhabited the area—the Sac and the Fox. Named after Thomas Jefferson, the county became officially separated from Henry County on January 21, 1839 by an act of the Iowa Territorial Legislature. Three commissioners were appointed and their first task was to locate and establish the Seat of Justice for the county. Fairfield, incorporated in 1847, was chosen because of its central location and its pleasant setting on an elevated prairie. In 1851 the County Court was created by the State of Iowa. This gave the County Judge power previously exercised by the Board of County Commissioners. In 1860, this changed again to a Board of Supervisors which remains to this day.

Early in its history, migrants to Jefferson County came from Indiana, Kentucky, Ohio, Virginia, and Pennsylvania. Swedish immigrants added their influence beginning in 1845 forming their first settlement west of the Mississippi River in Lockridge Township. Jefferson County's first courthouse was built in December 1839. The first school in the county was established in 1837. By 1962, most of the independent schools in the county had consolidated into either the Pekin or Fairfield school districts. The first railroad came to Jefferson County in 1858 and the first Carnegie Library in the United States outside the State of Pennsylvania was built in Fairfield in 1892.

[7] Jefferson County


Map of Cities
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
N
Legend
Jefferson County
Cities
Major Streams
Lakes
Railroads
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
Local Road
Packwood
Pleasant Plain
Skunk River
Maharishi
Vedic City
Fairfield
Lockridge
Batavia
Libertyville
Cedar Creek

Jefferson County at a Glance

Demographics		Workforce	
Population	16,843	**Total Labor Force**	8,647
Median Age	43.5	**Employed**	8,245
65 Years and Over	3,598	**Unemployment Percentage**	4.6%

Race	Number	Percent
White Alone	14,759	87.6%
Black or African American Alone	214	1.3%
American Indian and Alaska Native Alone	31	0.2%
Asian Alone	1,425	8.5%
Native Hawaiian or Other Pacific Islander Alone	2	0.0%
Hispanic or Latino	410	2.4%
Some Other Race Alone	144	0.9%
Two or More Races	268	1.6%

Household Income		Total Property Valuations	
Median Household Income	$44,688	**Residential**	$729,622,000
Per Capital Income	$27,408	**Commercial**	$136,645,840
Individuals Below Poverty Level	14.0%	**Industrial**	$432,057,800

Housing		Regulatory Information	
Total Housing Units	7,594	**Flood Insurance Rate Map**	No
Occupied Housing Units	6,846	**NFIP Participant**	No
Vacancy Rate	9.8%	**Comprehensive Plan**	1992
Owner-occupied Housing Units	4,573 (66.8%)	**Zoning Ordinance**	No

Occupation	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	295	3.6%
Construction	511	6.2%
Manufacturing	1,206	14.6%
Wholesale trade	289	3.5%
Retail trade	775	9.4%
Transportation and warehousing, and utilities	184	2.2%
Information	211	2.6%
Finance and insurance, and real estate and rental and leasing	500	6.1%
Professional, scientific, and management, and administrative and waste management	755	9.2%
Educational services, and health care and social assistance	1,798	21.8%
Arts, entertainment, and recreation, and accommodation and food services	652	7.9%
Public administration	365	4.4%
Other services	704	8.5%

Sources: U.S. Census Bureau (2014), Jefferson County Assessor (2016)

Population, Demographics, & Economics

According to the U.S. Census Bureau, the 1840 population of Jefferson County was 2,773.[8] Jefferson County grew rapidly until 1870, when it had a peak population of 17,839. It has remained relatively stable since about 1910 (Figure 3.1). The 2010 decennial census estimated the countywide population at 16,843, which represents a 4.1% increase from its 2000 population. Jefferson County is one of the only counties in Southeast Iowa to mark growth over this period. Table 3.1 shows a detailed chronology of State and County populations while Table 3.2 shows the population trends for each city within Jefferson County.

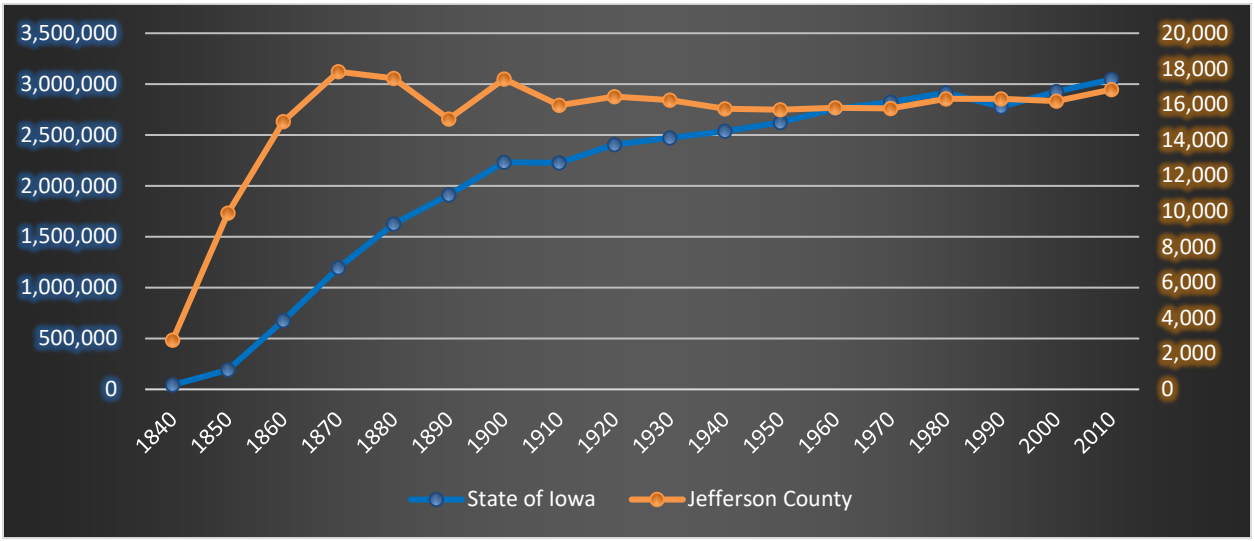


Figure 3.1. Historical Population: State of Iowa & Jefferson County

Table 3.1. Historical Population: State of Iowa & Jefferson County

Jurisdiction	1840	1850	1860	1870	1880	1890
State of Iowa	43,112	192,214	674,913	1,194,020	1,624,615	1,912,297
Jefferson County	2,773	9,904	15,038	17,839	17,469	15,184
	1900	1910	1920	1930	1940	1950
State of Iowa	2,231,853	2,224,771	2,404,021	2,470,939	2,538,268	2,621,073
Jefferson County	17,437	15,951	16,440	16,241	15,762	15,696
	1960	1970	1980	1990	2000	2010
State of Iowa	2,757,537	2,824,376	2,913,808	2,776,755	2,926,324	3,046,355
Jefferson County	15,818	15,774	16,316	16,310	16,181	16,843

Source: U.S. Census Bureau (2010)

Since the last plan was completed, the population of Jefferson County aged slightly from a median age of 41.1 to a median age of 43.5, which is higher than the median age of 38.0 for the State. In that time, the population of the county diversified substantially. The "white only" population declined by nearly 10%. While the "Black," and "Hispanic" populations each have shown slight increases, the "Asian" population has increased fivefold from 1.7% to 8.5%.

[8] U.S. Census Bureau

Table 3.2. Historical Population: Jefferson County Cities

Jurisdiction	1840	1900	1970	1980	1990	2000	2010
Jefferson County	**2,773**	**17,437**	**15,774**	**16,316**	**16,310**	**16,181**	**16,843**
Batavia	-	553	525	519	520	500	499
Fairfield	-	4,689	8,715	9,428	9,768	9,509	9,464
Libertyville	-	-	329	281	264	325	315
Lockridge	-	-	232	271	270	275	268
Maharishi Vedic City	-	-	-	-	-	-	259
Packwood	-	284	157	210	208	223	204
Pleasant Plain	-	280	121	144	128	131	93

Source: U.S. Census Bureau (2010)

From the early years of its existence, manufacturing has been a chief source of employment for residents of Jefferson County. Major occupations for the county today include: education (21.8%), manufacturing (14.6%), retail trade (9.4%), and professional/scientific services (9.2%). Though it is a largely rural county, the agricultural sector employs just 3.6% of the population. At $44,688, the median household income for Jefferson County is about 9% lower than the statewide median household income of $51,100. Nearly 4.6% of workers are unemployed and approximately 14% are living below the designated poverty level. Both figures are 1-2% higher than the state average. More demographic and economic details can be found in the "Jefferson County at a Glance" table on the following page.

Geography

Land Use

Jefferson county is located in an area known as the Southern Iowa Drift Plain. The land surface is characterized by steep rolling hills, level alluvial lowlands, and table-like upland divides. Jefferson County's landscape is continually evolving with a large amount of erosion and weathering. A land cover map may be found on Page 16.

The county has excellent soil for a variety of agricultural uses. Approximately 95% of the county's acreage is used for agricultural purposes; 46% is for crop production, 30% is grassland, and 19% is forested. Water and wetlands cover just over 1% of the county; while roads, structures, or other impervious surfaces cover over 2%. The remaining 1% is barren or fallow ground. Because trees and grass are typical elements in a yard, much of the area within city limits is forested or grassland.

Surface Water & Floodplains

Jefferson County contains a variety of surface water features, although they are mostly in the form of creeks, recreational lakes, and soil conservation structures (reservoirs). Only one river flows through Jefferson County. The Skunk River grazes the northeast corner of the county, but runs nowhere near any incorporated city. The major stream that runs through the county is Cedar Creek which bisects the southwest quadrant near Batavia, Fairfield, and Libertyville. Water travel within the county is limited to recreational use only.

When compared to most other areas around the State, Jefferson County has fewer issues with river flooding. Due to the topography of Jefferson County, floodplains are relatively narrow and impact mostly low-lying rural areas. When river flooding does occur, it typically is confined to the unincorporated areas of the county. A map of the rivers, streams, and elevation of the county may be found on Page 17. Below is a list of all of the streams in Jefferson County.

River in Jefferson County: Skunk

Creeks in Jefferson County: Berry Branch, Big Branch, Bonell, Brush, Bur Oak, Cedar, Church, Coon, Crooked, Crow, East Branch Lick, Grubb Run, Honey, Jones Branch, Lick, Little Competine, Little Lick, Middle Walnut, Mitchell, North Walnut, Richland, Rock, Rocky Branch, Shawnee, Smith, South Walnut, Stoddard, Stump, Troy, Turkey, & Wolf.

Infrastructure

Streets & Highways

As the map on the Page 18 illustrates, transportation exists primarily through on-road travel. The Iowa Department of Transportation is in charge of maintenance for State and U.S. Highways. Jefferson County's Secondary Roads Department tends to the roads in the unincorporated areas of the county. All cities maintain the streets within their own boundaries. The principal transportation routes in Jefferson County are U.S. Highway 34 (Iowa Highway 163) running east/west and Iowa Highway 1 running north/south. Iowa Highway 78 skirts the northeast corner of the county and runs east/west within a mile of county line in Keokuk and Washington Counties.

Air, Rail, & Public Transportation

One public use airport—Fairfield Municipal—is located approximately three miles north of downtown Fairfield, one-half mile east of Maharishi Vedic City. The runway is oriented north-south, away from Maharishi Vedic City.

Two railroads serve Jefferson County. The Ottumwa Subdivision of the BNSF Railway bisects the county, running east to west through Lockridge, Fairfield, and Batavia. Amtrak's California Zephyr provides passenger rail service through the area with stops in Mt. Pleasant about 25 miles east and Ottumwa about 25 miles west. Amtrak travels east to Chicago in the mornings and west toward Omaha in the evening. The Ottumwa Subdivision of the Canadian Pacific Railway clips the northwest corner of the county near Packwood and the campus of Pekin Schools.

Public transportation is available through 10-15 Transit, a federally-funded public transportation system that provides on-demand service to any citizen of Jefferson County and nine other southeast Iowa counties. Trips must be scheduled by the previous business day and are subject to driver and vehicle availability. Regional bus transportation is also available through the Burlington Trailways location at the Best Western Hotel in Fairfield.

Utility Systems

- Electric: Alliant Energy, MidAmerican Energy
- Natural Gas: Access Energy, Alliant Energy
- Water: Fairfield Waterworks, Rathbun Regional Water Assn., Wapello Rural Water Assn.
- Sewer: Cities, Regional Utility Service Systems (RUSS)
- Telephone/Internet: Farmers Telephone Co., Lisco, Mediacom, NaTel, Windstream

Local Media

There are number of media sources which serve the citizens of Jefferson County. The local newspaper is the *Fairfield Ledger*. This is a mail-delivered, daily publication. Much of its content is also made available online for subscribers. The county is served by major television stations out of Des Moines (ABC, CBS, NBC, and FOX) and Ottumwa (ABC and FOX), Iowa Public Television, and local public access television through the Fairfield Media Center. Local FM radio stations include KHOE 90.5 (Maharishi University), KSUI 91.7 (Classical), KKFD 95.9 (Classic Rock), and KRUU 100.1 (Variety). The local AM radio station is KMCD 1570.

Schools

The county is served by five public school districts, one private school district, and one institute of higher education. Table 3.3 provides a list of all school districts which show total school enrollment of the educational institutions serving of Jefferson County. The map on Page 19 outlines the boundaries of the public school districts in Jefferson County. The public school districts which have structures within Jefferson County are the Fairfield and Pekin Community School Districts. The Maharishi School of the Age of Enlightenment is affiliated with the Maharishi University of Management, both of which are located on the northwest edge of Fairfield.

Table 3.3. Jefferson County Schools

School District	School Sites	Enrollment
Cardinal Community School District	*	563
Fairfield Community School District	Fairfield, Libertyville	1,670
Maharishi School of the Age of Enlightenment	Fairfield	182
Maharishi University of Management	Fairfield	1,400
Mount Pleasant Community School District	*	1,992
Pekin Community School District	Packwood	638

*District does not have a school within Jefferson County
Source: Iowa Department of Education (2015)

Recreational, Historical, & Cultural Areas

Jefferson County is home to a variety of historical and cultural facilities. Nearly thirty buildings, structures, or districts appear on the National Register of Historic Places. Those places appear in Table 3.4 on Page 20.

Land Cover Map
Jefferson County, Iowa

Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.

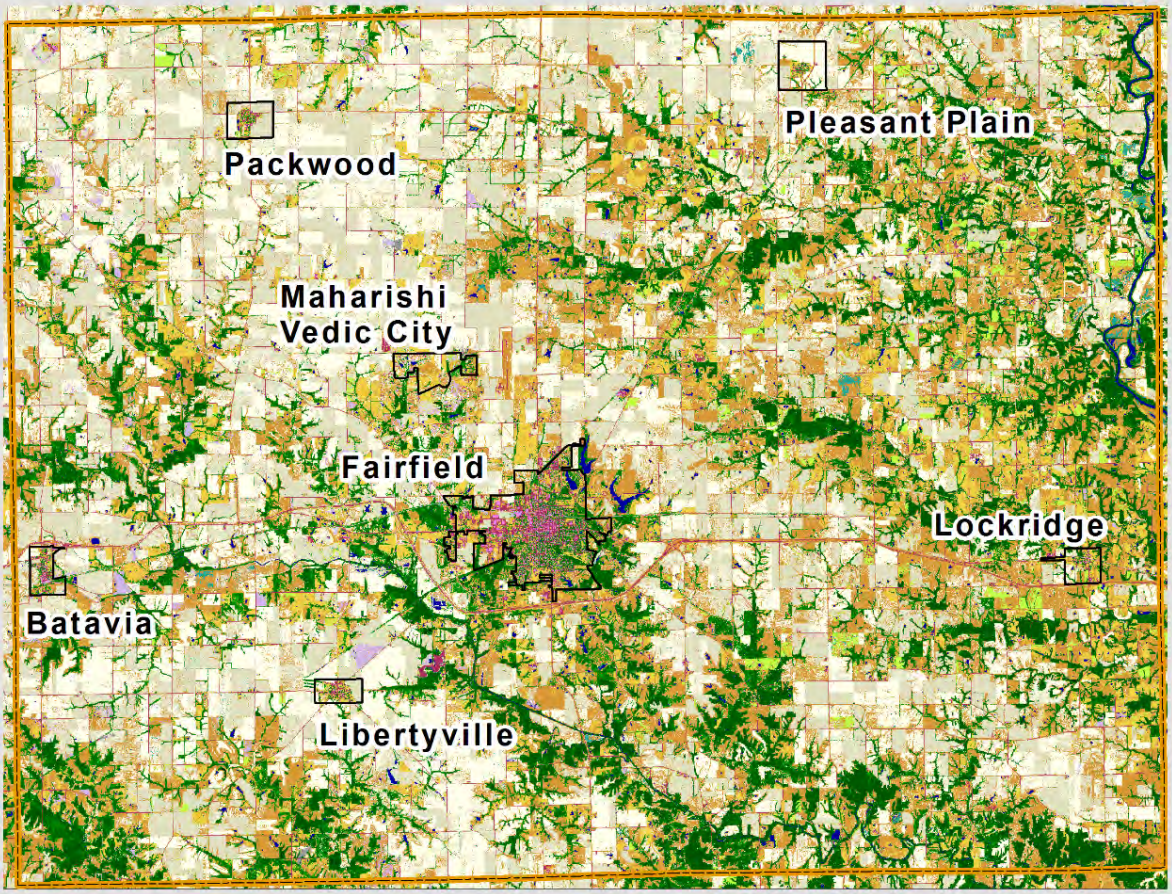
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -

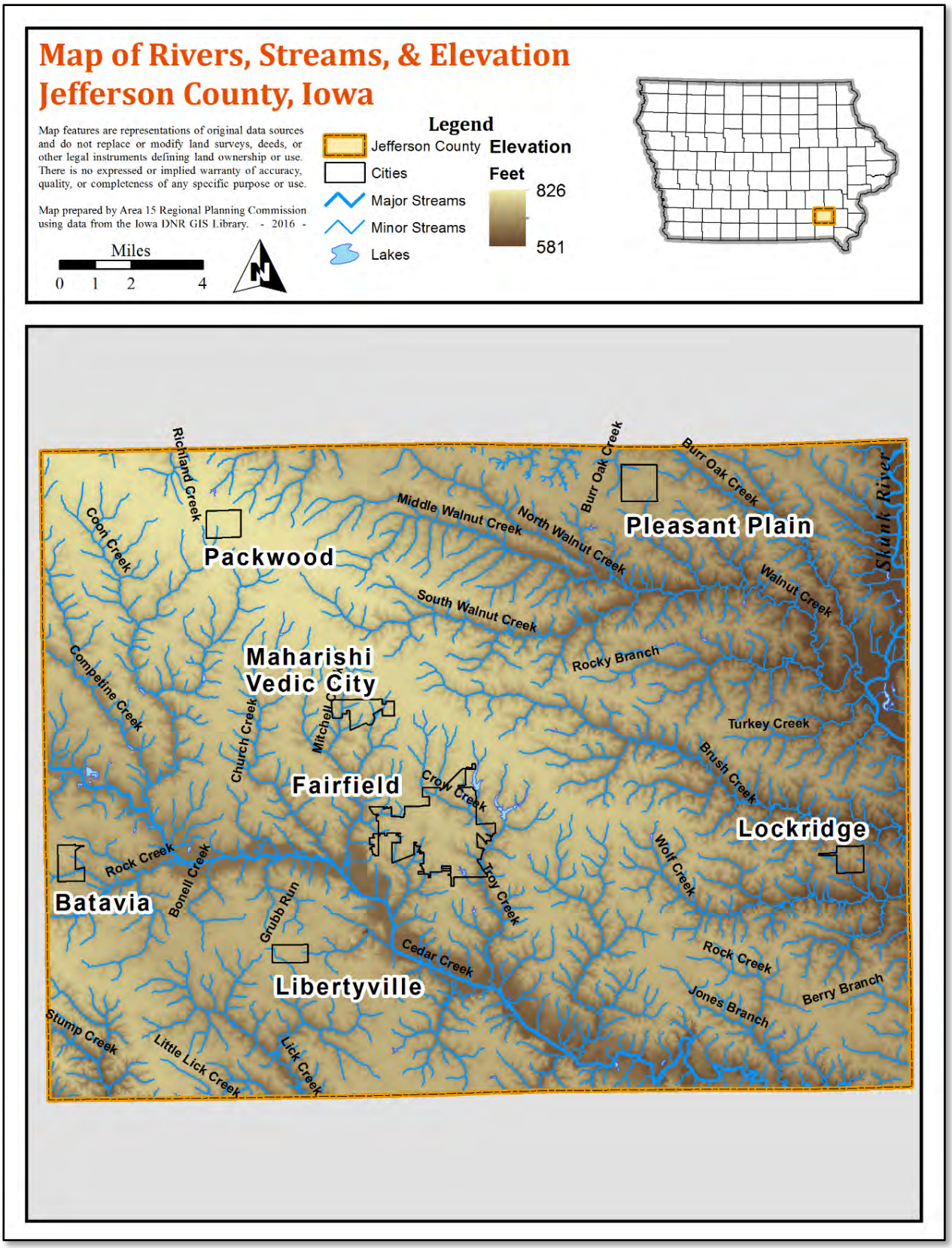
Miles
0 1 2 4

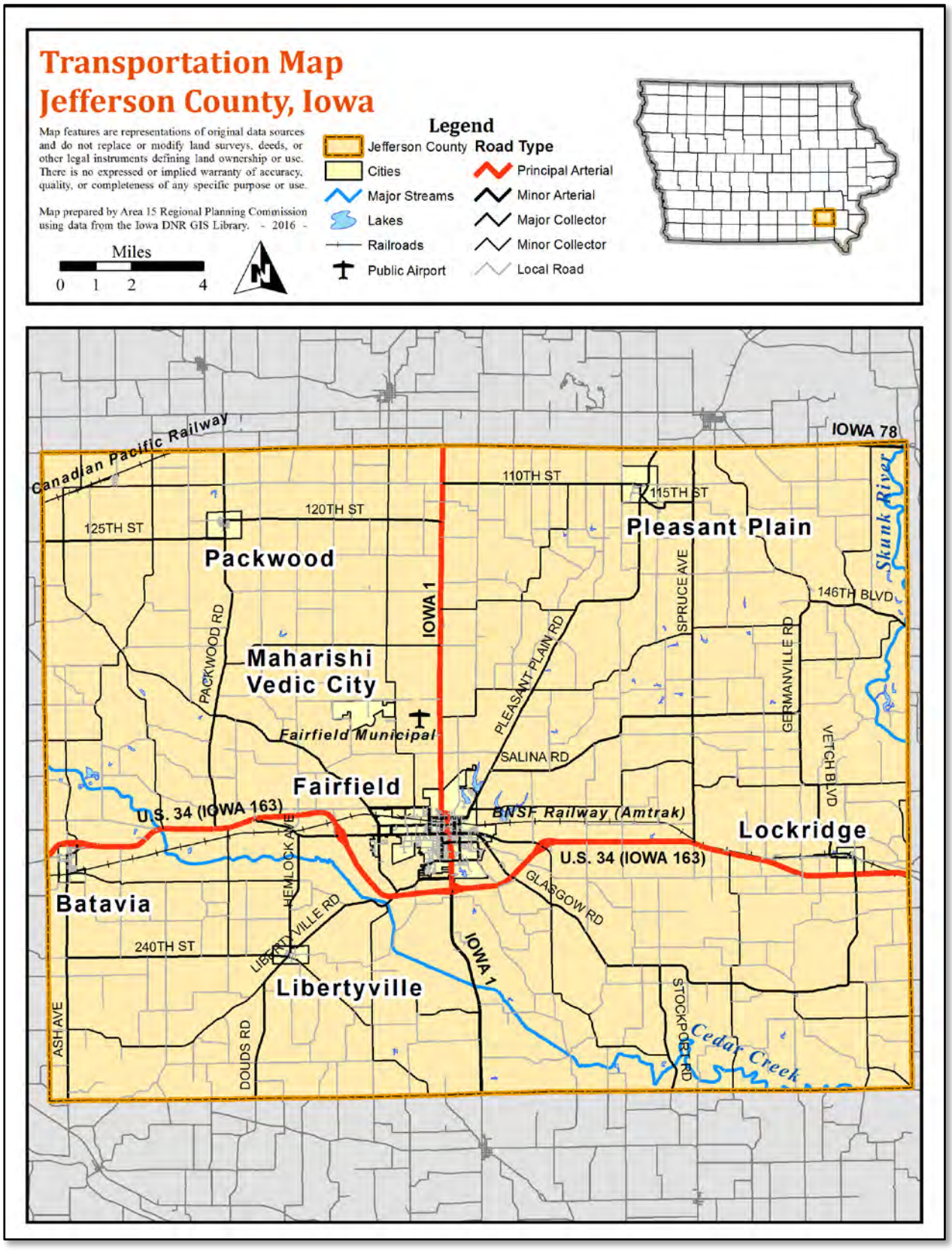
N

Legend

- Jefferson County
- Cities
- Background
- Water
- Wetland
- Coniferous Forest
- Deciduous Short
- Deciduous Medium
- Deciduous Tall
- Grass 1
- Grass 2
- Cut Hay
- Corn
- Soybeans
- Barren / Fallow
- Structures
- Roads / Impervious
- Shadow / No Data




Map of Rivers, Streams, & Elevation
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
Legend
Jefferson County
Cities
Major Streams
Minor Streams
Lakes
Elevation
Feet
826
581
Richland Creek
Coon Creek
Packwood
Middle Walnut Creek
North Walnut Creek
Burr Oak Creek
Burr Oak Creek
Pleasant Plain
Skunk River
Walnut Creek
South Walnut Creek
Rocky Branch
Competine Creek
Church Creek
Maharishi
Vedic City
Turkey Creek
Brush Creek
Crow Creek
Fairfield
Lockridge
Wolf Creek
Rock Creek
Bonell Creek
Batavia
Grubb Run
Troy Creek
Cedar Creek
Rock Creek
Libertyville
Jones Branch
Berry Branch
Stump Creek
Little Lick Creek
Lick Creek


Transportation Map
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
Legend
Jefferson County
Cities
Major Streams
Lakes
Railroads
Public Airport
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
Local Road
Canadian Pacific Railway
IOWA 78
110TH ST
115TH ST
120TH ST
125TH ST
Pleasant Plain
Packwood
Skunk River
146TH BLVD
IOWA 1
SPRUCE AVE
PACKWOOD RD
Maharishi
Vedic City
PLEASANT PLAIN RD
GERMANVILLE RD
Fairfield Municipal
SALINA RD
VETCH BLVD
Fairfield
U.S. 34 (IOWA 163)
BNSF Railway (Amtrak)
Lockridge
HEMLOCK AVE
GLASGOW RD
Batavia
LIBERTYVILLE RD
240TH ST
IOWA 1
Libertyville
ASH AVE
DOUDS RD
STOCKPORT RD
Cedar Creek

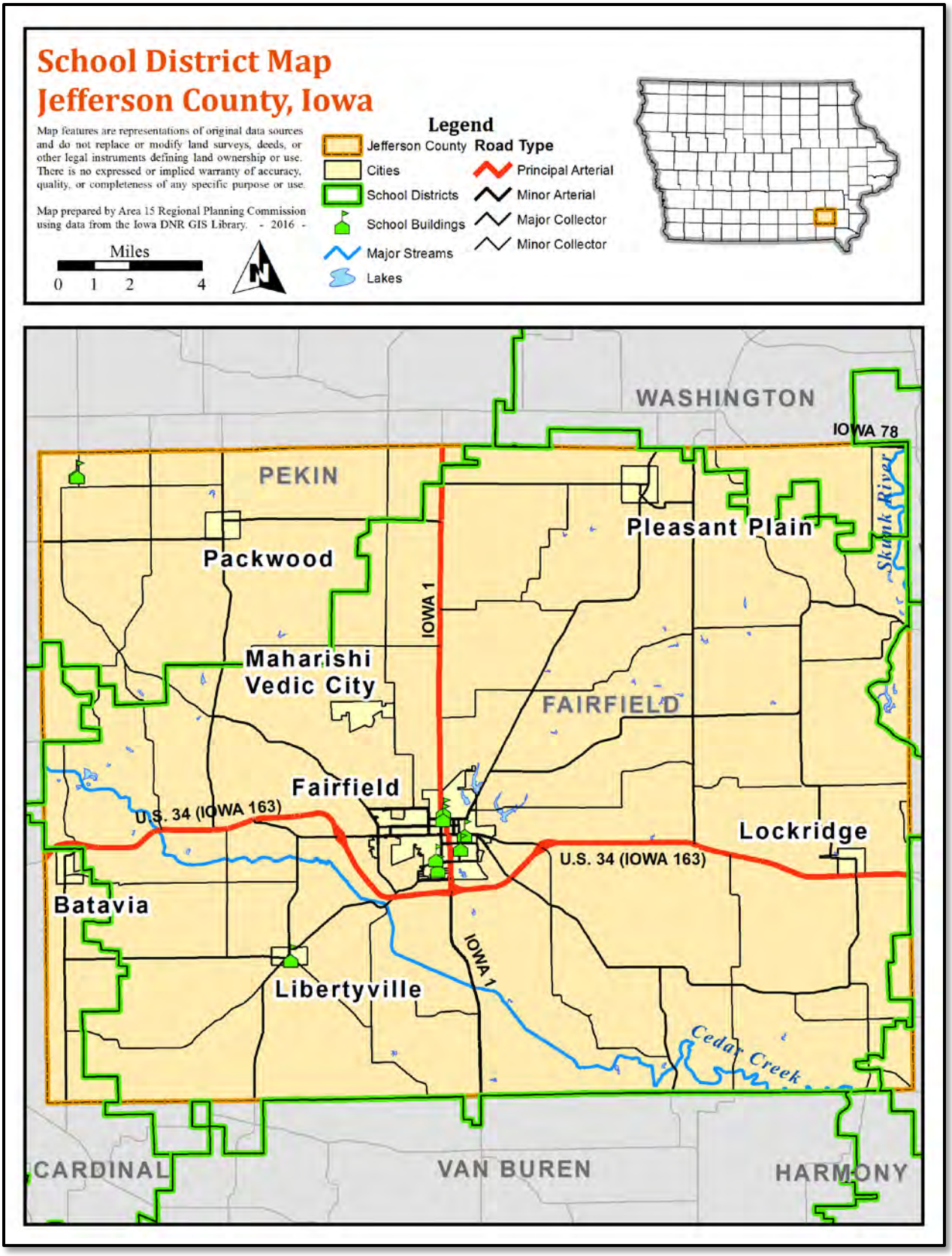

School District Map
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
Legend
Jefferson County
Cities
School Districts
School Buildings
Major Streams
Lakes
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
WASHINGTON
IOWA 78
PEKIN
Pleasant Plain
Skunk River
Packwood
IOWA 1
Maharishi Vedic City
FAIRFIELD
Fairfield
U.S. 34 (IOWA 163)
Lockridge
U.S. 34 (IOWA 163)
Batavia
IOWA 1
Libertyville
Cedar Creek
CARDINAL
VAN BUREN
HARMONY

Table 3.4. Jefferson County Historic Places

Property Name	Use	Location
Henry K. Holsman Historic Campus District	Educational	Fairfield
W.C. Ball House	Residential	Fairfield
James A. Beck House	Residential	Fairfield
Burnett-Montgomery House	Residential	Fairfield
James F. Clarke House	Residential	Fairfield
Evergreen Ridge Stock Farm Historic District	Agricultural	Fairfield
Fairfield Public Library	Civic	Fairfield
Fairfield U.S. Post Office	Civic	Fairfield
O.F. & Lulu E. Fryer House	Residential	Fairfield
Fred & Rosa Fulton Barn	Agricultural	Selma
Henn Mansion	Residential	Fairfield
Iowa Malleable Iron Company	Commercial	Fairfield
Jefferson County Courthouse	Civic	Fairfield
Louden Machinery Company	Commercial	Fairfield
Louden Monorail System in the Auto Repair Shop	Commercial	Fairfield
Louden Whirl-Around	Commercial	Fairfield
R.B. & Lizzy Louden House	Residential	Fairfield
R.B. & May W. Louden House	Residential	Fairfield
R.R. & Antoinette Louden House	Residential	Fairfield
August & Vera Luedtke Barn	Agricultural	Fairfield
McElhinny House	Residential	Fairfield
New Sweden Chapel	Religious	Fairfield
Old Settlers' Association Park & Rhodham Bonnfield House	Recreational	Fairfield
George A. Wells House	Residential	Fairfield
Wells-Stubbs House	Residential	Fairfield
Wilson Building	Commercial	Fairfield
U.S. Senator James F. Wilson House	Residential	Fairfield

Source: National Register of Historic Places

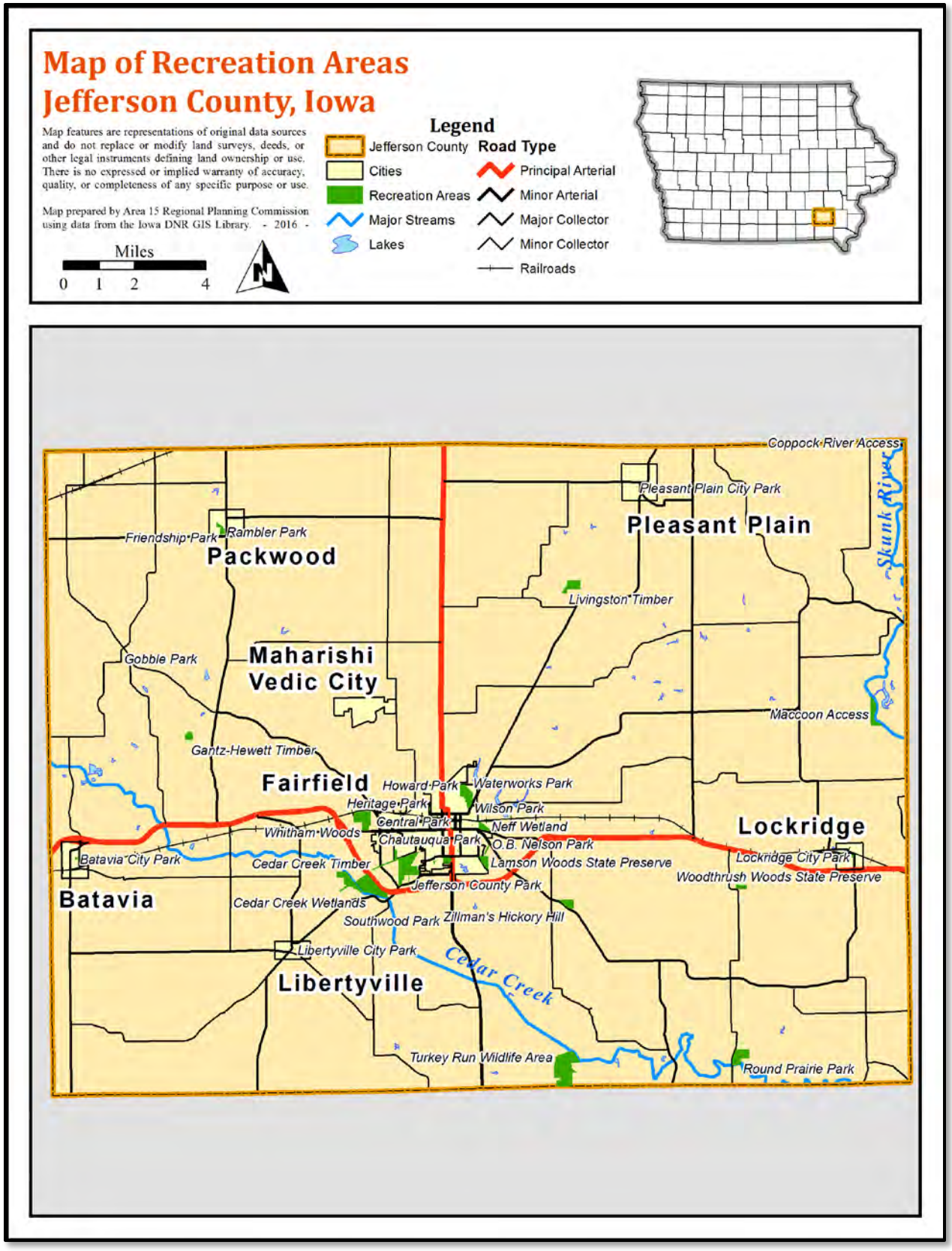
Jefferson County is home to a variety of State, County, and City recreation areas. There are no State Parks within the county, however there are two State Preserves. Eleven recreational areas lie within the purview of the Jefferson County Conservation Board (see Table 3.4). A variety of parks and recreational areas also lie within each local jurisdiction (see map on Page 21).

Table 3.5. Jefferson County Recreational Areas

State Recreation Area	
Lamson Woods State Preserve	Woodthrush Woods State Preserve

County Recreation Areas		
Cedar Creek Timber	Jefferson County Park	Turkey-Run Wildlife Area
Cedar Creek Wetlands	Livingston Timber	Whitham Woods
Gantz-Hewett Timber	Maccoon Access	Zillman's Hickory Hills
Gobble Park	Round Prairie Park	

Sources: Iowa DNR, Jefferson County Assessor, Jefferson County Conservation Board


Map of Recreation Areas
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
N
Legend
Jefferson County
Cities
Recreation Areas
Major Streams
Lakes
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
Railroads
Coppock River Access
Pleasant Plain City Park
Pleasant Plain
Skunk River
Friendship Park
Rambler Park
Packwood
Livingston Timber
Gobble Park
Maharishi Vedic City
Maccoon Access
Gantz-Hewett Timber
Fairfield
Howard Park
Waterworks Park
Heritage Park
Wilson Park
Central Park
Neff Wetland
Whitham Woods
Chautauqua Park
O.B. Nelson Park
Lockridge
Batavia City Park
Cedar Creek Timber
Lamson Woods State Preserve
Lockridge City Park
Woodthrush Woods State Preserve
Jefferson County Park
Batavia
Cedar Creek Wetlands
Southwood Park
Zillman's Hickory Hill
Libertyville City Park
Cedar Creek
Libertyville
Turkey Run Wildlife Area
Round Prairie Park

Emergency Response Services

A number of support agencies exist to respond to any of the many hazards that could occur within the county. These agencies include the Jefferson County Emergency Management Agency, the Southeast Iowa Response Group, the Iowa State Patrol, the Jefferson County Sherriff's Office, the Jefferson County Health Center (Midwest Ambulance), one local police department, and five public/volunteer fire departments. The Jefferson County Emergency Management Agency is responsible for the development, implementation, and management of county-wide disaster prevention, preparedness, response, recovery and mitigation.

Law Enforcement

The Jefferson County Sheriff is the principal peace officer for the county. The Sheriff's Office serves as the primary law enforcement for the unincorporated Jefferson County, as well as all cities except Fairfield. The city of Fairfield has its own police department. The Jefferson County Law Enforcement Center in Fairfield houses the Fairfield Police Department, the Jefferson County Sheriff's Office, and the Jefferson County Emergency Management Coordinator's office.

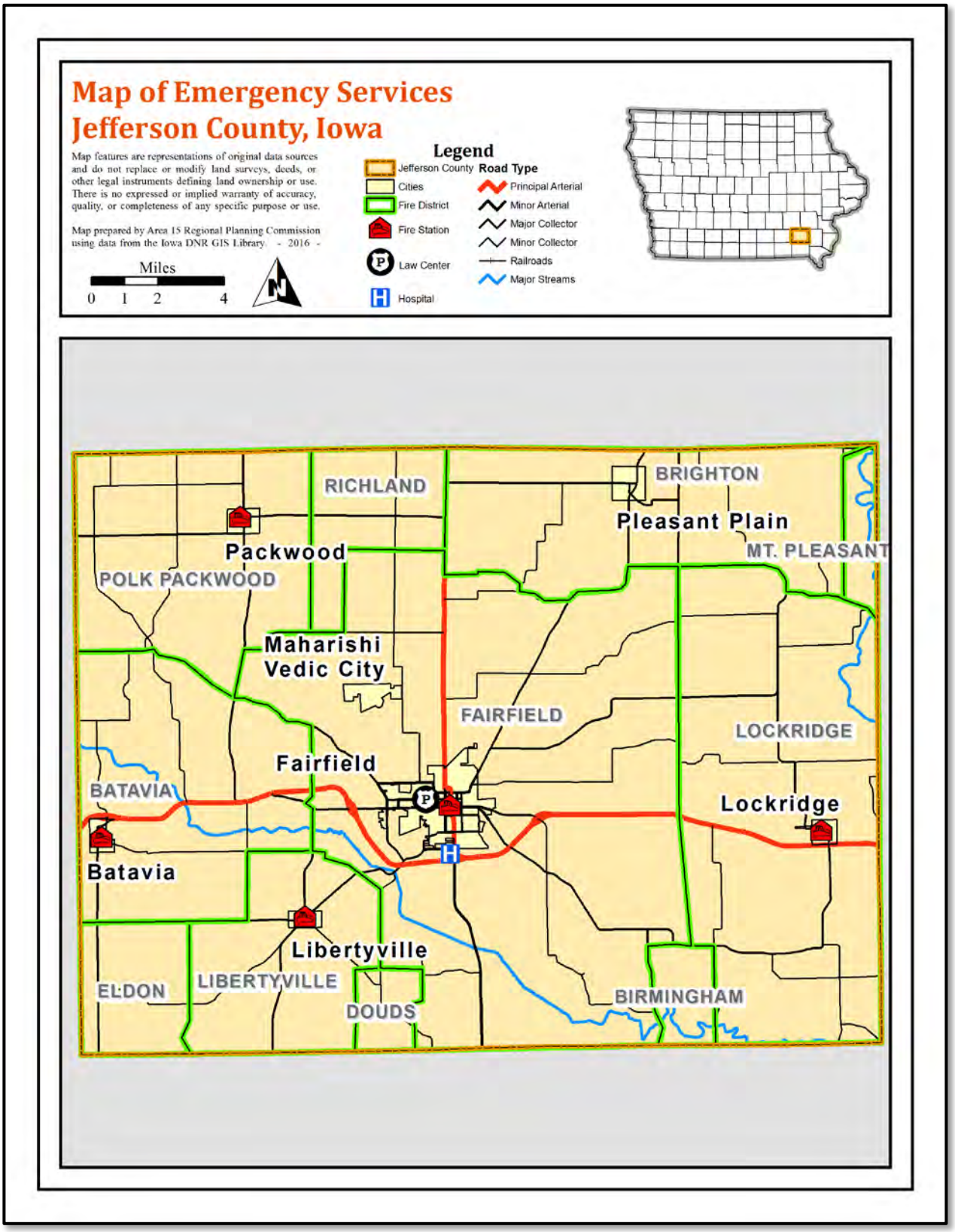
Ambulance & Hospital

Ambulance services in Jefferson County operate out of the Jefferson County Health Center—the county's only hospital—in Fairfield. Since 2012, Midwest Ambulance Service of Iowa has provided the E-911 services to the residents of Jefferson County from the hospital.

Fire Departments

Five fire departments are based in Jefferson County: Batavia, Fairfield, Libertyville, Lockridge, and Parkwood. Each of the fire departments has mutual aid agreements with neighboring departments to assist in response efforts within their respective cities as well as those rural and unincorporated areas of the county. Several other fire departments provide service for portions of Jefferson County, though their operation centers are located in surrounding counties. These include: Birmingham, Brighton, Douds, Eldon, Mount Pleasant, and Richland. A map of fire department locations and associated districts can be found on the following page, and an outline of each department's assets and staffing that was derived from the data collection guide follows.

Figure 3.2. Packwood & Fairfield Fire Department's Fire Safety and Severe Weather Training House Trailer


Map of Emergency Services
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
Legend
Jefferson County
Cities
Fire District
Fire Station
Law Center
Hospital
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
Railroads
Major Streams
RICHLAND
BRIGHTON
Pleasant Plain
MT. PLEASANT
Packwood
POLK PACKWOOD
Maharishi
Vedic City
FAIRFIELD
LOCKRIDGE
Fairfield
BATAVIA
Lockridge
Batavia
Libertyville
EL DON
LIBERTYVILLE
DOUDS
BIRMINGHAM

Structures, Community Assets, & Critical Facilities

44 CFR § 201.6(c)(2)(ii) – [The risk assessment shall include] a description of [each] jurisdiction's vulnerability to [each hazard]. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and facilities located in the identified hazard areas; (B) An estimate of the potential dollar losses to the vulnerable structures and a description of the methodology used to prepare the estimate; and (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

It benefits all communities to be prepared for the direct and indirect effects of hazards. It is especially important to minimize the risk of exposure to hazards for all future development. Based on the demographic trends discussed on Page 12, slight growth is expected to occur throughout Jefferson County. Aside from the continuing development of Maharishi Vedic City, no drastic shifts in land use have occurred in Jefferson County over the last decade which would cause a shift in vulnerability to natural hazards. As plans for development arise, Jefferson County and its communities should be vigilant in considering potential hazard areas—particularly in low lying areas near streams—prior to allowing any construction to occur. Targeted areas for development throughout the county are strategically identified and are typically low-risk areas.

In order to better target investments for mitigation activities, it is important to be cognizant of community assets, including: critical structures, facilities, and infrastructure within the county. Section 4 provides a detailed profile for each hazard that was determined to be a potential threat. Each hazard profile includes a vulnerability assessment section in which the potential damages within the county are highlighted. This section establishes a generalized inventory of the community assets and critical facilities that could be exposed to such risks. Table 3.6 shows a generalized breakdown of the existing structural assets within the county and their approximate total values.

Table 3.6. Jefferson County Structures & Property Valuations

Jurisdiction	Residential		Commercial		Industrial & Ag.	
	No.	Value	No.	Value	No.	Value
Batavia	201	$11,153,500	22	$1,271,100	0	$489,100
Fairfield	3,287	$383,949,400	404	$105,087,041	85	$15,887,700
Libertyville	128	$10,771,800	16	$1,389,100	0	$276,100
Lockridge	107	$6,006,900	10	$712,552	3	$280,300
Maharishi Vedic City	100	$20,003,600	6	$3,096,700	0	$2,456,000
Packwood	77	$5,275,700	12	$784,600	0	$1,004,300
Pleasant Plain	41	$2,169,100	0	$0	0	$1,232,200
Unincorporated Area	2,161	$290,292,000	89	$24,304,747	14	$410,432,100
TOTAL	**6,102**	**$729,622,000**	**559**	**$136,645,840**	**102**	**$432,057,800**

Source: Jefferson County Assessor (2016)

Members of each community were asked to identify critical facilities within their jurisdiction. These facilities, if impacted by a hazard, could have significant adverse effects on the county and its communities.

Many of these facilities are public works facilities, which provide essential services and functions. Others are hubs of community activity and have the potential to inflict significant structural damage and present risks to injury and loss of life. Each jurisdiction was responsible for identifying its own community facilities and assets. Table 3.7 outlines the number of critical facilities that were identified in each jurisdiction and shows an estimated cumulative replacement value. This data was aggregated from surveys and local insurance documents. Appendix G is reserved for survey and insurance information that is specific to each individual jurisdiction.

Table 3.7. Jefferson County Public Structures & Property Valuations

Jurisdiction	Community Facilities	
	No.	Value
Batavia	8	$670,790
Fairfield	31	$41,434,674
Libertyville	8	$820,459
Lockridge	7	$973,200
Maharishi Vedic City	13	$4,145,112
Packwood	5	571,800
Pleasant Plain	2	117,624
Fairfield Schools	14	$ 27,835,100
Maharishi Schools	200	$107,468,195
Pekin Schools	13	$ 13,901,400
TOTAL	**301**	**$197,938,354**

Source: Local Insurance Documents, Jefferson County Assessor

Data limitations keep the actual total loss values from being determined, as valuation extends beyond just the structures themselves. It is important to consider the values of items within a particular facility that have the potential to be damaged or destroyed, along with functional losses due to breakdowns in communications, electricity, transportation, and/or other utility networks. Losses of these functions have the ability to further threaten a community and can significantly add to the economic impacts a particular hazard can cause.

It is also important to be aware of other areas in the county where high concentrations of people live, work, learn, and gather. Schools, residential areas, primary employers, and economic/cultural centers concentrate populations and can increase the numbers of people affected by a particular hazard event. Areas with high concentrations of people should be given extra attention when it comes to risks from hazards, particularly cities and large employers within the county.

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Section 4 – Hazard Analysis & Risk Assessment

44 CFR § 201.6(c)(2) – [The plan shall include] a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Hazard Analysis

Hazard analysis and risk assessment (HARA) is a tool utilized in mitigation planning to identify hazards to which a jurisdiction is susceptible and then to analyze the impact those hazards may have on the jurisdiction. In order to perform this task, the planning team consulted both the *2010 Jefferson County Multi-Jurisdictional Hazard Mitigation Plan* and the *2013 State of Iowa Hazard Mitigation Plan*. These documents provided a good starting point for the latest analysis.

2010 Jefferson County Plan

The previous planning effort was rather exhaustive in its identification of potential hazards. In total, thirty-eight hazards were identified, scored, and ranked. Fifteen natural hazards, ten, man-made accidental, eight man-made purposeful, and five other hazards were discussed. When the 2010 Plan for Jefferson County was completed, the State Hazard Mitigation Plan suggested a HARA that included six categories for the evaluation of risk for each hazard: historical occurrence, severity of impact, probability of future events, vulnerability, maximum threat, and speed of onset. Each category was evaluated for each hazard identified to determine the biggest threats to Jefferson County. The twenty-six hazards that were profiled appear in rank order in Table 4.1.

Table 4.1. Hazards Analyzed: *2010 Jefferson County Hazard Mitigation Plan*

Ranking of Hazards Identified in the *2010 Jefferson County Hazard Mitigation Plan*			
1	Structural Fire	11	Extreme Heat
2	Severe Winter Storm	11	Railway Transportation Incident
3	Highway Transportation Incident	12	Hailstorms
4	Tornado	13	Air Transportation Incident
4	Transportation HAZMAT Incident	14	Energy Failure
5	Thunderstorms/Lightning	15	Dam Failure
6	Communications Failure	15	River Flood
6	Grass/Wildland Fire	15	Levee Failure
7	Structural Failure	15	Abandoned Mines, Wells & Sinkholes
8	Windstorms	15	Pipeline Transportation Incident
9	Drought	16	Expansive Soils
9	Flash Flood	17	Earthquake
10	Fixed HAZMAT Incident	18	Landslide

2013 State of Iowa Plan[9]

The State of Iowa's foundation for hazard mitigation is based on a hazard analysis and risk assessment that is comprehensive and multi-hazard. This recognizes that multiple hazards that can occur simultaneously in the state, and the risk that each hazard poses is assessed in terms of a disaster or emergency that can be created from that hazard. The comprehensive planning approach seeks a clear understanding of what hazards exist, risks they pose, who and what can be impacted.

The HARA in the 2013 State Plan describes the hazards identified through the process along with their resulting priority rank. It is also the primary vehicle in documenting and distributing concise yet informative results of the process to emergency management professionals and stakeholders in Iowa. The following four-step process was followed in the 2013 State Plan:

1. **Identify Hazards** – determine which hazards can affect each community.
2. **Community Profile** – determine if/to what extent hazards will affect community assets.
3. **Profile Hazard Events** – determine how bad a hazard can get.
4. **Prioritizing Hazards** – determine which hazards need to be addressed.

The State Hazard Mitigation Team (SHMT) developed a list of potentially significant hazards. Current HARAs from local jurisdictions were used to accumulate a list of hazards that occur in the State. A survey of local hazard mitigation plans from across the State contributed to the State's hazard analysis and risk assessment. The hazard identification portion of the HARA consists of an inventory of those threats and hazards that have the potential to impact the State of Iowa. FEMA recognizes several additional hazards that do not affect Iowa because of its geographic location, including: avalanches, volcanoes, coastal erosion, coastal storms, hurricanes, and tsunamis. These hazards were discussed, but ultimately left out of the hazards list for the State. The SHMT elected to combine several events because of their similarity and likelihood of concurrence, including: combining hailstorms with thunderstorms/lightning, windstorms with tornadoes, and levee failure with dam failure. As a result of this process the SHMT identified twenty hazards to assess. The fourteen natural hazards and six technological/human-caused threats are listed in Table 4.2 below.

Table 4.2. Hazards Analyzed: *2013 State of Iowa Hazard Mitigation Plan*

Natural Hazards			
Thunderstorm/Lightning/Hail	River Flood	Landslide	Extreme Heat
Tornado/Windstorm	Flash Flood	Sinkhole	Drought
Severe Winter Storm	Earthquake	Expansive Soils	Grass/Wildland Fire
Human Disease/Epidemic		Animal/Plant/Crop Disease	
Technological/Human-Caused Hazards			
Dam/Levee Failure		Hazardous Materials Incident	
Infrastructure Failure		Radiological Incident	
Transportation Incident		Terrorism	

[9] Iowa Homeland Security & Emergency Management

Once the list of hazards was compiled, they were ranked and sorted by composite score. The metrics used for the *2013 State of Iowa Hazard Mitigation Plan* were also used for this plan update and are described in the updated risk assessment, beginning on Page 77. A hazard with a higher score represents a higher potential risk to the community. Roughly the top one-third were taken as the first priority group, the following third as the second priority group, and the remaining third as the lowest priority group. The HARA was used to set priorities, but the SHMT made the final determination of the priority group in which a hazard is placed. The hazards as ranked by the SHMT appear in Table 4.3. The first six were ranked as highest priority, the next eight were ranked as moderate priority, and the last six were ranked as lowest priority.

Table 4.3. Hazard Rank: *2013 State of Iowa Hazard Mitigation Plan*

Ranking of Hazards Identified in the *2013 State of Iowa Hazard Mitigation Plan*			
1	River Flooding	11	Drought
2	Tornado/Windstorm	12	Human Disease
3	Severe Winter Storm	13	Transportation Incident
4	Levee/Dam Failure	14	Infrastructure Failure
5	Terrorism	15	Extreme Heat
6	Flash Flood	16	Grass/Wildland Fire
7	Animal/Plant/Crop Disease	17	Sinkholes
8	Hazardous Materials Incident	18	Landslide
9	Radiological Incident	19	Earthquake
10	Thunderstorm/Lightning/Hail	20	Expansive Soils

2016 Jefferson County Plan Update

Since the completion of the *2010 Jefferson County Multi-Jurisdictional Hazard Mitigation Plan*, FEMA released the *Local Mitigation Planning Handbook*, which has helped provide guidance on how to develop the risk assessment section of local hazard mitigation plans. Additionally, the State chose to consolidate and update its master list of profiled hazards in the *2013 State of Iowa Hazard Mitigation Plan*. These sources were used to initiate discussions on hazards.

The Jefferson County planning team chose to follow to the State and discussed a consolidated list of hazards. The focus of discussions centered on the natural hazards identified in the State Plan, not including human, animal, or plant diseases. Additionally, the technological hazard of dam/levee failure was discussed. The hazards to be profiled in this Jefferson County plan update appear in Table 4.4 below.

Table 4.4. Hazards Profiled: *2016 Jefferson County Plan Update*

Natural Hazards			
Thunderstorm/Lightning/Hail	River Flood	Landslide	Extreme Heat
Tornado/Windstorm	Flash Flood	Sinkhole	Drought
Severe Winter Storm	Earthquake	Expansive Soils	Grass/Wildland Fire
Technological Hazards			
Dam/Levee Failure			

Hazard Profiles

44 CFR § 201.6(c)(2)(i) – [The risk assessment shall include] a description of the type, location, and extent of all natural hazards that affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

44 CFR § 201.6(c)(2)(iI) – [The risk assessment shall include] a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

The hazards addressed in this plan were determined by the countywide planning team. In an effort to streamline the planning process and maintain consistency across plans and future planning efforts, it was decided to analyze hazards and their associated risks in a manner similar to the *2013 State of Iowa Hazard Mitigation Plan*, tailoring it to be locally significant. Previous plans, presidential disaster declarations, historical events data, and local knowledge of the area were consulted to base the decision-making process in fact.

The following is a series of profiles for each hazard identified in the plan, arranged alphabetically. Each hazard profile includes a detailed description of the event and is analyzed for historic occurrences and the probability and potential severity of an occurrence. A vulnerability assessment accompanies each hazard profiled if sufficient information was available. Wherever possible, maps and other tools were used to help in the analysis of each particular hazard.

Vulnerability assessments were included to offer loss estimates when reasonable structural information could be obtained. In many cases, loss estimates from the State Plan were used. Then, using exposure values provided by the County Assessor, it was possible to provide a rough appraisal of each jurisdiction's share of those estimated damages. Since there are no universally established means of estimating potential loss, these estimates should not be used for official agency action.

It is simpler to quantify vulnerabilities with hazards that have certain amount of spatial limitations. Several contextual factors increase the vulnerability of a particular facility to certain hazards—specifically river flooding, landslides, sinkholes, dam failure, and levee failure. Such hazards only occur in the area that contains the associated spatial features [i.e. a major stream or steep slope]. Conversely, other hazards identified by the planning team can affect all properties—specifically severe winter storms, tornadoes, windstorms, thunderstorms, lightning, hail, flash floods, drought, extreme heat, wildfires, earthquakes, and expansive soils. Defining specific hazard areas for this second group of hazards is troublesome, since they may and often do affect many areas of the county simultaneously.

Dam/Levee Failure

The National Dam Safety Program defines a dam as an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of water control or storage.[10] Dams are used to regulate the flow of water and usually contain a reservoir upstream. Dams are also used for erosion control, hydroelectric power generation, and recreation.

The National Levee Safety Program defines a levee as an embankment—including floodwalls—whose primary purpose is to provide storm and flood protection relating to seasonal high water, precipitation, and other weather events that is subject to water loading for only a few days or weeks during a year.[11] Levees reduce the risk of temporary flooding; however, they do not eliminate the risk. Levees are constructed from the earth, compacted soil, or artificial materials (i.e. concrete or steel). To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete.

A dam or levee failure occurs when the structural integrity is compromised and large volumes of water are allowed to flow uncontrolled downstream into inundation areas. A dam or levee failure can result from flooding, poor construction, poor maintenance, earthquakes, terrorism, vandalism, or burrowing animals.

Historic Occurrences

According to the Iowa DNR, no dams in Jefferson County have ever been reported to have failed.[12] Only two major dam failures have occurred in Iowa. In 1968 the Virden Creek Dam in Waterloo was breached, resulting in one fatality. The other and more severe dam failure in Iowa occurred in July of 2010, when the Lake Delhi Dam failed (Figure 4.1). The Saylorville Dam just north of Des Moines nearly breached during the floods of 1993. The outflow was at full capacity as the Des Moines River continued to rise. In this case, however, the water did not overtop the dam, which would have affected a large portion of Des Moines and other downstream communities.

Figure 4.1. Dam Failure at Lake Delhi

[10] 33 U.S.C. § 467
[11] 33 U.S.C. § 3301
[12] Iowa DNR Dam Safety Program

Probability/Extent

The Iowa DNR is responsible for tracking all dams that are greater than twenty-five feet high and/or have storage capacities of at least fifty acre-feet of water. Their inventory excludes all dams that are less than six feet high regardless of storage capacity and dams that store less than fifteen acre-feet of water regardless of height.

Dams in Iowa are not evaluated based on structural condition, rather they are characterized based on their potential risk to life and property if a failure were to occur. The Iowa DNR categorizes dams into three categories:

- **High Hazard Dam**: failure creates a serious threat to loss of human life.
- **Moderate Hazard Dam:** failure may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads, interrupt major utility services, but are without substantial risk of loss of human life. This also includes dams that are of public importance, such as dams associated with public water supply systems, industrial water supply, or public recreation, or which are an integral feature of a private development complex.
- **Low Hazard Dam:** failure would result in loss of the dam, livestock, farm buildings, agricultural lands, and lesser used roads. Loss of human life is unlikely.

There are sixty-five dams in Jefferson County that meet the DNR criteria for official tracking; however, most of these dams are relatively small and are used as water quality and control features on or near farmland. Jefferson County does not contain any high hazard dams and only contains two moderate hazard dams—both in Fairfield. Neither pool of these dams is fed by a stream and their collection areas have excess capacity to hold significant amounts of runoff.

With its general absence of rivers and other major streams, there are no levees of record within Jefferson County. Most of Jefferson County appears to be insulated from major impacts of a dam failure as there are no major dams upstream and there are no high-risk dams within the county. The severity of damage from a dam failure will typically be limited crop, road, or minimal property damage. A map showing dams and floodplains can be found on Page 34.

Vulnerability

A dam can give little or no warning time prior to failure. During periods of heavy rains, dams should be monitored for weak areas or potential breaching to warn people located downstream in the areas at risk for inundation. During the Lake Delhi Dam failure, residents downstream were notified in advance as water levels began to rise, and as a result nobody was

Vulnerable Jurisdictions			
	Batavia		Packwood
X	Fairfield		Pleasant Plain
	Libertyville		Fairfield Schools
	Lockridge		Pekin Schools
X	Maharishi Vedic City		Maharishi Schools
X	Jefferson County (Unincorporated)		

killed or injured. People and property downstream of dams along streams are most vulnerable, particularly in a dam's inundation area. Depending on the volume of the reservoir, as well as channel characteristics, a flash flood resulting from a dam failure can travel a long distance.

Dam owners have the primary responsibility for the safe design, operation, and maintenance of dams. Federal, state, and local governments own a significant number of dams, but private citizens also own a large number, as well. The Iowa DNR has a permitting process required of anyone interested in constructing a dam. All dams that meet any of the following criteria are required to obtain a permit:[13]

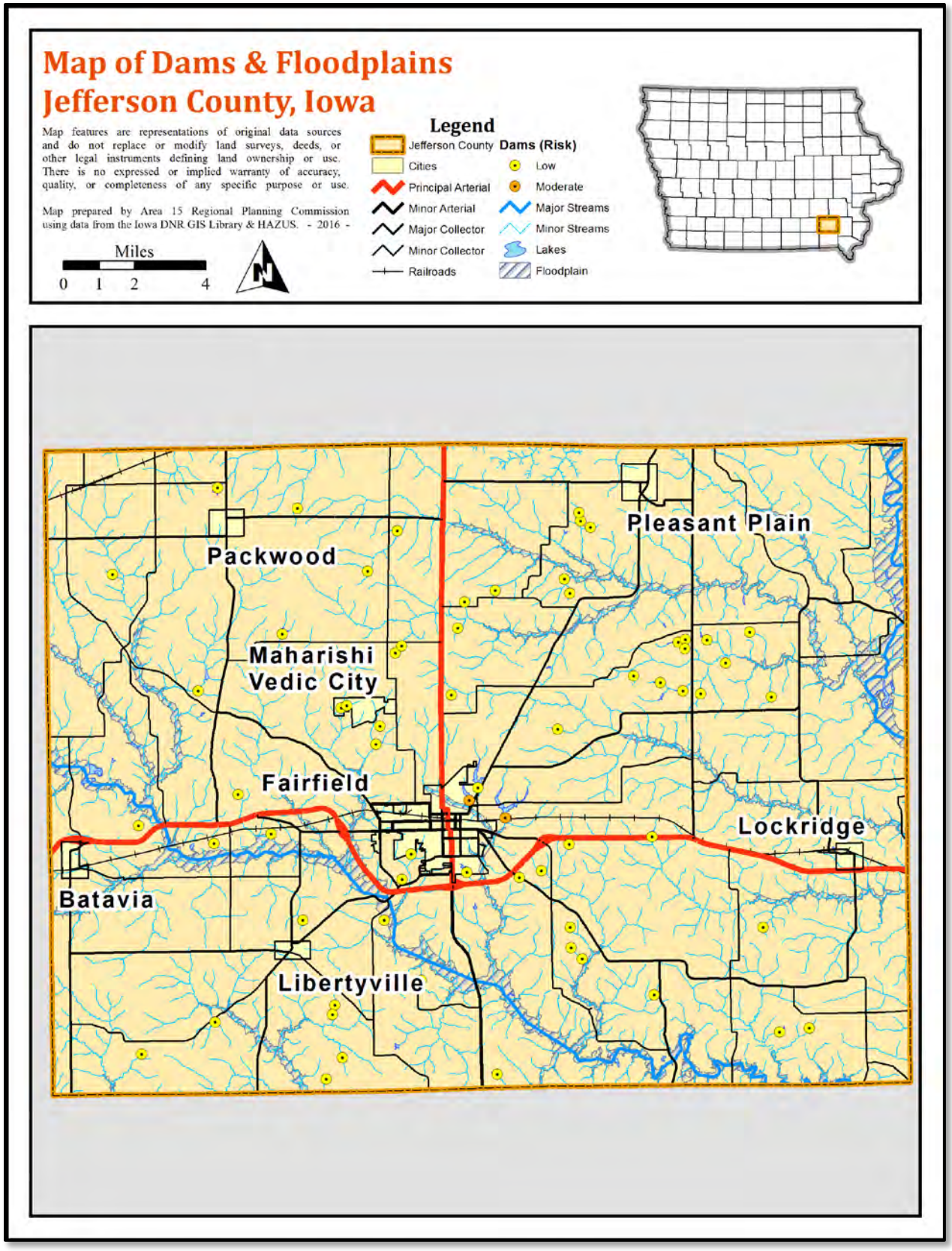
- Any dam designed to provide a sum of permanent and temporary storage exceeding fifty acre-feet at the top of dam elevation, or twenty-five acre-feet if the dam does not have an emergency spillway, and which has a height of five feet or more;
- Any dam designed to provide permanent storage in excess of eighteen acre-feet and which has a height of five feet or more;
- Any dam across a stream draining more than ten square miles;
- Any dam located within one mile of an incorporated municipality, if the dam has a height of ten feet or more, stores ten acre-feet or more at the top of dam elevation, and is situated such that the discharge from the dam will flow through the incorporated area.

The Iowa DNR also gives guidance for proper operations and maintenance, inspections, and tips for developing emergency action plans. There are currently 321 dams in the state that require formal inspections every two or five years, depending on classification. It is important to note that there is no system in place to routinely evaluate any of the other that the DNR has inventoried. One must use caution when assuming the quantity of unregulated dams is accurate.

Dam failure is a hazard with clear implications for land use as it relates to future development. While there currently are no countywide zoning regulations prohibiting development in potential inundation areas, it is in the best interest of property owners to minimize construction activities within areas that could be flooded. The map on Page 34 provides an overview of the predicted floodplains [from FEMA's HAZUS software] as well as identified locations of dams throughout Jefferson County. The ability to accurately assess potential losses in Jefferson County is limited because of the absence of inundation studies. Ideally, future inundation studies will be carried out to help the County be more cognizant of inundation zones and regulate development in those areas.

Jurisdictions participating in this plan expressed a minimal amount concern with dam failure, indicating a low vulnerability rating for this hazard. Only Fairfield and Maharishi Vedic City expressed moderate levels of concern for dam failure. Both of the moderate risk dams exist in the county are in Fairfield with little developed ground below the dam. Any dam failure in Jefferson County would affect only very localized areas and cause minimal infrastructure damage.

[13] Iowa DNR Dam Safety Program


Map of Dams & Floodplains
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library & HAZUS. - 2016 -
Miles
0 1 2 4
N
Legend
Jefferson County
Cities
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
Railroads
Dams (Risk)
Low
Moderate
Major Streams
Minor Streams
Lakes
Floodplain
Packwood
Pleasant Plain
Maharishi Vedic City
Fairfield
Lockridge
Batavia
Libertyville

Drought

A drought is a deficiency in precipitation over an extended period of time. Droughts are normal, recurring climactic events that occur nearly everywhere on earth. They can last from a few weeks to a few months. In rare cases, they may last for several years. Droughts can result in poor crop yields (Figure 4.2), increased soil erosion, water supply shortages, and an elevated potential for wildfires. The effects of a drought may be worsened by extreme heat and/or excessive wind. Even though droughts are generally associated with extreme heat, they may occur during cooler months, as well. Additionally, human factors, such as water consumption, can exacerbate the impact of a natural drought on the area. There are four common types of drought:[14]

Figure 4.2. Drought-affected Cornfield

- **Meteorological:** refers to a precipitation deficiency;
- **Agricultural:** refers to soil moisture deficiencies;
- **Hydrological:** refers to declining surface and groundwater supplies; and
- **Socioeconomic:** refers to when physical water shortages begin to affect people.

Historic Occurrences

Meteorological and agricultural droughts are the most frequent occurrences of drought conditions in Iowa and occur as a result of low soil moisture and/or a lack of precipitation. Hydrological and socioeconomic droughts tend to be more severe and long-term than meteorological and agricultural droughts, and thus occur less frequently. The NCDC lists 17 drought events for Jefferson County since 2003. These incidents resulted in crop damages totaling approximately $18,060,000 but no property damages. Associated annual losses for Jefferson County as a result of drought are estimated to be approximately $1,736,000.[15]

Probability & Severity

Based on an analysis of past events, Jefferson County should expect to be affected by a drought in any given year. Droughts can have a serious impact on a community's water supply and economy. In Iowa, the most direct impact of a drought would be to agricultural producers and associated industries. Because of the Iowa's reliance on the agricultural industry, the effects of a drought

[14] NWS Drought Fact Sheet
[15] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

would certainly extend to other sectors. Extensive droughts can cause food shortages if agricultural production is damaged or destroyed by a loss of crops or livestock. Areas affected by drought have the potential to be more vulnerable to wildfire due to the dryness of the vegetation.

An extreme drought could lead to a lowering of the water table, potentially drying-up public and private wells. Industries that use a lot of water in their production processes may be affected in such a case. Concurrently, these industries may accelerate the depletion of a well or aquifer, exacerbating the problems. Fire suppression, can become a problem if there is a lack of available water. Though it is possible in the most extreme cases; droughts typically do not cause structural damage, infrastructure damage, or loss of life.

The magnitude of a drought is difficult to measure as the impacts of a drought vary between geographic regions. The National Integrated Drought Information System (NIDIS) has created the U.S. Drought Portal. The website presents weekly updates for drought monitoring, including: current conditions (Figure 4.3), impact assessments, and seasonal forecasts.[16] The site also links to the National Drought Mitigation Center (NDMC) which maintains a Drought Impact Reporter, an interactive tool that allows users to submit their own drought impact reports.[17]

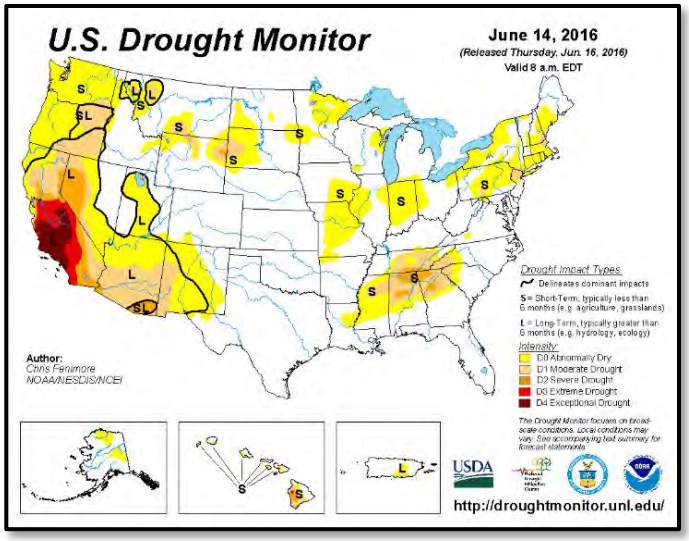


Figure 4.3. Example of the U.S. Drought Monitor

Vulnerability

Aside from short-term weather forecasts, drought events are difficult to predict as they generally rely on the parameters of precipitation and temperature. Droughts do follow a rough cyclical pattern, and more recent research into interacting global systems is resulting in more predictable long-range climatic forecasts. Scientists still cannot accurately predict a drought more than a month in advance for most locations. Historically the driest months in Iowa are July and August.

Vulnerable Jurisdictions			
	Batavia		Packwood
	Fairfield		Pleasant Plain
	Libertyville		Fairfield Schools
	Lockridge		Pekin Schools
	Maharishi Vedic City		Maharishi Schools
X	Jefferson County (Unincorporated)		

[16] U.S. Drought Portal
[17] NCMC Drought Reporter

As with the rest of Iowa, Jefferson County is very dependent on the agricultural industry, and the effects of a drought would indirectly affect other populations. Most farms are covered by some form of crop insurance, which helps to mitigate some of the potential losses in the event of drought, though uninsured agricultural producers would be the most vulnerable population.

Drought is a hazard which affects the agricultural sector much more than it influences land use. Drought has relatively few land use implications in the region, and its impact on future development is negligible, as drought typically does not affect structures in Iowa. Outside of the agricultural industry, residents with shallow wells that do not extend deep into the water table run the risk of having a well dry up, and consumers may see food prices rise as a result of the decrease in supply of food availability. A prolonged drought may affect municipal water rates as well.

Each of the jurisdictions participating in this plan expressed a limited amount concern with drought. Each of the jurisdictions is somewhat vulnerable to this hazard, however the potential for losses is minimal within cities and schools. Rural residents—especially farmers—are most vulnerable to the effects of a drought.

Earthquake

An earthquake is a sudden, rapid shaking or vibrating in the earth's crust as a result of tectonic activity. It is caused by the breaking and shifting of subterranean rock as it releases strain that has accumulated over an extended period of time.

Historic Occurrences

Iowa has experienced very few earthquakes in its recorded history.[18] The epicenters of only thirteen earthquakes have been located within the state; most being located along the Mississippi or Missouri Rivers.[19] No recorded earthquakes had an epicenter within Jefferson County nor have any seriously impacted the County. The New Madrid Fault earthquakes of 1811-1812 in Southeast Missouri were the first reported earthquakes to be felt in Iowa. The absence of historical records from the territory, prevents an accurate assessment of the effects from these earthquakes.

The closest recorded event occurred between Wayland, MO, and Keokuk, IA, on April 13, 1905. The approximate epicenter would have been as close as forty miles to the southeast of Jefferson County, and was estimated to have produced Mercalli Scale intensity 5 effects. A 1965 earthquake in eastern Missouri reportedly produced intensity 5 effects as close as Ottumwa. Another in 1968, centered in Illinois resulted in intensity 5 reports in Wapello and Monroe Counties, though nothing was reported in Jefferson County. An earthquake measuring 5.6 on the Richter Scale occurred in Pawnee, Oklahoma, on September 3, 2016, producing tremors which were felt in Jefferson County.

Table 4.5: Explanation of the Modified Mercalli Scale & the Richter Scale

Mercalli Scale		Description of Typical Damage	Richter Scale
#	Strength		
1-4	Instrumental to Moderate	No Damage	≤ 4.3
5	Rather Strong	Damage negligible. Small, unstable objects displaced or upset; some dishes and glassware broken.	4.4 - 4.8
6	Strong	Damage slight. Windows broken. Furniture moved or overturned. Weak plaster and masonry cracked.	4.9 - 5.4
7	Very Strong	Damage slight-moderate in well-built structures; considerable in poorly-built structures. Furniture and weak chimneys broken. Masonry damaged. Loose bricks, tiles, plaster, and stones will fall.	5.5 - 6.1
8	Destructive	Considerable structural damage. Chimneys, towers, elevated tanks may fail. Frame houses moved. Trees damaged. Cracks in wet ground and steep slopes.	6.2 - 6.5
9	Ruinous	Structural damage severe. General damage to foundations. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground.	6.6 - 6.9
10	Disastrous	Most masonry and frame structures/foundations destroyed. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Sand and mud shifting on beaches and flat land.	7.0 - 7.3
11	Very Disastrous	Few or no masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely bent. Widespread earth slumps and landslides.	7.4 - 8.1
12	Catastrophic	Damage nearly total. Large rock masses displaced. Lines of sight distorted.	> 8.1

[18] Iowa Geological Survey
[19] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

Probability & Severity

The National Seismic Hazard Maps produced by the United States Geological Survey (USGS) are nationwide maps that display the potential peak ground acceleration for various probability levels. These maps are an assessment of the best available science related to earthquake hazards and were last updated in 2014. The maps are derived from calculations of data collected from a grid of monitoring sites across the United States and depict the probabilistic ground motion with a two-percent probability of exceedance within a certain period of time. Jefferson County is in a very low risk category for earthquake (Figure 4.4) and the odds of any significant earthquake occurring in the County are highly unlikely.[20]

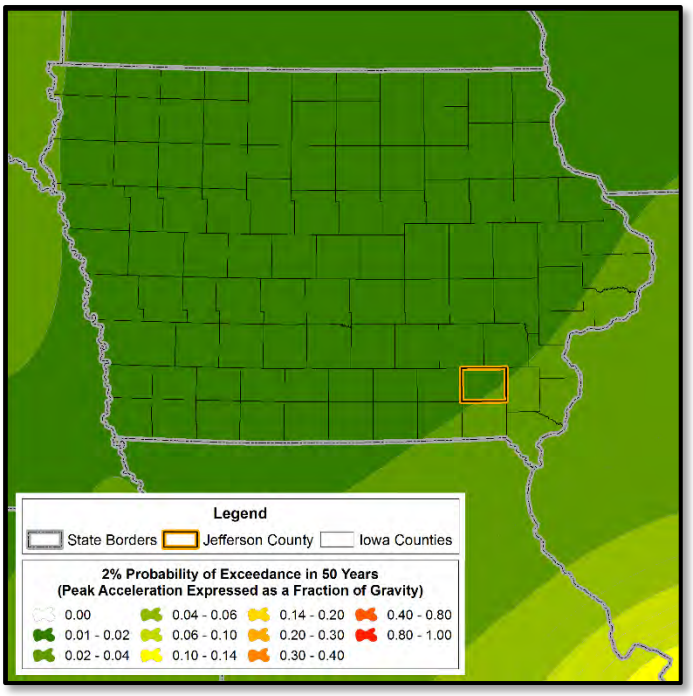


Figure 4.4. National Seismic Hazard Map for Iowa

Magnitude and intensity are the two primary methods that measure the strength of an earthquake. Magnitude is a measure of the amount of energy released at the source of the earthquake and is determined with seismographs. Intensity, on the other hand, is a measure of the physical effects produced by an earthquake. The Richter Scale is used to measure magnitude while the Mercalli Scale is used to measure intensity. These scales are outlined in Table 4.5 on the previous page. A magnitude 6.5 earthquake at the New Madrid Fault Zone, would create effects comparable to a magnitude 4 quake in the southeastern portion of Iowa, resulting in little or no damage. The effects of such an earthquake would be similar to the vibrations created by the passing of a heavy truck—rattling dishes, shaking walls, and swinging suspended objects. Delivery services such as water, wastewater, electricity, and communications may suffer minor, short-term impacts.

Vulnerability

Earthquake is a hazard that has relatively few land use implications in the State of Iowa, and its impact on future development is negligible. Any earthquake in the region most likely will be more intense south and east of

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

[20] USGS Earthquake Hazards Program

Jefferson County, primarily along the Mississippi River in Southeast Missouri. Damage from such an earthquake would typically be minimal in Iowa. The most vulnerable structures would be those built on poorly consolidated substrate and in floodplains. Deteriorating and poorly constructed buildings are more vulnerable as well.

Encouraging communities to adopt building codes is one way to ensure that new development will be structurally protected. Development regulations which discourage construction on poor soils will create more resilient structures as well. Several communities within Jefferson County enforce building codes that help structures be more resilient to natural disasters.

Each of the jurisdictions participating in this plan expressed a minimal amount concern with earthquakes. Each community may be potentially vulnerable to the effects should a major earthquake occur; however, the risk of a damaging tectonic event is extremely low. The lack of any historic events affecting Jefferson County and the nonexistence of damage data limits the opportunity to assess potential losses from earthquakes.

Expansive Soils

Soils and soft rocks that swell or shrink excessively due to changes in moisture content are known as expansive soils. Expansive soils are most prevalent in regions with moderate to high amounts of precipitation; where prolonged periods of drought are followed by long periods of rainfall. It is the change in soil volume that presents a hazard to structures built on top of expansive soil. Roadways, foundations, and walls are most at risk to structural damage. Because expansive soil conditions develop slowly, damages occur gradually and rarely pose a threat to human life. As a result, this phenomenon receives little attention.

Historic Occurrences

In Iowa, expansive soil events are infrequent and are hard to predict. Most events involve cracking damage to building foundations, floors, walls, doors/windows, and retaining walls (Figure 4.5). Premature cracking in roadways is another common effect of expansive soils. Because of its low visibility and negligible risk to public safety, damages due to expansive soils are vastly underreported. Moreover, many of these problems may not be recognized as soil-related. Other, minor damages may be ignored, written off as a nuisance not worth fixing. Though high-clay soil does exist in Jefferson County, there have been no major events reported due to expansive soils.

Probability & Severity

There are two major groups of rocks that serve as parent materials for expansive soils in the United States. One group is more commonly found in the western states, while the other is present in Iowa. That second group consists of sedimentary rocks which contain clay materials. It is the clay content which is susceptible to swelling and shrinking and why expansive soils are often referred to as "swelling clays".[21] The primary concern with expansive soil is the cumulative effects of the shrinking and swelling over many years.

Figure 4.5. Cracked wall from a shifting foundation

Expansive soils generally do not create a situation that makes development unsuitable, but certain measures can be taken to ensure that foundations and roadways are protected in high-risk areas. The best means of preventing or minimizing damage from expansive soil is to identify suspect ground and avoid building on it. If that is not possible,

[21] FEMA Geologic Hazards

engineers can design structures that are more resistant to the effects of swelling and shrinking ground. Water management features that reduce the variability of the soil's water content may also be constructed to minimize the potential for ground swelling. To help mitigate any significant effects of this hazard, structural reinforcement of all structures new and old is important in areas with suspect soils. Foundations of and base layers of future developments should be constructed to resist ground swell.

The highly localized and moisture-dependent nature of the hazard make it nearly impossible to determine the probability and magnitude of an event. The USGS Swelling Clays Map (Figure 4.6) identifies the areas of the state that are susceptible to expansive soils. All jurisdictions within Jefferson County are likely to contain soils with slight to moderate swelling potential, and thus are at risk to this hazard. The risk is relatively low, however.

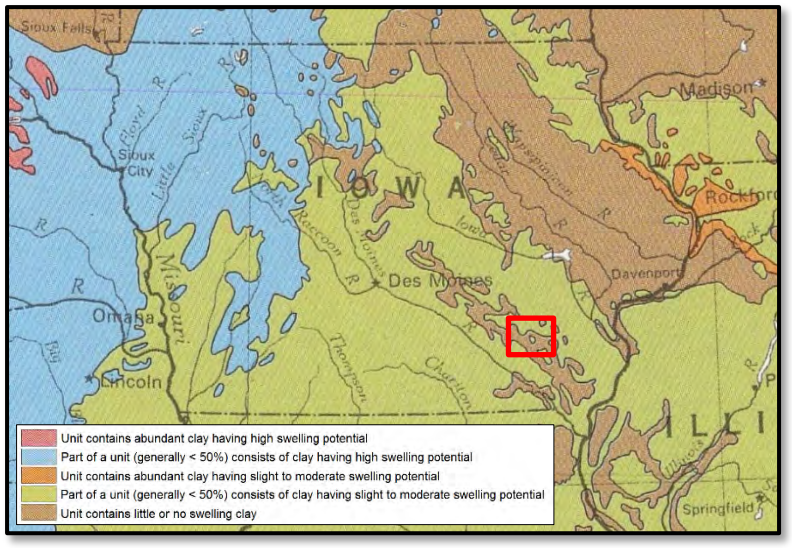


Figure 4.6. Swelling Clays Map of Iowa

Vulnerability

The most significant threat that expansive soils pose is damage to buildings, streets, and infrastructure. Houses and one-story commercial buildings are more likely to be damaged by swelling clays than are heavier, taller buildings.

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

While expansive soils are unlikely to pose risks to human life, they are likely to produce economic losses as a result of structural damages—particularly where development is located on soils with high clay content. Accordingly, each of the jurisdictions expressed limited amount of concern with this hazard and indicated a low risk rating for it.

The lack of available data limits the opportunity to accurately assess potential losses from expansive soils. In most cases, structural values depreciate over the course of time for a variety of reasons. There are no current plans to take a more detailed inventory of the locations in the county where expansive soils exist.

Extreme Heat

Extreme heat is defined by weather that is substantially warmer and/or more humid than average for a particular location at that time of year. A heat wave is an extended period of extreme heat and is often accompanied by high humidity. Periods of extreme heat may occur concurrently with droughts, which often amplifies the issue. These conditions can be dangerous and even life-threatening for humans and livestock. A power outage may increase problems as it may prevent people from running cooling systems.

Figure 4.7. Sun rising on a muggy morning.

Historic Occurrences

Between 1995 and 2010, the State of Iowa experienced 30 extreme heat events.[22] The NCDC storm events database no longer reports extreme heat events, the closest similar item is "excessive heat." Although documentation for excessive heat covers a much shorter time series, it is the best data available. The only excessive heat report for Jefferson County occurred on July 4, 2012. [23]

Probability & Severity

Excessive heat can stress humans, plants, and animals. Heatstroke, dehydration, cramps, exhaustion, and fatigue are possible with prolonged exposure and/or activity. Extreme heat can also compromise structures and cause buckling in roadways and railroad tracks. Additional economic costs from extreme heat include decreased agricultural yields, increased energy consumption, transportation issues, and infrastructure failure. These direct costs can impact other sectors indirectly.

Based on an analysis of past events, the State of Iowa Hazard Mitigation Team determined that Iowa as a whole has between 10% and 19% chance of experiencing an extreme heat event in a given year. There are estimated to be no associated losses expected for Jefferson County as a result of extreme heat annually.[24]

Heat index values typically determine heat alerts. The heat index is a scale that factors in the relative humidity as well as the temperature. The human body cools itself by perspiring, and the evaporation of the perspiration carries excess heat from the body. High humidity inhibits this

[22] Iowa Hazard Mitigation Plan – 2013 Risk Assessment
[23] NCDC Storm Events Database
[24] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

evaporation and interferes with this natural cooling mechanism, making the heat index a more accurate reflection of danger than temperature alone. Figure 4.8 shows how heat index is measured. To find the heat index and the associated category of heat risk, find the intersection of the temperature and the percentage of relative humidity. The NWS will initiate alerts when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.[25]

Figure 4.8: NOAA Heat Index Chart

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: NOAA Office of Climate, Water, and Weather Services

Vulnerability

Weather forecasts can fairly accurately predict extreme heat events several days in advance. Many sources for weather forecasts exist. The National Weather Service issues heat advisories via radio, television, and weather alert radios when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

Extreme heat events can occur anywhere. The elderly, small children, chronic invalids, those on certain medications or drugs, persons with weight and alcohol issues, livestock, and pets are the most vulnerable. Outside of these groups, any healthy person with prolonged exposure to the heat is susceptible to heatstroke, sunstroke, dehydration, or exhaustion. People in older homes, apartments, or those with lower budgets often do not have access to air conditioning and therefore put themselves at greater risk.

[25] NOAA Office of Climate, Water, and Weather Services

Extreme heat remains a hazard which has relatively few land use implications in the region, and its impact on future development is negligible. However, there are ways to mitigate effects of heat. Use of air conditioning is one direct way in which such extreme temperatures can be mitigated. Additionally, the planting of shade trees, especially on the south and west sides of buildings helps to significantly lower the inside temperatures of buildings. Impervious surfaces such as streets and parking lots in urbanized areas can also intensify the effects of heat.

Each of the jurisdictions participating in this plan expressed concern with extreme heat events and indicated a moderate vulnerability rating for this hazard. With the exception of the school districts, each jurisdiction chose to identify the hazard as a potential threat. Since schools are air conditioned and are not in session during the hottest months of the year, their concern with this heat events is limited. Certain extra-curricular activities, such as sports practices or competitions, may be canceled if such extreme temperatures pose a concern.

The greatest vulnerabilities to this hazard include functional losses (i.e. power failure and infrastructure damage), as well as individual risks (i.e. heatstroke). Extreme heat events typically do not put structures at risk, and their effect on the general population is extremely unpredictable, making loss estimates particularly challenging.

Flash Flood

Figure 4.9. Scouring from a flash flood caused part of this roadway to collapse after a brief, but heavy rain storm.

Floods are one of the most common hazards in the United States; however, not all floods are alike. Flash floods occur when water levels accumulate and rise at an extremely fast rate and can happen anywhere. Though flash floods can occur at the same time as a river flood, they are two different types of hazards. Flash flooding typically results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, high water tables, frozen ground, saturated soil, and/or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area in a short period of time.

Historic Occurrences

Flooding is a very regular and frequent hazard in Iowa, and unlike river flooding, flash floods can occur virtually anywhere. The NCDC identifies 9 flash flood events that have been reported in Jefferson County since 1997. These incidents resulted in property damages totaling approximately $155,000 and no crop damages reported. [26]

Probability & Severity

Many human-caused factors contribute to flash flooding and the land's ability to absorb rainfall. Iowa has lost a significant amount of wetlands primarily through agricultural use conversion, which has reduced the land's ability to detain water. Water that had been allowed to percolate in a wetland is now directed into streams as a result of tiling, ditching, and other means. In addition, urbanized areas have a high density of impervious surfaces, which limits infiltration and increases runoff. Often, aging storm sewer systems are not designed to carry high capacities of water and unless measures are taken to reduce the amount of runoff or at least slow its movement, flash floods will continue to occur and potentially increase in frequency.

Floods are among the most common and widespread of all natural disasters, particularly in Iowa. Based on the analysis of past events, there is an approximately 50% chance that a flash flood will affect Jefferson County in any given year. Flash flooding can result in human injury and death;

[26] NCDC Storm Events Database

property damage; transportation, communication, and utility disruption; and losses to crops and livestock. Flash floods can cause significant property and infrastructure damage as a result of rapid erosion and undercutting (Figure 4.9). These hazards can move waters at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, obliterate bridges, and wash out roads. Based on information provided in the Iowa Hazard Mitigation Plan, losses for Jefferson County as a result of flash flooding are estimated to be approximately $12,000 annually.[27]

Vulnerability

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

Typically, flash flooding occurs with little or no warning. Since flash flooding most often results from intense rainfall or snowmelt, weather forecasts can give some indication of the potential for flash flooding. However, flash flooding is also associated with sudden events such as the release of water during dam failure, levee failure, or from an ice jam. Weather surveillance radar is being used to improve monitoring capabilities during periods of intense rainfall. The NWS often issues flash flood watches and warnings when conditions appear favorable for flash flooding. Additionally, local knowledge of watershed characteristics can help to lengthen the warning time of a potential hazard and often results in avoiding construction in areas that are prone to flooding.

Flash floods usually occur in localized areas; particularly near streams, in low-lying areas, close to creek beds or drainage ditches, on poorly drained soils, in areas with a high water table, in urbanized areas, or downstream from a dam, levee, or storage basin. People and places in areas with insufficient storm sewers, sump pumps, and other water management infrastructure may also be at risk. Flash flooding tends to result in higher loss of life than river and stream flooding because it is less predictable and much more rapidly developing.

Future developments should be constructed with the potential effects of flash floods in mind. Proper mitigation starts with well-designed infrastructure. Adequate storm water management is essential to the prevention of flash floods. Communities should be aware of which areas have a tendency to flood and have the ability to encourage development of flood-prevention infrastructure such as ditching, culverts, tiling, and the expansion of storm sewers. New construction and infill development can mitigate potential flood damage through foundation waterproofing, installation of sump pumps, and reducing the area of impervious surfaces constructed. Additionally, communities should take the necessary steps to participate in the National Flood Insurance Program, through the adoption of floodplain regulations. This will help to minimize the risks associated with development in or near floodplains.

[27] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

Unlike river flooding, flash flooding has the potential to affect all communities. In some of the planning meetings, certain members noted some of the more susceptible areas of their community and were very aware of the potential threat that exists. Each of the jurisdictions participating in this plan expressed a significant concern with flash floods.

Flash flooding is highly dependent on the location and quantity of a precipitation event which makes estimating vulnerability in terms of loss estimates a difficult task. In reading through the NCDC storm events reports, the majority of reported flash flooding in Jefferson County was limited to short-term road closures; however, it was noted that a few of the events did cause localized basement flooding. Below is a list of the roads that have been previously impacted by flash flooding according to the NCDC reporting.

- Highway 1 north and south of Fairfield flooded several times.
- County Road H43 between Cedar Ave. and Cresswood southeast of Batavia.
- Street flooding was reported in Fairfield and Packwood.

In the future, it is recommended that more specific information is noted and added to Appendix H to provide enhanced information for plan updates.

Grass & Wildland Fire

Grass and wildland fires are non-structural fires that generally occur in rural areas where development is sparse. These fires have the ability to spread and threaten life and property. All wildfires begin with an ignition source and often the impetus is unnoticed. Lightning is a common ignition source of wildfires. Most fires, however, are started directly or indirectly by people; through debris burning, campfires, improperly discarded cigarettes, sparks from vehicles or equipment, arced power lines, arson, or other means. They can spread quickly, igniting brush, trees, crops, and structures. The fundamental influences on the spread of wildfires include the type and character of available fuels, weather conditions in the area, and topography. Drought conditions exacerbate the potential for these fires and increase their potential severity.

Historic Occurrences

According to the National Interagency Fire Center (NIFC), Iowa experienced 3,363 wildfires burning some 74,118 acres between 2002 and 2015.[28] There are no records of any historically significant wildfire events in Iowa, also according to NIFC statistics. Most wildfires have been relatively isolated events that have been able to be contained before they caused widespread damage. According to the Iowa DNR, Jefferson County has had 28 reported fires since 2005 that have burned approximately 482 acres.[29]

Probability & Severity

The USDA Forest Service maintains a map of wildfire hazard potential, depicting the relative potential for wildfire (Figure 4.10). Areas mapped with higher potential values represent those areas which contain fuel sources with a higher prospect of exhibiting extreme fire behaviors. As the majority of Iowa is agricultural, much of the state falls within the "non-burnable" or "very low" potential category.

By definition, the probability of a wildfire in Jefferson County is very low; however, the presence of cropland and vegetation in the ditches does present some risk for uncontrolled grass fires.

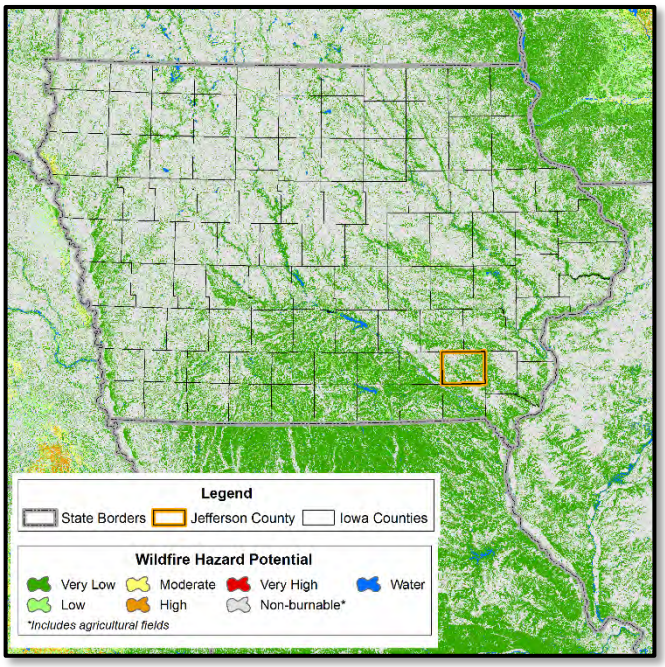


Figure 4.10. Map of wildfire hazard potential.

[28] National Interagency Fire Center
[29] Correspondence with Iowa DNR Wildland Fire Supervisor

Based on the analysis of reported non-structural fire events, Jefferson County should expect to have about one event in any given year. Though the risk is generally low, wildfires still have the potential to damage property and can cause other disruptions to transportation and utility infrastructure.

Vulnerability

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville		Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City		Maharishi Schools
X	Jefferson County (Unincorporated)		

Grass and wildland fires have potential to pose serious risks to structures, livestock, and human life. Wildfires have the potential to spread as long fuels exist to maintain a burn. A significant reason that Iowa has not had any major events is that there are very few inaccessible areas around the state. The grid system of roads that has emerged in the rural areas as a result of row cropping provides relatively great access to all areas and also acts as a natural firebreak. As described in Section 3, the Jefferson County is well covered by fire departments both in and near the county. No portion of the county is further than 7 miles from a fire house.

Certain precautionary measures can be taken by landowners, particularly during periods of drought and extreme heat to help mitigate potential dangers of wildfire. Respecting burn bans and exercising caution when burning trash or other debris (i.e. not burning in windy conditions, properly extinguishing campfires, etc.) can greatly reduce the potential for localized wildfires. Many areas have fire danger ratings to help assist residents and visitors in determining whether or not it is okay to start fires in the area.

Grass and woodland fire are a hazard that has relatively few land use implications in the region, and its impact on future development is negligible. One precautionary measure landowners could take is to mow areas close to structures and cut down dead trees to reduce the amount of fuel available to a potential fire.

All jurisdictions are potentially vulnerable to this hazard, though cities and schools are more vulnerable to structural fires. The lack of available data limits the opportunity to assess potential losses from wildfires. Data reports for wildfires are dependent upon local fire department staff. Ensuring that fire departments accurately report their incidents will help provide better data for future reference. Additionally, communicating who is responsible for reporting when multiple departments respond to a single call will also ensure better data going forward.

Landslides

Landslides occur when masses of rock, earth, or debris move down a slope. Landslides can be caused by a variety of factors and vary in size and speed. They can occur because of erosion, rainstorms, overly saturated soils, fires, earthquakes, and human modification of the land's slope and drainage characteristics. Landslide problems can be exacerbated by poor land management, particularly near hills and streams. Areas that have had grass or forest fires are at increased risk for a landslide.

Historic Occurrences

There have been no reported injuries or deaths in the State of Iowa as a result of landslides. There have been no documented occurrences of landslides in Jefferson County. Although no reported events have been recorded, minor slides most likely have occurred and will continue to occur as isolated, non-severe events.

Probability & Severity

The highest risk for landslides within the State exists near the Mississippi River Valley in the northeastern portion of Iowa and the Loess Hills in western Iowa. Additional susceptibility exists where steep terrain is present in major river valleys, such as the Des Moines River.[30]

The map from U.S. Geological Society data in Figure 4.11 shows that there is a low risk potential for landslides in Jefferson County. The county has little in terms of steep terrain; therefore, most landslides would affect only localized areas. Damages resulting likely would be limited to minor structural/infrastructure damage and may include the short-term interruption of essential services.

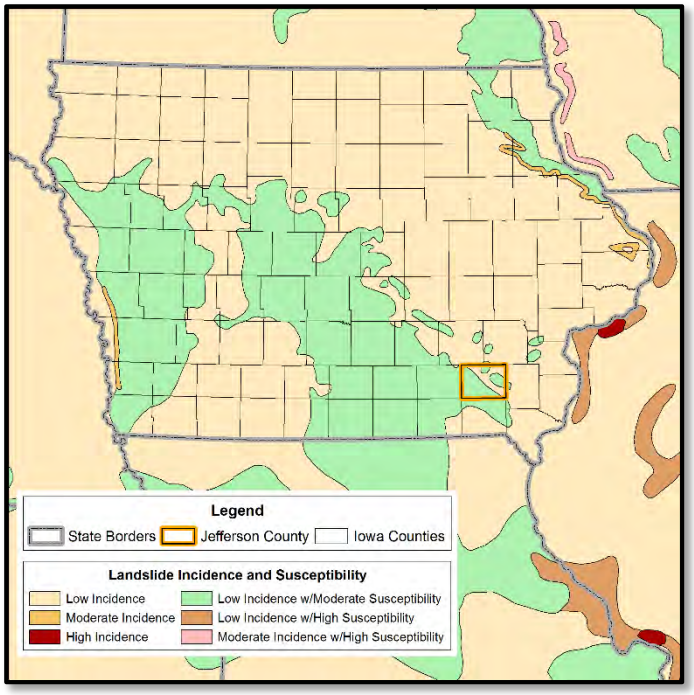


Figure 4.11. Map of Landslide Incidence & Susceptibility

Vulnerability

Though a landslide often occurs without notice, susceptible areas can be identified well in advance of an incident. Steep slopes, stream banks, slopes devoid of vegetation, and recently disturbed soils

[30] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

all are at risk of having a landslide. A large rain—which can be forecast days in advance—increases the probability of a landslide in these areas. Nearby structures and infrastructure would be most susceptible to damage should the ground nearby fail. Though most of the cities in Jefferson County are on relatively level ground, slopes and small streambeds do exist in parts of each. Avoiding new construction on steep slopes is a good way to minimize risks associated with landslide. Zoning and building permits help prevent development in unsuitable locations.

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville		Fairfield Schools
X	Lockridge		Pekin Schools
X	Maharishi Vedic City		Maharishi Schools
X	Jefferson County (Unincorporated)		

All jurisdictions are potentially vulnerable to this hazard, but such incidents may only occur in an isolated area. A lack of historic events and available data limits the opportunity to assess potential losses from landslides. There are no current plans to take a more detailed inventory of the locations in the county where landslides could occur.

River Flood

Floods are one of the most common hazards in the United States; however, not all floods are alike. River flooding—the most common type of flooding event—is the rising of any stream [including creeks] that overflows its banks onto adjacent land that is not typically covered by water. River flooding occurs when the amount of water exceeds the carrying capacity of the stream channel. This can occur after prolonged periods of rainfall, after rapid snowmelt, or from dam or levee failures.

Figure 4.12. Flooding from an overflowing creek.

Many human-caused factors contribute to river flooding. Iowa has lost a significant amount of its natural wetlands through conversion to agricultural uses. These wetlands previously detained water that is now released into streams through tiling, ditching, and other means. In addition, urbanized areas have a high amount of impervious surface area, which limits infiltration and increases storm water runoff. Unless measures are taken to reduce the amount of runoff or slow its movement, river floods will continue to occur and could increase in frequency and magnitude.

Historic Occurrences

Even though there are relatively few major streams in Jefferson County and most of the county's populated areas are not in or near predicted floodplains, three Presidential Disaster Declarations related to flooding have included Jefferson County since 1990. The NCDC identifies only eight river flood events that have been recorded in Jefferson County between 1996 and 2015. These incidents resulted in property damages totaling approximately $250,000 and no crop damages reported.[31]

Probability & Severity

Floods are among the most common and widespread of all natural disasters, particularly in Iowa. Based on the analysis of past events, in any given year, the probability that Jefferson County will sustain a river flood event is approximately 40% in any given year. Discussions with residents and local officials; however, suggest that the data are likely lacking. Cedar Creek often floods low lying areas that are used for farming row crops and has caused damage to the county road leading from Highway 34 to Libertyville within the last few years.

[31] NCDC Storm Events Database

Floodwaters can erode the landscape, inundate buildings, and cover roads. River flooding most directly affects personal property, structures, and land located in the floodplain. Floodwaters can be extremely dangerous; in fact, the force of just six inches of swiftly moving water can knock a person off his/her feet and two feet of water can float a car.

Though loss of life can occur during river floods, the risk is not as high as what is associated with flash flooding because of the generally slower onset and better predictability of the event. Floods are a natural and regular phenomenon in which potentially inundated areas can be predicted on a fairly accurate basis. The National Oceanic and Atmospheric Administration (NOAA) issues flood warnings when certain geographic areas are considered to be at a high risk.

River flooding can affect communication, transportation, electric service, and community facilities. Unfortunately, public and private facilities and infrastructure are commonly located in floodplains and are frequently at a high risk of flooding. Based on information provided in the State of Iowa Hazard Mitigation Plan, loss estimates for river flooding in Jefferson County are estimated to be approximately $7,487,000 annually.[32]

The National Flood Insurance Program

44 CFR § 201.6(c)(2)(ii) – All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.

44 CFR § 201.6(c)(2)(ii) – All plans approved after October 1, 2008 must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance protection against flood losses. If a community chooses to adopt and enforce adequate floodplain development and management regulations, the Federal Government will make flood insurance available to property owners.

The U.S. Congress created the NFIP in 1968 with the passage of the National Flood Insurance Act of 1968, and has further been modified with through other legislative measures. The intent was to reduce future flood damage by promoting the adoption of community floodplain management ordinances. Without community oversight of building activities in the floodplain, the best efforts of some to reduce future flood losses could be undermined or nullified by the careless building of others. Unless the community as a whole participates, the potential for loss will not be reduced sufficiently to affect disaster relief efforts. Insurance rates would then reflect the probable higher losses that would result without local floodplain management enforcement activities.

In support of the NFIP, FEMA identifies flood hazard areas through the U.S. and its territories by producing Flood Insurance Rate Maps (FIRMs), Flood Hazard Boundary Maps (FHBMs), and Flood Boundary and Floodway Maps (FBFMs). Several flood hazard zones are commonly

[32] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

identified on these maps. One of these areas is the Special Flood Hazard Area (SFHA), a high risk area defined as any land that would be inundated by a flood having a 1% chance of occurring any given year (also referred to as the base flood or 100-year flood).

States have the liberty to require NFIP participation and to enforce more stringent regulations. In 2009, the Iowa Legislature passed House File 759 which ties a community's eligibility for certain post-disaster state assistance to its participation in the NFIP. This bill required NFIP participation by those communities that had an existing FIRM identifying a SFHA. The bill also stipulated that communities which previously were not mapped have twenty-four months to participate in the NFIP if a FIRM is developed that identifies a SFHA within the boundaries of the community. When this plan was submitted, most of Jefferson County was not FIRM-mapped. Only the City of Fairfield has an effective FIRM. As such, Fairfield is the only active NFIP participant. Table 4.6 outlines the NFIP participants in Jefferson County (Fairfield). None of these properties is a severe repetitive loss (SRL) property. The City of Fairfield will continue NFIP participation through the enforcement of its Floodplain Districts Ordinance (No. 17.04) which prohibits new construction in the identified floodplain areas.[33] Building permits are required in Fairfield, as well.

Table 4.6. NFIP Participants in Jefferson County

Jurisdiction	Fairfield
CID	190168
Initial FHBM	06/28/74
Initial FIRM	02/18/81
Effective Map Date	09/30/94
Policies in Force	3
Insurance in Force	$950,000.00
Total Number of Losses	0
Number of Losses Paid	0
Value of Losses Paid	$0.00

Sources: FEMA Community Status Book Report, NFIP Policy Status Report, Iowa DNR

Following the floods of 2008, in which eighty-five Iowa counties were declared Presidential Disaster Areas, the State of Iowa launched a statewide floodplain mapping initiative.[34] The Iowa DNR has partnered with the Iowa Flood Center (IFC) and U.S. Army Corps of Engineers (USACE) to begin the process of developing updated flood maps called, draft flood hazard products (DFHPs). Much like existing FIRMs, DFHPs will show predicted floodplain boundaries for 100-year and 500-year floods. LiDAR and hydrological data is being used to generate the DFHPs that predict flood inundation. LiDAR is much more detailed and accurate than the original elevation data that was used to develop FIRMs.

Over time, streams erode banks and their course changes somewhat. These draft flood hazard products not only should be more accurate than original FIRMs, but they also will reflect the changes in landform over time. As these new maps are delivered, each jurisdiction plans to review the information to see how it may affect the communities they represent. The IFC is responsible for developing DFHPs for the eighty-five counties which were declared disaster areas. The

[33] City of Fairfield Code of Ordinances
[34] Iowa Flood Center: Statewide Floodplain Mapping Project

USACE was charged with developing DFHPs using Section 22 Planning Assistance to States (PAS) funding for the remaining fourteen counties.

Although these products are not regulatory documents, when completed, they are being submitted to FEMA for FIRM consideration. Jefferson County is one of those counties that are being mapped by the Rock Island District of the USACE. As the mapping process continues and products are developed for Jefferson County, the USACE and IFC will engage the leaders and citizens of Jefferson County for review. The USACE expected their draft maps to be completed in September 2016, but as of November 2016, this had not been presented to the County.[35]

Vulnerability

Vulnerable Jurisdictions			
	Batavia		Packwood
X	Fairfield		Pleasant Plain
X	Libertyville		Fairfield Schools
	Lockridge		Pekin Schools
	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

Floods can be slow or fast rising, but typically develop over a period of several days or weeks and can last for a few hours or a few months. The incident period for the 1993 Disaster Declaration was just short of six months. Flood waters have the potential to destroy anything in their path. While most homes and businesses located in the floodplain have been removed or abandoned over time, many remain.

There are an estimated three properties with a total assessed building value of $2,804,600 that appear to be in the floodplain and an estimate of the total assessed value of the buildings on these properties. These figures were derived from a comparison of the effective FIRM and information from the County Assessor.

Future developments—especially near streams in unincorporated areas—should be constructed with the potential effects of river flooding in mind. Communities are very aware of which areas have a tendency to flood and with flood maps available, they can prohibit development within floodplains. The County and its communities also have the ability to encourage development of flood-prevention infrastructure such as ditching, culverts, and the expansion of storm sewers. Additional efforts may be taken to revert flood-prone areas to wetland, particularly through watershed management programs available from the USDA.

[35] U.S. Army Corps of Engineers: Jefferson County, IA Floodplain Work Map

Severe Winter Storms

Winter storms occur every winter and across all jurisdictions within Jefferson County. Winter storms can range from large accumulations of moderate snowfall over a prolonged period of time to a blizzard with blinding, wind-driven snow. Most winter storms are accompanied by some combination of dangerously low temperatures, high winds, snow, sleet, icing, and freezing rain.

The National Weather Service refers to winter storms as the "deceptive killers" because most deaths associated with winter storms are indirectly related to the storm event itself. People die in traffic accidents on slick roadways or of hypothermia from prolonged exposure to the cold. One of the primary concerns of a winter storm is the weather's ability to knock out power which, in turn, can knock out heat sources and communications services. Heavy snowfall and ice (Figure 4.13) can immobilize entire regions for days at a time, making any effort to restore power or communication failures difficult.

Figure 4.13. Ice and snow cling to trees and power lines the morning after a winter storm. Several large tree limbs which fell from the weight of the snow are piled up in the foreground.

Historic Occurrences

Since 1990, seven Presidential Disaster Declarations have been issued in Iowa related to winter storms, of which, two were issued for Jefferson County. The National Climatic Data Center's Storm Events Database lists 119 winter-related events affecting Jefferson County since 1996; including four blizzard events, sixteen heavy snow events, nine ice storms, and thirty-five winter storms. Total property damage from these events is estimated at $85,000 and no crop damage was reported.[36] There were no injuries or fatalities reported as a result of those incidents; however, it is very likely that minor injuries may have been sustained as a result of vehicle accidents, falling on slick sidewalks, and cold weather conditions.

Probability & Severity

Based on the analysis of past events, Jefferson County can expect several winter-related events each year; however, the State Plan estimates no associated annual losses for Jefferson County due to extreme cold, snow, and ice.[37]

[36] NCDC Storm Events Database
[37] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

Winter storms have the ability to disrupt travel, damage property and infrastructure, cause power outages, and lead to human, livestock, and crop casualties. The majority of the losses and disruptions caused by winter storms are associated with infrastructure. Power outages are commonly created by the buildup of ice on trees and power lines. Water mains may burst as a result of the freezing and thawing of the soil. Winter storms necessitate the pre-treating of major roadways and the removal of snow and ice from streets during and after a storm. Mobility issues that may arise due to the ice and snow on the roadways can slow or stop vital supply lines, can hamper the response of emergency services, and may prevent repairs to utility line damages.

The National Weather Service has several different watches, advisories, and warnings that they may issue in the winter.[38] A Winter Storm Watch is issued when conditions are favorable for the development of severe winter weather. When issued, a watch should prompt residents, businesses, and communities to prepare for a storm. A Winter Weather Advisory means that winter weather conditions are expected to cause significant inconveniences and that conditions outdoors are potentially hazardous. A Winter Storm Warning is more severe and indicates that the weather outside is hazardous to human and animal safety and that conditions are unsafe for travel.

Additional winter-related NWS advisories include freezing rain/fog, high wind, and wind chill. Freezing fog and rain create unsafe conditions for travel and may impact utility infrastructure if ice builds up on trees and power lines.[39] High wind can also impact travel and utility infrastructure, and can create a hazardous situation for humans and animals when combined with very cold temperatures. The Wind Chill Index is a measure of how cold it feels outside when wind is factored in with the ambient air temperature.[40] Figure 4.14 identifies the wind chill and the likely amount of time it would take to get frostbite at a given temperature and wind velocity.

Figure 4.14. NOAA Wind Chill Chart

Air Temperature (°F)

Wind Speed (MPH)	Calm	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
	5	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52
	10	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59
	15	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64
	20	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68
	25	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71
	30	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73
	35	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76
	40	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78
	45	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
	50	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81
	55	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82
	60	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84

Wind Chill (°F) = 35.74 + 0.6215T – 35.75($V^{0.16}$) + 0.4275T($V^{0.16}$) where T = Air Temperature, V = Wind Speed

Frostbite Times	30 Minutes		10 Minutes		5 Minutes

Source: NOAA National Weather Service

[38] National Weather Service – Winter Warnings
[39] National Weather Service – Ice & Frost
[40] National Weather Service – Wind Chill

Vulnerability

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

Traffic accidents are the most common hazard and leading cause of death in winter storms. A power outage during a significant cold weather period has the potential to impact a significant number of people, and might require assistance and shelter accommodations for the homeless. Though modern buildings make the current population significantly less vulnerable than the first settlers, deaths may still occur as a result of severely cold temperatures. The particularly vulnerable populations are the homeless, elderly, and very young. Modern furnaces require electricity to function. An estimated 51.2% of Jefferson County residents use natural gas as their primary source of heat, while 23.9% use liquefied propane gas, and 18.9% use electricity.[41] Other significant dangers are the risks placed on livestock, whose needs for food, water, and shelter can often be put in jeopardy.

Winter storms have little impact on future development; however, any new development is likely to increase demand for infrastructure which may increase overall exposure. Each of the jurisdictions participating in this plan expressed an extreme amount of concern for winter storms. With the exception of the school districts, each jurisdiction indicated a high vulnerability rating for the hazard. The school districts have the ability to delay or cancel school in the event that any significant winter weather hazard threatens the area.

[41] U.S. Census Bureau

Sinkholes

A sinkhole is the loss of surface elevation due to the removal of subsurface support. Land subsidence can occur slowly over time or abruptly and can be the result of natural processes or human activities. "Karst" is a type naturally occurring terrain that is composed of carbonates, or slowly dissolving types of rock that form the uppermost portion of the bedrock. Jefferson County is not in the portion of the state in which these types of sinkholes pose the biggest risk.[42] The primary causes of human-caused incidents involve mining activities, the extraction of petroleum and groundwater, or leaking underground utility lines (i.e. water mains and storm sewer lines). Sinkholes have the potential to cause localized damage to buildings, roads, and other infrastructure.

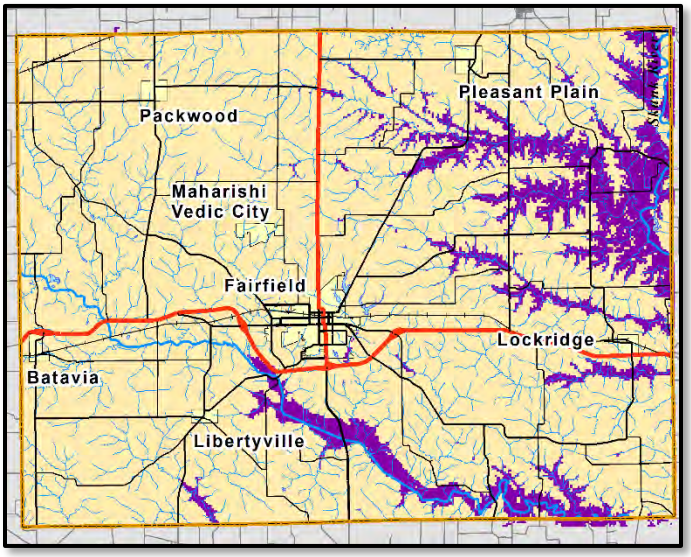


Figure 4.15. Map of karst terrain in Jefferson County

Historic Occurrences

The majority of documented sinkholes in Iowa have occurred along the Upper Iowa River watershed in the northeast portion of the state.[43] Iowa has a rich history of coal mining, though most operations ceased in the 1930s. [44]

There have been no reported occurrences of major sinkholes or mine subsidence in Jefferson County according to the Iowa DNR and the planning team. While carbonate soils (Figure 4.15) and abandoned mines (Figure 4.16) do exist in Jefferson County, sinkholes related to these features have not been reported.

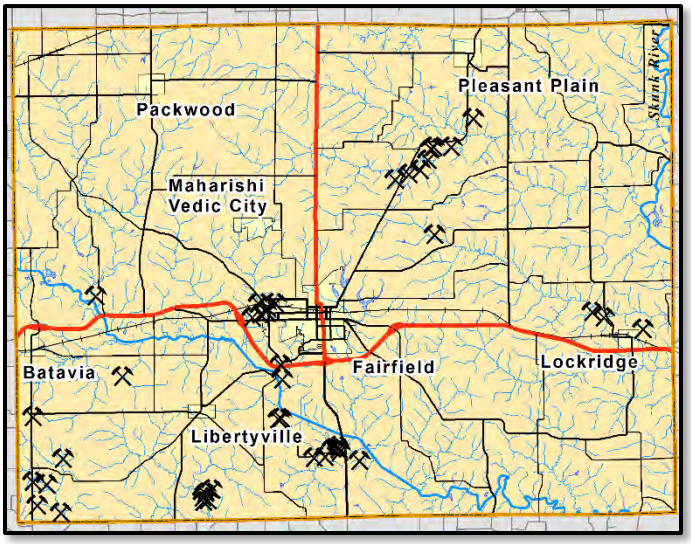


Figure 4.16. Map of known coal mines in Jefferson County

[42] Iowa Geological Survey
[43] Iowa Hazard Mitigation Plan – 2013 Risk Assessment
[44] University of Northern Iowa

Probability & Severity

Although no reported events have occurred, there is always a chance that a sinkhole could occur. Land subsidence occurs at different rates throughout the state and does occur in Jefferson County, though historically not at significant rates. There are identified and unidentified abandoned mines and wells throughout the county that could potentially cause problems, as well. Sinkholes primarily pose structural risks to buildings as well as roads and infrastructure. The most likely cause of a sinkhole in Jefferson County would be associated with a water main break or a broken storm sewer that has allowed water to flow beneath the surface of the ground and erode the substrate. There may be the potential for a very limited interruption of essential facilities and services, but the risk to human life is negligible.

Vulnerability

Land subsidence occurs gradually over time, while the collapse of mines and voids in soil layers can occur suddenly. Slowly occurring land subsidence can be addressed early to prevent extensive structural damage when vulnerable soils are identified. Measures can be taken below the ground to address the potential damages that abandoned mines can create.

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

All jurisdictions could potentially be vulnerable to sinkholes to some extent, although such incidents are rare and are unpredictable. Sinkholes are a hazard that has relatively few land use implications in the region, and its impact on future development is negligible. The lack of available data limits the opportunity to assess potential losses from sinkholes. The highly isolated character of a sinkhole further complicates the ability to assess potential losses. There are no current plans to take a more detailed inventory of the locations in the county where sinkholes may occur.

Thunderstorms, Lightning, & Hail

Thunderstorms develop in cumulonimbus clouds and are created from a combination of moisture, rapidly rising warm air, and often the collision of warm and cold air masses. Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt", which can occur within a cloud or between the clouds and the ground. Cloud to ground lightning is most dangerous to humans and property.

Figure 4.16. Lightning

Thunderstorms are typically characterized by rain, thunder, lightning, strong gusts of wind, and often hail. Other potential hazards may accompany a thunderstorm; including flash floods, river floods, hail, windstorms, and tornadoes. Thunderstorms primarily occur during the warmer months of the year, but can occur in the winter (i.e. "thundersnow"). A thunderstorm may occur as a single isolated storm or may occur as part of a system of storms hundreds of miles long.

Hail are bits of ice that fall along with rain during a precipitation event. Hail is produced by strong rising currents of air carrying water droplets to a height where freezing occurs. While suspended, the ice particles grow in size until they are too heavy to be supported by the updraft and fall down to earth. The State Plan considers a hailstorm as being one that produces hail greater than one inch in diameter. Hailstorms can occur at any time of the year, though typically occur in conjunction with a severe thunderstorm or tornado. While most hail pellets are typically small, they can reach the size of a softball. Damage to property, crops, and people are likely in a severe hailstorm.

Figure 4.17. Hail-damaged corn.

Thunderstorms typically can be forecast several days in advance. The NWS issues different watches and warnings regarding thunderstorms and storms which have the potential to produce hail, damaging winds, tornadoes, or floods. Storm systems are monitored by trained weather spotters and information is broadcast over local radio and television stations, as well as on NOAA weather radios. Advances in cellular technology now allow weather alerts to be sent directly to cell phones and other mobile devices.

Historic Occurrences

Between 1955 and 2010, over 10,000 severe thunderstorms, lightning, and/or hail events impacted Iowa.[45] Since 1950, four deaths have occurred in Iowa due to hail. Since 1996, thirty-five injuries and one death have resulted from lightning statewide. For Jefferson County, the NCDC identifies ninety-three thunderstorm wind events between 1957 and 2015, four lightning events between 1996 and 2015, and eighty-nine hail events between 1960 and 2015. Fifty-one of those hail events produced stones greater than one inch in diameter. The cumulative amount of property damages resulting from these incidents totals approximately $1,419,000 in property damages and approximately $89,900 in crop damages. Zero injuries and deaths have been associated with thunderstorms, lightning, or hail in Jefferson County.

Probability & Severity of Thunderstorms/Lightning

Based on the analysis of past events, Jefferson County will experience several severe thunderstorm events each year. Although storm prediction technologies are continuously improving, thunderstorms and lightning can develop quickly with little notice. The greatest danger to people and livestock during a thunderstorm is lightning. A lightning strike can cause significant environmental and structural damages and casualties, as well. The number of fatalities due to lightning has declined significantly over the last century; however, lightning still has been responsible for an average of thirty-three deaths per year nationwide over the last decade.[46]

Even with the number of casualties that occur annually, the direct impact of thunderstorms and lightning to communities is limited. There is the potential for minor injuries and illnesses, minor property damage with little threat to structural stability, minor short-term environmental impacts, and the possible shutdown of essential facilities. Lightning can create power outages which can cut off communication. This can affect electrical warning systems—such as television and radio—which can be dangerous if a thunderstorm is also associated with strong winds, tornadoes, flooding, or large hail. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Jefferson County as a result of thunderstorms, lightning, and hail are estimated to be approximately $87,000 annually.[47]

Probability & Severity of Hail

Based on the analysis of past events, Jefferson County will experience at least one hailstorm in any given year. Severe hailstorms have the potential to damage structures, vehicles, and other property and threaten lives. Hail may cause power outages, leaving people without a source of heating or cooling. Transportation issues may also arise due to hail, ice, and snow on the roads. This may create hazardous driving conditions and delay response time for emergency vehicles.

[45] NCDC Storm Events Database
[46] NWS Weather Fatalities
[47] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

Hail is often described relative to other similar-sized round or spherical objects. The NCDC size comparison appears in Table 4.7. Other factors besides hail size contribute to the damage potential of a storm. These include the accompanying wind speed, fall speed, texture, and number of stones. The Tornado and Storm Research Organisation (TORRO) in the United Kingdom has developed a Hailstorm Intensity Scale to approximate the magnitude of a hailstorm (Table 4.8). This scale categorizes storms from H0 to H10, with intensity related to the typical damages associated with the event. Evidence indicates that maximum hailstone size is the most important variable relating to structural damage, especially toward the larger end of the scale.

Table 4.7: Hail Size Comparison

Diameter (in.)	Description
< 0.50	Pea
0.75	Penny
0.88	Nickel
1.00	Quarter
1.25	Half-Dollar
1.50	Ping-Pong Ball
1.75	Golf Ball
2.00	Hen Egg
2.50	Tennis Ball
2.75	Baseball
3.00	Tea Cup
4.00	Grapefruit
4.50	Softball

Source: NCDC Storm Events Database

Table 4.8. TORRO Hailstorm Intensity Scale

Size Code	Intensity Category	Diameter*	Typical Damage Impacts
H0	Hard Hail	< 0.2 in.	No damage
H1	Potentially Damaging	0.2 - 0.6 in.	Slight damage to plants, crops
H2	Significant	0.4 - 0.8 in.	Significant damage to fruit, crops, vegetation
H3	Severe	0.8 - 1.2 in.	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.0 - 1.6 in.	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.2 - 2.0 in.	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	1.6 - 2.4 in.	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	2.0 - 3.0 in.	Severe roof damage, risk of serious injuries
H8	Destructive	2.4 - 3.5 in.	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.0 - 4.0 in.	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	> 4.0 in.	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

*Approximate range since other factors affect severity of damages. Converted from metric (mm) to imperial (in).
Source: The Tornado and Storm Research Organszation

Vulnerability

With Iowa's location in the interior of the U.S., there is a near certainty that several of these storms will occur and cause damage each year. Iowa's typically humid climate enhances the opportunities for severe thunderstorms to develop. People and livestock who are caught outside during a thunderstorm—

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

particularly those on hills, under trees, in open areas, or on the water—are at higher risk to lightning. Those in mobile homes, older homes, or automobiles are also at risk.

Hailstorms can happen anywhere. Crops, plants, livestock, pets, and those left without shelter are the most vulnerable, but larger hail has the potential to damage personal property and cause structural damage. Residents that live in mobile homes are especially vulnerable to damage due to the structure and design of the units. Currently, there are approximately 868 occupied mobile homes in Jefferson County. People who live in older homes built before 1960 are also vulnerable due to their weaker structural integrity. Nearly 45% of the houses in Jefferson County were built before 1960.[48] Additionally, campgrounds and other recreational areas are also particularly vulnerable due to a lack of shelter.

Future developments should be constructed with the potential effects of thunderstorms, lightning, and hail in mind. The potential for such a hazard is an important consideration in the design of all structures, but particularly tall and metal structures. It is necessary to ensure that all buildings are adequately grounded to protect against lightning strikes. Also, since these storm events are often associated with power outages, it is important to ensure that essential facilities and functions have the support of a backup power generator.

Each of the jurisdictions participating in this plan expressed a significant concern with thunderstorms, lightning, and hail, indicating a high vulnerability rating for this hazard.

[48] U.S. Census Bureau

Tornadoes & Windstorms

A tornado is characterized as a violent, rotating, funnel-shaped cloud that extends from a cloud to the ground with whirling winds that can reach 300 miles per hour. Tornadoes are typically associated with super-cell thunderstorms and are often accompanied by hail. The base of a tornado can range from just a few feet wide to well over one-mile wide, creating a range of damage paths can be localized or many miles long. The damages from a tornado are the result of the high winds and associated rainfall that may inundate a damaged structure. Although tornadoes can come and go in a matter of seconds, damages can be severe and potentially deadly.

Figure 4.18. Rain-wrapped tornado in Monroe County.

Tornadoes are unpredictable in nature as they can occur one at a time or in groups and vary in travel direction and distance, velocity, and width. Being geographically located where warm/moist, and cool/dry air masses meet, Iowa and other Midwestern states are extremely susceptible to tornadic activity. The collision of these air masses creates the very favorable conditions for the development of super-cell thunderstorms and tornadoes. Tornadoes most often occur during the spring and summer months—particularly April, May, and June. Although tornadoes can occur at any time of the day, they are most commonly seen during the late afternoon and evening hours.

Windstorms are characterized as sustained winds in excess of thirty miles per hour. Windstorms tend to occur in greater force when associated with large expanses of open land. As such, the landscape of Iowa yields particularly strong surface winds. High winds can occur in all types of weather and are most notably associated with severe thunderstorms, tornadoes, severe winter storms, downbursts, and steep pressure gradients.

Figure 4.19. Straight-line winds toppled this dead tree into a power line and onto the adjacent county road.

The most significant non-tornadic wind damage typically is caused by derechos, which produce straight-line winds [Figure 4.19]. Unlike tornadoes, these winds generally produce destruction in a single direction along a relatively straight path, may have a footprint that is several miles wide, and the duration of these events typically is much longer.

Historic Occurrences

Since 1990, fifteen Presidential Disaster Declarations have been issued in Iowa identifying tornadoes or extreme wind events, three of which included Jefferson County. Since 1953, Jefferson County has experienced twelve tornadoes. Five of the tornadoes were EF-0, two were EF-1, three were EF-2, and two were EF-3. The NCDC lists eight high wind events that have been recorded in Jefferson County since 1996. It also lists ninety-three thunderstorm wind events recorded in this same time frame. The tornadoes resulted in approximately $28,215,000 in total property damages while the high wind incidents resulted in approximately $120,000 in property damages. No crop damages were reported with any of the events; however, crop damage likely did occur. Just three injuries and no deaths were reported with these high wind and tornado incidents.[49]

According to NCDC data, the longest, most severe, and most costly tornado recorded in Jefferson County occurred in May of 1988, when an F2 tornado nearly bisected the county from southwest to northeast. According to the data, this tornado began east of Eldon a few miles from the county line and extended approximately twenty-seven miles to near Brighton in Washington County; causing $25,000,000 in property damage.

Probability & Severity of a Tornado

According to NOAA, the State of Iowa experienced an average of fifty-one tornadoes per year between 1991 and 2010.[50] Based on the analysis of past events for Jefferson County, there is a 21% chance that the county will experience a tornado in a given year. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Jefferson County as a result of tornadoes are estimated to be approximately $448,000 annually[51].

Table 4.9: Enhanced Fujita Scale for Tornado Intensity

Category	Wind Speeds	Damage Examples
EF0	65-85 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards
EF1	86-110 mph	The lower limit is the beginning of hurricane-wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed
EF2	111-135 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	136-165 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	166-200 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	>200 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged

Source: NOAA Storm Prediction Center

[49] NCDC Storm Events Database
[50] NOAA Tornado Climatology
[51] Iowa Hazard Mitigation Plan – 2013 Risk Assessment

Between 1971 and 2007, the magnitude of a tornado was determined by the Fujita-Pearson Scale (F-Scale). Since 2007, the Enhanced Fujita Scale (EF-Scale) in Table 4.9 has been used to determine the strength of a tornado. Tornadoes are categorized on an ascending scale of wind intensity from EF-0 to EF-5. This measurement scale is largely subjective, since measurements are made based on sustained damage.

Probability & Severity of a Windstorm

Based on an analysis of past events [including thunderstorm wind events], Jefferson County will face at least one high wind event in a given year. According to NCDC data, the highest recorded non-tornadic wind affecting the county was nearly eighty miles per hour in May 2012. Windstorms have the potential to cause extensive damage (Figure 4.19). Considering the geographic area that a windstorm may affect, damages from a severe incident can be very significant. Based on the NCDC reports, structural losses for Jefferson County from windstorms are estimated to be approximately $6,000 annually.[52]

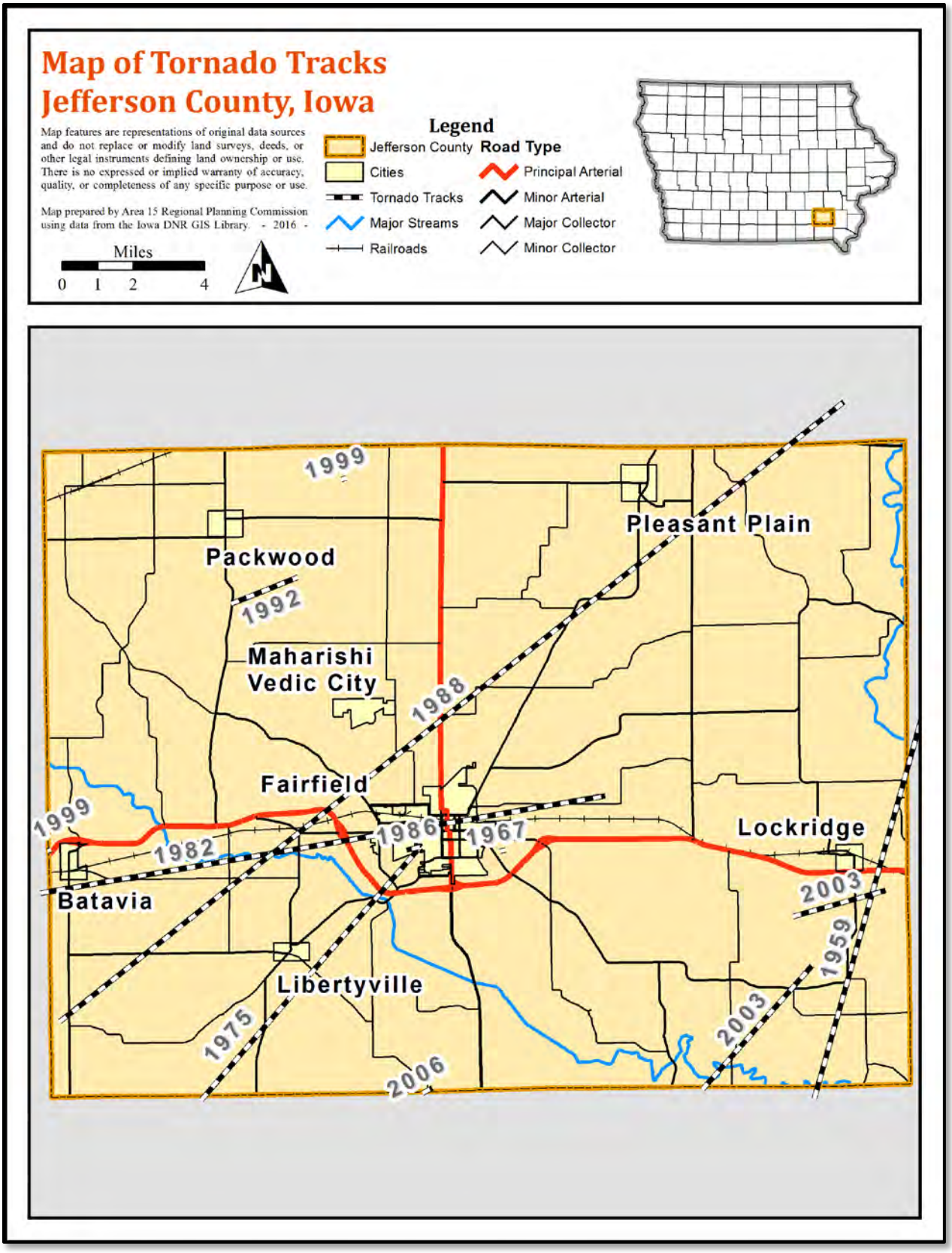
The magnitude of a windstorm is typically measured by wind speed. The Beaufort Wind Scale is comprised of thirteen classes of wind severity and has descriptions for typical effects (Table 4.10). If the winds of a particular storm are associated with a tornado, the Enhanced Fujita Scale is used to determine its magnitude.

Table 4.10: Beaufort Wind Scale

Force	Wind Speed (MPH)	Description	Land Conditions
0	<1	Calm	Calm. Smoke rises vertically.
1	1-3	Light Air	Smoke drift indicates wind direction, wind vanes don't move.
2	4-7	Light Breeze	Wind felt on exposed skin. Leaves rustle, vanes begin to move.
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended.
4	13-17	Moderate Breeze	Dust, leaves, and loose paper lifted. Small tree branches begin to move.
5	18-24	Fresh Breeze	Branches of a moderate size move. Small trees begin to sway.
6	25-30	Strong Breeze	Large branches in motion. Whistling heard in overhead wires. Empty garbage cans tip over.
7	31-38	High Wind, Near Gale	Whole trees in motion. Effort needed to walk against the wind.
8	39-46	Fresh Gale	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	47-54	Strong Gale	Some branches break off trees, and some small trees blow over. Slight structural damage.
10	55-63	Storm, Whole Gale	Trees are broken off or uprooted, saplings bent and deformed. Asphalt shingles may peel off roofs.
11	64-72	Violent Storm	Widespread damage to vegetation; many roofing surfaces are damaged.
12	≥ 73	Hurricane-Force	Some windows may break; mobile homes and many sheds/barns are damaged; debris hurled about.

Source: NOAA Storm Prediction Center

[52] NCDC Storm Events Database


Map of Tornado Tracks
Jefferson County, Iowa
Map features are representations of original data sources and do not replace or modify land surveys, deeds, or other legal instruments defining land ownership or use. There is no expressed or implied warranty of accuracy, quality, or completeness of any specific purpose or use.
Map prepared by Area 15 Regional Planning Commission using data from the Iowa DNR GIS Library. - 2016 -
Miles
0 1 2 4
Legend
Jefferson County
Cities
Tornado Tracks
Major Streams
Railroads
Road Type
Principal Arterial
Minor Arterial
Major Collector
Minor Collector
1999
Packwood
1992
Maharishi
Vedic City
1988
Pleasant Plain
Fairfield
1999
1982
1986
1967
Lockridge
Batavia
2003
1959
Libertyville
1975
2003
2006

Vulnerability

Vulnerable Jurisdictions			
X	Batavia	X	Packwood
X	Fairfield	X	Pleasant Plain
X	Libertyville	X	Fairfield Schools
X	Lockridge	X	Pekin Schools
X	Maharishi Vedic City	X	Maharishi Schools
X	Jefferson County (Unincorporated)		

Tornadoes are extremely dangerous because of their ability to form rapidly with little notice and cause great destruction. Often, a tornado watch will be issued along with a severe thunderstorm watch if forecasters feel the environment is ripe for the potential development of a tornado. Typically, trained storm spotters will monitor severe storms and notify county officials of the storms or the presence of funnel clouds and county officials typically then handle dispatching of the appropriate response. The National Weather Service sends out tornado warnings via radio, television, and NOAA weather radios when a tornado is spotted or indicated on radar. Increasingly, cellular devices are being equipped with weather applications that can alert a user to a developing weather condition.

Though windstorms can happen quickly without notice, the National Weather Service has developed a windstorm warning system similar to other events such as thunderstorms, tornadoes, and winter storms. Watches are issued when conditions are favorable for windstorms to develop, and typically come twelve to twenty-four hours in advance. Advisories are issued when existing or imminent windstorms cover part or all of the area and pose inconvenience. Wind warnings are issued when existing or imminent high winds threaten part or all of the forecast area and pose a threat to life and property.

Tornadoes and windstorms can affect any place in Mahaska County. Wooded areas can threaten life and property because of falling tree limbs. Campgrounds and parks are also vulnerable due to lack of shelter. High-profile vehicles are susceptible to being blown off of the road. Windstorms have the potential to knock down power lines, leaving citizens without power and disrupting communication capabilities, potentially complicating response efforts. While tornadoes do not always affect a large spatial area, those areas they do hit could sustain a significant amount of structural damage, injuries and loss of life. Population centers are particularly vulnerable.

Residents that live in mobile homes are especially vulnerable to damage limitations of their structural design. They are typically not secured to any kind of permanent foundation, which makes them very susceptible to complete destruction. There are approximately 868 occupied mobile homes in Jefferson County.[53] Homes built before 1960 are also vulnerable due to their potentially weaker structural integrity of the structures. Forty-five percent of the houses in Jefferson County were built before 1960.[54]

[53] U.S. Census Bureau
[54] Ibid.

Future developments should be constructed with the potential effects of wind and tornadoes in mind. The danger reaffirms the importance of structural integrity for all types of construction. Buildings must be able to withstand high winds. It is important to consider mitigation strategies for tornadoes and high winds for any significant development projects. The inclusion of safe rooms and/or storm shelters helps to increase protection of human life against such a hazard.

Other Hazards Not Profiled

The planning teams also spent time discussing some of the risks that other hazards identified in the State Plan pose to the county and shared information regarding many of the past incidents.

- **Human Disease:** Human disease was not a major concern of the participants. Outside of certain areas, such as schools or hospitals, the generally rural nature of Jefferson County offers a degree of insulation from the rapid spread of any human disease.

- **Animal/Crop/Plant Disease:** Animal, crop, and plant diseases were of minor concern to the rural areas and Maharishi Vedic City. Rural areas are highly dependent on the agricultural yield of crops and livestock for their livelihood. However, insurance is available to cover most potential losses. Maharishi Vedic City is unique in the county in that it is a certified organic community. They were most concerned about overspray or cross-pollination from neighboring farmers as it relates to keeping their organic certification. One other concern was the emerald ash borer that has become an imminent threat to the county's ash tree population.

- **Infrastructure Failure:** The state of America's roads and bridges certainly is a concern of the residents and businesses of Jefferson County. County Supervisors and other local officials work to ensure that transportation infrastructure maintenance and improvements will be made to make the safest possible street and highway network.

- **Transportation Incident:** The residents of Jefferson County expressed the most concern with oil and ethanol trains. A commodity flow study is in progress to identify the types and amounts of potentially dangerous or hazardous materials that may be on the rails through Jefferson County. There was some concern regarding truck traffic on Highway 34. Bypasses were completed for each community along the route in the mid-2000s, which has reduced the direct threat to the highly-populated portions communities of a major accident.

- **Hazardous Materials:** With the vast amount of farming activity in Jefferson County, the biggest concern for HAZMAT was with the transport and application of chemicals associated with modern farming techniques. Many people also expressed some degree of concern with the new construction of the Dakota Access Pipeline that will cut through the southwest corner of county near Batavia and Libertyville.

- **Terrorism:** This was of very little concern locally for the participants.

- **Radiological Incident:** This was not a concern for the participants.

Risk Assessment

The planning area is relatively uniform in terms of climate and building characteristics, and the occurrence of weather-related hazards does not vary greatly. The hazards which have the most potential to vary across the planning area include: river flooding, dam/levee failure, grass and wildland fires, landslides, and sinkholes. For this multi-jurisdictional plan, the risk for each hazard was assessed for each jurisdiction where its situation deviated from that of the county.

To evaluate the risk of each hazard, the Jefferson County Planning Team and each participating jurisdiction considered a number of factors when analyzing the potential for disasters. When analyzing the hazards to be profiled in the plan, the risk was determined as a function of both the probability of the hazard occurring in a given time period and the potential severity of an event. These ratings considered many factors including perceived threat, geographic location, previous incidents (as identified in the Storm Events Database maintained by the National Climactic Data Center[55]), and potential losses.

History of Hazard Occurrence

FEMA maintains a database of declared disasters and emergencies. As of July 2016, Iowa had experienced thirty-nine presidential-declared disasters since 1990. Of these disasters, just six affected Jefferson County.[56] Table 4.11 shows the declarations which included Jefferson County (a complete list may be found in Appendix D). Two-thirds of the disaster declarations involved severe storms and flooding, while the other one-third were winter storm events. Two of the six have occurred in the last three years.

Table 4.11. Disaster Declarations including Jefferson County, 1990-2016

DR No.	Incident Date Range		Description of Declaration	Assistance	
	Begin	End		Public	Individual
4234	06/20/2015	06/25/2015	Severe Storms, Tornadoes, Straight-line Winds & Flooding	Yes	No
4119	04/17/2013	04/30/2013	Severe Storms, Straight-line Winds & Flooding	Yes	No
1737	12/10/2007	12/11/2007	Severe Winter Storms	Yes	No
1688	02/23/2007	03/02/2007	Severe Winter Storms	Yes	No
1230	06/13/1998	07/15/1998	Severe Weather, Tornadoes, & Flooding	Yes	Yes
996	04/13/1993	10/01/1993	Flooding, Severe Storms	Yes	Yes

Source: FEMA

Methodology

The methodology to evaluate hazard risk mirrors that which was followed in the *2013 State of Iowa Hazard Mitigation Plan*. Scores for four weighted metrics were used to determine the level of priority each particular hazard is perceived to pose risk to each community: probability, magnitude/severity, warning time, and duration.

[55] NCDC Storm Events Database
[56] FEMA Presidential Disaster Declarations

Table 4.12. Description of Hazard Risk Assessment Metrics

Probability: *The likelihood of a hazard occurring in the future, considering the hazard's history of occurrence in the area and the projected likelihood of the hazard occurring in any given year.*		
Score	**Likelihood**	**Description**
1	**Unlikely**	Less than 10% probability in any given year, history of events is less than 10% likely, or the event is unlikely but a possibility of its occurrence exists
2	**Occasional**	Between 10% and 19% probability in any given year
3	**Likely**	Between 20% and 33% probability in any given year
4	**Highly Likely**	More than 33% probability in any given year

Magnitude/Severity: *Assessment of a hazard's impact in terms of the potential for injury or fatality, damage to personal property and public infrastructure, and/or the degree/extent to which the hazard affects the county.*		
Score	**Likelihood**	**Description**
1	**Negligible**	Less than 10% of property severely damaged, shutdown of facilities/services for less than 24 hours, and/or injuries/illness treatable with first aid.
2	**Limited**	10% to 25% of property severely damaged, shutdown of facilities/services for more than a week, and/or injuries/illness that do not result in permanent disability
3	**Critical**	More than 25% but less than 50% of property severely damaged, shutdown of facilities/services for at least 2 weeks, and/or injuries/illness resulting in permanent disability.
4	**Catastrophic**	More than 50% of property severely damaged, shutdown of facilities and services for more than 30 days, and/or potential for fatality.

Warning Time: *Assessment of the potential amount of time available prior to an event.*	
Score	**Description**
1	More than 24 hours
2	12 – 24 hours
3	6-12 hours
4	Minimal, less than 6 hours

Duration: *A measure of the amount of time a hazard event will affect the community.*	
Score	**Description**
1	Less than 6 hours
2	Less than 1 day
3	Less than 1 week
4	More than 1 week

Source: 2013 State of Iowa Hazard Mitigation Plan

The probability and potential severity of the hazard event contributed the greatest weight to the hazard risk score. Each metric is described in Table 4.12 on the preceding page. The formula for calculating the risk assessment appears in the call-out below.

(**Probability** x 0.45) + (**Magnitude/Severity** x 0.30) + (**Warning Time** x 0.15) + (**Duration** x 0.10) = **Final Hazard Risk Assessment Score**

Updated Risk Assessment

Table 4.13 shows the results of the updated countywide hazard risk assessment. These scores were discussed during the second countywide public meeting. It was decided to use a composite score of 2.50 or above as the cutoff for "high risk" hazards. Scores of 2.00 – 2.99 were "moderate risk" hazards, and anything below 2.00 was classified as "low risk."

Table 4.13. Updated Countywide Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	Tornado/Windstorm	4	4	4	1	3.70	High
2	Severe Winter Storm	4	2	3	3	3.15	High
3	Thunderstorm/Lightning/Hail	4	2	3	2	3.05	High
4	Drought	3	3	1	4	2.80	Moderate
5	Flash Flood	3	2	4	1	2.65	Moderate
6	Grass/Wildland Fire	3	2	3	2	2.60	Moderate
7	River Flood	2	2	1	3	1.95	Low
7	Dam/Levee Failure	1	2	4	3	1.95	Low
9	Expansive Soil	3	1	1	1	1.90	Low
10	Extreme Heat	2	2	1	2	1.85	Low
11	Sinkhole	1	1	4	1	1.45	Low
11	Landslide	1	1	4	1	1.45	Low
11	Earthquake	1	1	4	1	1.45	Low

Each individual jurisdiction was given an opportunity to review and amend these scores to make them more locally relevant. Scores for each jurisdiction may be found in their respective section in Section 7. Table 4.18 displays a summary risk assessment of each hazard as determined by each jurisdiction.

Table 4.18. Hazard Risk Assessment Summary

Hazard	Jefferson County	Batavia	Fairfield	Libertyville	Lockridge	Maharishi Vedic City	Packwood	Pleasant Plain
Dam/Levee Failure	L	L	M	L	L	M	L	L
Drought	M	L	L	L	L	L	L	L
Earthquakes	L	L	L	L	L	L	L	L
Extreme Heat	L	M	M	M	M	M	M	M
Expansive Soils	L	L	L	L	L	L	L	L
Flash Flood	M	M	M	M	M	M	M	M
Grass/Woodland Fire	M	M	M	M	M	M	M	M
Landslides	L	L	L	L	L	L	L	L
River Flood	L	L	M	M	L	L	L	L
Severe Winter Storms	H	H	H	H	H	H	H	H
Sinkholes	L	L	L	L	L	L	L	L
Thunderstorms/Lightning/Hail	H	H	H	H	H	H	H	H
Tornadoes/Windstorms	H	H	H	H	H	H	H	H

Section 5 – Mitigation Strategy

44 CFR § 201.6(c)(3) – [The plan shall include a] mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.

Mitigation Goals

44 CFR § 201.6(c)(3)(i) – [The mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Once the list of potential hazards had been discussed and prioritized, the planning team turned its attention to mitigation goals and actions. Participants reviewed and retained the goals from the 2010 plan, with only minor changes. This updated list appears below.

Goal 1: Protect the health, safety, and quality of life for the residents of Jefferson County.

- Prioritize mitigation policies, projects, and programs beginning with those that address the greatest threats to health and safety of residents and property.
- Ensure that property owners can maintain and improve upon their property.
- Utilize available technologies to provide advanced warning for potentially hazardous events.

Goal 2: Provide public education and encourage emergency preparedness.

- Make emergency planning and preparation resources available to the public.
- Hold severe weather awareness events to inform the public of the risks that exist.
- Encourage the use of a family preparedness kit that will provide adequate supplies for them during a disaster situation.

Goal 3: Decrease impact of potential hazards to property and businesses.

- Use the most effective approaches to protect buildings and infrastructure from hazards.
- Enact and enforce regulatory measures to ensure that new buildings and infrastructure are not constructed in at-risk areas and do not increase risk to existing properties.
- Seek future projects to reduce the risk of potential damages to property in Jefferson County.
- Encourage businesses within Jefferson County to develop continuity plans to prepare for disasters.

Goal 4: Ensure continued government and emergency response functionality after a disaster.

- Develop and utilize disaster recovery plans in the wake of an event.
- Coordinate planning with the appropriate agencies in Jefferson County to be prepared for a disaster.
- Run exercises and hold meetings to clarify the responsibilities of each agency in the event of a disaster.

Goal 5: Ensure that public funding is being used efficiently.

- Use available funds appropriately to protect critical facilities and public services.
- Select projects which maximize public benefit.
- Maximize the use of outside sources of funding, such as grant opportunities.
- Encourage owner participation in mitigation efforts to protect their properties.

Participants reviewed the recommendations outlined in the previous plan and identify new mitigation actions moving forward that could help offset damages from future disasters. The goals and mitigation actions in this section provide guidance for local budgeting processes, capital improvement plans, and other policy decisions at both the county and local levels.

Mitigation Actions

44 CFR § 201.6(c)(3)(ii) – [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Many steps can be taken to help mitigate potential effects of the many hazards that threaten Jefferson County. When implemented appropriately, mitigation projects save lives, reduce property damage, save public money, and enhance the natural environment. Mitigation can reduce the potential cost of disasters to property owners and all levels of government. In addition, mitigation actions protect critical community facilities, reduce exposure to liability, and minimize community disruption during and after an event.

Categories of Mitigation Actions

Mitigation actions can be grouped into six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. These actions can be simple or complex, low-cost or expensive, and can have local or widespread benefits. Each of the categories is described briefly below:

- **Prevention** actions include government, administrative, or regulatory measures that influence future land development and building construction. These actions aim to reduce risk or exposure to hazards. These measures also include public activities to reduce hazard losses.
- **Property protection** actions involve the modification of existing structures and/or their surroundings to protect them from hazards, the removal of buildings or structures from hazard-prone areas, or providing insurance to cover potential losses.
- **Public education and awareness** measures inform and educate citizens, property owners, and elected officials about hazards and the means by which they may be mitigated.
- **Natural resource protection** measures minimize hazard losses and preserve or restore the functions of natural systems.
- **Structural projects** involve the construction or maintenance of structures that will reduce the impact of a hazard or direct the impact away from people or property.
- **Emergency services** are measures taken before, during, and after a hazard event to protect people and property; although these measures are not typically considered “mitigation”, they significantly minimize the events impact and preserve the community’s health and safety.

Review of 2010 Mitigation Actions

44 CFR § 201.6(d)(3) – A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities.

The following tables detail the mitigation actions that were identified in the *2010 Jefferson County Multi-Jurisdictional Hazard Mitigation Plan*, separated by category. Participants in the planning process were asked to review these mitigation measures and discuss if and how they may have been addressed since 2010. Their assessment of each mitigation action's status and/or whether it should remain in the plan update going forward [modified, merged with another action, or deleted altogether] is indicated in the "Status" column. The "Notes" column summarizes the information gathered through the discussion.

The key below helps identify the hazards which were associated with each mitigation action in the previous plan. Many of these hazards were discarded for the purposes of the plan update, but the strategy may be retained in this update as it may be associated with another hazard(s) that was profiled in this plan.

Key to 2010 Mitigation Action Tables			
Hazards Addressed			
1	Structural Fire	14	Extreme Heat
2	Severe Winter Storm	15	Railway Transportation Incident
3	Highway Transportation Incident	16	Hailstorm
4	Tornado	17	Air Transportation Incident
5	Transportation HazMat Incident	18	Energy Failure
6	Thunderstorms/Lightning	19	Dam Failure
7	Communications Failure	20	River Flood
8	Grass/Wildland Fire	21	Levee Failure
9	Structural Failure	22	Abandoned Mines/Wells and Sinkholes
10	Windstorm	23	Pipeline Transportation Incident
11	Drought	24	Expansive Soils
12	Flash Flood	25	Earthquake
13	Fixed HazMat Incident	26	Landslide

Prevention

2010 Mitigation Action Table – Prevention			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Encourage and continue compliance in the National Flood Insurance Program (NFIP)	12, 19, 20, 21	Ongoing/ Modify	Fairfield is the only currently mapped jurisdiction and will continue to participate in the NFIP.
Complete Flood Insurance Rate Map (FIRM)	12, 19, 20, 21	In Progress/ Modify	USACE is currently in the process of mapping Jefferson County.
Updating of flood maps.	12, 19, 20, 21	Merge	Merge with above.
Enforce building codes to reinforce buildings.	24, 25, 26	Ongoing/ Modify	This is a normal function of the County and each city.
Discourage building on unsuitable sites.	22, 24, 26	Ongoing/ Modify	Identification of unsuitable sites will be easier to enforce once flood maps become available.
Regulatory building practices on identified areas of concern.	22, 24, 26	Merge	Merge with above.
Each city is in charge of condemning structurally unsound property.	9	Ongoing/ Modify	This speaks to building codes/nuisance ordinances and their enforcement.
Vacant properties demolished to reduce the risk for hazard.	9	Merge	Merge with above.
Enforcement of an ordinance to keep power lines free of debris.	2, 6, 7, 10, 18	Ongoing/ Modify	All power utility companies have their own tree trimming programs. The County and cities have tree trimming programs, too, for things such as road and sign visibility.
Audit of public facilities that can run without power and install backup power at those that do not currently have their own backup power.	18	Ongoing/ Modify	The County, cities, and schools are generally aware of the facilities which do or do not have back-up power sources, though they do not have formal documentation/inventories.
Create a plan to save and store water for emergencies.	1, 8, 11, 20	Completed	The EMC indicated that ponds were identified in the emergency operations plan to fill up pumper trucks if necessary.
Hydrology study to make sure dams and levees are working properly.	19, 21	Delete	No major dams are located within the county and dam inspections are performed by a State agency. No levees were identified in the county.
Storm water master plan and assessment.	12, 20	Merge	Merge with below.
Storm water drainage surveys and inspections.	12, 20	In Progress/ Modify	County officials have identified 26 low roads/bridges that are susceptible to high water crossing. Inspections are carried out frequently after periods of intense rain or high stream levels.

Monitor river levels and reevaluate if protection from river waters is working adequately.	19, 20, 21	Delete	With its general lack of major streams, the county has no levees or other protection measures.
Maintain the levee maintenance program as well as keeping up with the inspections.	21	Delete	With its general lack of major streams, the county has no levees or other protection measures.
Maintain the dam maintenance program as well as keeping up with the inspections.	19	Delete	This is a function of a State agency.
Verify railway inspections.	5, 15	Delete	This is a function of a Federal agency.
Regular inspections of the pipelines.	23	Delete	This is a function of a State agency.
Pipeline owners control building and construction near or on their pipelines.	23	Delete	Iowa Code already requires that Iowa One Call be contacted prior to any planned excavation.

Property Protection

2010 Mitigation Action Table – Property Protection			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Construction of public tornado safe rooms.	4, 6, 10, 14, 16	Ongoing/ Modify	None have been constructed, but interest remains should funding become available.
Integrating safe rooms into existing schools and other critical facilities.	4, 6, 10, 16	Merge	Merge with above.
Retrofitting of existing buildings to support updated warning/communication systems.	7	Ongoing/ Modify	As technologies evolve, buildings will need to be retrofitted.
Encouraging buyouts (acquisition) of properties located in flood plains and/or repetitive loss.	12, 19, 20, 21	Modify	With its general lack of major streams and no SRL properties in the county, the risk for flooding to properties is low. Until the county is officially flood mapped, the identification of potential buyout properties is limited, but maps are in development by USACE, so a review may be possible before the next plan update.
Purchase and install backup generators	2, 4, 6, 7, 10, 14, 16, 18	Ongoing	A few communities have purchased generators since the last plan. All desire to acquire additional generators.
Maintain training and emergency response equipment for firefighters and responders. This will encourage efficient response and minimize property damage and injuries or fatalities.	1, 5, 8, 13	Ongoing	First responders and law enforcement officers have this equipment but upgrades and replacement of broken devices will always be necessary.
Having mobile/battery powered backup communication equipment.	7, 18	Complete	First responders and law enforcement officers have this equipment but upgrades and replacement of broken devices will always be necessary.

Purchasing road barricades in case of accidents or emergency situations.	3, 12	Complete	Local jurisdictions and law enforcement officers have this equipment but replacement of broken devices will always be necessary.
Encourage the burial of new and existing power lines.	2, 6, 7, 10, 18	Ongoing/ Modify	No activity was reported on this item, although communities recognize the potential benefits of minimizing the exposure of power infrastructure to elements—especially lightning, wind, and ice.
Strengthening of current power lines to withstand storms and encourage stronger power lines and burial of power lines for new construction.	2, 6, 7, 10, 18	Merge	Utility companies replace their aging infrastructure with stronger components when necessary. Merge with above.
Making sure all wells are capped off throughout the county.	22	Ongoing	Jefferson County Sanitarian is responsible for the review and approval of permits for new wells or abandoning old wells.
Maintain known wells in the county.	22	Modify	Merge with above.

Public Education & Awareness

2010 Mitigation Action Table – Public Education & Awareness			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Broadcasting weather warnings to the public through the use of local television stations and Jefferson County Emergency Management.	2, 4, 6, 10, 11, 12, 14, 16, 19, 20, 21, 25	Ongoing/ Modify	Weather alerts are broadcast on local television and radio stations. Alert Iowa now enables residents to opt-in to receive messages on their home and mobile devices. Social media is also a place where alerts may be posted.
Encouraging the use of NOAA weather radios	2, 4, 6, 10, 11, 12, 14, 16, 19, 20, 21, 25	Ongoing/ Modify	Although mobile devices are becoming more prevalent, many people—especially older residents still prefer the NOAA weather radio as their best option for severe weather alerts.
Making education materials available for the public and improve awareness in the community	ALL	Ongoing/ Modify	The EMC occasionally has coverage in the local paper for preparedness—i.e. severe storms, winter weather, and avoiding heat-related illness. Various entities in the county are beginning to utilize social media to disseminate this type of information.
Practice drills and encourage preparedness.	ALL	Ongoing	Communities and schools do this regularly.
Encourage citizens to create a family preparedness kit that will provide food and resources in times of a disaster	2, 4, 6, 16, 18, 20, 25	Ongoing/ Modify	The EMC and Jefferson County Health Center regularly recommend this at the various health fairs and other events.
Identifying mines, wells, and sinkholes to property owners.	22	Complete/ Ongoing	Approximate locations of known abandoned mines and potential karst terrain locations are included in this plan (see: Sinkholes).

Continue fire safety education and start working on a program with the schools in Jefferson County to have a Fire Prevention Week. Encourage workshops to address all situations that can come up in an emergency.	1, 8, 13	Ongoing	Fire departments visit the local schools frequently to teach students about fire prevention. Fairfield and Polk-Packwood fire departments have a trailer that they use to simulate fires to teach people how to react to a fire in their home.
Encourage the use of smoke detectors and carbon monoxide detectors. These will provide early warning and improve response time from the fire departments.	1	Complete	Fire departments give out smoke detectors as they become available.
Education about safe storage of hazardous materials and how to respond in the case of a hazardous materials spill.	5, 13	In Process/ Modify	Jefferson County has partnered with the Southern Iowa Response Group (SIRG) to respond to HazMat incidents. SIRG has trained all fire departments within the county and offers continuing educational opportunities.
Post signs and develop a guidebook at facilities holding hazardous materials on how to respond if there is an incident.	13	Delete	Local jurisdictions already post signs at their facilities. The SIRG has trained fire departments on how to respond to HazMat incidents.
Having a location that people can dispose of hazardous materials properly.	13	Complete	The Southeast Iowa Multi-County Solid Waste Agency in Richland is a hazardous materials disposal location for Jefferson, Keokuk, & Washington Counties.

Natural Resource Protection

2010 Mitigation Action Table – Natural Resource Protection			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Burn bans publicized when needed to be enforced.	1, 8	Ongoing	Burn bans are reported to the State Fire Marshal Division of the Iowa Department of Public Safety. Notification is given to local officials, fire departments, and various news outlets (newspaper, radio, and online). Red Flag Warnings may be added to Jefferson County's Alert Iowa hazard notification system.
Turn agricultural ground that is in the floodplain to wetlands.	12, 19, 20, 21	Complete/ Ongoing	Several land owners across the county have participated in programs (i.e. USDA Conservation Reserve Program). Further encouragement of participation in these types of wetland restoration programs could reduce runoff and losses from crops that are planted in low-lying areas.
Safe erosion control and farm practices on unsafe areas.	24, 26	Merge	Merge with above.

Structural Projects

2010 Mitigation Action Table – Structural Projects			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Update and install warning sirens for all communities that have inadequate systems or those that have no warning systems.	4, 6, 16	Ongoing/ Modify	Most of the communities have a warning siren, but a few do not. Those that do have sirens have aging systems, but still have the ability to be triggered by the Jefferson County EMC.
Improving obsolete communication systems.	7	Ongoing	In a sense, this will always be a reactionary measure as technologies evolve. The Jefferson County Law Center has undergone some upgrades recently to bolster its communication systems.
Increasing the number of communication towers.	7	Ongoing/ Modify	Many cellular towers have been erected across the county over the last several years to enhance the coverage of cellular and data service throughout the county.
Installing new dry hydrants so that the fire departments can have access to water faster and decrease travel time.	1, 8	Complete/ Ongoing/ Modify	It was mentioned that dry hydrants were installed using Southern Iowa Development and Conservation Authority (SIDCA) appropriations between 2006 and 2011. No money has been allocated to SIDCA since FY11.
Repair sewer system problems to eliminate sinkhole problems.	22	Ongoing/ Modify	Several communities have undertaken water and/or sewer system improvements projects to reduce leakage and infiltration problems.
Culvert and ditching work to increase proper storm drainage.	6, 12	Ongoing/ Merge	Merge with below.
Build up and maintain roadways and bridges that are in problem areas near creeks so that they do not get washed out during flood events.	12, 20	Ongoing/ Modify	County officials have identified 26 low roads/bridges that are susceptible to high water crossing. Inspections are carried out frequently after periods of intense rain or high stream levels.
Road improvements to identified areas to reduce accidents	3, 5	Delete	The State and County strategically appropriate funds to repair road and bridge infrastructure.
Improvement of traffic design.	3, 5	Complete	Since the last plan was completed, the U.S. Highway 34/Iowa Highway 163 bypass project was completed that routes major traffic around the cities of Batavia, Fairfield, and Lockridge.
Maintaining the railways and the railway approaches.	5, 15	Delete	This is typically a function of the private railroad companies. The Iowa DOT does have a program to help fund crossing improvements which Fairfield and Jefferson County used in 2014.
Lengthening airport runways.	17	Delete	The airport was significantly expanded in 2006 to 5,502'. The DOT Airport Layout Plan Existing & Ultimate show that it is planned to be extended to 6,000' eventually.
Misting machines to cool off the public when needed.	14	Delete	These are used at certain major events, but realistically are infeasible as an effective tool to prevent heat-related illness.

Emergency Services

2010 Mitigation Action Table – Emergency Services			
Mitigation Action	**Hazard(s) Addressed**	**Status**	**Notes**
Maintain Emergency Operations Center (EOC).	ALL	Ongoing	This will always be a need.
Mutual aid with neighboring communities to assist if there is a breakdown in communication or electricity.	7, 18	Ongoing	This will always be a need.
Developing a plan to identify all designated shelters so that the public knows where to go when there is a disaster and supply equipment to run the shelter	2, 4, 6, 10, 14, 16, 18, 19, 20, 21, 25	Ongoing/ Modify	No consolidated plan has been completed to identify shelter locations, nor have signs been posted in most locations.
Having warming shelters identified	2, 18	Merge	Merge with above.
Having cooling shelters identified.	14	Merge	Merge with above.
Increase the size of fire departments.	1, 5, 8, 13	Ongoing	It will always be important to maintain an appropriate number of fire fighters—volunteer and full-time—in order to provide adequate response to structural or wild fires.
Maintain training and emergency response equipment for firefighters and responders. This will encourage more efficient response and minimize property damage and injuries or fatalities.	1, 5, 8, 13	Ongoing/ Modify	This will always be a need.
Training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	ALL	Complete/ Ongoing/ Modify	Law enforcement officers, fire fighters, and other first responders receive periodic training. Local elected officials receive training upon their election.
Continued training for fire departments on how to deal with hazardous materials.	5, 13	Merge	Merge with above.
Training for first responders on how to respond to utility issues.	2, 6, 7, 10, 18	Merge	Merge with above.
Improving communication between the county and the utility companies.	18	In Process/ Modify	Alliant provides notice to customers when they will be working in the area that may affect service.
Enforcement of speeding by law enforcement.	3, 5	Delete	This is not a valid mitigation strategy.

Tracking companies traveling throughout the county that are transporting hazardous materials.	5	In Process	A commodity flow study is in progress to identify types and quantities of potentially hazardous products that are transported by highway and rail through the county.
Fire departments conducting walk through audits of the facilities storing hazardous materials.	13	Ongoing	This is something that fire departments do periodically.
More staff to keep track of airplanes.	17	Delete	This is a function of a Federal agency.
Improving tracking equipment for airplanes.	17	Delete	This is a function of a Federal agency.
Maintain a working relationship with Iowa 1-Call	23	Delete	It is an Iowa law to notify Iowa One Call of any planned excavation at least 48 hours prior to digging.
Maintain contacts with pipeline owners.	23	Ongoing	With the State's approval of the Dakota Access Pipeline, this topic has become an issue. Local officials are particularly interested in ensuring proper construction practices are followed and that the new oil pipeline is as safe as possible.

Additional Mitigation Actions Since 2010 Plan

The *2010 Jefferson County Multi-Jurisdictional Hazard Mitigation Plan* identified a number of mitigation actions that were undertaken prior to adoption of that plan. Additionally, some actions were carried out that were not identified in the 2010 plan. These types of projects came about when certain unforeseen opportunities and demands surfaced. Below is a list of mitigation actions that have been carried out since the adoption of the 2010 mitigation plan.

- In 2014, The State of Iowa rolled out a statewide mass notification and emergency messaging system called "Alert Iowa." Alert Iowa is free of charge to all counties in the State. The system allows citizens to voluntarily opt-in to receive emergency alert messages. Messages can be issued via landline or wireless phone, text messaging, email, FAX, TDD/TYY (hearing impaired), and social media. Messages may contain photo, video, and audio attachments to help subscribers better understand the situation at hand or where to find additional information. Jefferson County enabled their system shortly thereafter and as of August 2016, this Alert Iowa was active in Jefferson County and each of its neighboring counties.

Updated Mitigation Actions

44 CFR § 201.6(c)(3)(ii) – [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

44 CFR § 201.6(c)(3)(iii) – [The mitigation strategy shall include a] an action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Many of the recommendations that follow address important actions to put forth on a continual basis, while others address a specific need. There are many examples of mitigation actions that were identified in the previous plan which fall in line with the general operations of county, city, or district staff and have been eliminated from the lists of proposed mitigation actions that follow.

Most of the following mitigation actions carry over from the previous plan, with slight revisions and/or consolidation. Many of the jurisdictions highlighted in this plan have many projects in mind which could loosely be considered hazard-related, but do not fall in line with projects commonly associated with the Hazard Mitigation Assistance grant programs or IHSEMD's current list of priority actions.

The tables on Pages 90-93 present an examination of mitigation actions identified for the 2016 Jefferson County plan update. Each mitigation action identifies the applicable hazards it addresses, which communities it affects, prioritization of the project, generalized cost estimates, potential funding sources, responsible parties, and an estimated timeline for implementation. The table on

this page serves as the key to the 2016 mitigation action tables that follow. The Jefferson County Emergency Management Agency represents all jurisdictions covered in this plan and can assist each jurisdiction in implementing most of the identified mitigation actions. Additionally, the county board of supervisors, each city council, school board, fire chief, police chief and/or sheriff are responsible for local implementation of their identified mitigation actions.

Key to 2016 Mitigation Action Tables			
Hazards Addressed			
1	Tornado/Windstorm	8	Dam/Levee Failure
2	Severe Winter Storm	9	Expansive Soil
3	Thunderstorm/Lightning/Hail	10	Extreme Heat
4	Drought	11	Sinkhole
5	Flash Flood	12	Landslide
6	Grass/Wildland Fire	13	Earthquake
7	River Flood		
Applicable Jurisdiction			
1	Jefferson County	5	Lockridge
2	Batavia	6	Maharishi Vedic City
3	Fairfield	7	Packwood
4	Libertyville	8	Pleasant Plain
Responsible Entity			
EM	Emergency Management	PD	Police/Sheriff Department
FD	Fire Department	SD	School District
LG	Local Government	UC	Utility Company
OP	Other/Private Entity		
Priority		**Cost Estimate**	
L	Low	L	Low (< $1,000)
M	Medium	M	Moderate ($1,000 - $9,999)
H	High	H	High ($10,000 - $99,999)
Timeline for Implementation		VH	Very High (> $100,000)
O	Ongoing	**Funding Source**	
S	Short Term (< 3 Years)	B	Local Budget
M	Mid-Range (3-5 Years)	G	Grant
L	Long Term (> 5 Years)	T	Local Time

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Prevention

2016 Mitigation Action Table – Prevention							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
P-01. Complete Countywide Flood Insurance Rate Map (FIRM). Update as necessary.	5, 7, 8	All	H	LG, EM	M	G	S
P-02. Encourage participation in or continued compliance with the National Flood Insurance Program (NFIP).	5, 7, 8	All	H	LG	L	B	O
P-03. Encourage businesses in Jefferson County to develop Business Continuity Plans to prepare for potential disaster situations	All	All	M	LG, OP	L	T	S
P-04. Prohibit building on unsuitable or flood-prone sites.	5, 7, 8, 9, 11, 12, 13	All	H	LG	L	T	O
P-05. Enact and enforce building codes and development regulations.	All	All	H	LG	L	B, T	O
P-06. Enact and enforce ordinances to minimize the risks associated with vacant and/or derelict structures.	1, 2, 3, 13	All	M	LG	L	B, T	O
P-07. Audit facilities that have backup power supplies and identify other facilities that currently do not, but should have backup power supplies.	1, 2, 3, 5, 7, 8, 10, 13	All	H	LG, EM, FD, PD	L	T	S
P-08. Maintain city, county, and utility company tree trimming programs.	1, 2, 3, 6	All	M	LG, UC	M	B	O
P-09. Develop a storm water management plan. Perform regular inspections of existing infrastructure and make improvements as needed.	1, 3, 5, 7, 8	All	M	LG	M	B, G	M

Property Protection

2016 Mitigation Action Table – Property Protection							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
PP-01. Bolster existing power lines to withstand storms. Bury power lines, if feasible.	1, 2, 3	All	M	LG, UC	H	B, G	L
PP-02. Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	All	H	All	H	B, G	L

PP-03. Construct tornado safe rooms.	1, 2, 3, 10	All	M	LG, SD, OP	VH	B, G	L
PP-04. Encourage the buyout/acquisition of properties located in floodplains if FIRMs are developed.	5, 7, 8	1, 3	M	LG	H	B, G	L
PP-05. Retrofit existing buildings to support updated warning and/or communication systems.	All	All	H	All	M	B, G	O
PP-06. Maintain known wells in the county and ensure that all abandoned wells are capped off.	11	All	M	LG	M	B, T	O

Public Education & Awareness

2016 Mitigation Action Table – Public Education & Awareness							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
PEA-01. Broadcast weather alerts to the public via local media outlets and other technologies available to Jefferson County Emergency Management. Educate the public on how to sign up for weather alert services (i.e. Alert Iowa, applications for mobile devices, etc.).	All	All	H	LG, EM	L	B, G	S
PEA-02. Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	All	H	EM	L	B	O
PEA-03. Practice drills & encourage preparedness.	All	All	H	LG, EM, FD, SD	L	T	O
PEA-04. Purchase, distribute, and encourage the use of NOAA weather radios	All	All	H	LG, EM	M	B, G	O
PEA-05. Continue fire safety education for adults and children—especially fire prevention programs with Jefferson County schools.	4, 5	All	M	EM, FD	M	B, T	O
PEA-06. Encourage citizens to develop a family emergency plan and a disaster preparedness kit that contains basic supplies in case of an event.	All	All	H	EM	L	T	O
PEA-07. Identify mines, wells, and sinkholes. Take necessary actions to minimize risk to the public.	11	All	M	LG	L	B, T	M

PEA-08. Provide education about the safe storage and handling of hazardous materials and on how to respond in the event of a hazardous materials spill.	Other	All	M	EM, FD	M	B, T	O
PEA-09. Identify locations where people can dispose of hazardous materials properly.	Other	All	L	FD	L	T	S

Natural Resource Protection

2016 Mitigation Action Table – Natural Resource Protection							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
NRP-01. Enact burn bans and alert the public when the fire risk is elevated.	1, 4, 6, 10	All	M	EM, FD	L	T	O
NRP-02. Encourage participation in watershed programs that create buffer zones or restore wetlands in flood-prone agricultural areas (i.e. USDA).	5, 7, 8	1	M	LG	H	B, G	L

Structural Projects

2016 Mitigation Action Table – Structural Projects							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
SP-01. Inspect, maintain, and protect roads and bridges that are in problem areas near creeks to prevent washouts.	1, 3, 5, 7	All	M	LG	H	B, G	O
SP-02. Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	All	H	LG	H	B, G	O
SP-03. Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	All	H	LG	M	B, G	S
SP-04. Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	All	H	LG, EM, FD	H	B, G	L
SP-05. Upgrade aging or obsolete communication systems.	All	All	M	LG, EM, SD	H	B	O

SP-06. Encourage the expansion of communication network infrastructure within the county.	All	All	M	LG, UC	VH	B	O
SP-07. Purchase and install new dry hydrants so that the fire departments can have access to water faster and decrease travel time.	4, 6	1	M	LG	M	B, G	M

Emergency Services

2016 Mitigation Action Table – Emergency Services							
Mitigation Action	**Hazard(s) Addressed**	**Applicable Jurisdiction(s)**	**Priority**	**Responsible Entity**	**Cost Estimate**	**Funding Source**	**Timeline**
ES-01. Maintain Emergency Operations Center.	All	1	H	EM, LG	H	B, G	O
ES-02. Maintain relationships with neighboring communities to provide assistance in the event of a disaster.	All	All	H	LG, EM, FD, PD	L	T	O
ES-03. Improve communication between the county and the utility companies (service disruptions, line relocation, future project planning, etc.).	1, 2, 3, 10, 11, 12, 13	All	M	LG, UC	L	T	S
ES-04. Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	All	H	LG, EM, FD, PD, SD, UC	M	B, G, T	O
ES-05. Increase the size of fire departments.	1, 2, 3, 4, 5, 13	1, 2, 3, 4, 5, 7	H	FD	M	B	O
ES-06. Purchase and maintain emergency response equipment for firefighters and first responders.	All	All	H	LG, EM, FD, PD, OP	H	B, G	O
ES-07. Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	All	H	LG, EM, SD, OP	M	B, G	O

STAPLEE

In the 2010 plan, mitigation actions were discussed and then evaluated using the STAPLEE criteria.[57] STAPLEE is an assessment tool used to determine the feasibility of identified mitigation measures and to aid in their prioritization. STAPLEE stands for:

S – Social	• Is the proposed mitigation action acceptable to the community? • Will the measure treat all individuals and groups equitably? • Will the measure result in an inadvertent negative treatment of one or more segments of the population?
T – Technical	• Will the measure reduce losses in the long-term? • Is the measure a whole or partial solution to the problem? • Does the measure solve the problem instead of the symptoms?
A – Administrative	• Do the agencies responsible for implementing the measure have the skill, ability, experience, knowledge, staffing, funding, and maintenance capability to do so?
P – Political	• Does the measure have the support of elected officials, public or private agencies, and the general public?
L – Legal	• Does the jurisdiction responsible for implementing the measure have the legal authority to do so? • Is there a legal basis (code/ordinance, state law, or federal law) for the measure?
E – Economic	• Do the measure's expected benefits exceed the likely costs? • Does the measure contribute to the overall economic goals of the community? • Are there current sources of funds to implement the measure? • Will the measure impose an increased burden on the tax base or local economy?
E – Environmental	• Does measure positively or negatively impact the natural environment? • Does the measure comply with local, state, and federal laws? • Is the measure consistent with current environmental goals?

The STAPLEE analysis was scored using a simple scoring system. For each category, an action was given a score of +1, 0, or -1. If the action would be considered favorable for a category it was given a +1; if the action would be considered negative or less favorable it was given a -1; a neutral or not applicable rating was given a score of 0. The scores were then summed, with a maximum possible score of +7. Since most of the updated mitigation actions were carried over from the previous plan, the scores from the 2010 plan were reviewed and retained in most instances. The chart for the STAPLEE analysis is shown on Pages 95-97.

Hazard Numbers for STAPLEE Table			
1	Tornado/Windstorm	8	Dam/Levee Failure
2	Severe Winter Storm	9	Expansive Soil
3	Thunderstorm/Lightning/Hail	10	Extreme Heat
4	Drought	11	Sinkhole
5	Flash Flood	12	Landslide
6	Grass/Wildland Fire	13	Earthquake
7	River Flood		

[57] FEMA 386-3

Updated STAPLEE Table										
Mitigation Action		Applicable Hazards *(See Table on Page 96 for Number)*	Social	Technical	Administrative	Political	Legal	Economic	Environmental	TOTAL
#	Description		S	T	A	P	L	E	E	
P-01	Complete Countywide Flood Insurance Rate Map (FIRM). Update as necessary.	5, 7, 8	1	1	1	1	1	(1)	1	**5**
P-02	Encourage participation in or continued compliance with the National Flood Insurance Program (NFIP).	5, 7, 8	1	1	0	1	1	(1)	1	**4**
P-03	Encourage businesses in Jefferson County to develop Business Continuity Plans to prepare for potential disaster situations.	All	1	1	0	1	0	1	0	**4**
P-04	Prohibit building on unsuitable or flood-prone sites.	5, 7, 8, 9, 11, 12, 13	1	1	1	0	1	(1)	(1)	**2**
P-05	Enact & enforce building codes and development regulations.	All	0	1	(1)	0	1	(1)	1	**1**
P-06	Enact and enforce ordinances to minimize the risks associated with vacant and/or derelict structures.	1, 2, 3, 13	0	1	(1)	0	1	(1)	1	**1**
P-07	Audit facilities that have backup power supplies and identify other facilities that currently do not, but should have backup power supplies.	1, 2, 3, 5, 7, 8, 10, 13	1	(1)	0	0	1	(1)	1	**1**
P-08	Maintain city, county, and utility company tree trimming programs.	1, 2, 3, 6	1	(1)	(1)	0	1	0	1	**1**
P-09	Develop a storm water management plan. Perform regular inspections of existing infrastructure and make improvements as needed.	1, 3, 5, 7, 8	1	(1)	0	0	1	(1)	1	**1**
PP-01	Bolster existing power lines to withstand storms. Bury power lines, if feasible.	1, 2, 3	1	1	1	1	1	0	0	**5**
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	1	0	1	1	1	(1)	0	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	1	0	1	1	1	(1)	0	**3**
PP-04	Encourage the buyout/acquisition of properties located in floodplains.	5, 7, 8	1	0	1	1	1	(1)	0	**3**
PP-05	Retrofit buildings to support updated warning and/or communication systems.	All	1	0	0	1	1	(1)	0	**2**
PP-06	Ensure that all abandoned wells are capped off throughout the county.	11	1	(1)	0	0	1	(1)	1	**1**
PP-07	Maintain known wells in the county.	11	1	(1)	0	0	1	(1)	1	**1**

PEA-01	Broadcast weather alerts to the public via local media outlets and other technologies available to Jefferson County Emergency Management. Educate the public on how to sign up for weather alert services (i.e. Alert Iowa, applications for mobile devices, etc.).	All	1	0	1	1	1	1	0	**5**
PEA-02	Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	1	0	1	1	1	1	0	**5**
PEA-03	Practice drills & encourage preparedness.	All	1	0	1	1	1	1	0	**5**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	1	0	1	1	1	(1)	0	**3**
PEA-05	Continue fire safety education for adults and children—especially fire prevention programs with Jefferson County schools.	4, 6	1	(1)	1	1	1	(1)	1	**3**
PEA-06	Encourage citizens to develop a family emergency plan and a disaster preparedness kit that contains basic supplies in case of an event.	All	1	0	1	0	0	0	0	**2**
PEA-07	Identify mines, wells, and sinkholes. Take necessary actions to minimize risk to the public.	11	1	(1)	0	0	1	(1)	1	**1**
PEA-08	Provide education about the safe storage and handling of hazardous materials and on how to respond in the event of a hazardous materials spill.	Other	1	0	1	0	0	(1)	0	**1**
PEA-09	Identify locations where people can dispose of hazardous materials properly.	Other	1	0	1	0	0	(1)	0	**1**
NRP-01	Enact burn bans and alert the public when the fire risk is elevated.	1, 4, 6, 10	1	1	(1)	0	1	1	1	**4**
NRP-02	Encourage participation in watershed programs that create buffer zones or restore wetlands in flood-prone agricultural areas (i.e. USDA).	5, 7, 8	0	1	0	0	1	0	1	**3**
SP-01	Inspect, maintain, and protect roads and bridges that are in problem areas near creeks to prevent washouts.	1, 3, 5, 7	1	0	1	1	1	(1)	1	**4**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	1	(1)	1	1	1	(1)	1	**3**
SP-03	Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	1	1	0	0	1	(1)	1	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	1	0	1	0	1	(1)	1	**3**
SP-05	Upgrade aging or obsolete communication systems.	All	1	0	0	0	1	(1)	1	**2**
SP-06	Encourage the expansion of communication network infrastructure within the county.	All	1	0	0	0	1	(1)	1	**2**

SP-07	Purchase and install new dry hydrants so that the fire departments can have access to water faster and decrease travel time.	4, 6	1	(1)	1	1	1	(1)	(1)	**1**
ES-01	Maintain Emergency Operations Center.	All	1	0	1	1	1	0	0	**4**
ES-02	Maintain relationships with neighboring communities to provide assistance in the event of a disaster.	All	1	0	1	1	1	0	0	**4**
ES-03	Improve communication between the county and the utility companies (service disruptions, line relocation, future project planning, etc.).	1, 2, 3, 10, 11, 12, 13	1	0	1	1	1	0	0	**4**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	1	0	1	0	1	(1)	1	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	1	0	1	1	1	(1)	0	**3**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	1	0	1	0	0	-1	1	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	1	(1)	(1)	1	1	0	0	**1**

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Section 6 –Implementation

Plan Adoption & Implementation

44 CFR § 201.6(c)(5) – [The plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan.

Once this plan was completed, Area 15 Regional Planning Commission (RPC) staff presented an adoption resolution to the Jefferson County Board of Supervisors, each local community, and each of the school districts. The County formally adopted the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa* at its board meeting on December 19, 2016. This resolution may be found on Page 102. Local adoption resolutions appear in Section 7.

Jefferson County Supervisors and local officials for each of the participating jurisdictions (mayors/councils and superintendents/school boards) are responsible for overseeing the implementation of this plan, with assistance from the Jefferson County Emergency Management Agency. The mitigation actions identified on Pages 90-93 were prioritized by the planning teams through discussions, evaluations of costs and benefits, and the STAPLEE process. Generalized cost estimates were developed to help determine which mitigation actions best aligned with the economic goals of each jurisdiction. Discussions with the plan participants reaffirmed that budgets are tight and available funding is scarce. The prioritization of identified mitigation actions was based on minimizing costs while maximizing benefits.

The availability of grant funding will play a significant role in the implementation of mitigation actions. Upon the adoption of this plan local governments and schools will be eligible for pre-disaster funding assistance from FEMA for mitigation strategies identified above. While many of the mitigation actions have little or no additional costs associated with them, the majority do. When dealing with a rural county made up of small schools and communities that have constricted local budgets, it will be important to utilize grant opportunities as they come available and to seek out cost-share opportunities (i.e. public-private partnerships) whenever possible. The mitigation actions appearing in this plan will be considered when developing local budgets and making public improvements and will be incorporated if possible. The implementation of any single mitigation strategy on its own; however, is likely to be impeded by fiscal constraints.

Area 15 RPC will monitor for the availability of grant funds that may become available for eligible projects and notify the County Board of Supervisors, the Emergency Management Coordinator, and all participating jurisdictions of their availability. If desired, the RPC may provide grant application and administration assistance to eligible jurisdictions if funding opportunities become available.

Plan Maintenance & Updates

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

Most of the recommendations within this plan are for the use of the Jefferson County Emergency Management Agency, emergency responders, and the county's local elected officials—county supervisors, mayors, city councils, and school board members. In order to ensure consistency, minimize risk, and better coordinate mitigation activities; the governing bodies of the local jurisdictions are should reference this plan when relevant planning decisions are to be made. Since few of the communities in the county have comprehensive plans or formal capital improvement plans, the opportunity to incorporate these recommendations into existing planning mechanisms is very limited. Wherever possible, the mitigation actions identified in this plan should be incorporated into planning-related activities, such as annual local budgets.

44 CFR § 201.6(c)(4)(i) – [The plan shall include a maintenance process that includes a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a 5-year cycle.

Plan maintenance involves taking action to ensure that the plan stays current with information, that priorities are still in order, and that goals and objectives are maintained and updated as necessary. The progress and status of the activities included in the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa*, will be re-evaluated annually by each jurisdiction in a public setting, such as a city council meeting or work session where annual budgets are developed. All participating jurisdictions in this plan receive the Area 15 RPC quarterly newsletter. In addition to noting when mitigation funding is available, planning staff will be sure to include an annual reminder in the newsletter for cities, counties, and schools to review this plan when developing their respective annual budgets.

This plan will be monitored based on the mitigation strategies identified in the plan and associated status updates. As damaging hazard events occur documentation (i.e. photographs, newspaper articles, or insurance claims) should be added to Appendix H of the plan to help provide better information regarding actual occurrences and experiences. Minutes of meetings or work sessions where capital projects, infrastructure budgeting, or changes in land use are discussed should also be included in Appendix H to assist in the update of future mitigation plans. Mitigation projects that are completed will be documented in Appendix H and should be monitored for effectiveness. Any strategies that are removed from the plan also will be documented.

Current FEMA guidelines mandate that a comprehensive update to this plan be completed at least once every five years to maintain eligibility for pre-disaster grant funds. Area 15 RPC staff will continue to act as a liaison with staff at Iowa Homeland Security and Emergency Management and communicate any changes in federal laws related to mitigation planning.

Continued Public Participation

44 CFR § 201.6(c)(4)(iii) – [The plan shall include a maintenance process that includes a] discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an essential part of the planning process. The public will be involved in the implementation of the plan through meetings with the Jefferson County Board of Supervisors, city councils, and other public meetings. When mitigation actions and implementation strategies will be discussed, the public will be encouraged to provide input. When necessary, each jurisdiction will notify the public by emails, newspapers notices, and other methods to citizens in the area to participate in the mitigation planning process. Additional avenues by which the county can pursue public engagement is through the increased usage of social media sites and/or public surveys to gauge overall community support. All residents are invited and encouraged to participate in any such meetings that are to be held.

The opportunity for the public to take part in updates and reviews of this plan will comply with Iowa's Open Meetings Law (Iowa Code, Chapter 21). For each major (currently, five-year) plan update, the plan will be presented to the public for a thirty-day comment and review period prior to FEMA approval. For each recommended annual review, public notices will be released. At minimum, the plan shall be available for review in each community's City Hall and at the Jefferson County Courthouse. A copy will always be available for public review at the Area 15 RPC office.

County Adoption Resolution

Resolution # _____

A RESOLUTION TO ADOPT THE 2016 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR JEFFERSON COUNTY, IOWA

WHEREAS, the Jefferson County Board of Supervisors recognizes the threat that natural hazards pose to the people and property within the community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA2K) emphasizing the need for pre-disaster mitigation of potential hazards; and

WHEREAS, the DMA2K made available hazard mitigation grants to state and local governments; and

WHEREAS, an approved and adopted local hazard mitigation plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre-disaster mitigation grant programs; and

WHEREAS, the Jefferson County Board of Supervisors participated in the hazard mitigation planning process to prepare the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa*; and

WHEREAS, Iowa Homeland Security and Emergency Management (IHSEMD) and FEMA have reviewed the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa,* and approved it contingent upon this official adoption by the participating governing body; and

WHEREAS, the Jefferson County Board of Supervisors desires to comply with the requirements of the DMA2K and to augment its emergency planning efforts by formally adopting the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa*; and

WHEREAS, adoption by Board of Supervisors demonstrates Jefferson County's commitment to fulfilling the mitigation goals and objective outlined in the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa*; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE, BE IT RESOLVED, that the Jefferson County Board of Supervisors adopts the *2016 Multi-Jurisdictional Hazard Mitigation Plan for Jefferson County, Iowa*, as an official plan; and

BE IT FURTHER RESOLVED, that the Area 15 Regional Planning Commission on behalf of the Jefferson County Board of Supervisors will submit this adoption resolution to IHSEMD and FEMA Region VII officials to enable the plan's final approval.

Approved and Adopted this 19th day of December, 2016.

SIGNED:

Lee Dimmitt, Chair
Jefferson County Board of Supervisors

ATTEST:

Scott Reneker, Auditor
Jefferson County, Iowa

Section 7 – Local Focus

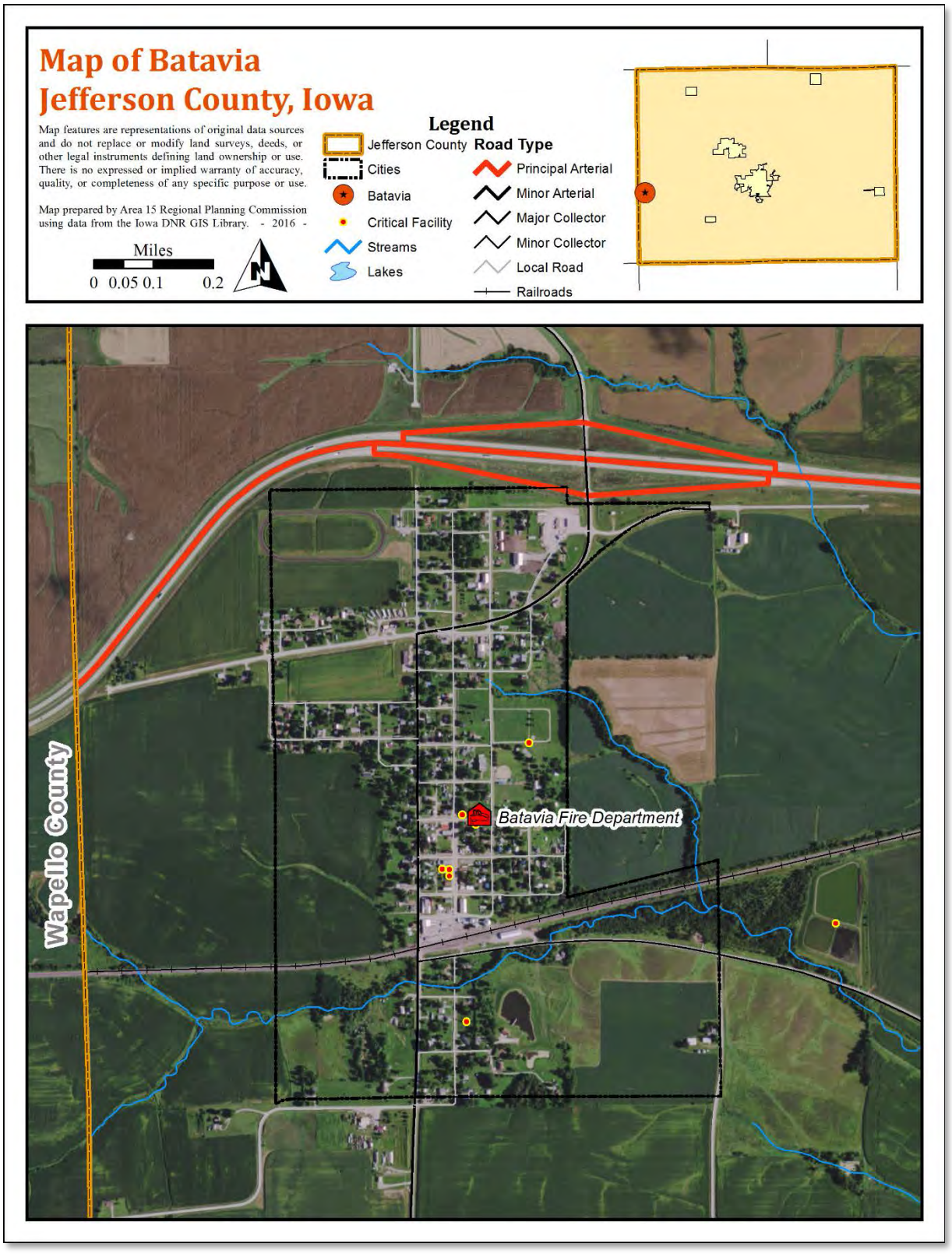
44 CFR § 201.6(a)(4) – Multi-jurisdictional plans may be accepted as long as each jurisdiction has participated in the process and has officially adopted the plan.

44 CFR § 201.6(c)(2)(iii) – For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

44 CFR § 201.6(c)(3)(iv) – For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

44 CFR § 201.6(c)(5) – [The plan must include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

City of Batavia



Batavia at a Glance

Demographics		Workforce	
Total Population	499	Total Labor Force	299
Median Age	40.4	Employed	289 (96.7%)
65 Years and Over	75 (15.0%)	Time Travel to Work	19.2 min.

Household/Income		Property Valuations	
Median Household Income	$41,771	Residential	$11,153,500
Per Capita Income	$23,235	Commercial	$1,271,100
Average Household Size	2.31	Industrial/Agricultural	$489,100

Housing		Regulatory Information	
Total Housing Units	236	Flood Insurance Rate Map	No
Occupied Housing Units	216	NFIP Participant	No
Housing Units removed/demolished since 2000	2	Comprehensive Plan	No
Building Permits	Yes	Zoning/Land Use Ordinance	No
New Building Permits Since 2000	0	Subdivision Ordinance	No

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	Alliant Energy
Water	Rathbun Rural Water Association
Sewage Treatment	City of Batavia
Telephone	Farmers Telephone Co.
Internet	netINS
Ambulance	Jefferson County Health Center
Fire Protection	Batavia Volunteer Fire Dept.
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
201 (-13)	22 (-5)	0 (0)	8 (+3)

Sources: U.S. Census Bureau (2010), City of Batavia (2014), Jefferson County Assessor (2016)

Planning Process

The Batavia planning team held two meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **October 13, 2014:** Batavia Hazard Risk Assessment
- **January 12, 2015:** Batavia Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the October 13, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Batavia, including historical records of events and damages. Participants were reminded of the critical facilities located in Batavia, identified in the map on Page 104. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Batavia, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Batavia. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Batavia. That list appears in Table 7.1.

Batavia may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Batavia, it will be examined at that time or when the plan is updated.

Table 7.1. Batavia Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	**Tornado/Windstorm**	4	4	4	1	3.70	High
2	**Severe Winter Storm**	4	2	3	3	3.15	High
3	**Thunderstorm/Lightning/Hail**	4	2	3	2	3.05	High
4	**Flash Flood**	3	2	4	1	2.65	Moderate
5	**Grass/Wildland Fire**	3	2	3	2	2.60	Moderate
6	**Extreme Heat**	3	2	1	2	2.30	Moderate
7	**Expansive Soil**	3	1	1	1	1.90	Low
8	**Drought**	2	1	1	4	1.75	Low
9	**River Flood**	1	2	1	3	1.50	Low
10	**Landslide**	1	1	4	1	1.45	Low
10	**Sinkhole**	1	1	4	1	1.45	Low
10	**Dam/Levee Failure**	1	1	4	1	1.45	Low
10	**Earthquake**	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to consider existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Batavia to evaluate current mitigation efforts underway:

- Batavia Municipal Codebook of Ordinances, 2016

As this plan was under development, Batavia was also in the process of revising its City Code. The updated City Code requires building permits for new structures and that all new buildings must be affixed to a permanent foundation. It established additional regulations for the erection and maintenance of mobile/manufactured homes. Provisions for nuisances, junk cars and salvage lots, animal control, and fire protection are also outlined in the Code.

Mitigation Strategy

The Batavia Planning Team met on January 12, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A NOAA weather radio distribution program was implemented for the citizens of Jefferson County.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.
- Regularly scheduled training sessions were held with emergency service personnel.
- Educational opportunities were presented for the public regarding the variety of hazards that may affect them and how to protect their property.

The 2010 Plan included the following mitigation actions:

- Ditching and culvert repairs;
- Storm water drainage surveys and inspections;
- Purchase and install a back-up generator;
- Develop a plan to identify all designated shelters so that the public knows where to go when there is a disaster and supply equipment to run the shelters;
- Provide training for local elected officials on how to respond to a disaster; and
- Purchasing emergency response equipment to encourage more efficient response and minimize property damage and injuries or fatalities.

The City has worked on each of these tasks to some degree. While the City does not have a regular maintenance plan for ditching and culvert repair, they do perform repairs as necessary. The previous mayor had begun to look into grants that could fund the development of stormwater infrastructure, but the ultimately City has not applied for any.

The City purchased a power generator for the community center in 2014 and do use it as an emergency shelter, if needed. The planning team mentioned that an Amtrak train had derailed several years ago and the community center was used as a temporary holding area until buses could come to transport the passengers to their destinations. The City has also identified a couple of other locations within the community that can serve as overflow locations if the community center exceeds capacity.

The mayor and council members receive periodic training with the fire department on disaster response. Additionally, the fire department maintains and purchases equipment as necessary to adequately perform the basic functions of the department.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- Batavia's City Code was updated to include provisions for a stronger building stock that is more resistant to storm damages.
- Batavia's fire department partners with Eldon's fire department annually during Fire Prevention Week to visit Cardinal Schools and discuss risks and prevention measures with the school children.
- The City regularly tests its warning siren, but have noted that may need to be upgraded or replaced in the future.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.2. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.2. Batavia Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	**Description**		
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	**3**
ES-07	Provide training for first responders on how to respond to utility issues.	1, 2, 3, 10, 11, 12, 13	**2**
P-09	Develop a storm water management plan. Perform regular inspections of existing infrastructure and make improvements as needed.	1, 3, 5, 7, 8	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution

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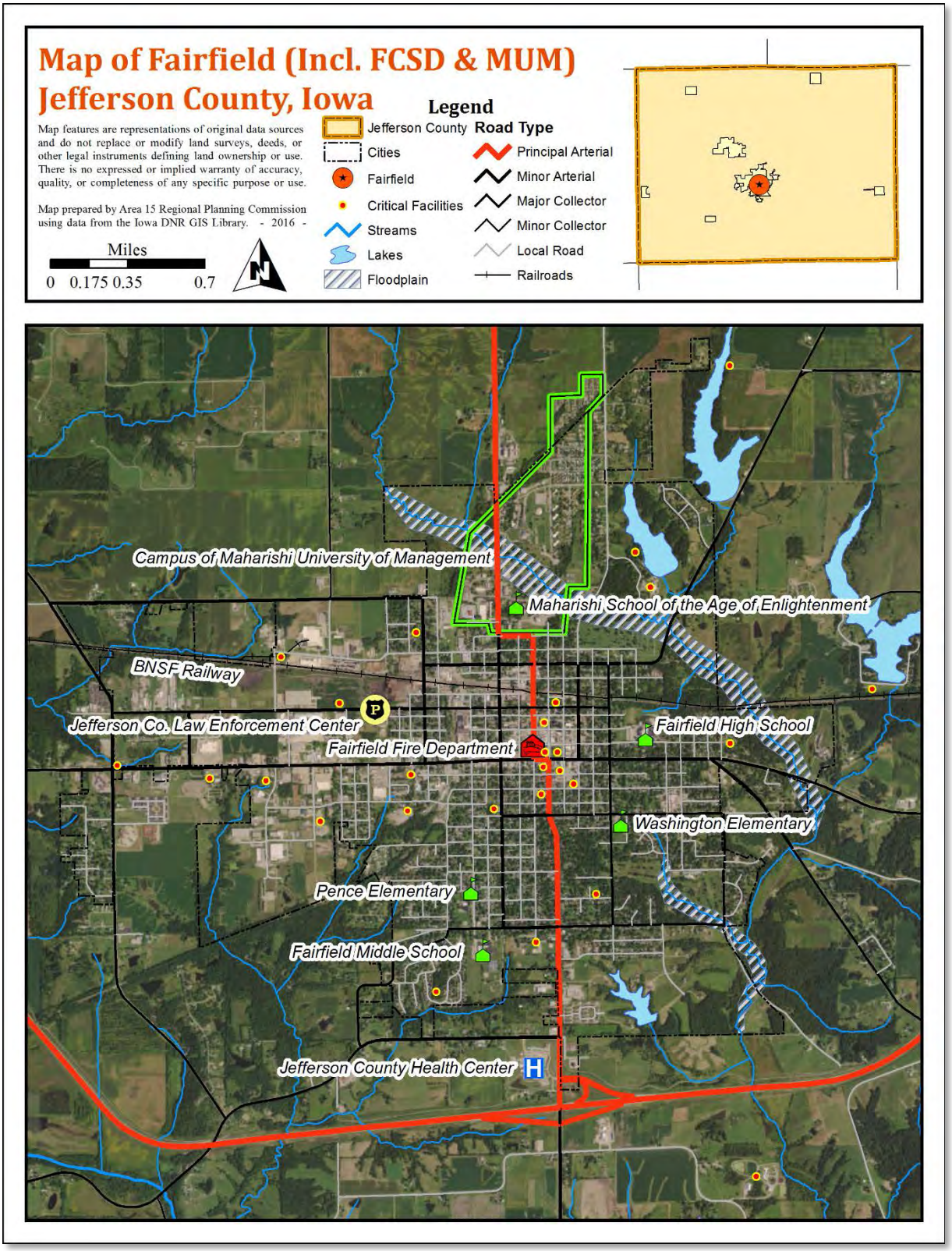
City of Fairfield (Incl. Fairfield Schools & Maharishi Univ.)



Fairfield at a Glance

Demographics		Workforce	
Total Population	9,464	Total Labor Force	4,844
Median Age	46.0	Employed	4,588 (94.7%)
65 Years and Over	1,508 (15.9%)	Time Travel to Work	10.8 min.

Household/Income		Property Valuations	
Median Household Income	$39,044	Residential	$383,949,400
Per Capita Income	$24,166	Commercial	$105,087,041
Average Household Size	2.09	Industrial/Agricultural	$15,887,700

Housing		Regulatory Information	
Total Housing Units	4,650	Flood Insurance Rate Map	09/30/1994
Occupied Housing Units	4,201	NFIP Participant	Yes
Housing Units removed/demolished since 2000	82	Comprehensive Plan	1995
Building Permits	Yes	Zoning/Land Use Ordinance	1995
New Building Permits Since 2000	176	Subdivision Ordinance	2013

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	Alliant Energy
Water	City of Fairfield
Sewage Treatment	City of Fairfield
Telephone	Windstream, Lisco
Internet	Windstream, Lisco, Mediacom
Ambulance	Midwest Ambulance, Jefferson County Health Center
Fire Protection	Fairfield Fire Department
Police/Law Enforcement	Fairfield Police Department

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
3,287 (+145)	404 (-109)	85 (-12)	31 (+9)

Sources: U.S. Census Bureau (2010), City of Fairfield (2014), Jefferson County Assessor (2016)

Planning Process

The Fairfield planning team held four meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **November 10, 2014:** Fairfield Hazard Risk Assessment
- **January 26, 2015:** Fairfield Mitigation Strategy
- **February 16, 2015:** Fairfield Community Schools Mitigation Strategy
- **March 23, 2015:** Fairfield Economic Development Association Mitigation Strategy
- **October 7, 2016:** Maharishi Schools Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the November 10, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Fairfield, including historical records of events and damages. Participants were reminded of the critical facilities located in Fairfield, identified in the map on Page 112. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Fairfield, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Fairfield. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Fairfield. That list appears in Table 7.3. Fairfield may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Fairfield, it will be examined at that time or when the plan is updated.

Table 7.3. Fairfield Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	**Tornado/Windstorm**	4	4	4	1	3.70	High
2	**Severe Winter Storm**	4	2	3	3	3.15	High
3	**Thunderstorm/Lightning/Hail**	4	2	3	2	3.05	High
4	**Flash Flood**	3	2	4	1	2.65	Moderate
5	**River Flood**	3	2	1	3	2.40	Moderate
5	**Dam/Levee Failure**	2	2	4	3	2.40	Moderate
7	**Extreme Heat**	3	2	1	2	2.30	Moderate
8	**Grass/Wildland Fire**	2	2	3	2	2.15	Moderate
9	**Expansive Soil**	3	1	1	1	1.90	Low
10	**Drought**	2	1	1	4	1.75	Low
11	**Sinkhole**	1	1	4	1	1.45	Low
11	**Landslide**	1	1	4	1	1.45	Low
11	**Earthquake**	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Fairfield, Fairfield Schools, and Maharishi Schools to evaluate current mitigation efforts:

- Fairfield Municipal Codebook of Ordinances, 2010
- Fairfield Urban Revitalization Plan, 2013
- "Filling the Gap" Study, 2016
- Fairfield Housing Needs Assessment, 2014
- Fairfield Go-Green Strategic Plan 2020, 2009
- Fairfield 2012 Community-Wide Strategic Plan, 2003
- Fairfield Comprehensive Plan, 1995
- Fairfield Community School District Emergency Preparedness Plan
- Fairfield Community School District Emergency Procedures
- Fairfield Community School District Tornado Drill Procedures

Mitigation Strategy

The Fairfield Planning Team met on January 26, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A NOAA weather radio distribution program was implemented for the citizens of Jefferson County.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.
- Fairfield adopted a comprehensive plan which addresses planning and zoning issues.
- Fairfield adopted zoning and subdivision ordinances.
- Consideration was given to review Fairfield's building codes on a regular basis, updating them as necessary.
- Fairfield requested IHSEMD grant funding to provide the community with backup power capabilities.

The 2010 Plan included the following mitigation actions:

- Purchase and install a back-up generator.
- Develop a plan to identify all designated shelters so that the public knows where to go when there is a disaster and supply equipment to run the shelters.

- Construct tornado safe rooms.
- Strengthen power lines to withstand storms and encourage stronger power lines and the burial of power lines for new construction.
- Encourage the use of NOAA weather radios.
- Purchase emergency response equipment to encourage more efficient response and minimize property damage, injuries, and fatalities.
- Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to a disaster.
- Upgrade or replace inadequate warning sirens.
- Improve obsolete communication systems.
- Purchase road barricades in case of accidents or emergency situations.
- Make educational materials available to the public to improve awareness in the community.

The City has completed many of these tasks. The City has back-up generators for many of its critical facilities, including its water and wastewater treatment plants. Fairfield has partners in the town to provide emergency services and shelter, but they would like to work on better identifying these places so that people know where they are and how to get there. There have been no city-led efforts to construct tornado safe rooms or to replace/bury power lines. Fairfield has three functional sirens that they test regularly. As technology evolves and the sirens age, they may need to be upgraded or replaced. Emergency response equipment and road barricades have been purchased as the needed.

Local officials work with the fire department, hospital, and police to get basic training on first aid and disaster response. Fairfield and Packwood fire departments share a safety trailer that they use to teach students and citizens about fire safety and severe weather. The local news outlets—including the Fairfield Ledger, local television and radio stations—often provide information on severe weather and identify websites and other places to find more information. The City may add a link to its website to help citizens and businesses learn more about severe weather preparedness and risk avoidance. The use of NOAA weather radios is encouraged, but no funding has been secured recently to provide free or reduced cost radios to those who need them. However, with the roll-out of Alert Iowa, an increased number of citizens can receive weather alerts without the need for a NOAA weather radio.

Local officials work with the fire department, hospital, and police to get basic training on first aid and disaster response. Fairfield and Packwood fire departments share a safety trailer that they use to teach students and citizens about fire safety and severe weather. As technology evolves, so do communication systems. Cellular communications towers have been erected in the city and across the county to improve service. Wired communications networks also have been upgraded throughout town as homes, businesses, and public services become increasingly dependent on reliable internet.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- Fairfield updated its City Code in 2010. The Code has provisions that require building permits for new structures and that all new buildings must be affixed to a permanent foundation. Other regulations for the erection and maintenance of mobile/manufactured homes, nuisances, junk cars and salvage lots, animal control, fire protection, and floodplain development are also outlined in the Code.
- Fairfield enacted an Urban Revitalization Plan in January 2013 to encourage construction or rehabilitation of industrial, commercial, and residential property within the city limits but avoiding new construction on agricultural land if possible.
- The City put out an RFP for a comprehensive plan update in 2013, but ultimately did not continue with the project as changes in City staff were taking place at that time. The City chose to reevaluate the need for a comprehensive plan update at a future date.
- The Area 15 RPC completed a Housing Needs Assessment for the City in 2014 to evaluate the housing stock and needs of the community. Growth in the community throughout the last several decades has occurred on the fringes of the City and it appears as if that will be a continuing trend if growth is to occur as opportunities for single-family infill development are limited.
- The School of Urban & Regional Planning at the University of Iowa further studied the availability of land for infill development through the "Filling the Gap" study completed in May 2016. This study should help the city target land for single-family infill development, reducing the need for increased development on the fringes of the city.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.4. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.4. Fairfield Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PEA-02	Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	**5**
PP-01	Bolster existing power lines to withstand storms. Bury power lines, if feasible.	1, 2, 3	**5**
P-03	Encourage businesses in Jefferson County to develop Business Continuity Plans to prepare for potential disaster situations.	All	**4**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	**3**
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
PP-04	Encourage the buyout/acquisition of properties located in floodplains.	5, 7, 8	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-03	Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**
SP-05	Upgrade aging or obsolete communication systems.	All	**2**
P-04	Prohibit building on unsuitable or flood-prone sites.	5, 7, 8, 9, 11, 12, 13	**2**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution – City of Fairfield

Fairfield Community School District

The Fairfield Community School District is the largest school district in Jefferson County with two elementary schools, one junior high school, and one senior high school in the City of Fairfield, as well as an elementary school in Libertyville. An elementary school in Lockridge closed in 2012.

The Fairfield Community School District planning team met on February 16, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan included the following mitigation actions:

- Purchase and install backup generators.
- Construct tornado safe rooms.
- Upgrade or replace warning sirens.
- Improve obsolete communication systems.
- Retrofit existing buildings to support updated warning/communication systems.
- Purchase road barricades in case of accidents or emergency situations.
- Purchase emergency response equipment to encourage more efficient response and to minimize property damage, injuries, and fatalities.
- Survey and inspect storm drainage infrastructure.
- Culvert repairs.

The Fairfield Community School District has made progress on some, but not all of these tasks. Buildings are retrofitted with new technologies as they are needed or as facilities are remodeled or added. The high school building has recently undergone major additions and renovations which have helped to upgrade communication systems. Safe rooms and backup power generators, however, were not a part of the construction. No progress was reported on formal surveys and inspections of storm drainage infrastructure, but spot repairs are completed as needed.

All of the schools are within city limits (Fairfield or Libertyville) and are within audible range of a city-owned warning siren. If these existing sirens become inaudible at a given location, school officials should communicate this to the proper city to work out a solution. School public address systems, though, should function as an on-site warning system. Road barricades are more of a city function and should assume responsibility for providing road closure protection when necessary. Each facility also has basic first aid supplies to handle most common issues that could arise at a school. First responders are typically on site for major sporting events.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- FCSD has the ability to live stream events in locations throughout the district (i.e. school board meetings, sporting events). This technology may have other uses, for instance to help disseminate real-time information regarding an emergency situation.
- A "21st Century Room" was recently installed (April 2016) in the high school as a classroom with "flexibility for the digital age." It has the latest technology available for computers, audio-visual equipment, and smart boards.

Future Mitigation Actions

The Fairfield Community School District's priority list of future mitigation actions appears in Table 7.5. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the district may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.5. Fairfield Community School District Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PEA-02	Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	**5**
PEA-03	Practice drills & encourage preparedness.	All	**5**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-03	Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	**3**
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
SP-05	Upgrade aging or obsolete communication systems.	All	**2**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution – Fairfield Community School District

Maharishi Schools

Founded in 1971, Maharishi International University (MIU) purchased the former campus of defunct Parsons University on the northwest edge of Fairfield in 1974. In 1995, MIU became the Maharishi University of Management. The Maharishi School of the Age of Enlightenment was founded in 1975 as the world's first seamless system of consciousness-based education from preschool to PhD. All of Maharishi's educational facilities are located in Fairfield. The Maharishi Schools planning team met via teleconference on October 7, 2016, to review the 2010 plan, any mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

No mitigation actions were identified for Maharishi Schools in the 2010 plan.

Future Mitigation Actions

The Maharishi Schools' priority list of future mitigation actions appears in Table 7.6. The priority of the projects was determined through the STAPLEE scores from Pages 95-98. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, Maharishi Schools may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.6. Maharishi Schools Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PEA-02	Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	**5**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
SP-05	Upgrade aging or obsolete communication systems.	All	**2**
P-04	Prohibit building on unsuitable or flood-prone sites.	5, 7, 8, 9, 11, 12, 13	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution – Maharishi University of Management

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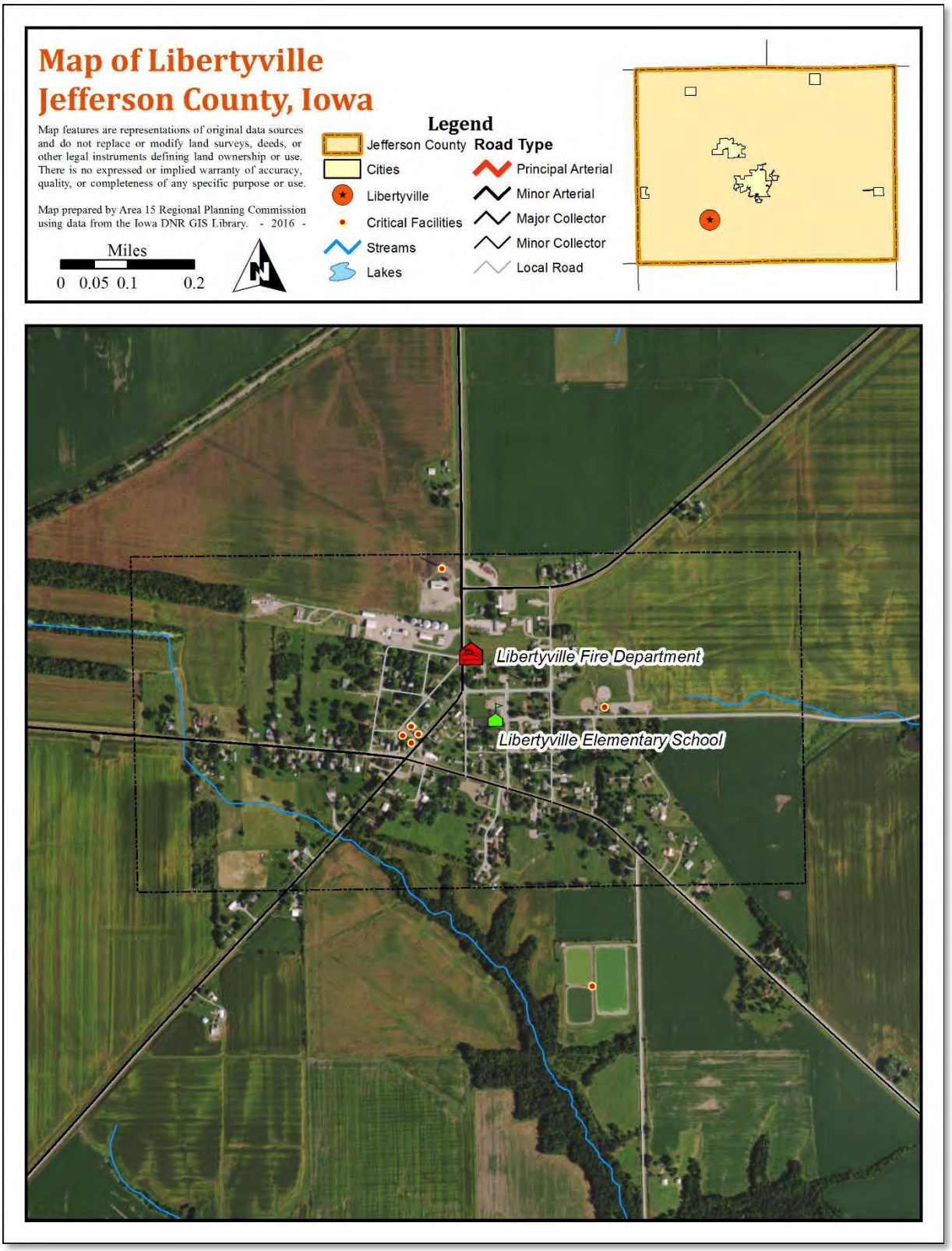
City of Libertyville



Libertyville at a Glance

Demographics		Workforce	
Total Population	315	Total Labor Force	171
Median Age	38.2	Employed	160 (93.6%)
65 Years and Over	38 (12.1%)	Time Travel to Work	17.0 min.

Household/Income		Property Valuations	
Median Household Income	$41,667	Residential	$10,771,800
Per Capita Income	$24,795	Commercial	$1,389,100
Average Household Size	2.39	Industrial/Agricultural	$276,100

Housing		Regulatory Information	
Total Housing Units	142	Flood Insurance Rate Map	No
Occupied Housing Units	132	NFIP Participant	No
Housing Units removed/demolished since 2000	0	Comprehensive Plan	No
Building Permits	No	Zoning/Land Use Ordinance	No
New Building Permits Since 2000	0	Subdivision Ordinance	2014

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	Alliant Energy
Water	City of Fairfield
Sewage Treatment	City of Libertyville
Telephone	Windstream
Internet	Windstream
Ambulance	Midwest Ambulance, Jefferson County Health Center
Fire Protection	Libertyville Fire & Rescue
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
128 (+1)	16 (-1)	0 (-1)	8 (+2)

Sources: U.S. Census Bureau (2010), City of Libertyville (2014), Jefferson County Assessor (2016)

Planning Process

The Libertyville planning team held two meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **October 14, 2014:** Libertyville Hazard Risk Assessment
- **February 10, 2015:** Libertyville Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the October 14, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Libertyville, including historical records of events and damages. Participants were reminded of the critical facilities located in Libertyville, identified in the map on Page 126. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Libertyville, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Libertyville. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Libertyville. That list appears in Table 7.7.

Libertyville may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Libertyville, it will be examined at that time or when the plan is updated.

Table 7.7. Libertyville Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	Tornado/Windstorm	4	4	4	1	3.70	High
2	Severe Winter Storm	4	2	3	3	3.15	High
3	Thunderstorm/Lightning/Hail	4	2	3	2	3.05	High
4	Flash Flood	3	2	4	1	2.65	Moderate
5	Grass/Wildland Fire	3	2	3	2	2.60	Moderate
6	River Flood	3	2	2	3	2.55	Moderate
7	Extreme Heat	3	2	1	2	2.30	Moderate
8	Expansive Soil	3	1	1	1	1.90	Low
9	Drought	2	1	1	4	1.75	Low
10	Sinkhole	1	1	4	1	1.45	Low
10	Landslide	1	1	4	1	1.45	Low
10	Dam/Levee Failure	1	1	4	1	1.45	Low
10	Earthquake	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Libertyville to evaluate current mitigation efforts underway:

- Libertyville Municipal Codebook of Ordinances, 2014

The City updated its code to require that all new buildings must be affixed to a permanent foundation. Additional regulations for the erection and maintenance of mobile/manufactured home were also established. Provisions for nuisances, junk cars and salvage lots, animal control, and fire protection are also outlined in the Code.

Mitigation Strategy

The Libertyville planning team met on February 10, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A NOAA weather radio distribution program was implemented for the citizens of Jefferson County.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.

The 2010 Plan included the following mitigation actions:

- Construct tornado safe rooms.
- Purchase and install backup generators.
- Perform ditching and culvert repairs.
- Purchase emergency response equipment to encourage more efficient response and minimize property damage, injuries, and fatalities.
- Provide training for local elected officials on how to respond to a disaster.
- Post signs and develop a guidebook at facilities holding hazardous materials on how to respond if there is an incident.
- Encourage the use of NOAA weather radios.

The City has made progress on a few of these tasks. Libertyville does not have a regular maintenance plan to perform ditching and culvert work, but the City does use tractor to dig out ditches to prevent back-ups as needed. There is also an ongoing effort to maintain equipment and

provide training opportunities to ensure that firefighters can adequately perform the basic functions of the fire department. City officials and firefighters do encourage their use, but have not had any funding recently to be able to provide radios to locals who don't have but want one. The city has not purchased any back-up generators or installed any tornado safe rooms.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- Libertyville's City Code was updated to include provisions for a stronger building stock that is more resistant to storm damages.
- Libertyville bulk purchases its water from the City of Fairfield and the main runs parallel to County Road V64 north of town. In April 2013 a severe thunderstorm produced heavy rains and caused flash flooding in Cedar Creek. This event led to a water main break where the water main crosses beneath the creek. The City received FEMA assistance to repair the water main and install shut-off valves to prevent future washouts from completely crippling the system.
- The City of Libertyville installed a new water storage tank and replaced nearly all of its water mains in a 2013-2016 CDBG project. Discussions with city officials indicate that a sewer project may be necessary in the near future.
- The City is considering the purchase of a new truck and plow. They thought that they may be able to remove the existing plow and install it on the fire department's brush truck to help response efforts during the winter.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.8. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.8. Libertyville Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
PP-04	Encourage the buyout/acquisition of properties located in floodplains.	5, 7, 8	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-03	Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	**3**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution

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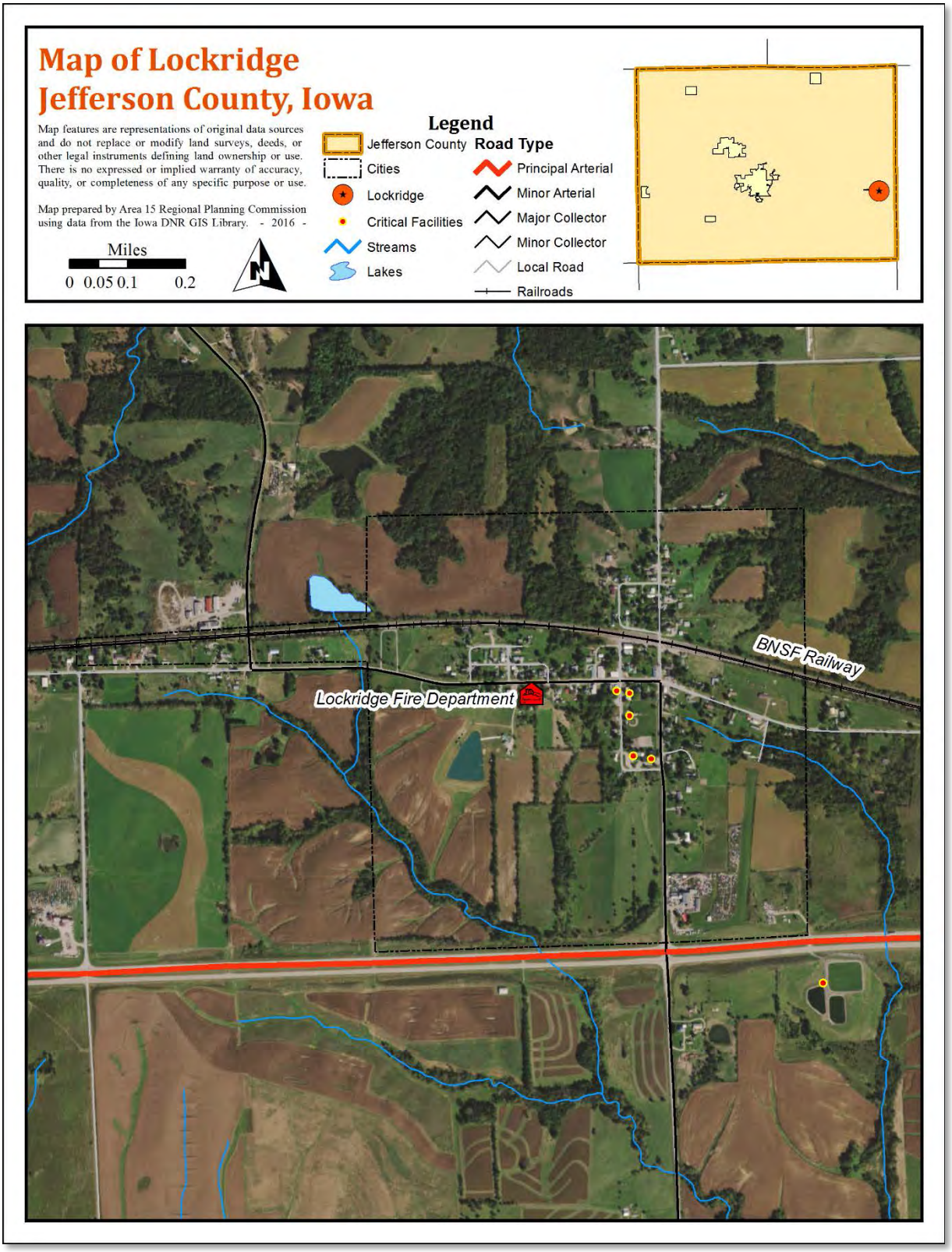
City of Lockridge



Lockridge at a Glance

Demographics		Workforce	
Total Population	268	Total Labor Force	141
Median Age	39.0	Employed	137 (97.2%)
65 Years and Over	27 (10.1%)	Time Travel to Work	26.0 min.

Household/Income		Property Valuations	
Median Household Income	$31,250	Residential	$6,006,900
Per Capita Income	$17,380	Commercial	$712,552
Average Household Size	2.50	Industrial/Agricultural	$280,300

Housing		Regulatory Information	
Total Housing Units	123	Flood Insurance Rate Map	No
Occupied Housing Units	107	NFIP Participant	No
Housing Units removed/demolished since 2000	0	Comprehensive Plan	No
Building Permits	No	Zoning/Land Use Ordinance	No
New Building Permits Since 2000	0	Subdivision Ordinance	No

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	Alliant Energy
Water	City of Fairfield
Sewage Treatment	City of Lockridge
Telephone	Windstream
Internet	Windstream, NaTel, Lisco
Ambulance	Jefferson County Health Center
Fire Protection	Lockridge Fire & Rescue
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
107 (+2)	10 (-2)	3 (+2)	7 (0)

Sources: U.S. Census Bureau (2010), City of Lockridge (2014), Jefferson County Assessor (2016)

Planning Process

The Lockridge planning team held two meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **October 7, 2014:** Lockridge Hazard Risk Assessment
- **February 3, 2015:** Lockridge Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the October 7, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Lockridge, including historical records of events and damages. Participants were reminded of the critical facilities located in Lockridge, identified in the map on Page 134. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Lockridge, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Lockridge. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Lockridge. That list appears in Table 7.9.

Lockridge may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Lockridge, it will be examined at that time or when the plan is updated.

Table 7.9. Lockridge Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	Tornado/Windstorm	4	4	4	1	3.70	High
2	Thunderstorm/Lightning/Hail	4	3	3	2	3.35	High
3	Severe Winter Storm	4	2	3	3	3.15	High
4	Flash Flood	3	2	4	1	2.65	Moderate
5	Grass/Wildland Fire	3	2	3	2	2.60	Moderate
6	Extreme Heat	3	2	1	2	2.30	Moderate
7	Expansive Soil	3	1	1	1	1.90	Low
8	Drought	2	1	1	4	1.75	Low
9	River Flood	1	2	1	3	1.50	Low
10	Sinkhole	1	1	4	1	1.45	Low
10	Landslide	1	1	4	1	1.45	Low
10	Dam/Levee Failure	1	1	4	1	1.45	Low
10	Earthquake	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Lockridge to evaluate current mitigation efforts underway:

- Lockridge Municipal Codebook of Ordinances, 2011

Mitigation Strategy

The Lockridge Planning Team met on February 3, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.

The 2010 Plan included the following mitigation actions:

- Purchase and install backup generators.
- Provide training for local officials on how to respond to a disaster.
- Purchase emergency response equipment to encourage more efficient response and minimize property damage, injuries, and fatalities.
- Develop a plan to identify all designated shelters so that the public knows where to go when there is a disaster and supply equipment to run the shelters.
- Encourage the use of NOAA weather radios.

The City has made progress on several of these tasks. Local officials work with the fire department to provide training opportunities and there is an ongoing effort to maintain equipment that is adequate to perform the basic functions of the fire department. City officials and firefighters do encourage the use of NOAA weather radios, but have not had any funding recently to be able to provide radios to locals who don't have but want one.

The Senior Citizen's Center serves as a central meeting space with basic services. Churches in town may be able to provide shelter, as well. Most citizens in town have an idea of where to go or whom to call if they need assistance, but no formal identification/shelter designation has taken place. None of the community facilities have a back-up power generator.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- Lockridge readopted its City Code in 2011. This code includes provisions for the building construction and maintenance, nuisance abatement, and requirements for mobile and manufactured homes.
- Lockridge is working on plans to demolish a derelict structure (part of the old elementary school) using the Iowa DNR's Derelict Structures Grant Program.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.10. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

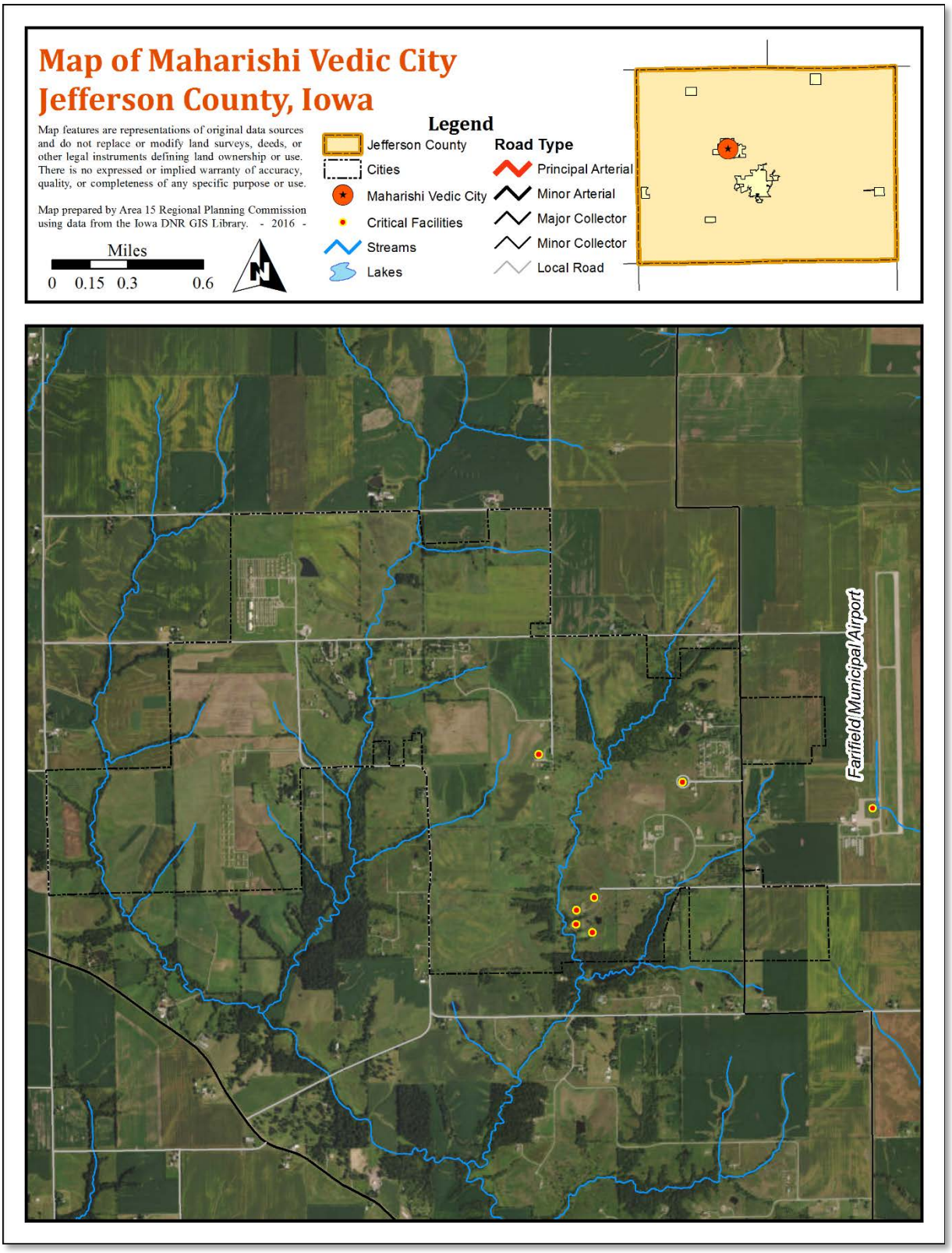
Table 7.10. Lockridge Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	**3**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution

City of Maharishi Vedic City



Maharishi Vedic City at a Glance

Demographics		Workforce	
Total Population	259	Total Labor Force	286
Median Age	57.8	Employed	286 (100.0%)
65 Years and Over	12 (10.8%)	Time Travel to Work	7.5 min.

Household/Income		Property Valuations	
Median Household Income	$51,250	Residential	$20,003,600
Per Capita Income	$15,264	Commercial	$3,096,700
Average Household Size	1.74	Industrial/Agricultural	$2,456,000

Housing		Regulatory Information	
Total Housing Units	174	Flood Insurance Rate Map	No
Occupied Housing Units	142	NFIP Participant	No
Housing Units removed/demolished since 2000	0	Comprehensive Plan	2012
Building Permits	No	Zoning/Land Use Ordinance	2016
New Building Permits Since 2000	0	Subdivision Ordinance	2015

Service	Provider(s)
Electric	Alliant Energy, Access Energy
Natural Gas	None
Water	Wapello Rural Water Association
Sewage Treatment	City of Maharishi Vedic City
Telephone	Windstream, Lisco, NaTel
Internet	Windstream, Lisco, NaTel
Ambulance	Midwest Ambulance, Jefferson County Health Center
Fire Protection	Fairfield Fire Department
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
100 (+17)	6 (0)	0 (0)	13 (+6)

Sources: U.S. Census Bureau (2010), City of Maharishi Vedic City (2014), Jefferson County Assessor (2016)

Planning Process

The Maharishi Vedic City planning team held two meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **November 21, 2014:** Maharishi Vedic City Hazard Risk Assessment
- **October 7, 2016:** Maharishi Vedic City Mitigation Strategy

Maharishi Vedic City
Invincible America Campus
Vedic Scholar Campus
Brahmasthan
1
2
3
4
5
6
7
8
9
10

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the November 21, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Maharishi Vedic City, including historical records of events and damages. Participants helped to identify the critical facilities located in Maharishi Vedic City, shown in the map on Page 140. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Maharishi Vedic City, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Maharishi Vedic City. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Maharishi Vedic City. That list appears in Table 7.11.

Maharishi Vedic City may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Maharishi Vedic City, it will be examined at that time or when the plan is updated.

Table 7.11. Maharishi Vedic City Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	**Tornado/Windstorm**	4	4	4	1	3.70	High
2	**Severe Winter Storm**	4	2	3	3	3.15	High
3	**Thunderstorm/Lightning/Hail**	4	2	3	2	3.05	High
4	**Flash Flood**	3	2	4	1	2.65	Moderate
5	**Dam/Levee Failure**	2	2	4	3	2.40	Moderate
6	**Extreme Heat**	3	2	1	2	2.30	Moderate
7	**Grass/Wildland Fire**	2	2	3	2	2.15	Low
8	**Expansive Soil**	3	1	1	1	1.90	Low
9	**River Flood**	2	2	1	2	1.85	Low
9	**Drought**	2	1	1	4	1.75	Low
11	**Sinkhole**	1	1	4	1	1.45	Low
11	**Landslide**	1	1	4	1	1.45	Low
11	**Earthquake**	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Maharishi Vedic City to evaluate current mitigation efforts underway:

- Maharishi Vedic City Municipal Codebook of Ordinances, 2013
- Maharishi Vedic City Urban Renewal Plan, 2013
- Maharishi Vedic City Design and Use Ordinance, 2016
- Maharishi Vedic City Conceptual Master Plan, 2001

As this plan was under development, Maharishi Vedic City was also in the process of revising its City Code. Chapter 21 of the Code states that all improvements in the City shall be designed and constructed according to the principle of Maharishi Sthapatya Veda® design [architecture according to Natural Law]. The updated City Code includes provisions for police and fire protection, waste water and stormwater systems, and establishes itself as an entirely certified organic community.

The Design and Use Ordinance further explains the strict elements and conditions to which new construction is to adhere. Consistency with the City's Master Plan (see Page 136) is essential for all development and City Council approval is required prior to any construction in Maharishi Vedic City. The City plans to develop primarily in and around the ten "mandalas" identified in its master plan. All land in the City is to be managed in accord with the principles of the USDA's National Organic Program (NOP). As such, many uses are not permitted within the city, including: confined animal feeding operations, junk/scrap yards, quarries, landfills, and any other business which may produce substantial amounts of gas, smoke, odor or noise.

Buildings, in general, are restricted to a height not to exceed 150 feet above the Fairfield Airport's base elevation of 797 feet. All utilities are to be constructed below ground, the use of renewable energy sources is encouraged, and development in general is to be constructed in a manner which promotes pedestrian accessibility.

Mitigation Strategy

The Maharishi Vedic City planning team met on October 7, 2016, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan was the first multi-jurisdictional hazard mitigation plan Maharishi Vedic City was able to participate in after incorporation; therefore, no mitigation actions were identified before that plan was completed.

The 2010 Plan included the following mitigation actions:

- Construct tornado safe rooms.
- Upgrade or replace inadequate warning sirens.
- Perform ditching and culvert repairs.
- Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.
- Encourage the use of NOAA weather radios.

The City has completed few of these tasks. The community has designated shelter locations in each Mandela, but no tornado safe rooms have been constructed. There are no warning sirens within the city limits, but expressed interest in the installation of a warning siren for the community. Planning participants did indicate that a siren on the west side of Fairfield often can be heard, but the direction of the wind plays a big part in how well. Ditching and culvert repairs are conducted as maintenance is required. City officials have opportunities to engage in emergency response training through the County.

Aside from the above, the planning team identified a number of other mitigation actions that have been carried out since the adoption of the 2010 plan:

- The City Code has been updated and the City has adopted an official Design and Use Ordinance which puts strict building design and construction guidelines into place.
- The adopted Design and Use Ordinance also limits the construction of above-ground utilities which greatly reduces the risk of power failure in the community during severe weather events.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.12. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

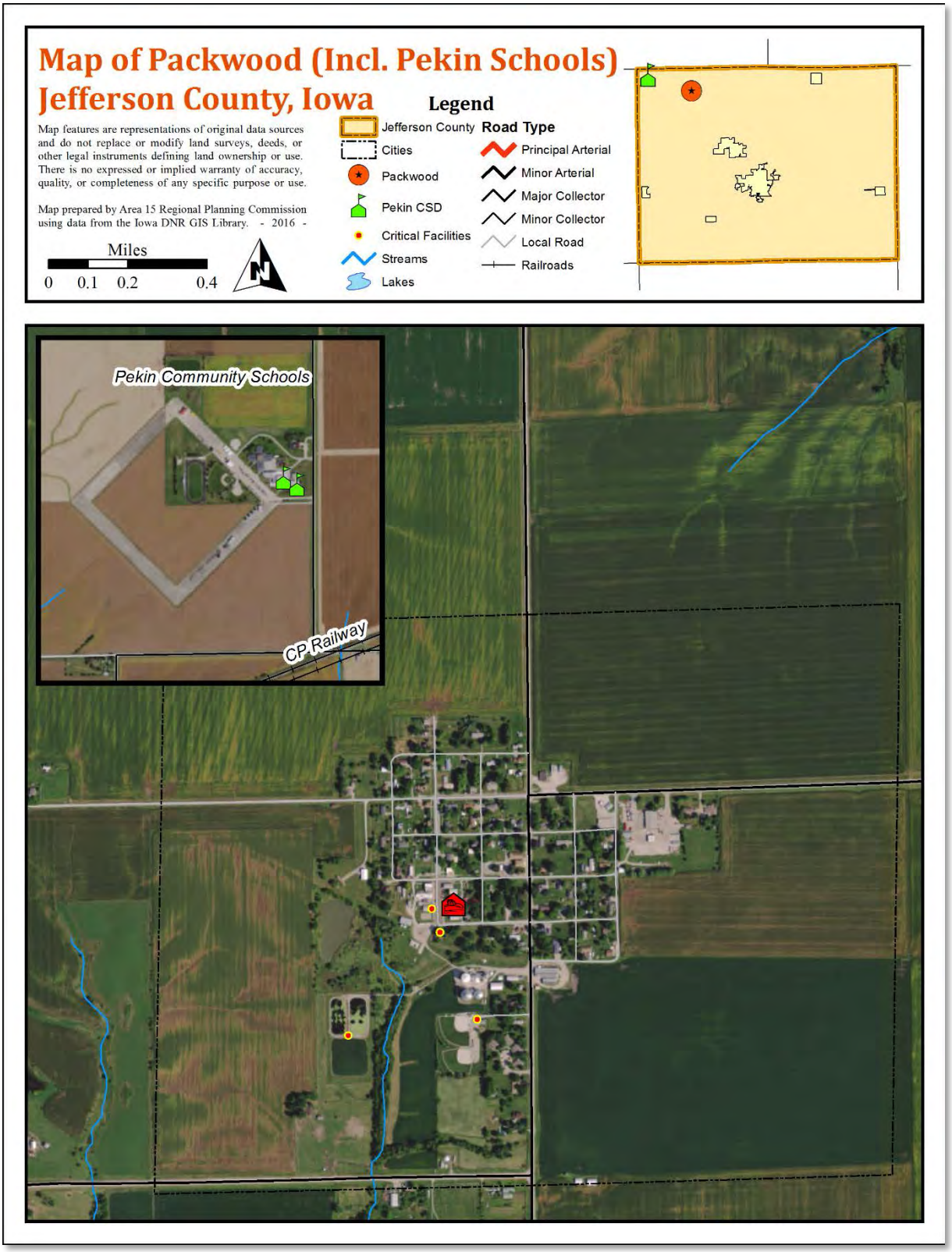
Table 7.12. Maharishi Vedic City Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution

City of Packwood (Incl. Pekin Schools)



Packwood at a Glance

Demographics		Workforce	
Total Population	204	Total Labor Force	146
Median Age	41.5	Employed	142 (97.3%)
65 Years and Over	33 (16.2%)	Time Travel to Work	19.9 min.

Household/Income		Property Valuations	
Median Household Income	$33,333	Residential	$5,275,700
Per Capita Income	$20,295	Commercial	$784,600
Average Household Size	2.40	Industrial/Agricultural	$1,004,300

Housing		Regulatory Information	
Total Housing Units	96	Flood Insurance Rate Map	No
Occupied Housing Units	85	NFIP Participant	No
Housing Units removed/demolished since 2000	0	Comprehensive Plan	No
Building Permits	No	Zoning/Land Use Ordinance	No
New Building Permits Since 2000	0	Subdivision Ordinance	No

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	None
Water	Wapello Rural Water Association
Sewage Treatment	City of Packwood
Telephone	Windstream
Internet	Windstream, Lisco
Ambulance	Jefferson County Health Center, Midwest Ambulance
Fire Protection	Polk Packwood Volunteer Fire Dept.
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
77 (-2)	12 (-4)	0 (0)	5 (-1)

Sources: U.S. Census Bureau (2010), City of Packwood (2014), Jefferson County Assessor (2016)

Planning Process

The Packwood planning team held three meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **October 14, 2014:** Packwood Hazard Risk Assessment
- **February 10, 2015:** Packwood Mitigation Strategy
- **October 7, 2016:** Pekin Schools Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the October 14, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Packwood, including historical records of events and damages. Participants were reminded of the critical facilities located in Packwood, identified in the map on Page 148. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Packwood, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Packwood. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Packwood. That list appears in Table 7.13.

Packwood may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Packwood, it will be examined at that time or when the plan is updated.

Table 7.13. Packwood Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	**Tornado/Windstorm**	4	4	4	1	3.70	High
2	**Severe Winter Storm**	4	2	3	3	3.15	High
3	**Thunderstorm/Lightning/Hail**	4	2	3	2	3.05	High
4	**Flash Flood**	3	2	4	1	2.65	Moderate
5	**Grass/Wildland Fire**	3	2	3	2	2.60	Moderate
6	**Extreme Heat**	3	2	1	2	2.30	Moderate
7	**River Flood**	2	2	1	3	1.95	Low
7	**Expansive Soil**	3	1	1	1	1.90	Low
9	**Drought**	2	1	1	4	1.75	Low
10	**Sinkhole**	1	1	4	1	1.45	Low
11	**Landslide**	1	1	4	1	1.45	Low
11	**Dam/Levee Failure**	1	1	4	1	1.45	Low
11	**Earthquake**	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Packwood to evaluate current mitigation efforts underway:

- Packwood Municipal Codebook of Ordinances, 2008 (and 2016 update)
- Pekin Community School District Crisis Plan, 2006

As this plan was under development, Batavia was also in the process of revising its City Code. The updated City Code requires building permits for new structures and that all new buildings must be affixed to a permanent foundation. It established additional regulations for the erection and maintenance of mobile/manufactured homes. Provisions for nuisances, junk cars and salvage lots, animal control, and fire protection are also outlined in the Code.

Mitigation Strategy

The Packwood Planning Team met on February 10, 2014, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.
- Mutual aid agreements have been developed and maintained for emergencies involving a large number of people or when local resources have been exhausted.
- A local emergency response plan has been considered but not pursued.

The 2010 Plan included the following mitigation actions:

- Construct tornado safe rooms.
- Purchase and install backup generators.
- Perform ditching and culvert repairs.
- Purchase emergency response equipment to encourage more efficient response and minimize property damage, injuries, and fatalities.
- Provide training for local elected officials on how to respond to a disaster.
- Encourage the use of NOAA weather radios.

The City has made progress on several of these tasks. The City does perform ditching and culvert repairs as necessary, but it does not have a formal maintenance plan for stormwater drainage infrastructure. Local officials work with the fire department to provide training opportunities and there is an ongoing effort to maintain equipment that is adequate to perform the basic functions of the fire department. City officials and firefighters do encourage the use of NOAA weather radios, but have not had any funding recently to be able to provide radios to locals who don't have but want one.

The fire station serves as a central meeting space and community center with basic services (full kitchen and restrooms); however, it is not stormproof and does not have a back-up power generator.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.14. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.14. Packwood Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-03	Identify and repair decaying water, storm water, and/or sewer infrastructure.	11	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
ES-05	Increase the size of fire departments.	1, 2, 3, 4, 5, 13	**3**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution – City of Packwood

Pekin Community School District

On July 1, 1959, Pekin Community School came into existence. In October 1958, Ollie, Farson, Packwood and Martinsburg had voted to consolidate and form a new district. The four schools merged into the district but classes were not held at Pekin until 1961 when the high school building was completed on the site of an auxiliary landing field for the Ottumwa Naval Air Base that was used during World War II. Richland joined the district in 1962. From 1962 till 1970 kindergarten through 8th grade was housed at the elementary building in each town in the district. In 1970 Packwood School was designated as a junior high. Kindergarten through 5th grade was held in each elementary school. In 1975 Ollie was designated to be a kindergarten through 2nd grade and Richland to house grades 3 through 5. In 1976 a bond issue was approved for a new elementary-junior high building. The building was completed and used for the first time in 1978.[58]

The Pekin Community School District planning team met via teleconference on October 7, 2016, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

No mitigation actions were identified in the 2010 plan.

Future Mitigation Actions

The Pekin Schools' priority list of future mitigation actions appears in Table 7.15. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the district may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

[58] Jefferson County IAGenWeb

Table 7.15. Pekin Schools Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PEA-02	Make educational materials available to the public to improve community awareness. Expand outreach using available technologies (i.e. social media).	All	**5**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
ES-04	Provide training for first responders, medical services, fire fighters, emergency management, law enforcement, local elected officials, and volunteers on how to respond to disasters.	All	**3**
SP-05	Upgrade aging or obsolete communication systems.	All	**2**
ES-06	Purchase and maintain emergency response equipment for firefighters and first responders.	All	**2**
ES-07	Designate and identify shelter locations. Provide signage so that the public knows where to go when there is a disaster. Identify and procure necessary supplies and equipment to run the shelter.	1, 2, 3, 5, 7, 8, 10, 13	**1**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution – Pekin Community School District

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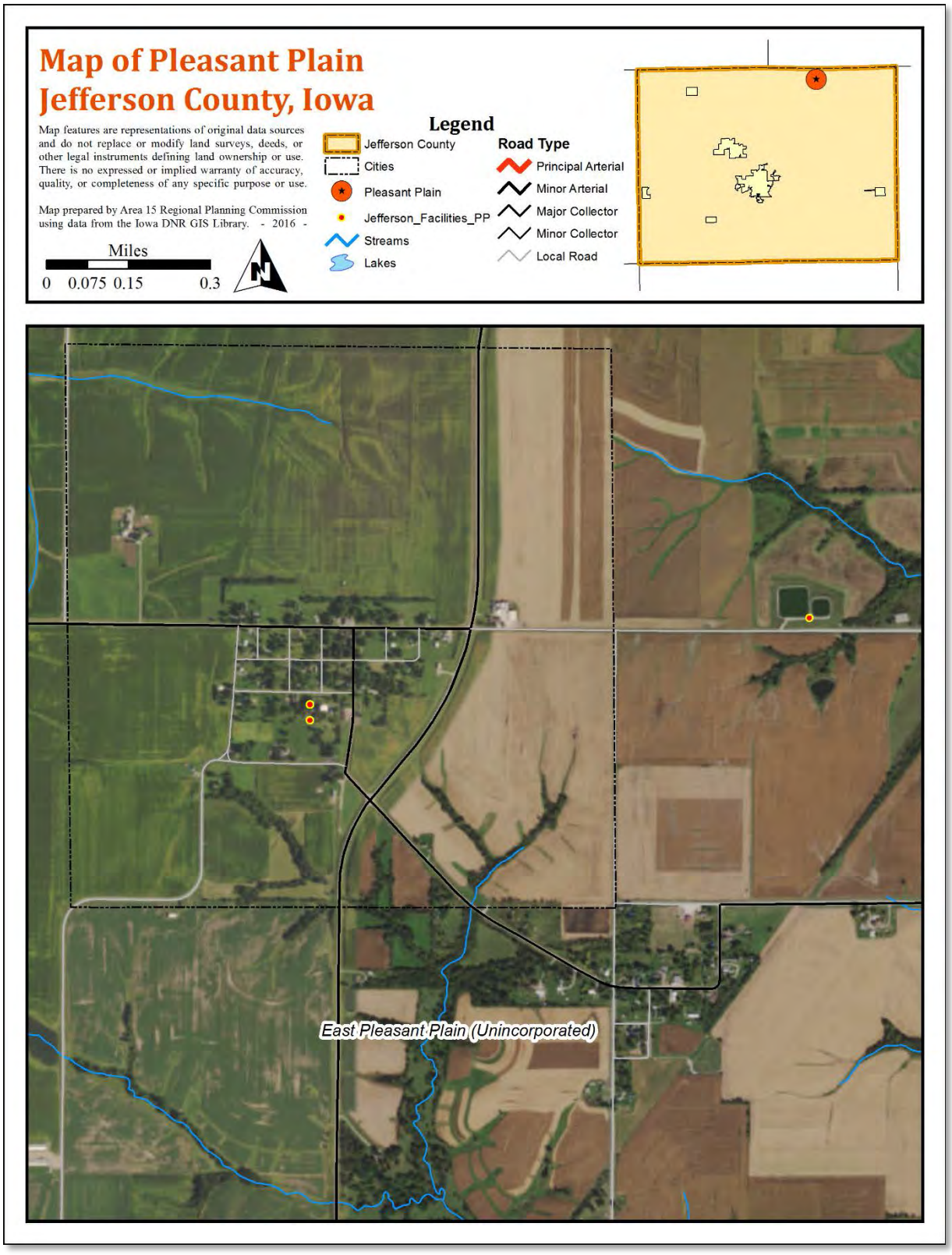
City of Pleasant Plain



Pleasant Plain at a Glance

Demographics		Workforce	
Total Population	93	Total Labor Force	28
Median Age	45.5	Employed	27 (96.4%)
65 Years and Over	17 (18.3%)	Time Travel to Work	35.2 min.

Household/Income		Property Valuations	
Median Household Income	$33,333	Residential	$2,169,100
Per Capita Income	$20,295	Commercial	$0
Average Household Size	2.27	Industrial/Agricultural	$1,232,200

Housing		Regulatory Informations	
Total Housing Units	47	Flood Insurance Rate Map	No
Occupied Housing Units	41	NFIP Participant	No
Housing Units removed/demolished since 2000	0	Comprehensive Plan	No
Building Permits	No	Zoning/Land Use Ordinance	No
New Building Permits Since 2000	0	Subdivision Ordinance	No

Service	Provider(s)
Electric	Alliant Energy
Natural Gas	None
Water	Wapello Rural Water Association
Sewage Treatment	Regional Utility Service Systems (RUSS)
Telephone	Windstream
Internet	Windstream
Ambulance	Jefferson County Community Hospital
Fire Protection	Brighton Rural Fire Department
Police/Law Enforcement	Jefferson County Sheriff

Structures (+/- since 2008)			
Residential	Commercial	Industrial	Public
41 (-6)	0 (-1)	0 (0)	2 (+1)

Source: U.S. Census Bureau (2010), City of Pleasant Plain (2014), Jefferson County Assessor (2016)

Planning Process

The Pleasant Plain planning team held two meetings throughout the planning process to collect and share information with the general public. Meeting public notices were published in the Fairfield Ledger, a local newspaper with countywide circulation. Each specific occasion for public participation in the development of this plan is listed below:

- **November 17, 2014:** Pleasant Plain Hazard Risk Assessment
- **January 19 2015:** Pleasant Plain Mitigation Strategy

Hazard Risk Assessment

The Jefferson County Hazard Mitigation planning team determined the countywide hazard rankings. At the November 17, 2014, meeting, the countywide hazard ranking was presented to the City. The City was also provided with information and statistics relevant to hazards affecting Pleasant Plain, including historical records of events and damages. Participants were reminded of the critical facilities located in Pleasant Plain, identified in the map on Page 158. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Pleasant Plain, and if not, how the city's situation differs from that of the county.

Based on this discussion, relevant hazards were determined for Pleasant Plain. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the city. After the discussion among the group, the list of hazards was re-prioritized for this portion of the plan based on the hazards that threaten Pleasant Plain. That list appears in Table 7.16.

Pleasant Plain may be susceptible to other hazards, but those hazards are not considered to be high-risk and were not examined in detail. However, if circumstances change and it is determined that a hazard does pose a risk to Pleasant Plain, it will be examined at that time or when the plan is updated.

Table 7.16. Pleasant Plain Hazard Risk Assessment

Rank	Hazard	Probability	Magnitude	Warning Time	Duration	Score	Risk
1	Tornado/Windstorm	4	4	4	1	3.70	High
2	Severe Winter Storm	4	2	3	3	3.15	High
3	Thunderstorm/Lightning/Hail	4	2	3	2	3.05	High
4	Flash Flood	3	2	4	1	2.65	Moderate
5	Grass/Wildland Fire	3	2	3	2	2.60	Moderate
6	Extreme Heat	3	2	1	2	2.30	Moderate
7	River Flood	2	2	1	3	1.95	Low
8	Expansive Soil	3	1	1	1	1.90	Low
9	Drought	2	2	1	4	1.75	Low
10	Sinkhole	1	1	4	1	1.45	Low
10	Landslide	1	1	4	1	1.45	Low
10	Dam/Levee Failure	1	1	4	1	1.45	Low
10	Earthquake	1	1	4	1	1.45	Low

Review of Existing Plans

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following local documents were identified and reviewed by the City of Pleasant Plain to evaluate current mitigation efforts underway:

- Pleasant Plain Municipal Codebook of Ordinances, 1992

Mitigation Strategy

The Pleasant Plain planning team met on January 19, 2015, to review the mitigation actions identified in the 2010 plan, the mitigation actions carried out since its adoption, and potential mitigation actions to be undertaken in the future.

Previous Mitigation Actions

The 2010 Plan identified the following mitigation actions that were previously completed:

- The NOAA weather radio transmitter on the Fairfield tower north of the City of Fairfield was raised by the National Weather Service.
- A technician level hazardous material response team covers Jefferson County (Southeast Iowa Response Group).
- A comprehensive countywide Emergency Operations Plan was developed and written.
- Mutual aid agreements have been developed and maintained for emergencies involving a large number of people or when local resources have been exhausted.
- Local emergency response and comprehensive plans have been considered but not pursued.

The 2010 Plan included the following mitigation actions:

- Construct tornado safe rooms.
- Purchase and install backup generators.
- Upgrade or replace inadequate warning sirens.
- Perform ditching and culvert repairs.
- Encourage the use of NOAA weather radios.

The City has made progress on a couple of these tasks. The City does perform ditching and culvert repairs as necessary, but it does not have a formal maintenance plan for stormwater drainage infrastructure. City officials do encourage the use of NOAA weather radios, but have not had any funding recently to be able to provide radios to locals who don't have but want one.

Pleasant Plain does not have a warning siren. Participants said that they can normally hear the siren in Brighton, but they certainly feel that the community would be better served with a siren of its own in town. The community center is not a tornado-safe structure and does not have a back-up generator, but it is a place where people may be able to go if they need heat/air conditioning temporarily if it goes out in their home.

Future Mitigation Actions

The City's priority list of future mitigation actions appears in Table 7.17. The priority of the projects was determined through the STAPLEE scores from Pages 95-97. The process of implementing these actions is outlined in Section 6 starting on Page 99. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects is dynamic and is largely dependent on the time, place, imminent need, feasibility, and opportunity. Therefore, the community may wish to employ an action from the complete list of mitigation actions identified for Jefferson County located on Pages 90-93.

Table 7.17. Pleasant Plain Future Mitigation Actions

Mitigation Action		Applicable Hazards*	STAPLEE
#	Description		
PP-02	Purchase and install backup generators for critical facilities and designated shelters.	1, 2, 3, 10	**3**
PP-03	Construct tornado safe rooms.	1, 2, 3, 10	**3**
PEA-04	Purchase, distribute, and encourage the use of NOAA weather radios	All	**3**
SP-02	Culvert and ditching work to improve storm drainage.	1, 3, 5, 7	**3**
SP-04	Purchase and install warning siren systems for communities that have none. Upgrade warning sirens that are outdated, ineffective, and/or inadequate.	1, 3	**3**

**See Table on Page 94 for Hazard Numbers*

Plan Adoption Resolution

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Section 8 - Appendices

Appendix A – 44 CFR § 201.6 – Local Mitigation Plans

Appendix B – Glossary

Appendix C – FEMA Preparedness List

Appendix D – Disaster Declarations in Iowa: 1990-2016

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Appendix A – 44 CFR § 201.6 – Local Mitigation Plans

Retrieved from the Electronic Code of Federal Regulations on: 01 October 2016.

Available online at: *https://www.fema.gov/hazard-mitigation-planning-laws-regulations-policies*

The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

(a) Plan requirements.

(1) A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. The Administrator may, at his discretion, require a local mitigation plan for the Repetitive Flood Claims Program. A local government must have a mitigation plan approved pursuant to this section in order to apply for and receive mitigation project grants under all other mitigation grant programs.

(2) Plans prepared for the FMA program, described at part 79 of this chapter, need only address these requirements as they relate to flood hazards in order to be eligible for FMA project grants. However, these plans must be clearly identified as being flood mitigation plans, and they will not meet the eligibility criteria for other mitigation grant programs, unless flooding is the only natural hazard the jurisdiction faces.

(3) Regional Administrator's may grant an exception to the plan requirement in extraordinary circumstances, such as in a small and impoverished community, when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of grant's termination will not be reimbursed by FEMA.

(4) Multi-jurisdictional plans (*e.g.* watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan. State-wide plans will not be accepted as multi-jurisdictional plans.

(b) Planning process.

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

(c) Plan content.

The plan shall include the following:

(1) Documentation of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

(2) A *risk assessment* that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:

(i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

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

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate;

(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

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

(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

(ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

(4) A *plan maintenance process* that includes:

(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

(ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

(iii) Discussion on how the community will continue public participation in the plan maintenance process.

(5) *Documentation* that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

(d) Plan review.

(1) Plans must be submitted to the State Hazard Mitigation Officer (SHMO) for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval. Where the State point of contact for the FMA program is different from the SHMO, the SHMO will be responsible for coordinating the local plan reviews between the FMA point of contact and FEMA.

(2) The Regional review will be completed within 45 days after receipt from the State, whenever possible.

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

(4) Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c) will be delegated approval authority for local mitigation plans, and the review will be based on the criteria in this part. Managing States will review the plans within 45 days of receipt of the plans, whenever possible, and provide a copy of the approved plans to the Regional Office.

[67 FR 8848, Feb. 26, 2002, as amended at 67 FR 61515, Oct. 1, 2002; 68 FR 61370, Oct. 28, 2003; 69 FR 55096, Sept. 13, 2004; 72 FR 61748, Oct. 31, 2007 ; 74 FR 47482, Sept. 16, 2009]

Appendix B – Glossary

100-Year Floodplain – An area in which the chance of a flood occurring in a given year is 1% independent of any other year. Statistically, the probability of occurrence is once every 100 years.

500-Year Floodplain – An area in which the chance of a flood occurring in a given year is 0.2% independent of any other year. Statistically the probability of occurrence is once every 500 years.

Acceptable Risk Hazards – Hazards that have been determined by the planning team to be low priority for mitigation strategies to the point no actions or steps are worth currently taking.

Agricultural Drought – A drought which refers to soil moisture deficiencies.

Aquifer – An underground layer of porous rock or soils such as sand or gravel from which water can be drawn.

BFE – Base Flood Elevation. Shown on the FIRM, it is the elevation of the water surface resulting from a 100-year flood.

Demographics – Statistical data about a population including population count, age, race, income, housing status, etc.; information is typically found in the U.S. Census Bureau.

Enhanced Fujita Scale – Alphanumeric system with values from EF0 to EF5 that rates the magnitude of a tornado based on wind speed and damage sustained. An EF0 indicates minimal damage such as broken tree limbs or signs, while and EF5 indicates catastrophic damage.

EOP – Emergency Operations Plan.

Essential Facility – Elements that are important to ensure a full recovery of a community, county, or state following a hazard event. These would include: government buildings, utility providers, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.

Flood Hazard Area – The area shown to be inundated by a flood of a given magnitude on a map; the land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA) on a FIRM. The SFHA is the area where the NFIP floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

FIRM – Flood Insurance Rate Map.

FIS – Flood Insurance Study.

Floodplain – An area along a stream or river where flooding is a natural occurrence. Floodplains can change over time based on changing conditions upstream such as urban development, dam or levee constructions, and other human actions.

Funnel Cloud – A rapidly rotating funnel-shaped cloud extending downward from the base of a cumulonimbus cloud, which, if it touches the surface of the earth, is a tornado or waterspout.

Gradient Winds – horizontal wind velocity tangent to the contour line of a constant pressure surface at or above 2,500 feet.

HazMat – Short-hand for Hazardous Materials.

Heat Index – A number in degrees Fahrenheit that tells how hot it really feels when relative humidity is factored into the actual air temperature.

High-risk Hazards – hazards that are determined by the Planning Team to pose the most risk to the community and are of highest priority for developing mitigation strategies and activities.

Horizontal Peak Gravity Acceleration – A measure of how hard the earth shakes during a seismic event.

Hydrological Drought – A drought which refers to declining surface water and groundwater supplies.

Infrastructure – Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology (i.e. phone lines, cellular communication towers), vital services (i.e. water and sewer treatment facilities), and includes an area's transportation system (i.e. airports, highways, trails, bridges, railways, dams).

IDNR – Iowa Department of Natural Resources.

Land Uses – Classifications of how land is used in a given space including farmland, forests, water bodies, or urban areas; also a system of classifications used in zoning ordinances.

Low-risk Hazards – Hazards that are determined by the Planning Team to pose a low risk to the community and are of low priority for developing mitigation strategies or activities.

Magnitude – Size; extent.

Median – Statistical convention of indicating that half of the data is higher and half of the data is lower than this number; though it can be, the median does not necessarily equal the average.

Meteorlogic Drought – Drought which refers to precipitation deficiency.

Mine Subsidence –Collapsed or caved-in mines leading to depressions or sinkholes on the surface.

Mitigation – Any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event. Mitigation, also known as prevention, encourages long-term reduction of hazard vulnerability. The goal of mitigation is to be proactive in decreasing the need for response to a disaster rather than simply increasing the response capabilities.

NFIP – National Flood Insurance Program; A federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.

NCDC – National Climactic Data Center.

NWS - National Weather Service.

Probability – Likelihood of the hazard event, sometimes without regard to hazard history.

Repetitive Loss Property – A property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978.

Seismic Zone – A designated area where earthquakes and other seismic activity may take place.

Severity of Impact – Assessment of the severity in terms of fatalities, injuries, property losses, and economic losses.

Socioeconomic – Pertaining to the interaction between economic and social conditions.

Speed of Onset – Potential amount of warning time available before the hazard occurs.

Subsidence – Sinking or lowering to a different level; also known as a sinkhole.

Tectonic – Pertaining to the structure of the earth.

Topography – Detailed description of a specific place including the shape and elevation of land.

Tributary – A creek or stream that feeds into a larger creek or stream or a river.

USDA – United States Department of Agriculture.

Vulnerability – measure of the percentage of people and property that would be affected by the hazard event.

Watch vs. Warning – The NWS uses a *watch* to indicate that conditions are right for a given storm to develop while *warning* indicates that an event is occurring in the area.

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Appendix C – FEMA Preparedness List

FEMA has a number of resources online to help individuals and families prepare for potential disasters. This list provides a summary of the necessary precautionary measures necessary to be explored prior to a hazard—such as family communication plans, emergency contact numbers, and items to include in a home or vehicle supplies kit. The following items are recommended for inclusion in your kit:

- Three-day supply of water (one gallon of water per person, per day)
- Three-day supply of non-perishable food
- First aid kit and manual
- Flashlight and extra batteries
- Matches and waterproof container
- Paper and pencils
- Portable, battery-powered radio or television and extra batteries
- Sanitation and hygiene items (i.e. wet wipes, toilet paper, trash bags)
- Whistle
- Rain gear
- Tools (i.e. knife, wrench, duct tape)
- Kitchen accessories and cooking utensils (i.e. can opener)
- Photocopies of identification cards, and other important family documents (i.e. insurance)
- Cash and coins
- Special needs items (i.e. prescription medications, eye glasses, items for babies/infants)

In potentially cold climates like Jefferson County, you must think about warmth. It is possible that you will not have power or heat. Think about your clothing and bedding supplies. Be sure to include one complete change of clothing and shoes per person, including:

- Jacket or coat
- Long pants
- Long sleeve shirt
- Sturdy shoes
- Hat, mittens, and scarf
- Sleeping bag or warm blanket (one per person)

The following are things to consider when putting together your food supplies:

- Avoid foods that will make you thirsty.
- Stock canned foods, dry mixes, and other staples that do not require refrigeration, cooking, water, or special preparation.
- Remember special dietary needs

For more detailed and updated information on planning and preparing for a disaster, refer to the FEMA website: **http://www.ready.gov/**

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Appendix D – Disaster Declarations in Iowa: 1990-2016

Number	Date Declared	Description
4281	09/29/2016	Severe Storms, Straight-line Winds, & Flooding
4234	07/31/2015	Severe Storms, Tornadoes, Straight-line Winds & Flooding
4187	08/05/2014	Severe Storms, Tornadoes, Straight-line Winds & Flooding
4184	07/24/2014	Severe Storms, Tornadoes, Straight-line Winds & Flooding
4181	07/14/2014	Severe Storms, Tornadoes, Straight-line Winds & Flooding
4135	07/31/2013	Severe Storms, Tornadoes, & Flooding
4126	07/02/2013	Severe Storms, Tornadoes, & Flooding
4119	05/31/2013	Severe Storms, Straight-line Winds, & Flooding
4114	05/06/2013	Severe Winter Storm
4018	08/30/2011	Severe Storms and Flooding
4016	08/24/2011	Severe Storms, Straight-Line Winds, & Flooding
1998	06/27/2011	Flooding
1977	05/05/2011	Severe Storms, Tornadoes, & Straight-line Winds
1930	07/29/2010	Severe Storms, Flooding, & Tornadoes
1928	07/27/2010	Severe Storms & Flooding
1880	03/02/2010	Severe Winter Storms
1877	02/25/2010	Severe Winter Storms & Snowstorm
1854	08/13/2009	Severe Storm
1763	05/27/2008	Severe Storms, Tornadoes, & Flooding
1737	01/04/2008	Severe Winter Storm
1727	09/14/2007	Severe Storms & Flooding
1705	05/25/2007	Severe Storms, Flooding, & Tornadoes
1688	03/14/2007	Severe Winter Storms
1518	05/25/2004	Severe Storms, Tornadoes, & Flooding
1420	06/19/2002	Severe Storms & Flooding
1367	05/02/2001	Severe Storms & Flooding
1282	07/22/1999	Severe Storms & Flooding
1277	05/21/1999	Severe Storms, Flooding, & Tornadoes
1230	07/02/1998	Severe Weather, Tornadoes, & Flooding
1191	11/20/1997	Severe Snow Storms
1133	08/21/1996	Flooding
1121	06/24/1996	Flooding
996	07/09/1993	Flooding, Severe Storm
986	04/26/1993	Flooding, Severe Storm
965	10/02/1992	Flooding, Severe Storm
928	12/26/1991	Ice Storm
911	07/12/1991	Flooding, Severe Storm
879	09/06/1990	Flooding, Severe Storm
868	05/26/1990	Flooding Severe Storm

Source: https://www.fema.gov/disasters

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Appendix E – Planning Meeting Participation

This section is reserved for the agendas, presentations, minutes, and sign-in sheets that were prepared for each planning meeting. Below is a list of all those who participated in at least one planning meeting in the process of this plan's development.

Jennifer Anderson
Tom Atwood
Rodgers Badgett
Aaron Becker
Karen Blakely
Thomas Booton
Steven Boss
Kent Boyum
Jane Brewer
Harold Brewer
Gladys Burnham
Melanie Carlson
Joe Carr
Margaret Cary
Ray Chambers
Renota Chambers
Virgil Chandler
Justin Clements
Scott Cline
Christine Copeland
Paul Corbin
Vickie Corbin
Shirley Creek
Darlene Davidson
Wes Davis
Dave Dickey
Lee Dimmit
Jaylene Doud
Larry Doud
Judy Dovico
Harold Downing
Tom Drish
James Dunbar
Marci Dunlap
LaVerne Dunn
Jolyne Dyke
Randy Eakins
Rita Eastman
Andrew Edlin
Jeff Eeling
Saundra Ersmminga
Chris Estle
Carrie Fleig
Bob Glass
Bill Goldstein
Gerrod Goodrich
Diane Goudy
Lisa Greenig
Morten Gregg
Matt Guise
Michael Halley
Tony Hammes
Mike Harmon
Nicole Hester-Williams
Ilia Honkanen
Judy Hoover Warning
Dave Horras
Cherrie Horras
G. Howard
K. Howard
Jeff Johannes
Rebecca Johnson
Toni Johnson
Matt Jones
Jodi Kerr
Paul Kessel
Wayne King
Jeri Kunkle
Joyce Le Duc
Jessica Ledger-Kalen
Rustin Lippencott
Jeremy Loving
Greg Lowenberg
Kent Lox
Karen Major
Randy Major
Patricia Martin
Madeline Martinez
Ken McCarth
Charleen McGinnis
Judy McNiel
Randy Melcher
Jean Mercer
Joy Messer
Rich Metcalf
John Meyer
Jeremy Miller
Paul Miller
Paul Minicucci
Mike Mitchell
Fred Moelwer
John Morrissey
Nancy Morrissey
Jerry Nelson
Bev Nelson
Rodney Nelson
Danny Nelson
Randy Nitschke
Laurie Noll
Dan Nystrom
Kristy Nystrom
David Owen
Keith Parcell
Wyverne Pence
Kathy Petersen
Adam Plagge
Jake Pohren
Kay Pohren
Richard Pohren
Jim Pratt
Michael Renker
Connie Richardson
Richard Richardson
Diane Rosenberg
Keeli Rubey
Jennifer Sanders
Kristen Septer
Kimberly Sheets
Lindsay Shipler
Joanne Shipley
Thomas Shipley
Roberta Sloat
Darien Sloat
Curtis Smith
Marlys Smith
Rick Smithburg
David Speas
David Sterling
Joe Stever
Brian Stone
Laura Taglauer
Travis Tedrow
Annie Tedrow
Betty Templeton
David Thomas
Kate Van Pelt
Joan VanBlaricome
Scott Vaughan
Jim Warner
Nancy Watkins
Lori Weaton
Derik Wolfekuhle
Staci Worley
Maureen Wynne
Robert Wynne
Lynda Yochum

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Appendix F – Image Credits

Unless otherwise indicated below, all photographs, maps, or other graphics were created by Area 15 Regional Planning Staff.

- *Figure 4.1: KCRG-TV9 – Cedar Rapids, IA*
- *Figure 4.2: National Drought Mitigation Center Photo Gallery*
- *Figure 4.3: National Drought Mitigation Center*
- *Figure 4.5: FEMA Media Library*
- *Figure 4.6: U.S. Geological Survey*
- *Figure 4.17: FEMA Media Library*

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Appendix G –Local Plan Data & Information

This section is reserved for the survey responses and insurance documents that were collected. This information will not be included in the public document, but will be added to each jurisdiction's binder for their records.

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Appendix H –Information for Future Plan Updates

This section is reserved for any documentation of damages from hazard events, of discussions relating to mitigation, or the completion of mitigation actions. This will be useful in providing data and good information on reporting on the maintenance of this plan for the next update.

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